

# SUMMIT ON ENERGY

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## HEARING BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE ONE HUNDRED TENTH CONGRESS SECOND SESSION

TO

CONSIDER HOW WE ACHIEVE A MORE SECURE, RELIABLE, SUSTAIN-  
ABLE AND AFFORDABLE ENERGY FUTURE FOR THE AMERICAN PEOP-  
PLE.

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SEPTEMBER 12, 2008



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## SUMMIT ON ENERGY

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FRIDAY, SEPTEMBER 12, 2008

U.S. SENATE,  
COMMITTEE ON ENERGY AND NATURAL RESOURCES,  
*Washington, DC.*

The committee met, pursuant to notice, at 9:35 a.m. in room SDG-50, Dirksen Senate Office Building, Hon. Harry Reid presiding.

### OPENING STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM NEVADA

Senator REID. There are many who deserve credit and thanks for organizing this summit. I appreciate the work that Senator McConnell has done. He and I have done our best to put together a fair group of witnesses.

Of course Senators Bingaman and Domenici who are so unique, both coming from the same State, being chair and ranking member of that committee off and on over the last several years, appreciate their good work. Of course, I again extend my appreciation to those who are here from government. There are academics here, people from industry.

Especially I want to thank Senator Conrad whose idea this was, lead organizer of this summit, suggesting this was something we should do. So he's pushed relentlessly to have this done. Of course, we've all watched with interest the work that's he's done on a strictly bipartisan basis coming up with some energy legislation that we'll see in the next few days.

I think we've seen two diverging trends in this energy debate. One I think is very encouraging and one perhaps, not so. On the one side, as the fall campaigns heat up, we've seen energy move into a more partisan realm with candidates looking to score points with sound bites that really solve nothing.

But on the other side, we're seeing increasing consensus. When all political dust settles our energy challenges can't fall into political partisan bickering. We've got to understand that it's, the issue, is bigger than any one of us, any one political party.

I think an encouraging trend toward bipartisanship is some things that's happened the last few days. We've seen the gang of ten, which has continued to work on their product. They recognize, and we all recognize, their work is certainly not perfect. Compromise never is.

But we've seen also, for example, yesterday, Senators Baucus and Grassley come up with what they think is a way to move forward on this. We've seen the month's long work of two Senators,

Cantwell and Ensign. Democrat and Republican working to move forward on what they believe is an answer to a significant problem we have in the energy world.

So these are all good signs. In Nevada this last August, on the 19th, I had the final day of a 2-day summit on energy. It was a national summit. It was really worked out so well.

We had coming together, industry, labors, sportsmen, environmentalists, Democrats and Republicans. To come with a serious purpose to find a solution to some of the problems we have with energy. It was unique that I was sharing the stage with T. Boone Pickens.

He wanted to make his presentation on a blackboard. The President of the University said when he requested that, they don't use blackboards anymore. So he had to go to the girl's volleyball department.

The only one they could find in the University. Boone did a great job as a teacher up there telling us what he thinks should be done. What he thinks should be done is a direction that a lot of us believe is the right direction.

He and Al Gore have gotten together, recognizing that the security of our Nation is extremely important. One of the answers to a more secure Nation is not being dependent on 70 percent of our oil being imported from foreign sources. So today's summit is the latest step in this bipartisan trend.

But I have to say that this bipartisan trend has been a hallmark of Bingaman/Domenici's work on the Energy Committee for a long, long time. So we're going to hear today from noted academic leaders, America's high tech giants and oil company executives. With energy legislation, we hope, moving to the floor next week as Senator McConnell and I think it will. This is a rare opportunity to put our ideas directly into action.

But the legislation of this work period is just one of many steps we must take. It is important. I think we all agree that a problem as big as this requires comprehensive solutions. I wish we had a magic formula that we could mix up and solve all of our problems.

I wish we could have a silver bullet to solve our problems. I think the only silver bullet we have is to decrease our consumption of fossil fuels. There are a number of ways we can do that, conserve energy, of course. We can do this painlessly in a number of ways by improving efficiency of our buildings, our household appliances.

We also need to move to renewable energy which is so important. We all recognize that. We also need to demand a better fuel efficiency from our automobiles.

Most people in this room probably never saw a Model T. But some of us have. A hundred years ago when the Model T was introduced, this little vehicle averaged 13 to 21 miles a gallon.

Since then we've invented television, taken to the skies, landed on the moon, put a man on the moon. But most of our cars and trucks in 2008 average 13 to 21 miles a gallon, just like the Model T. So we can do better. We have to do better.

One part of the solution is the advanced technology vehicle manufacturing incentives program that a number of people are talking about. So I want to do everything I can to see if we can secure funding to implement this important program as soon as possible,

hopefully this year. We also, of course, need to bring down prices for the oil we use in many different ways. We have to go after speculators, price gougers and oil producing nations who game or cheat the system and leave American consumers paying the bill.

Finally, I think we can all agree that we need to view this not as a crisis. It's hard to put that out of our calculation, but as an opportunity. An opportunity to see if America can move back into the world of being the most efficient automobile manufacturer in the world, automobiles made here in America.

That solar panels and wind turbines will power the planet in the years to come can be built by American workers, that the transition from fossil fuels of old to renewable fuels of tomorrow can create jobs, protect our national security and cleanse our environment.

Already State and local governments are joining with the private sector. These entrepreneurs who have made our country so successful see the light. That there is money to be made in this world that we have created where people who are willing to invest not only can make money, but make a better world.

So thank you all for being a part of this program. I think it's long time past for the Federal Government to take a lead to help clean our country and move to a clean revolution in every city and town across our country. The American people demand that we do something differently. They're demanding bold, new ideas and creative solutions. I'm confident the day's panel will help move meaningfully to that end and move away from what we have now which is status quo.

On behalf of Senator McConnell, we have some business on the floor. We're in session today. We created it so there will be no votes, but there is work that we have to do. So if you would be good enough to excuse us after we complete our statements, Senator Bingaman and Domenici. We would appreciate it.

Senator McConnell.

[The prepared statement of Senator Snowe follows:]

PREPARED STATEMENT OF HON. OLYMPIA J. SNOWE, U.S. SENATOR FROM MAINE

I want to thank Chairman Bingaman, Ranking Member Domenici, as well as the Majority and Minority Leaders for holding this timely summit on how we achieve a more secure, reliable, sustainable and affordable energy future for the American people. I also want to thank our broad collection of experts for their time and their insight into how our country can reestablish a coherent energy policy that will both enhance our nation's security and ultimately provide Americans with clean and economical energy.

I am encouraged by the development of this summit, and I hope that we can build upon this event to forge a resolution to a crisis that is afflicting every American. In June of this year, Senator Ben Nelson and I wrote to Senate leadership, and later to the President, calling for an energy summit that would bring together the President, the Bicameral Leadership of Congress, and key stakeholders to move beyond this energy paralysis that is costing Americans every single day at the pump and invoking fear as winter approaches.

Specifically we stated that, "The partisan stalemate on energy issues must end and we believe it will require good-faith efforts from both ends of Pennsylvania Avenue. Accordingly, we urge you to convene a national energy summit with the President with the goal of developing a consensus on sensible proposals that can address the crisis facing all of our constituents."

I continue to believe it is essential that such a national summit be convened, to truly develop consensus legislation that can be passed, implemented, and produce tangible results for the American people. I hope that today's summit is the beginning of more serious discussion of the most pressing issue facing the American people.

Americans will not accept anything less than an energy revolution, a sentiment that is leaps and bounds beyond the half measures that Congress has proposed. Clearly, we must expand our vision beyond a patchwork energy policy and boldly lead the United States to a future in which America's energy is no longer controlled by unstable suppliers and rogue nations.

On Wednesday, September 10, 2008, this stark reality was illustrated once again when the OPEC Cartel announced that the petroleum market was oversupplied and that overall production will be reduced by 520,000 barrels per day. As the New York Times reported, "the cartel's members appeared deeply split, with one camp, led by Iran and Venezuela, advocating reductions in output to stem further price declines, and another, led by Saudi Arabia, wishing to allow prices to fall further."

The reverberations of this decision, made in part by America's enemies, are profound and chilling. According to Michael Stoddard of Environment Northeast, the price of heating oil will translate into a shift of \$11 billion from the Northeast to foreign countries, and collectively America will transfer an estimated \$700 billion to foreign countries. For individual families, the consequence of a nonexistent energy policy is that they are paying roughly \$3,500 just to stay warm during the winter.

At the same time, the opportunity to reestablish our energy policy is firmly in our own hands. Sheikh Zaki Yamini, a Saudi Arabian oil minister of the 1970s and the architect of the 1973 oil crisis, recently offered an interesting prediction on the future of oil: "The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil." The point is, when less expensive and cleaner energy alternatives are viable, oil will be displaced irrespective of the level of world supply. If we are to hasten the arrival of that day—as costs, as well as environmental and national security concerns dictate we must—it is imperative that our federal government provide the incentives and assistance to encourage entrepreneurs to lead the way to a new energy paradigm that ends the oil age.

The foundational shift in our energy markets highlights the anemic federal effort to adopt the next generation of energy technology and policies. We are not only in the midst of an energy crisis but also a crisis of confidence in our governmental institutions—both Congress and the Administration—to actually do something about it. The manifestations of our current energy policy, or lack thereof, are discernible in some of the greatest issues facing America. The critical issues of climate change, the trade imbalance, an inflexible foreign policy in the Middle East—are all directly related to our energy policy, and with increasing clarity we are witnessing the consequences of petroleum dependency. Concurrently, clean energy production has undergone rapid technological advances in the past decade, and its costs have dropped appreciably.

Clearly, it is illogical to produce additional energy when that energy is wasted through inefficiency. It is imperative that we promote energy efficiencies that enhance the use of existing resources. As Dan Reicher has stated before the Senate Finance Committee, "energy efficiency is our cheapest, cleanest, and fastest energy option." Accordingly, I believe a long-term energy plan should encourage energy efficiency with the same level of commitment as we have invested in the production of clean energy.

That is why I long have championed energy efficiency tax credits as a Member of the Senate Finance Committee and worked to ensure that the 2005 Energy Bill included landmark tax credits for energy efficient buildings. One tax credit, that provides a \$2,000 credit for the construction of new, energy-efficient homes, already has saved our country 51 gigawatt hours of electricity since it was created in 2005. I also fought for revolutionary tax incentives for commercial buildings and retrofitting existing homes that were enacted into law. Current practices saddle future generations with the costs of inefficient buildings, and given our current circumstances, it is unacceptable that we continue to construct porous buildings that waste expensive energy purchased offshore.

Yet, Congress already has allowed one of my provisions that assists homeowners in improving the efficiency of their homes to expire at the beginning of this year. This is the antithesis of the energy policy that our nation must employ to address rising energy costs. For example, a taxpayer could use a \$300 tax credit, included in the tax extenders package, to purchase a high efficiency oil furnace, which would save over \$180 annually according to calculations based on Department of Energy data and recent home heating prices. This tax credit is essential to save home heating oil and reduce our reliance on foreign oil. Other energy efficiency tax incentives, such as the commercial buildings deduction, expire at the end of this year and, incredibly, the future of these credits is in limbo because of Congressional inaction.

At a time when we must be investing in energy efficiency, it is incomprehensible that these tax credits have not been extended. Our failure to provide an extension

for these incentives works directly against their very purpose. We must come together to find a way to provide long-term extensions of these provisions to instill the confidence necessary for consumers to know that if they make the right investment, that they will have a tax incentive to reward them for the energy efficiencies that they gain through retrofitting their home, or building more efficient new homes and commercial buildings.

Furthermore, it is beyond my comprehension that Congress has failed to extend renewable production tax credit [PTC]—a key catalyst for moving our country to self sufficiency through increased use of wind, wave, biomass, and geothermal power—which is set to expire December 31st. As a Member of the Finance Committee, I long have been a champion of this critical incentive and on December 14th, 2006, I sent a letter with 41 of my Senate colleagues to the President requesting that we extend the renewable energy PTC, at least through the end of 2013.

Specifically, the letter stated, “The PTC is a vital component in financing new renewable energy projects. As you know, it is crucial to our national security that we expand and strengthen investment in renewable energy resources. The continued development of energy also will spur significant economic development opportunities, stabilize prices by diversifying the electric generation supply, and help reduce greenhouse gas emissions.”

At a time when job losses are crippling a struggling economy, a long-term extension of this tax credit could create 100,000 jobs, yet we have failed to promote a palpable opportunity to energize our economy and reduce our reliance on foreign oil. So we are not only forfeiting the opportunity to promote energy independence, but also the collateral job creation that accompanies greater clean energy investment exactly at a time when our economy requires a tangible boost.

Just imagine where we might be if we had approved these extensions last January! As a result of Congress’ failure to approve these common sense provisions, a potential bright spot in our economy, our renewable energy industry, is faced with uncertainty: Will Congress act or not? This point was reiterated before the Finance Committee last February, when Dr. Dan Arvizo, of the National Renewable Energy Laboratory stated, in reference to the PTC, that, “While I can only imagine the challenges that confront those who deliberate and adopt a federal budget, anything we can do to move beyond a year-to-year approach, and chart a long term course for renewable energy policy, will provide us with lasting benefits.” I believe we should have at least a ten year extension of this critical tax extender. If we want to set our country on an irreversible track to self-sufficiency and demonstrate to the world that we are committed to clean energy, we should make this vital production tax credit permanent. An assurance of this magnitude provides a strong signal to investors that they can count on these credits as they decide whether to develop renewable energy and thereby maximize our ability to accelerate a clean, self-sufficient energy policy. Similarly, a long range commitment to renewable energy makes clear to oil producing nations—and to Americans burdened with enormous energy costs—that the United States is on a steady course to energy independence, not one interrupted by politically driven decisions every year or two.

We know what America can achieve when our innovative spirit is unleashed. We must seize on the entrepreneurial spirit that has spurred our economy in the past. Just consider what we have accomplished—the microchip, the Internet, and the microwave are all American innovations that altered our lifestyle—this type of vision will bring about the energy revolution that the American people are seeking from Washington.

At a recent speech in Atlanta, author Tom Friedman urged America to retake the lead in the world through innovation in “ET”—Energy Technology. Friedman said the United States needs to “invent a source of abundant, cheap, clean, reliable electrons.” He compared the “ET” movement to the “IT” (Information Technology) movement of the last decade.

To that end, I strongly believe that we should develop innovation grants for the thousands of entrepreneurs who are developing the next energy concept that will revolutionize our energy policies. The Advanced Research Projects Agency—Energy, which was authorized in the 2005 Energy Policy Act, has not been funded by Congress—and it should be. This is a basic step forward in expanding federal research, but we also should use this model to allow private industry and private citizens the incentives and opportunities to also develop America’s next innovative idea.

Finally, there are additional steps that I believe our country must take in the short-term. As we approach a winter under an unprecedented pricing structure for home heating oil, it is unacceptable that the federal government would store refined heating oil in tanks in the North East Home Heating Oil Reserve Program. I have introduced legislation with Senator Dodd and Chairman Kerry that would release this heating oil if prices remain over \$4 per gallon. The releases would occur in a

staggered process throughout the winter and invest the monies from the sale of this heating oil in weatherization. At a time when we know that the prices will force individuals to use cooking stoves, space heaters, and kerosene cans that can lead to fires as well as produce toxic fumes, we must take every step to reduce prices by releasing these supplies to the open market and use the revenue to invest in weatherization.

In addition, I am appalled that the National Highway Traffic Safety Administration's (NHTSA) draft Environmental Impact Statement (EIS) used an assumption of \$2.26 per gallon of gasoline in 2016 to justify their proposed reduced fuel economy standards. This is the type of nonsensical response that regrettably demonstrates the appallingly low level of seriousness with which this issue is approached in too many circles in our government. We must accept the reality of the energy crisis and plan accordingly. Every American would tell NHTSA that a \$2.26 per gallon estimate is, at best, exceedingly optimistic, if not, more accurately, absurd.

Our country has lost years by not forging a comprehensive energy policy, so we must redouble our efforts to make up for lost time. We have foolishly forfeited years of American innovation because Congress has failed to craft the policies that inspire and encourage a nation of entrepreneurs. It is my sincere hope that we can build on today's energy summit to bring about the change in energy policy that the American people demand.

I thank you all for being here today and I look forward to reviewing the testimony of the witnesses.

**STATEMENT OF HON. MITCH MCCONNELL, U.S. SENATOR  
FROM KENTUCKY**

Senator MCCONNELL. Thank you, Senator Reid. It's great to be here. I want to also thank Senator Bingaman and Senator Domenici for their leadership and all of those, of our colleagues who are around the table, who expressed extraordinary interest in this.

I do want to say, with regard to Senator Domenici. As we all know he is wrapping up 36 years of extraordinary service in the Senate. He has been our energy expert on our side for a long time.

I know it must be gratifying to him, even though he will not be here next year, that the subject that he has devoted such an extraordinary percentage of his public service to is the No. 1 issue in America. We hate it that you won't be here next year, Senator Domenici because you have been a wonderful leader on the subject of energy over the years. So much of what you've suggested we ought to do. We should have done a lot earlier.

Over the past several months Congress has been engaged in this important debate. Americans are rightly frustrated over the high cost of gas at the pump and the high cost of energy in general. The \$4 a gallon gasoline was the tipping point of galvanizing consumers across the country and sparking Congress to refocus its energy on a problem that has been with us for decades.

The seriousness of the problem and the need to do something about it soon was brought home to me in an especially vivid way during my time at home in Kentucky over the August break. In dozens of public events I spoke to commuters, farmers and owners of small and large businesses whose lives have been disrupted, in some cases tragically so, by the high cost of gas. Kentucky is home to about 80,000 farms. I heard about the soaring cost of fertilizer which is made with natural gas, the cost of fueling farm equipment with diesel and even the rising cost of seeds, which are often trucked into farms from long distance.

I heard about the soaring cost from UPS which is Kentucky's largest employer and the owner of one of the Nation's largest air fleets. A recent article in one of the national papers noted that UPS

drivers have been told by management not to take left hand turns. It saves gas by cutting down on idling time. The article was meant to be funny. But I assure you the employees in Louisville are not laughing.

Nor are the residents in rural Kentucky who are among the hardest hit consumers in the Nation as a result of high gas prices. With lower than average incomes and few mass transit options, most of these folks are now spending a giant chunk of their paychecks each week on fuel. The average resident of Owsley County in Eastern Kentucky, for example is now spending more than 15 percent of his or her income on fuel, the fourth highest average of any county in the Nation.

But perhaps the most distressing story I've heard about is the consequences of high fuel prices from the operators of the dialysis center in Elizabethtown who told me some of their patients are cutting down on life sustaining treatments. Because it's just too expensive for them to drive back and forth from their homes four times a week. These people are desperate for help.

Republicans, I assure you, are open to any reasonable suggestion that will lead to a concrete, meaningful result. It is with this in mind that Republicans have already coalesced around a simple and straight forward principle that we believe could and should form the basis for bipartisan legislation on this issue. We need to both find more American energy and use less.

We know that we can find more domestic energy by means of deep sea exploration off our coasts and by developing western oil shale deposits, which according to conservative estimates represent at least 800 billion barrels of recoverable oil. At the moment the vast majority of these enormous domestic resources are off limits to consumers as a result of Federal regulation. Republicans have repeatedly demonstrated our strong support for energy conservation measures. Most recently we demonstrated that commitment by supporting the first increase in Federal fuel economy standards for cars and trucks in decades.

But it must be said at the outset that conservation alone is clearly insufficient. While all of us may envision a future in which America does not run on fossil fuels, this is not today's reality. Nor will it be for many years to come. We need to be realistic and recognize that in the near term we will still need more oil and gas.

I believe that this oil and gas should come from America's own ample, domestic reserves, not from the Middle East. We cannot and should not ask people like rural Kentuckians to assume the burden of this transition when we have enormous energy reserves under our own feet. Reserves that the government has made increasingly difficult to tap.

Indeed few people seem to realize that as America's energy consumption has increased over the last three decades, we've actually been producing less and less of it at home. As a result of government regulation at every level, America's domestic oil production has dropped to roughly half of the ten million barrels per day that we produce right here at home three decades ago. This trend toward less domestic energy production may have made sense to some people at the time of cheap oil. It makes no sense at a time of \$4 a gallon gasoline. Most people realize that.

The American people are demanding that Congress do something to alleviate high gas prices and to do something significant. Some of the proposals we have heard certainly try to make that effort. But by and large, they fall seriously short. They either ignore the need for increased domestic supply or they're disproportionately meager in light of the severity of the crisis.

The primary drivers of the current oil shock, economic growth in China and India, are not going away. The American people realize this. That's why they're not likely to be satisfied with half measures from Congress.

In this case I'm convinced finding more means finding a lot more. We have the resources. Americans want us to use them. They are exactly right.

I look forward to hearing the proposals of today's witnesses. It is my hope that today's summit energizes the Senate and brings us even closer to delivering a concrete, meaningful solution to the people of Kentucky and to the rest of the American people as quickly as possible. Thank you.

**STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM  
NEW MEXICO**

The CHAIRMAN [presiding]. Alright, why don't we go ahead. Let me make a short statement and then call on Senator Domenici to make any statement he would like. Then we'll go ahead with witnesses and follow that with questions.

Let me start by thanking Senator Reid and Senator McConnell for asking our Energy and Natural Resources Committee to organize this event. Senator Domenici and his staff have worked with me and my staff to gather energy policy experts and high level executives of energy related industries to talk about all facets of the energy challenges that confront the Nation. I know Senator Reid referred to the National Clean Energy Summit that he hosted in August. A great many excellent policy recommendations came out of that summit.

The purpose of today's energy summit is to foster additional bipartisan dialog here in the Senate on how we can achieve a more secure, reliable, sustainable and affordable energy future for the country. Obviously this is a very challenging goal. To put this in some context, in June, the Energy Committee had hearings on a comprehensive and provocative report that was put out by the International Energy Agency. It detailed a mix of technologies ranging from carbon capture and storage to concentrating solar power that need to be developed and deployed in order to meet our energy needs and reduce greenhouse gases.

Transforming our economy from one based on fossil fuels to one based on clean energy will not happen overnight. It will require enormous investments; the range of \$40 to \$50 trillion was the estimate we heard.

Our goal is attainable if we encourage private sector investment in clean energy today, if we prioritize and sustain the support for energy technologies over the long term and if we ensure that those technologies that we do develop are in fact, manufactured and deployed here in this country. So we have a great many challenges

to talk about today. I appreciate all the witnesses being here to help us understand these challenges.

Let me call on Senator Domenici for any statement he would like to make.

**STATEMENT OF PETE V. DOMENICI, U.S. SENATOR FROM  
NEW MEXICO**

Senator DOMENICI. Mr. Chairman, I want to join you in thanking everybody that has come here this morning obviously willing to participate in this discussion and our two leaders for their direction. Obviously they've stated it for themselves. We can all heed it.

I, myself, would just like to put into perspective for a moment why we're here, why I think we're here. On May the first of this year I introduced a bill with 18 co-sponsors that essentially did a number of things, the biggest of which was to open the Continental Shelf of the United States to drilling and that is take off the statutorily imposed moratorium that has been existent for many years. So the first premise of that bill was to do that.

The second was to proceed with ANWR knowing full well that that was extremely controversial. Nonetheless, it was on the bill.

The bill also contained the proposition for converting coal to liquid.

It also contained a provision for removing a moratorium on regulations on the promulgation of regulations with reference to the oil shale in the State of Colorado and Utah.

About a month later the Minority Leader asked me if I would change that bill to a shrunken bill. I shrunk it down by taking out some of the controversial bills. Low and behold on our side of the aisle, we had a bill with 44 co-sponsors. But the primary focus of it was that we would try to use more American oil.

We're here today because that little stream turned into a bipartisan effort to open more of the off shore resources of America. We were astounded. I think, almost to a man or to woman, as Senators to find that within three or 4 months of the debate here in the U.S. Senate about opening the off shore that we owned, that the American people began to say, "Drill"

We were so frightened of the idea of drilling that we were using fancy words like exploration. We would say to ourselves, don't use drill. That's bad. Just make sure you use this fancy word, exploration.

It turned out the American people didn't care. They decided we should drill. Up came from the hinterlands of America, "Drill." Up came at the Republican Convention, "Drill, drill, drill." Now that's all we hear from our American people is that they want us to drill and to produce more of our own energy.

Now I'm not here telling you that that will solve America's problems at all. I'm merely telling you that's what brought us to this point. We are grateful that a bipartisan group of Senators, we know who the leaders were. They got together as a group of 10, I think, and took this cudgel and said we will try to put together a different bipartisan approach.

But it will have the opening of some of the Outer Continental Shelf, not all of it, some of it. We have proceeded from that point to today. You can apply your own logic as to what this group can

do or will do or will not do with reference to that status that I have just described.

That's about where we are. The group of 10 is out trying to put together Senators and have changed the format of the original bills which I did which were partisan and I think, admittedly so. We wrote them for Republicans. We even put ANWR in the original ones. We didn't go across the aisle.

But you all did. The gang of ten did. Now we are here, Senator Bingaman, not limited at all by the little historical sketch that I have given, but to hear what the experts tell us we ought to be doing to get ourselves out of one of the most significant crisis we have ever had.

I could have used my time otherwise. I could have tried to tell you what we have already accomplished. Because it does not do my heart any good to continue to hear, either direct or by implication, that we have done nothing because we have done much.

Under the leadership of Senator Bingaman for half the time, myself for half the time, the Energy Committee has produced an array of initiatives that are having and will have a dramatic, positive effect on the energy crisis of the United States. They're in a statement I have, but I will put the statement in.

[The prepared statement of Senator Domenici follows:]

PREPARED STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM  
NEW MEXICO

Senator Bingaman, as we discussed at yesterday's markup, this is my 36th and final year as a Senator. It has been my pleasure to serve a great deal of that time with you.

Over the years I have witnessed—and had the good fortune to play a role in—many accomplishments here in the Senate. I have had an opportunity to work with colleagues of all ideological stripes. I have now served six full terms during seven presidential administrations. I have worked with, and on behalf of, the great people of New Mexico. And it has truly been a privilege.

My years as Chairman and Ranking Member of the Budget Committee were particularly rewarding. After decades of deficits, with a Congress held by one party and a President from the other, we came together to do something big for the American people by passing the Balanced Budget Act.

We have made bipartisanship something of a habit on the Energy and Natural Resources Committee, as well. As a result, three major energy bills have been signed into law in the past three years. The full impact of these measures is far more significant than many people understand, or can feel, at this point.

We took important steps to modernize the electric sector. We opened areas to domestic production of oil and gas. We advanced clean energy technologies and jump-started alternative fuels. We raised vehicle mileage standards, and—something I take great pride in—we ushered in a brighter tomorrow by starting a nuclear renaissance in this country.

While bipartisanship played an essential role in all of these accomplishments, it is not the only factor that goes into making good policy. We also worked through a Committee process, with Members who know—from experience and expertise—what makes policies and programs effective.

I was here during the last energy crisis that our nation faced, in the 1970s, and too often I saw good intentions translate into bad policy. This happens when the desire to simply get something done prevails over the more advisable but more difficult path forward.

Today we face a new energy challenge, unparalleled in our nation's history and extending well beyond our borders. The fundamental question that must be answered is how we will meet our growing energy needs in a clean, affordable, and reliable way.

It is with deep regret that I declare that over the past year, Congress has failed to address this challenge. We have spent too much time debating policies that will do nothing to resolve the imbalance between the supply of oil and the demand for it. As prices soared past \$100 a barrel, to \$120, and then to nearly \$150—many in

Congress refused to rethink positions that were formulated years before under much different circumstances. As American consumers suffered at the pump, this Congress ground down into gridlock.

We have created vote structures that favor political cover and enable us to delay tough decisions. Popular policies have been muddied with poison pills like tax increases. And we have seen amendments on a single topic pitted against one another, knowing full well that if both were offered, both would fail and not done the work necessary to reconcile the differences between them.

For these reasons, I encourage my colleagues to not only listen to the witnesses before us today, but to start listening to each other as well. We will continue to discuss the dangers of importing our energy from overseas and the threats that greenhouse gases pose to the global climate. But if we continue to talk past each other, this situation will not go away—it will grow worse.

The following we know as fact: over the next 20 to 30 years, our country will require more oil. If we don't set out to improve conservation and increase energy production here at home, we will continue to rely on dangerous regions and pay even higher prices. We will weaken our economy and our national security.

The difficulties we face in our energy sector have indeed risen to the level of a crisis. And yet, the Senate will likely adjourn for four of the last five months of this year, having only managed to suspend the delivery of oil to the Strategic Petroleum Reserve.

As disappointed as I am in the current state of affairs, and as pessimistic as my remarks may seem, I believe that we have a great opportunity going forward. In the face of crisis, we have always found a will, and a way, to act. I believe we can still come together and develop a response on a scale that matches our problems.

It is with great sadness that I tell you, however, that I think it is too late to do so this year. This meeting should be a conference to hammer out the final details of a bill, not a summit to build consensus for a measure that has yet to be drafted. The spirit of bipartisanship that helped us balance the federal budget has not guided us this year.

The next Congress should learn from our mistake and seize this historic moment to come together, cast the tough votes, and make progress on these issues. Our conversation here today can help inform those efforts. I look forward to hearing from the witnesses and my fellow Senators.

Mr. Chairman, I think it was more fruitful for me to state the history. Because I think the history that got us here was one of saying produce more of our own at home. That isn't everybody's wish around this table.

But to put it into perspective, that is what started this momentum. I, for one know that the crisis is multi-faceted. The solutions are multi-faceted and tough to get to.

It won't be an easy achievement. But I do believe, permeating throughout that is the fact that the American people, have quite properly, seen that if you've got some of your own resources, you ought to seriously think about using them, U.S. Congress. I think that's what they're saying to us. Thank you very much.

The CHAIRMAN. Thank you very much. Let's turn to our witnesses now. We have a very distinguished panel of witnesses.

Let me introduce the entire panel and then call on each of them to speak for about 3 to 5 minutes and give us the main points that they think we ought to have in mind as we continue with this debate. Obviously the full statements of all witnesses will be included in the record. So if they could summarize their main points that would be appreciated.

On the panel is, let me start on the left of the panel. Frank Verrastro, Director of Energy and National Security Program at the Center for Strategic and International Studies.

Dan Yergin, Dan has, of course, been here many times. We appreciate him coming back. He is the Chair of the Cambridge Energy Research Associates, which we very much appreciate him being here.

Dan Reicher, who is also a regular witness here in the Congress, Director of Climate Change and Energy Initiatives at Google.org.

Next is Professor John Deutch, who is well known to all of us and a frequent testifier as well on many issues. He's a professor at MIT. We appreciate him being here.

Mr. Marvin Odum is the President of Shell Oil Company. He made a special effort to be here today. So we appreciate his presence as well.

Why don't we start with you, Frank? We'll go down the line. As I said, each of you take 3 to 5 minutes and tell us the main points you think we need to understand.

**STATEMENT OF FRANK VERRASTRO, DIRECTOR, ENERGY AND NATIONAL SECURITY PROGRAM, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES**

Mr. VERRASTRO. Thank you, Mr. Chairman, Senator Domenici, members of the committee and also members of the Senate. I very much appreciate the opportunity to be here this morning. I've worked on energy issues for about 30 years in both government and in the private sector.

There are ways that we can ensure a reliable, affordable, safe, secure and environmentally benign energy future. I commend the committee and also the group of 10, now the group of 16, for putting this session together to discuss a bipartisan way of approaching this issue.

Let me begin with an orientation on some of the basic facts. As the solutions and options we discuss this morning, they need to be put in the context of today's market reality. Those realities talk about higher prices, uneven and increasing demand, limited access capacity, heightened geo-political and investment risks and increased concern over climate change in the environment.

I would argue that to complicate matters further, as though we needed that, we are simultaneously facing these challenges against a back drop of a changing global landscape. It's one characterized by emerging new players with new agendas, new leverage, different business practices. We're doing it against the outmoded institutions which may not be up to the task. So we need to consider that as well.

We're looking at a series of new alignments in this new landscape. New alignments. New rules. So we need new policies.

The energy system we have today is truly global. It is immense. It's enormous. The projections are that will only grow larger as a function of population, GDP growth and increased standards of living going forward.

Today energy demand is projected to rise by over 50 percent between now and 2030. The bulk of that will be in the developing and emerging economies, not the OECD. The landscape is changing.

Some 85 percent of our energy demand globally is met with fossil fuels. While oil accounts for the majority of fuel use in the OECD, coal is the king in the non-OECD, where fossil fuels make up over 90 percent of total energy consumption. So overlaying a carbon constraint on an 85 percent fossil fuel dependent world is an enormous task.

Reducing that figure to 75 percent is a huge lift. Eliminating those fuels any time soon, I would argue, is impossible. As we currently have nothing to replace them at scale. At scale.

So as previously stated, it's a huge challenge. But it's also a unique opportunity for the United States to lead in this role. Having said that, given both the forecast for new demand growth and the present trends for investment, access and climate considerations, and we refer to those as the above ground risks, it's not the molecules in the ground. The path around is clearly unsustainable. So we have to change.

The transformation is necessary. I would argue, in many ways, it's already underway. But that transformation is one that will take decades, not months or years and requires the thoughtful and careful balancing of economic security and environmental objectives. One that in the interim will require the continued use of conventional fuels and infrastructure as well as the development of new technologies, alternative fuels of all form, conservation and efficiency.

So we need to distinguish between the truly visionary and strategic and the tactical interim steps that will move us from the current system to a more sustainable future. We need to do this in a bipartisan fashion. So I commend the Senate for taking this hearing.

Let me make a final point. This is on the issue of energy independence. While I understand the political attraction of slogans in this election year and how well this resonates with the American public, energy independent should not be confused with enhancing energy security.

There are 190 odd nations around the world and none of them is energy independent. That's for good reason. One need only be reminded on our reliance on the global market to replace lost production in the aftermath of Hurricane Katrina. That was refined products, not crude oil.

Further, as national policy such independence is in many ways incompatible with our trade agreements, our treaty obligations and I would argue, our foreign policy objectives. We will undoubtedly remain engaged in the Middle East. We really don't want to see lower cost Middle East energy supplies to competitor nations around the world.

Having said that, U.S. energy security can and must be enhanced and we could do this in five steps, I would argue.

First, by improving efficiency across the board in transport as well as in the industrial, commercial and residential sectors by diversifying our fuel choices and fuel suppliers and this includes the sustaining of domestic production as been pointed out. We are the world's third largest oil producer. We really can't afford to lose that position or to let depletion and decline rates in the United States put us in a position of increasing our import dependence which is currently at about 56 percent.

We need to continue to drill. We need to do so selectively and in an environmentally sound manner. We also need to find a way to preserve the role of coal for it comprises 50 percent of our electricity. We need to look for more ways to promote domestic gas de-

velopment even as we pursue accelerated development of alternative fuels, including nuclear, biofuels and of course, renewables.

From a security perspective it's also worth noting that we have significant resources, non-conventional energy, especially in the Western hemisphere. This is oil sands and oil shale. But we need to work on minimizing their carbon footprints, if we actually think that this is to be realized.

Third, we need a renewed commitment to research and technology, development and deployment and to expanding and enhancing our infrastructure. This is a capability issue. It includes human skills as well. So it's education components.

Fourth, we need to find more creative and better ways to manage global geo-politics. I'll be happy to elaborate on that. If we are truly serious about pursuing climate goals, we need to set an economy wide price for carbon.

I have specific suggestions with respect to many of these issues. But I'll hold those in the interest of time for specific questions. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much. Dr. Yergin, go right ahead.

**STATEMENT OF DANIEL YERGIN, CHAIRMAN, CAMBRIDGE  
ENERGY RESEARCH ASSOCIATES, CAMBRIDGE, MA**

Mr. YERGIN. Thank you. It's an honor to be at this energy summit. I'd like to express my appreciation to the leaders, the chairman and the ranking member of the Energy Committee, to the committee itself and to the gang of 10/16 for shaping this summit and bringing us all together. With the summit it's certainly expressing the great concern about the need for a comprehensive approach. I'm pleased to be able to contribute to that discussion.

In order to prepare for this, yesterday I read a major article from Time magazine entitled, "The Energy Crisis: Time for Action." It detailed the many risks and threats from the current energy course and laid out ideas for the future and it even used the phrase, "impending disaster." Of course the article was from May 7, 1973, 5 months before the famous October 1973 embargo more than 35 years ago.

In other words as many of you know, as a Nation we have been at work at this for a long time. As Senator Domenici emphasized, and as this committee knows from its own hard work, actually much has been accomplished as a Nation. We're more than twice as energy efficient as we were when that article came out in 1973. Yet, also, as this dialog makes clear, there is much to be done to meet the needs of the American people in terms of energy.

So let me address two pieces. One is just to pick up from, really, where we were last July, just 2 months ago when it turns out we were at the break point. When we met oil prices were just about at their peak of \$147.27. Now it's just a little over \$100. What's happened?

I think we have to go to the credit crisis to understand that. That ever since the credit crisis began last, a year ago, July, there's been a big debate as to whether the rest of the world is de-coupled from the U.S. economy or not. That debate has gone back and forth. It's

been related to what's happened to the dollar. It's going down and it's now going up.

I think with the sharp price decline that we've seen over the last 2 months, prices are still high, but a decline. The oil market is really conveying the notion that in voting against the idea that Europe and Japan are de-coupled from the U.S. economic downturn. So instead what's happening in the market now is reflecting a weaker global economy and thus a weaker global oil demand. I think that's the heart of the change that we've seen.

We have entered, I think, that break point scenario. Prices at the level what they were in July and where they are now and the apprehensions and insecurities that go with them have set in a series of motion a process that's changing the scene. We see in terms of consumers are voting for more efficient cars. They're managing their transportation differently. Businesses are making different decisions and government policies are changing, notably reflected in the fuel efficiency standards, the first ones in 32 years.

We see break point in another way. Last year was probably the year of peak demand in terms of U.S. gasoline. That's going down. Overall oil demand in the United States is down 4 percent, over 4 percent this year compared to last year. So I think that's the market.

This focus of the summit is on energy policy. Let me try and just distill maybe, seems to me, lessons from 35 years of national experience going back to 1973. It leads me to talk about the need, which is reflected here in the word, bipartisan and the work of the committee and the gang of 10 and it's now 16, an ecumenical approach, a balanced integrated approach.

I think the first point and I think we're hearing it now, is avoiding either/or as you look at the energy debates in the United States of the last 35 years there's been an awful lot of either/or. But the truth is that we have a \$14 trillion economy that runs on 100 quadrillion BTUs of energy every year. That's a lot of energy. As we've heard there's not a single solution to it. There's no magic wand.

Renewables are crossing the divide, to use a term we use. They're becoming part of the energy mix. They're going to grow. They're going to become more extensive. But at the same time, as Frank has emphasized, oil and natural gas today are a little over 60 percent of our total energy consumption. That's not going to go away soon.

The second point is one that goes back to something that Senator Bingaman said, the importance of encouraging timely investment because that's really what gives us our energy future. We need timely investment across the entire energy spectrum. We're playing a game of catch up in the world economy in terms of investment. This requires efficient and timely decisionmaking whether we're talking the United States or in resource holding countries.

It also requires something else. It requires consistency. An on again/off again production tax credit is not a way to promote stable development of renewable energy. The PTC needs a longer term horizon.

Certainly in terms of investment there is also a greater recognition of the role of investment in developing off shore oil resources.

A quarter of our oil now comes from the off shore. A third of the entire world oil supply comes from off shore. It's part of the portfolio. Uncertainty is the enemy of investment and predictability is a vital ingredient.

A third point and it follows from what Frank said, is understanding the relationship of the United States in global energy markets. We have become more integrated. As Frank pointed out, we import about 56 percent of our oil. That's a lot of oil. We keep hearing 70 percent, but when we do our numbers we keep coming up with 56 percent, still a very big number.

But we are less influential in the global energy markets because our share has gone down because of growth elsewhere. This emphasizes the need for a cooperative multi-faceted approach to relations both with other consumers and producers in the interest of our energy security.

The final point I want to go to is expectations. Expectations is really, of course, what drives action. It drives policy. It's what brings us all together. It drives investment. It drives technological innovation.

The role of expectations hinges on what we think the future is going to be and what we need and what the urgency of it will be. I think a major contribution to a sounder energy future would be to create an environment that, based upon realistic assessments, that ensures a timely investment is really and convincingly and steadily on the way. The answer to today's energy problems and more importantly, the answer to tomorrow's energy problems is not either/or.

We need an ecumenical approach, a comprehensive, an integrated approach, a combination of new oil and gas supplies, renewables, alternatives, efficiency, much more emphasis on innovation, all developed with the appropriate environmental and climate considerations in mind. Such an approach would be a great contribution, not only to relieving what's obviously already been discussed this morning, relieving the pain and pressures that the American people are feeling at the pump and the difficulties that are faced by American businesses today whether large or small. It would also be a fundamental contribution to the future prosperity and security of our Nation and to the global economy of which we are so essentially part.

Thank you.

[The prepared statement of Mr. Yergin follows:]

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

It is an honor to appear at this Energy Summit. I would like to express my appreciation to the Chairman and Ranking Member and to the Committee for the opportunity to appear this morning. In convening this timely Summit, the Committee is expressing its great concern about the need for a comprehensive approach, and I am very pleased to be able to contribute to the discussion.

I prepared for this hearing by reading a major article from Time Magazine entitled "The Energy Crisis: Time for Action". It detailed the many threats and risks from the current energy course and laid out ideas for the future. It even used the strong words "impending disaster".

Of course, the article was from May 7, 1973—five months before the famous October 1973 embargo—and more than 35 years ago. In other words, as this Committee knows, as a nation we have been at this for a long time. And, as this Committee also knows from its own hard work, much has been accomplished. After all, as a

nation we are more than twice as energy efficient as we were when that article appeared. Yet there is much to do to meet the needs of the American public and energy security and ensure that our nation can, as this Summit lays out, “achieve a more secure, reliable, sustainable and affordable energy future.”

Let me address two dimensions to help start the discussion—the oil market today, and an “ecumenical” broad-based approach to energy policy. First, let me start with the oil market.

#### I. THE OIL MARKET: A NEW PHASE?

Like any major movement in a major market, the decline in oil prices since July is the result of multiple factors. But two stand out:

##### *Prices and Weakening Demand*

The first is the increasingly evident weakness in the global economy. Ever since the credit crisis hit in the summer of 2007, there has been a debate as to whether the rest of the world economy is “decoupled” from the United States. Some thought that Europe and Asia would not be affected because of their own dynamism. Others thought that the impact would show up, but with delay.

The weakness of the dollar was predicated on the view that the U.S. would weaken and that Europe and other regions would not. The Federal Reserve has identified a relationship between a weaker dollar and higher oil prices going back to 2003.<sup>1</sup> That dollar weakness in turn fueled commodity prices, including that of oil, both as a repository of value against the dollar—and on the notion that global demand for these commodities would remain strong.

Over the last few months, it has become evident that the economic weakness is spreading. And that in turn means weaker oil demand. With the sharp price decline, the oil market is voting against the idea that Europe and Japan are decoupled from the U.S. economic downturn, and instead the market is now focusing on a weaker global economy and thus a weaker global oil demand.

##### *Breakpoint*

As oil prices moved up over \$100 and then over \$120 a barrel, they entered into what we call the “Breakpoint Scenario”.<sup>2</sup> Prices at that level—and the apprehensions and insecurities that go with them—set in motion a set of reactions that would start to undercut those prices.

We see that happening: Consumers are in the market for more efficient cars. They are also managing their transportation differently. Businesses are making decisions predicated upon higher prices. Government policies are changing, notably reflected in the first new fuel efficiency standards in 32 years.

The reality of Breakpoint was already becoming evident in the spring when our analysis indicated a point of “peak demand” for U.S. gasoline had been reached in 2007, and that a continuing decline was likely.<sup>3</sup> At this point, gasoline demand in the United States is down 2 percent compared to last year—the result of greater efficiency, behavioral changes, and economic circumstances. Overall oil demand is down more than 4 percent.

#### II. AN ECUMENICAL APPROACH—BALANCED AND INTEGRATED

In response to the Summit’s focus on energy policy, let me offer some thoughts based on 35 years of national experience—going back to 1973.

##### *Avoiding “Either Or”*

So often, it has seemed over the decades, US energy policy debates turns into an “either/or” debate, which sets conventional supply against renewables and conservation—as though one partial approach or another is sufficient. We need an ecumenical approach and indeed a portfolio strategy. Our \$14 trillion economy runs on 100 quadrillion Btu (British thermal units) of energy per year—50 million barrels of oil equivalent per day (of which actual oil is currently somewhat over 20 million barrels per day).

Alternatives and renewables have and should have an important role to play in our energy economy, and their role will and should grow. The CERA study on these options, *Crossing the Divide: The Future of Clean Energy*, outlines how that could

<sup>1</sup>Stephen P.A. Brown, Raghav Virmani, and Richard Alm, Economic Letter—Insights from the Federal Reserve Bank of Dallas, May 2008, p. 6.

<sup>2</sup>Breakpoint Revisited: CERA’s \$120-\$150 Oil Scenario, CERA: 2008.

<sup>3</sup>Drivers Turn the Corner in the United States: Gasoline “Peak Demand” Sooner than Expected, CERA: 2008.

happen.<sup>4</sup> At the same time we also have to keep in mind the overall scale of our energy needs, costs, and time. A great deal of effort is going into innovation, and the impact will be significant. But the timing and scale remain uncertain. And, as renewables grow in scale, the question of how they are integrated into the existing energy infrastructure becomes more important.

Today, oil and natural gas together represent a little over 60 percent of our total energy consumption. Most of the rest is coal and nuclear. Renewables are about 6 percent; most of that is biofuels and hydropower. Given these proportions, and in light of today's high prices, it is urgent to ask how to ensure the adequate supplies of oil and natural gas that are needed on an environmentally sound basis and at a price that does not damage the overall economy.

#### *Encouraging Timely Investment*

The current oil shock underscores the need to encourage timely investment across the energy spectrum. Investment has to be stepped up in order to play a vigorous game of catch-up with a growing world economy. That, in turn, requires efficient and timely decision making, whether in the United States or in resource-holding countries, as well as the facilitation of large, complex projects that bring on significant new supplies.

It also requires consistency. An on-again, off-again Production Tax Credit is not a way to promote stable development of renewable energy. A PTC needs a longer-term time horizon. At the same time, there is also greater recognition of the role of investment in developing offshore resources.

Uncertainty is the enemy of investment, whether for renewables and alternatives or for conventional energy. Predictability, by contrast, is a vital ingredient.

#### *The Role of Markets*

Markets themselves, with their decentralized decision making, generally provide faster and more effective mechanisms for responding to high prices and shortages than systems of price control, which can have unintended and very painful consequences.

#### *The United States and Global Markets*

The United States is more integrated into the global marketplace than in years past, and yet it has less leverage over the market. Our oil imports today are twice what they were in the 1970s. Yet our share of world markets is less, and the role of other nations greater. In the 1970s the United States represented 30 percent of world oil consumption. With economic growth elsewhere, the US share is down to 24 percent. The balance is changing in other ways. National oil companies—which vary greatly in their character and capabilities—control over 80 percent of world oil reserves. The five “supermajor” oil companies account for less than 15 percent of the world's total oil production on a net basis. China and India are now significant players in the market. The list of shifts goes on.

The realities of the global markets and America's integration into them emphasize the need for a cooperative, multifaceted approach to relations with both producers and other consumers and put a premium on how we manage, think through, and structure our relations with other countries.

#### *Price and Expectations*

The final point to consider is the role of expectations. Part of the pressure driving up oil prices into July was due not only to the short-term situation—the latest disruption in Nigeria, the ratcheting up of tension over Iran's nuclear program—but also to expectations about very tight supplies three or five years down the road, particularly because of the anticipated high growth in countries such as China and India. These longer-term expectations fed back into current prices.<sup>5</sup>

Prices are now lower due to a refocusing back to shorter-term demand.

The focus may change again. More general expectation of very tight supplies in the future is based upon the assumption that the global market cannot generate the responses that are warranted—in terms of demand and efficiency; in terms of new supplies and timely investment; and in terms of renewables, new technologies, and alternatives.

A major contribution to a sounder energy future would be to create an environment, based upon realistic assessments, that ensures that timely investment is really and convincingly on the way.

<sup>4</sup>Crossing the Divide: The Future of Clean Energy, CERA Multiclient Study.

<sup>5</sup>The importance of longer-term expectations is also emphasized in the Dallas Federal Reserve's Economic Letter.

The answer to today's energy problem is not "either or" We need an ecumenical approach—a combination of new oil and gas supplies, renewables, and greater efficiency—all developed with appropriate environmental and climate change considerations in mind.

Such an approach would be a great contribution not only to relieving the pain and pressures that the American people are feeling at the pump and the difficulties that are faced today by American businesses, small and large alike. It would also be a fundamental contribution to the future prosperity of our nation and to the global economy of which we are so centrally a part.

The CHAIRMAN. Thank you very much.  
Dan Reicher, go right ahead, please.

**STATEMENT OF DAN REICHER, DIRECTOR, CLIMATE CHANGE AND ENERGY INITIATIVES, GOOGLE.ORG, SAN FRANCISCO, CA**

Mr. REICHER. Senator Bingaman, Senator Domenici, other Senators here today, thank you for organizing this summit and for inviting me to participate. I serve as Director of Climate Change and Energy Initiatives for Google.org, a unit of Google which makes investments and advances policy in several areas including climate change and energy. I previously served as Assistant Secretary of Energy for Energy Efficiency and Renewable Energy and DOE Chief of Staff in the Clinton Administration. I was also Co-founder and President of New Energy Capital, a private equity firm focused on investments in clean energy projects.

To meet the critical challenges of the 21st century, climate change energy security and economic development, we indeed need a bold, new vision for how America generates and uses electricity. We must become smarter and more efficient in the way we use electricity, green our electricity supply through a massive scale up of renewable energy and electrify our transportation fleet with plug in vehicles to reduce our dangerous oil dependence. Our vision is a 21st century U.S. electricity system featuring hundreds of thousands of mega watts of renewable power, millions of plug in vehicles and tens of millions of energy efficient homes and businesses.

The biggest impediment to achieving this vision is not technology or even finance, it is policy, particularly at the national level. The current regulatory model for electricity is broken. It does not encourage utilities to help people save energy.

It retards renewable energy development. It discourages modernization of the grid. It fails to cut greenhouse gas emissions. We need to fundamentally rethink this model.

Most importantly, we need to put a price on carbon in order to significantly reduce global warming pollution. Putting a price on carbon, however, will not be enough to drive the urgent changes we need in our energy system. In addition to national climate legislation, we also need aggressive and targeted Federal energy legislation. There are four critical elements.

First, we need large scale public and private investment in electricity infrastructure and modernization of the power grid. Spurring this investment will require overcoming the current barriers to siting and construction of new electricity infrastructure, especially large scale transmission. This may require greater Federal authority balanced by strong environmental standards to overcome resistance to long distance, interstate transmission lines that are essential to the development of large scale renewables.

Second, we need strong standards and incentives for clean energy. These include a national renewable energy standard, a national energy efficiency resource standard and aggressive new appliance efficiency standards. As Dan Yergin just explained, we also need stable, long term tax credits and other financial incentives for energy efficiency, renewable energy and plug in vehicles.

Third, we need the Federal Government to take a leadership role in an exciting recent development, the increasing interplay between energy hardware and information software and the corresponding rise of the internet and connectivity it brings. From smart meters and smart appliances to smart homes and a smart grid, we're poised to significantly advance our ability to make, monitor and use energy more productively. With smart policy, like revenue de-coupling, we can align interests putting utilities in the position to make money helping consumers use less energy.

Fourth, we need major increases in government R and D. We must dramatically scale up investment in research and development for clean energy technologies. Total Federal energy R and D is less than half what it was at its peak in the late 1970s. Federal investment in this area will more than pay for itself just as it has in computer science, aerospace and biomedical research.

If enacted, these measures should stimulate literally trillions of dollars of investment, largely from the private sector over the next three decades to make the transition to a more efficient, low carbon, electricity system. It will also create millions of new jobs. This is an enormous opportunity.

One quick example, American consumers get a paper utility once a month that is complicated and encourages little except prompt payment.

What if utility customers had online, real time information about their home energy use?

What if their air conditioner, electronic equipment, appliances and lights, were programmed to automatically cut their bills?

What if their car ran on electricity instead of gasoline and automatically charged at night when electricity was cheaper or during the day from the solar panels on the roof?

These are exciting opportunities, but we are unfortunately a long way politically from making them happen. Sadly, the Congress has been unable to pass even a 1-year extension to renewable energy tax credits that will expire at the end of the year to say nothing of more fundamental changes outlined above. But I am hopeful with the progress of the last few weeks that we might actually break the current impasse.

Going forward we have a big opportunity with a new President and a new Congress and unprecedented concerns about high energy prices, our oil dependence and climate change. There's never been a better moment. Let's seize the opportunity. Thank you.

The CHAIRMAN. Thank you very much. Professor Deutch, go right ahead.

**STATEMENT OF JOHN DEUTCH, PROFESSOR OF CHEMISTRY,  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE,  
MA**

Mr. DEUTCH. Mr. Chairman, Senator Domenici, I first appeared in front of this committee somewhat over 30 years ago when I was being considered for confirmation as the first Director of Energy Research at the Department of Energy. Scoop Jackson was in the chair and I say that the Senator Domenici was a member of that committee. It has been my privilege and my pleasure to work with Senator Domenici both inside and outside of government when I've been at the Department of Energy, when I've been in the intelligence community and when I've been in the Department of Defense.

I want to begin by taking this opportunity to tell him my tremendous respect and my gratitude for what he's done for the country and my affection for Senator Domenici.

[Applause.]

Mr. DEUTCH. Now Senator Domenici will remember some of those events of the 1970s. President Nixon's project Independence which called on the United States to become independent of imported oil at a time when we were taking less than 20 percent of our oil from abroad. Senator Domenici will remember Vice President Rockefeller's 1975 proposal for \$100 billion energy independence authority. He will also recall President Carter's 1978 National Energy Plan.

Oil and gas was de-regulated in 1977. An action acknowledging that market forces are more efficient than government regulation to allocate energy to users. In 1978, I stood by President Carter in the Rose Garden when he announced that the United States would have 20 percent solar energy by the year 2000. There was a creation of the Synthetic Fuels Corporation, an effort to set backstop technologies to imported oil in synthetic oil and gas. Congress has appropriated tens of billions of dollars for research and development and demonstration.

I do not believe that the sum of all these efforts allows the country to meet its energy challenges for the future. We are not sufficiently, rapidly making a transition from conventional oil and gas to other sources of energy. We have not reduced emissions of carbon dioxide and other greenhouse gases and avoided the adverse consequences of climate change. We are not managing the foreign policy consequences of energy import dependence from politically unstable or unfriendly parts of the world, Iran, Venezuela and Russia.

I offer seven priority suggestions for what we should do to put ourselves on a path for taking care of our energy security. This is not a list which says pick some. It says you must do them all. There are other things as well.

First, I believe we need to establish a charge for greenhouse gas emissions. This charge ought to be large enough so that it increases the opportunity for better energy efficiency, the use of renewable energy sources such as wind, geothermal. It will help make nuclear a reality and it will lead to carbon free use of coal.

The revenue from this charge should be used for impact assistance for groups such as the needy and the elderly that cannot be

expected to carry the burden of higher energy prices and should be used for energy research, development and demonstration. It should be used to offset other taxes so as to make the macro economic consequences of an energy charge like this, less burdensome.

Second, it is absolutely crucial that this country learns how to use its coal in a clean, carbon free way. That means that the government must establish a much more aggressive program to demonstrate the regulatory framework, the technical performance and the cost of carbon sequestration. I keep on pointing out that while there are many interesting efforts underway today in carbon capture and sequestration, there is yet, no concrete plan for a large scale project at scale, a million tons a year or greater, that demonstrates the proper sequestration of carbon.

Third, we must improve the efficiency of our energy use.

Fourth, it is critical that we accelerate the pace of energy innovation. The record does not point to the fact that the expenditures that have been made on energy research, development and demonstration have been adequate for the needs of the country. There are several changes which could take place which would make energy innovation more successful in this country.

The first is a creation of an energy innovation council that would have a national energy research, development and demonstration plan involving all government agencies, not just the Department of Energy. Department of Energy expenditures certainly have to be increased, but that's not a complete solution. We have to launch a large, integrated energy research and development program in critical areas such as batteries, cellulosic biomass, photovoltaics, gas separations and the like.

We need to establish a career path for people who have energy technology credentials within the civil service. I believe we need to consider establishment of an energy technology corporation to manage the demonstration projects that are so urgently needed. Examples include carbon sequestration, gas to liquids, smart electricity distribution grids, large scale cellulosic biomass production, carbon capture and sequestration, first mover, once through, nuclear power plants.

Several people have mentioned a need to increase domestic oil and gas production. It is not only going to make some contribution to our energy needs, but it is also an important signal to other countries that we need their production as well. If we do not do something at home it is hard to convince other countries to increase their production.

Sixth, we need to expand the use of commercial nuclear power. It is an essential, carbon free source of electricity. I know Congress has done a great deal to put in measures to increase the incentives for new, first of a kind, nuclear power plants. The process is moving too slowly. The process is moving much too slowly.

Seventh, we need to improve the coordination of energy policy. Let me just say that there is a fantastically close relationship between energy policy in the domestic area and our foreign policy. James Schlesinger and I have recently co-chaired a study for the task force for the Council on Foreign Relations on the national security linkage between oil and gas import dependence and foreign policy. It's incredibly important that we take into account in all of

our foreign policy deliberations, energy aspects and in our domestic concerns, foreign policy implications of what we do.

Let me just point out Iran. We have in Iran, three conflicting problems.

One is they produce about three million barrels of oil per day for the international market.

Second they're interested in acquiring a nuclear weapon.

Third, they are not a constructive force in our efforts in bringing a secure country in Iraq.

All of this indicates the interaction between energy, oil and gas especially, and our foreign policy efforts.

Let me conclude, Mr. Chairman by noting that there's also a strong relationship between U.S. nuclear non-proliferation policy, our nuclear force structure and our nuclear power and nuclear energy commercial developments. The Department of Energy is involved in all three aspects, non-proliferation, commercial power development and of course, being responsible for our nuclear weapons program. My experience as Under Secretary of Energy and as Chairman of the Department of Defense's nuclear weapons council for 2 years, leads me to believe that the transfer of those responsibilities from nuclear weapons from the Department of Energy elsewhere in the government to the Department of Defense, or to some independent agency would be a mistake.

You will hear proposals put before you of that kind. I do not believe that it would strengthen our role with respect to nuclear force structure. I do not believe that it would strengthen our efforts with respect to energy research and development.

Over the years the national laboratories which were involved in weapons, Livermore, Los Alamos and Sandia, have made a tremendous contribution to our energy R and D. That should be re-invigorated. It would strengthen both our energy efforts and it would strengthen our efforts at nuclear weapons security.

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

[The prepared statement of Mr. Deutch follows:]

PREPARED STATEMENT OF JOHN DEUTCH, PROFESSOR OF CHEMISTRY,  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA

Chairman Bingaman, Senator Domenici, Members of the Committee, my name is John Deutch, and I am Institute Professor of Chemistry at the Massachusetts Institute of Technology. During the Carter administration I was Director of Energy Research, Acting Assistant Secretary for Energy Technology, and Undersecretary of the Department of Energy (DOE). During the first Clinton administration I was Undersecretary for Acquisition and Technology and Deputy Secretary of Defense, as well as Director of Central Intelligence. During President Reagan's administration I served as a member of the White House Science Council and during the second Clinton administration I served as a member of the President's Council on Science and Technology. Over the years I have served as a board member and/or a consultant for many energy companies, and as an advisor to government agencies and not-for-profit. I continue to do so. I teach a subject in physical chemistry and in energy technology at MIT and serve on MIT's energy council.

I first appeared before this committee over thirty years ago for my confirmation hearing to be Director of Energy Research. Senator Domenici was a member of the committee at that time, and it has been a privilege and a pleasure to work with him over the years. He has made tremendous contributions to this country and I hold him in the greatest respect and indeed with considerable affection.

Senator Domenici will remember, and perhaps some others here today, energy issues that were debated by Congress during the 1970s:

- Many different national energy plans:

- President Nixon’s 1973 Project Independence intended to make the United States independent from imported oil by 1985;
- Vice President Rockefeller’s 1975 proposal to create a \$100 billion (real money at that time) Energy Independence Authority to provide over a ten year period loans and guarantees to private companies to develop new domestic energy sources;
- President Carter’s 1978 National Energy Plan.
- Oil and natural gas price deregulation in 1977. An action acknowledging that market forces are more efficient than government regulation to allocate energy to users.
- President Carter’s goal of 20% of all energy use from solar by the year 2000, announced in 1978.
- Creation of the Synthetic Fuels Corporation in 1979 for the purpose of demonstrating production of synthetic gas and liquids from coal and shale.
- Annual Congressional appropriations for research, development, and demonstration (RD&D), for a range of energy supply and conservation technologies, at expenditure levels significantly greater than today, in real terms.

Despite these and many other well-intentioned energy policy initiatives, the fact is that the United States has not been, and is not now, on a path to a secure and sustainable energy future. Although energy consumption per unit of gross domestic product is projected to continue to decline, due in large part to high projected prices, aggregate consumption of oil, natural gas, and coal is projected to increase. The DOE’s Energy Information Administration estimates that oil imports, crude and products, will remain at high levels—about 60% of U.S. oil consumption—for the next two decades. In addition, North America is expected to become a net importer of natural gas in the form of LNG. EIA projects, in its 2008 Annual Energy Outlook, that renewable sources of electricity capacity will grow from 10% in 2005 to 12% in 2030, while coal generating capacity will grow from 34% to 36%, during this same period. Total U.S. carbon dioxide emissions, mostly from coal-fired electricity generating plants, are expected to grow at an annual rate of 0.6%.

In sum, the U.S. economy is not meeting the three great energy challenges the country faces: (1) beginning the long and demanding transition away from a petroleum based economy; (2) reducing emissions of carbon dioxide and other greenhouse gases, in order to avoid the adverse consequences of global climate change, and (3) managing the foreign policy consequences of energy import dependence from politically unstable or unfriendly parts of the world, e.g., Iran, Venezuela, and Russia.

There are several reasons why it has proven so difficult for the United States to adopt and sustain a national energy policy: unrealistic goals, shifts in direction with each change in administration, difference among regional interests, strongly held views by different interest groups about technology winners, and vacillation in public attention as energy prices go up and down. But, in my judgment, the root cause is that our political leaders find it difficult to speak the truth about energy matters.

The public understandably wants affordable energy, free from foreign dependence and adverse environmental effects, but these objectives cannot be easily or quickly met. The reality is that progress will be slow because of the scale and magnitude of investment required, because of the need to invent and demonstrate new technology, and because of the need to adapt market structure and consumer preferences to new patterns of energy use. Moreover, the likelihood is that real energy prices—for electricity, home heating, motor and aviation gasoline—will continue, on average, to increase in real terms in the coming decades.

The sharp rise in oil prices has once again focused the public’s attention on the urgency of providing for our energy future. If significant action is not taken today and sustained for several decades, we will, once again, run the risk that future generations of Americans will experience greater economic costs and dislocations, including conflict, than needs to be the case.

I offer seven priority actions that the country must take in order to be on a path to a sustainable future. The list is not a menu that offers choice; all these action and perhaps others, are required.

1. Establish a charge for greenhouse gas emissions. The Administration should propose and Congress should enact a charge for greenhouse gas emissions. The charge could be in the form of an emission tax or a cap-and-trade system with sale of emission permits. The charge should be set at a sufficiently high level, for example \$30 per tonne of CO<sub>2</sub>, equivalent, so carbon free electricity generation, such as wind, geothermal, nuclear and coal with carbon capture and sequestration, is economic. Revenue from the charge should be allocated to (1) impact assistance for groups such as the needy and elderly that can-

not afford higher electricity prices, (2) energy research, development, and demonstration, and (2) off-setting other existing taxes in order to reduce the macro-economic impact of the charge. With a comprehensive national program in place, industry will have a clear signal for their future energy infrastructure investments. Many existing burdensome regulatory mandates, such as state renewable portfolio standards, could be rolled-back, as part of a process to harmonize federal and state controls on greenhouse gas emissions.

2. Establish an aggressive program to demonstrate carbon sequestration. The new administration should propose, and Congress should enact, an a ten-year program for 3 to 5 sequestration demonstration projects sequestering about 1 million tones of CO<sub>2</sub> per year, at a cost of about \$100 million per year per project (including the cost of CO<sub>2</sub>). The success of any effort to control greenhouse gas emissions in the United States depends on large scale deployment of coal electricity generation with carbon capture and storage. The present pace of demonstrating the technical, economic, and environmental characteristics of this key technology and the construction of a regulatory framework that has public acceptance, is much too slow. These projects should proceed in coordination with a new national regulatory framework that establishes rules for site selection, monitoring, modeling, and verification of the sequestered CO<sub>2</sub>, and site liability after some period of operation. Consideration should be given to establishing a special purpose public-private corporation to execute the sequestration demonstration program in order to streamline the process of design, engineering, and project management.

3. Improve the efficiency of energy use. All experts agree that improving efficiency of energy use is a priority objective. Improvement in the U.S. economy's energy productivity as measured by gross domestic product per unit energy should be expected to continue, as consumers and industry adjust to higher real energy prices. A notable current example is the accelerating adoption of compact fluorescent to replace less efficient incandescent light bulbs.

However, the historical record of effectiveness of government efforts, at both the state and federal level, to improve energy efficiency is mixed. Energy efficiency standards for buildings, appliances, automobiles, (CAFE), and federal demonstration programs in the DOE, DOD, GSA, and other agencies have their role. But, the U.S. consumer and smaller private companies seem reluctant to make investments or change behavior and avoid choosing options that provide energy services at lower life-cycle cost. National and local regulation involving demand side management or other mandates have had limited effectiveness. We need to find a better way to spread best practice through the economy. I do not have an answer about how best to achieve this but we need to reproduce the success of the agricultural extension service in improving the productivity of U.S. farms in the first half of the 20th century.

4. Accelerate energy innovation. The current pattern of DOE research, development, and demonstration (RD&D) management is inadequate for the future energy innovation the country requires.

The past record of federal sponsorship—principally the DOE and its predecessor agencies—is not adequate to meet today's challenges. Consider these shortcomings:

- A linear “technology driven” rather than “market” or application driven approach research development of demonstration of new technology;
- Little coordination between the R&D programs in various agencies: DOE, EPA, DOA, NSF, DOC, and others. For example, no five-year program budget exists for energy R&D across all involved government agencies;
- Reliance on traditional direct funding (and control) of R&D projects and episodic use of indirect incentives, such as guaranteed purchase, tax credits, loans;
- A mixed record on integrating private industry and government RD&D.
- Congressional influence out weighing technical merit in the selection of technologies and projects.

Consider the following suggestions for accelerating the federal effort in energy innovation:

(1.) Create an inter-agency Energy Innovation Council to develop a multi-year National Energy RD&D strategy. The Council would have the authority and responsibility to plan, program, and budget energy and environment RD&D for all agencies.

(2.) Increase the energy RD&D program budget to more than twice its current level.

(3.) Launch a sustained and integrated energy R&D program in key areas, examples include: batteries and energy storage, cellulosic biomass, photovoltaics, gas separations. This effort should include basic research, as well as exploratory development, and involve universities, industry, and the DOE national laboratories.

(4.) Create an energy technology career path within the civil service.

(5.) Establish an Energy Technology Corporation (ETC) to manage demonstration projects. The purpose of the ETC is to establish the feasibility of new energy technology by demonstrating technical, economic, and environmental performance. Examples include: (a) Carbon capture and sequestration, (b) Gas To Liquids, (c) a smart electric distribution grid, (d) large scale cellulosic biomass production, (e) first-mover once-through nuclear power plants.

The record shows that DOE does not have the authorities or expertise to carry out successfully such demonstration projects. New technology deployment, which after all is the purpose of innovation, requires demonstration that is convincing to the private sector and to investors.

The purpose of the proposed ETC is different from the 1979 Synthetic Fuels Corporation. The Synthetic Fuels Corporation focused on production of synfuels, not technology demonstration, and thus was vulnerable to the bittersweet collapse in oil prices.

The technical demonstration projects proposed for the ETC are not based on price expectation but serious externalities like climate change and the long-term need to make the transition away from petroleum dependence.

5. Expand domestic oil and gas production. The United States should expand access to areas for oil and gas exploration—in Alaska, the Gulf Coast, and the east and west coasts. While the amount of environmentally responsible incremental production will be modest compared to total oil and gas consumption, the increased production will slow the anticipated decline in domestic production. Importantly, any measures to expand domestic production will add credibility to United States efforts to encourage countries that possess resources to expand their production.

6. Expand the use of commercial nuclear power. Because nuclear power is essentially a carbon free source of electricity, it is highly desirable to expand its use. However, nuclear power faces three significant challenges. First, the cost of nuclear power generation is too high compared to coal in absence of a carbon charge. The impact of the recent increase in the cost of all large capital projects has been greater on nuclear power than other forms of generation. The assistance provided for a few new nuclear power plants in the 2005 Energy Policy Act is justifiable, provided that nuclear plants subsequently constructed are economic under commercial terms.

Greater progress is needed on radioactive waste management. The new administration and Congress would be wise to hedge successful licensing and completion of the Yucca Mountain underground spent fuel disposal facility by authorizing a new long-term program for away-from-reactor storage, with DOE taking custody of the spent fuel at federal facilities.

It is important that any expansion of nuclear power in the United States and other countries occurs without increasing the risk of nuclear weapons proliferation. President Bush and the G-8 have taken an important initiative that deserves bipartisan support: nuclear supplier states will offer front-end enrichment and back-end waste management services under attractive terms to countries who are new users of nuclear power, in order to prevent the spread of enrichment and reprocessing.

However, domestically, the Bush administration advocates a return to a “closed” fuel cycle, where spent reactor fuel from commercial reactors is reprocessed to produce mixed oxide fuel. This advanced fuel cycle initiative has no justification at present. Developing the closed fuel cycle will require vast federal R&D expenses with dubious advantages for waste management compared to the “once-through” fuel cycle, when both short term and long term risk are considered. To be sure, at some time in the future, if nuclear power expands significantly, the cost of natural uranium ore will increase to the point that reprocessing is economically justified. However, there is no indication that this point will be reached for at least the next 50 years.

In the meantime, a decision by the United States to return to a policy of reprocessing commercial spent fuel, abandoned in the Ford and Carter administrations, sends a message to other countries, especially in the Middle East and Asia, that reprocessing is acceptable and has advantages compared to the once-

through-fuel cycle. And these countries will not use fancy "proliferation-resistant" fuel cycles invented by DOE labs, but rather the widely known and simple PUREX method used by most states that have separated plutonium for a weapon.

The United States, for the foreseeable future, should limit fuel cycle R&D to laboratory research on new separation methods, engineering analysis comparing different fuel cycles, and perhaps some process development unit (PDU) scale engineering studies.<sup>7</sup> Improve the coordination of energy policy. The new administration should establish a new inter-agency Energy Coordinating Council, co-chaired by the Secretary of Energy and Director of the National Economic Council to interagency harmonization of energy policy including such matters as

I conclude by underscoring the strong linkage between energy policy and national security. James R. Schlesinger and I co-chaired a study for the Council on Foreign Relations that describes how dependence on imported oil and gas is increasingly constraining the ability of the United States and its allies to accomplish important foreign policy objectives. Iran is a good example—its 3 million barrels per day of oil exports is important to international oil markets.

Iran's ability to stop these exports and thus disrupt the international oil market, is a factor that the United States and its allies must consider as they weigh possible actions to slow Iran's effort to acquire nuclear weapons, or to interdict Iranian support to Iraqi insurgents.

This linkage between energy and security exists in other areas as well. For example, how China meets its growing energy demand will increasingly impact world energy markets and hence influence the global climate, as well as how much U.S. consumers will pay for motor gasoline.

The point is that United States must consider the domestic consequences of foreign policy energy decisions and vice versa; the country has not done this well in the past. The interagency Energy Coordinating Council proposed above could be useful in providing the president with a coordinated view of the domestic and international aspects of contemplated energy policy. In addition, the Secretary of Energy should be a participant in any National Security Council meetings that involve energy issues.

There is also strong relationship between U.S. nuclear non-proliferation policy, nuclear force structure, and nuclear power development. The DOE is involved in all three aspects and should remain so in the future because of the breadth of its technical capability. You will hear proposals to transfer responsibility for management of the U.S. nuclear weapons program and the weapons complex from the DOE to the Department of Defense or a newly created independent agency. My experience as Undersecretary of Energy and Chairman of the DOD's Nuclear Weapons Council leads me to believe that this transfer has no bearing on nuclear force policy issues and the transfer would neither improve the management of the weapons program, or save money. Separation of the national laboratories involved in nuclear weapons—Livermore, Los Alamos, and Sandia—would greatly reduce DOE's capacity to carryout its energy mission.

The enterprise of generating, distributing, and using energy in the United States is enormous, complicated, and inter-connected. Casual attention will not constructively shape energy development, or fairly balance the many competing regional and private interests. Moreover, there are no quick fixes or technical break throughs that can sidestep the lengthy and demanding process of adapting the economy and the life style of our citizens to a sustainable, post-petroleum world. The United States has the resources, the technology and talented people, and the industrial base necessary to provide for a secure energy future. However, the country has not yet reached consensus or adopted a national energy policy scaffold that encourages the needed changes in production and consumption, but also has the flexibility to adapt to market reality and accommodate unexpected ingenuity that will emerge from working on this great challenge. It is high time for the country to embark on the exciting and important tasks that I have outlined.

The CHAIRMAN. Thank you very much.

Mr. Odum, why don't you go right ahead?

**STATEMENT OF MARVIN ODUM, PRESIDENT, SHELL  
OIL COMPANY**

Mr. ODUM. Good morning and thank you. First of all I'd like to thank the Senators for allowing me to move to the morning meet-

ing. As I'm sure you know we have a rather large hurricane bearing down on the Texas coast. I'm anxious to get back and deal with some of the business issues there.

The—I can assure you though that the infrastructure is as prepared as it can be. We have the thousands of people that work in that industry in safe locations. It will be returned to production as absolutely quickly as possible.

I'd like to commend Senator Bingaman and Domenici for holding this summit and all of the Senators, of course, that are here today. I think it is precisely the kind of dialog that our Nation needs to have on energy policy. If we're going to successfully meet the energy challenge we will need this type of cooperative spirit.

It is an undeniable truth that when we will need more of all kinds of energy including that saved through efficiency and conservation. By all kinds of energy, of course, I mean oil and gas, coal, biofuels, wind, solar, nuclear, hydrogen and potentially others. Along with this there are two other points that you've heard from me before.

First, that oil and gas will remain critical fuels for our economy for decades to come.

Second, we must develop all energies with particular attention to addressing CO<sub>2</sub> emissions.

As one of the largest oil and gas producers, I'm going to focus my comments on the oil and gas side of this equation. Then I'll conclude with just a few comments on the broader energy policy.

The fact is that the U.S. imports much more petroleum than it should. I'm not going to repeat all the numbers that we've heard before, but 12 million barrels a day, \$600 billion a year to pay for that. The U.S. is in somewhat of a unique position among the world's nations in not producing more of our own resources instead expecting others to produce it for us.

I think the choice is fairly clear. We can continue to import ever-more oil and gas as we transition to a new energy mix that's at an unknown point and time in the future or we can develop more of our own resources. We have, potentially, abundant resources.

The U.S. has a well designed system in place for managing oil and gas exploration and development. We also have a very strong system in place for ensuring the environmental impacts are avoided or mitigated. If more areas are open to oil and gas exploration, I think it is crucial that adequate funding be provided to Federal agencies that manage those activities.

When adequate funding is not in place, the system breaks down, permits are not issued on time, environmental studies are questioned and the system is vulnerable to litigation. Just because lands are leased, doesn't mean drilling will commence. I'll use Alaska as a case in point.

Alaska's Chukchi and Beaufort Seas are some of most promising, undeveloped, hydrocarbon basins in the U.S. In the last couple of years, Shell has invested more than \$2 billion in leases and hundreds of millions more in equipment, studies, permits, training and other preparation trying to bring more production to the U.S. market. We've assembled what is arguably the most environmentally sensitive and thoroughly responsible exploration program in history.

But with permit slippage and litigation delay, we're nearly 3 years on and have yet to drill a single exploration well. Let alone produce much needed oil and gas. Remember this is an area that's open to leasing.

Our drilling program in the Beaufort has been delayed now for a second year as the nine circuit, Court of Appeals has deliberated over a lawsuit against the MMS. We still do not have a decision.

I'd also like to comment on the topic of revenue sharing. It is important to recognize that states and communities adjacent to off shore development will have infrastructure needs such as roads, schools and demands for basic public services. Revenue sharing is available for four Gulf of Mexico states and it will help address some of those needs. Congress should routinely extend revenue sharing to other areas, starting with Alaska.

So to close, the challenges we face today result, I think, from not having a comprehensive energy policy like we're talking about today. These challenges cannot be resolved with one simple solution. We need to face some hard truths and produce more energy, all forms of energy.

You're going to find a lot of commonality with the other panel members in these next couple of statements. Because I believe a comprehensive energy policy should include providing more access to domestic oil and gas resources, encouraging more investment in alternatives and renewables, and there are some exciting things happening there. Encourage and reward more conservation and efficiency, reduce CO<sub>2</sub> emissions using market mechanisms, such as cap and trade, that enables such reductions and also, very much need to account for carbon capture and storage which we heard from Mr. Deutch.

We are committed to meeting the energy challenge and to working with Congress and the American people to find real solutions. In 2008 we will invest somewhere around \$35 to \$36 billion, which is more than our profits in 2007, to bring more energy to the world. So I'll stop there and look forward to the questions and our conversation.

The CHAIRMAN. Thank all of you for excellent testimony. Let me start the questions, then we will have questions from Senator Domenici and then we'll go back and forth between Democrats and Republicans in the order that people arrived. We have a long list. So I'll try to be brief in my questions.

One of the issues that I think we're going to have to better understand is in order to reduce the use of petroleum in the transportation sector, there's sort of three options, obviously increased efficiency, everyone agrees is important. But when you start looking at other ways to substitute for imported oil being used to be refined into gasoline for the transportation sector, there's sort of three options out there.

One is the one Dan Reicher was referring to, which is electrify the transportation sector. Get more and more of our vehicles operating off electrical power.

Second, of course, is biofuels as a way to substitute for petroleum use directly.

Third is the proposal that T. Boone Pickens is advertising and advocating these days which is the thought that we can meet many

of our transportation needs through more use of natural gas rather than through use of gasoline refined from oil.

I'd be interested in any of you who have an idea as to which of those courses is most promising to tell us what you think. I mean, obviously we're doing some of each that's appropriate. But is there one of the three that holds the greatest promise or one of the three that holds the least promise? Any of you have thoughts?

Professor Deutch.

Mr. DEUTCH. Mr. Chairman, I'm all in favor of all three, but I want to just suggest to you in each case there is a significant barrier. In the case of substitute electricity for hybrid vehicles or all electric vehicles, we have to have the electricity. That means that it has to come either from clean coal or it has to come from nuclear.

In the case of biofuels, we've looked at this in some detail. We don't want to compete with food. We want to have cellulosic biomass. There really is a limit of what you can expect from this. I would say that an aggressive limit for the United States would be like, two billion barrels of oil equivalent a day. That's still a small fraction of what we need to do.

With respect to natural gas let me point out North America has become an importer of natural gas. Natural gas is likely to become more and more, for us, like petroleum. So substituting natural gas and petroleum, yes, that's maybe a good thing to do in the short run. In the long run they're both very important.

Final point is the rest of the world is important here too. The rest of the world is rushing to use more oil, like China in their transportation system. So this is also has an international aspect that the rest of the world is going to be consuming oil for automobile transportation at a higher rate.

The CHAIRMAN. Mr. Odum, did you have a thought about this?

Mr. ODUM. If I could just add, I think it's a very important question. Because I think it points to an important topic that covers more than just this single question. Which is going back to what Dan Yergin said, there is no single answer here.

So I listen to that question, I hear those three options. I think they're all important. They will all be part of the solution that we need for the energy challenge in the U.S. Neither one on its own will solve the problem.

The CHAIRMAN. Dan, did you want to comment?

Mr. YERGIN. Just briefly, Mr. Chairman. I think, again, all three need to be part of the solution. I would put electrification of vehicles at the top of the list though. What's interesting, I think, is that this move that we're seeing in the marketplace today to hybrids, actually allow us to take the first option which is electrification and combine it with a second option which is biofuels.

You can electrify a vehicle as General Motors and Toyota are doing. Those vehicles will be out next year or the year after. Meanwhile there's a 12 or 14 gallon tank into which biofuels could go. So we could hybridize in yet another way, those two technologies.

Over time we do have to make the transition away from corn based ethanol to cellulosic ethanol for all the reasons that I think you know well. I do think natural gas has a role. I would put it further down the list.

Fleets, for example, buses, trucks, vehicles that come back to the same place at night, but I would say that should be a much smaller part of this mix going forward compared to electricity at the top of the list, biofuels in the middle and natural gas at the bottom.

The CHAIRMAN. Frank.

Mr. VERRASTRO. Yes, I concur with Dan's points and also with Marvin. If you had to do priority ranking, it strikes me that in the short term, hybrid technology is just terrific. If you can increase the vehicle standards and current technology you could increase it by, you can double.

So what the Congress did in the Energy Efficiency Act was terrific, maybe not aggressive enough. If you double the mileage, \$4 gasoline becomes \$2 gasoline. If you supplement that with plug in hybrids, you have the opportunity to have both liquid fuels and electricity.

Going to fully electric it just strikes me there's three questions. One is on efficiency, at least now until we upgrade the grid. It takes three units of primary energy at the front end to give you one unit of electricity at the back end.

So which leads to the second point of what's your fuel source and base load. As John said, it's either nuclear or coal. Could be natural gas is not the scale up for renewables yet at this point.

Third point is reliability. At this situation ice storms, wind, squirrels can take down the system. We need to make sure the system is reliable.

On compressed natural gas, I would agree with Dan. I think it's lower on the list for fleets, especially for buses, it's terrific. You can secure the size of the gas tank because as you compress the natural gas, your mileage efficiency goes down. Your miles able to be driven on a tank of CNG is lower. So for cabs, city cabs, something that's used on campuses, maybe local police forces and for buses, great idea, for the general public, probably not there yet.

The CHAIRMAN. Senator Domenici.

Senator DOMENICI. Thank you, Mr. Chairman. I'm very pleased to see so many Senators here that want to ask questions that I just want to ask three.

First, Professor Deutch, I think you know. Speaking nuclear power for a moment, we're making some fantastic strides as a Nation now with reference to applications for nuclear power plants. As you know we have gone from zero applications, license applications for design and construction before the passage of the Energy Policy Act to what's contemplated now is a total of 23 applications, 34 units.

I would say that's a rather significant step forward, leap forward by the United States in a commitment to going nuclear as rapidly as we can, consistent with the delicate nature of the licensing process. But you stated we should—we're going too slow on licensing. I really want you to believe me that I think that's the case. But I cannot find any way to use less time in the process.

If you and your people at MIT can look at the licensing process and tell us how we can save time, you would do us a great favor. The only thing we have done, and I'll just give it to you outright, we put 1 year after the licensing process is finished for citizen involvement. Because there are so many institutional approaches, in-

stitutional negatives they file against this that you've got to give them some time or you'll end up with never ending litigation.

So we're using 1 year in this 42 months that we claim is necessary. If you can find how we would do it with less, I believe everybody would be interested in hearing. Now if you already know, you can tell us now. If not, I will go to the next question.

[Laughter.]

Senator DOMENICI. That's what I thought would happen. Now let me say to Dr. Yergin. This is the second time you've appeared to help us. I want to tell you personally, as I leave, what great admiration I have for you.

I just whispered to my friend, the chairman, that if I were putting together any group of, as small as five, advisors on energy policy to help us, I would put you on that five. I might even put you on the three if we went that far. So I want to ask you a question. How did we move so quickly from an American energy scene which was short of natural gas? We were even beating ourselves up for using natural gas to make electricity because we claimed we didn't have enough.

All of sudden we're talking like we have so much. I seem to believe we have much more than we thought. But where are you in terms of proving that up? Where did we get the information that we have so much more natural gas than we thought we had?

Mr. YERGIN. First, thank you for your more than gracious words. I appreciate it.

Senator DOMENICI. You're welcome.

Mr. YERGIN. As with Professor Deutch, I have great admiration for the role you've played in energy over these many years and the consistency you've brought to it. I think the big change on natural gas has been it's, you know, what you see in the energy industry constantly, is this process of innovation that looks like you're in a dead end and then something changes it. What's changed it is in terms of the development of unconventional gas.

I think it's—and probably Mr. Odum can add to that, but over the last 2 years or 3 years what seemed to be very much of a fringe activity has now put us in a more abundant position. Last year our gas production went up 9 percent after many years of thinking that we were going to be tied into a global LNG market which as Professor Deutch said, we are, but not to the extent. So I think it's still unfolding and one big question about it is this kind of a short term rush or does this really open up a whole new horizon for natural gas in our economy.

So I think that's been, to me, the biggest reason for the change of perspective over the last 2 years.

Senator DOMENICI. The last question is the price of oil has dropped nearly \$50 in the past 2 to 3 months. Dr. Yergin says that the softened demand has caused that. Do you agree? We'll start over there at your end.

Do you agree?

Mr. VERRASTRO. I think there's three or four pieces that go into this. Clearly reduction in demand and then part of that is a result of higher prices.

The second is, I think, the prospects for additional production coming on line. Projects that were delayed last year because of cost

and technical difficulties, we're going to start seeing them third and fourth quarter of this year, first quarter of next year. So we're going to have a supply.

We also have alternative fuels that have made a huge contribution. We're seeing demand reduction. Technology has played a big role. I actually, a personal view is that there has been price speculation in the market. I think the drop from \$147 to \$100 over the last several weeks should indicate this is more than just fundamentals.

Senator DOMENICI. Did you want to add anything Dr. Yergin to my statement of your position?

Mr. YERGIN. I think those other factors are certainly part of it as well. In other words, it isn't just one thing. But I think this demand, this shift in demand and the focus on demand is a very important part of it.

Certainly, as Frank said, the financial markets have been playing a much more important role in the oil market than they had in previous years. Oh, yes, and Frank whispered to me, very important, is the strength of the dollar. I mean we've seen an inverse move between the dollar and commodities and the change of the dollar. We've seen all the commodity prices come down.

Senator DOMENICI. Thank you.

The CHAIRMAN. Senator Dorgan.

Senator DORGAN. Mr. Yergin, you describe the financial markets playing a much more important role. That's part of what Mr. Verrastro talked about with speculation as a portion of that. Is that correct? Is that what you mean?

Mr. YERGIN. Speculation is part of it. But it's more generally that the financial markets are engaged. It's also pension funds concerned about the equity markets, in turn concerned about delivering returns, looking at commodities as an asset allocation class.

Senator DORGAN. Mr. Chairman, let me say that I hope that this, which I think is a wonderful opportunity today, is perhaps the first in a series of urgent hearings that we would hold to put together the comprehensive plan that could come from a series of different centers of thought and interest here on comprehensive energy policy. It appears to me that \$4 for a gallon of gasoline became the tipping point. That filled the political system with enough helium to make things interesting and to have crowds gather chanting, "Drill, baby, drill" and it filled the policy discussion with enough urgency so that everybody's now talking about comprehensive energy legislations. So, I mean, this is certainly on the right subject at the right time.

My own view is we should do everything, drill. By the way the one thing that nobody's talking about is, it's a small piece. But there's estimated a half a million barrels of oil a day that the Cubans are making available and the Canadians and the Spanish and the Chinese and others are able to lease and we're not. That ought to be part of the drilling that American firms ought to be able to access.

But drilling, conservation, efficiency, renewables, all of it has to be part of what we're about with respect to comprehensive energy legislation. Also addressing what I think is excess speculation in

the markets. But what I'd like to ask, you know, if we don't do something.

We should do all of these things. But the question is what is game changing? What is it that can bring us back 15 years from now or 15 years of that, after that to not be talking about the same set of problems? Mr. Yergin talked about 30 years ago, you know, every 15 or so years, we hang around thumbing suspenders talking about the same old issues which I called yesterday, forever.

What is game changing? What truly is game changing here? Of the things that have been discussed by the witnesses, what do you say to us that you think in policy represents something that really is game changing for America's future energy use in terms of how you would prioritize it?

Mr. VERRASTRO. Senator, when you roll back to the 1970s, we're in a totally different place. I would argue that we had excess capacity in the 1970s. We actually were playing with that through the last 25 years. So we had excess refining capacity, excess crude oil capacity, excess transmission capacity.

The growth of China, but also of the non-OECD countries have tightened up the demand/supply balance. People didn't make the investments because there had been an overhang. The year 2004 to us was kind of the watershed year where everyone took notice that things were in tight supply.

Players behave differently in a tight market. We consistently want to go back and say, well what are the tools that we used in the 1980s and 1990s. They're the wrong tools because that was in a surplus market.

So, in terms of priorities, it just strikes me that the first thing you do when you look at this increasing projection of global demand, is unless you change the curve, you're constantly chasing this elusive target where you increasingly have to plug in various forms of supply. The above ground issues that I alluded to and they're everything from access to commerciality to sabotage and terrorism, distribution, infrastructure, investment. It's not the molecules in the ground that seem to be the problem at this point. Because I think the endowment, the resource endowment in the world is enormous. But accessing them, converting them, then delivering to places where they're needed is the issue.

So the first and foremost thing is to change demand. I think on the transportation side for oil, going to hybrids tomorrow in a broader scale is a no-brainer. We have the technology. If you can reduce demand by 50 percent by definition you reduce oil imports.

Maintaining U.S. production is the second piece of that, especially on the liquid fuel side because if you let the U.S. go into decline, even if you take the demand curve down, the gap is still filled by imports. At some point we have to make room for China and India. Otherwise we're competing for all these fuels in the market.

Like oil, natural gas will soon become like a bidding war on eBay. This is the second piece on natural gas. On the gas piece I think technology has really helped.

These unconventional plays, sub soil plays on the oil side, things we couldn't see 15 years ago with horizontal drilling, looking at permeability and porosity of the zones you can actually move the

gas through with fracturing. You can do the same with shale oil, like we're doing in the Bakken. It's a different type of play.

But these are supplements. They're not replacements. This transition that I think we're all looking for where you have fuels that are available, affordable, reliable and environmentally benign, all require tradeoffs.

So Dan, I and Marvin, we're all part of this National Petroleum Council study that we produced last year. We constructed this triangle. Triangle said you have to look at economics. You have to look at environmental performance and then you have to balance that against security.

Ideally you like to be in the center of the triangle where all three issues are balanced. Efficiency and low emission fuels are the only thing that fit in the center of the triangle. Everything else that you play with, whether it's nuclear or coal or natural gas, they all have tradeoffs.

So they may benefit you on the economic side, cost you on the foreign policy side. Benefits you on the environmental side, but costs more somewhere else. I think that's the juncture we're at.

I think we need to manage the transition is the point I'm getting to. We want to get to a different future. But there's smart things you need to put in place now.

We're resetting the system. The next President is the transition President.

Senator DORGAN. Mr. Chairman, might I just make a 30-second observation? I understand you want to move to others. It seems to me that in the infancy of various approaches to deal with this renewables and conservation approach and so on, we move toward what we incent.

We incented people to go look for oil and gas. I got from the Congressional Research Service the other day, on two of the tax incentives for people to go look for oil and gas, we have provided \$177 billion of tax incentives in the last 40 years. That's a pretty robust, aggressive incentive.

Compare that with what we've done with other things that might be game changing, renewables and so on, which is pathetic and anemic. So, I mean, I think we really have to evaluate what is game changing. Then how do we pursue it with the right kind of robust incentives that you can count on?

The CHAIRMAN. Senator Thune.

Senator THUNE. Thank you, Mr. Chairman. I want to thank the panel for their insights today and observations about what we all perceive to be a major issue affecting the economy in this country. I would argue is a national security issue as well.

I think that the triangle that you described is a good one. Because I believe that there are lots of implications that go beyond just the clear economic impact this has on people across this country. In my view, in a State like South Dakota, some of the members here who represent rural States, the impacts are even more profound because you've got largely agricultural economies that are very energy dependent, diesel, fertilizer, all the input costs that go into agricultural production continue to go up as a result of what we're facing across the world today in terms of the increasing global demand for all forms of energy, but particularly for fuels.

We've got a number of things that we've been looking at. I appreciate the observations with respect to efficiencies and conservation and everything else, trying to address this in a balanced way. I guess my question would be of all those different types of technologies, what do you perceive to be the one that we can realize the most quickly?

A lot of the things that we're talking about are 5-year, 10-year issues. We're all looking at how do we bridge to that technology. Right now I think we are in a transitional time. I think we're, you know, the oil and gas production, things that we're doing today or the energy sources we rely upon today, I think are designed as a bridge to get us to those new technologies and that future energy source.

But we obviously want to get there as quickly as possible. In my part of the world we're working to develop as fast as we can, cellulosic ethanol. We've had great success with corn based ethanol with 1.7 billion gallons in 2001. This year it's over 9 billion gallons.

So much so that many of our producers are saying we're going to run into what they call the blend wall. That is that we've got a lot of production. We don't have enough demand out there right now because we have limitations on how much can be blended.

As a result from that the price of ethanol has gone down dramatically relative to gasoline to the point where it's becoming very difficult for producers to find any kind of a margin right now in corn based ethanol. We're trying to push toward cellulosic ethanol. We're very close.

I mean, I've been out at NREL and they've done some wonderful things in terms of testing there. The key is to make it commercially viable. That's kind of the world I live in. We're very much into biofuels where I come from.

But I guess my question for all of you is, which of these various technologies that have been talked about are the most, I guess, that we would have an opportunity to realize some benefit from in the shortest amount of time?

Mr. YERGIN. Let me just jump in with part of the answer because I think your question very much ties into Senator Dorgan's question and where Senator Bingaman was. To me it seems when you look at it all, the agenda is pretty clear that there are a list of things. I think Frank has done a very good point of pointing out we want to skip over hybrids. But hybrids themselves are pretty darn important.

But I think and, you know, are we going to see 5 years from now is the big surprise. When I look at the energy history you always see that there are these big surprises that come. Is the big surprise going to be in biofuels that we don't see it or is it going to be electricity and transportation or maybe something that we don't even quite see?

In the near, medium term it does seem to me that the, you know, the big source that we have if we can figure out how to handle it because it's not one thing, is efficiency. That's what gives us time to address these other things. Then it's have a consistent process that John Deutch described so we don't have the stop and go on the technologies. That we have young people who are making careers in science in it, so that 35 years from now we're not reading

another Time magazine article that's now 70 years old that still sounds like where we were.

I'll just tell you when I looked at that Time magazine article, a lot has changed since we didn't have Google. We didn't have cell phones. We didn't have PCs. But you look at the agenda 35 years ago and it sounds, to some degree, like the agenda we're talking about today.

So there is that sense that we need that I don't think we know the answer on what the game changers, what the big innovation and that's why we've got to go down several paths at the same time.

Mr. REICHER. Could I just echo that, Senator? It's not sexy, but energy efficiency I do think is the fastest, cheapest, near term resource that we've got. You know you look at, just simply look at the cost of electricity from, you know, high cost photovoltaics at one end, even coal. Lower down the scale, nuclear, natural gas vastly cheaper as energy efficiency at a couple of cents a kilowatt/hour.

I just would urge you to take a look at what California has been able to do over the last 30 years keeping its per capita electricity use flat over 30 years. While in the rest of the country it's risen 40 to 50 percent. There's three things that the State did, very wisely.

One, it actually gave utilities the incentive. They can make money in California encouraging efficiency, encouraging people to use less electricity. Most of the rest of the country you can't do that. So the incentive is to sell more.

The second thing the State did very early on was to adopt aggressive building codes. Again, very boring stuff, I have to admit it. But very aggressive building codes and so it gets built there. It's vastly more efficient than in most of the rest of the country.

The third thing was to launch a real serious effort in appliance standards, electronic equipment standards. Again, terribly boring, but it has really driven a lot of change, in fact cause what we've been able to do at the Federal level to finally get off the ground.

So California is a great example. I think if we had done that in the rest of the country our total energy use would be dramatically lower today. I don't have the numbers at my fingertips, but it's significant.

Second game changer, completely other end of the spectrum. Several weeks ago we and several venture capital firms made an announcement about an advance geothermal technology. John Deutch may remember the days of what we used to call hot, dry rock back in the Carter Administration.

But essentially instead of traditional geothermal where you drill down to a pocket of steam or hot water, this modern geothermal technique, you can literally drill anywhere in the United States or all over the globe and at some point you get to hot, dry rock. There may not be water there. But if you can put a fluid down there and bring it back up, you can make steam and turn a turbine and make electricity.

The oil companies are very interested in this. The Australians lead the world. The EU has made significant investments. This technology is being proven out.

A major MIT study in 2007 told us that 2 percent of the heat energy between three and ten kilometers below the United States, 2 percent of that, if we could capture it, represents 2,500 times U.S. energy use. The oil companies know how to drill to those depths. They know how to fracture rock. They know how to move fluids around.

If we could take that kind of drilling, apply it to this enhanced geothermal system, as we call it, EGS approach. I think we may be there with a new technology that's base load as opposed to solar and wind which are intermittent, which is ubiquitous literally from border to border and coast to coast. The joke I tell is that if the big dig in Boston had been vertical instead of horizontal, at \$12 billion we might be making electricity in New England right now from deeper geothermal.

So this is a very interesting breakthrough technology. Major venture capital firms in the United States are beginning to take a step. We at Google have put money into a couple of companies. We're supporting the development of a new heat map for the United States. I would strongly encourage you take a look at that.

The CHAIRMAN. We're going to run out of the opportunity for members to ask questions here before we run out of members. I think we'll try to stick with a 5-minute rule at this point. Senator Cantwell, you're next.

Senator CANTWELL. Thank you, Mr. Chairman. It's been good this last conversation because it goes to questions that I have. First I want to say that Senator Dorgan and myself and other members of the Energy Subcommittee are having a hearing next week on the continuation of speculation. So thank you.

One, I wanted to comment about your points about speculation because I do think it's an important issue. We have seen a \$6.7 billion savings to businesses and consumers since the price has gone down. While part of it might be reduction in demand, we're seeing an export out of the market of large volumes of capital that just happen to coincide with the same time that we have decided to be more aggressive from a regulatory perspective.

So, \$6.7 billion in savings to consumers and businesses is a big deal to our U.S. economy. Hopefully we might even see the price go down below \$100 a barrel which would be pretty remarkable that we've seen this run up in such a short period of time. But my question is really about avoiding this for the future and you were just talking about this as it relates to energy efficiency.

I love, Professor Deutch, that you mentioned Scoop Jackson because I think if he was here he would have said, listen we went through this in the 1970s and we didn't act. So what is it going to take for us to act today? My point is we're having this discussion about drilling verses energy efficiency, renewables and the investment. I think EIA basically says that, you know, if you open up all the Outer Continental Shelf, you did all the drilling that you possibly could do.

You're only talking in the next, you know, by 2030 in the hundreds of thousands barrels of oil. But juxtaposed to that their own calculations is you can have enough from wind power to build the equivalent of 50 new coal plants. So you all have talked about energy efficiency and renewables and technology.

So I'm just asking you as you look at the next 20 to 30 years, so that we can calibrate this for the American public. I'm interested in knowing are you saying that the majority of the opportunity we have before us in driving down that price or let's just say, because there's many factors there. I'm sure Mr. Yergin would say there's many factors here. But the majority of the opportunity that exists before us in having new supply and getting a reduction in foreign oil has to do with renewables and efficiency and new technology platforms.

Professor Deutch.

Mr. DEUTCH. I don't know really how to begin with this. Let me just say the single most important issue with wind at large scale and with other renewable sources such as photovoltaics or central thermal power is the intermittency of the supply. It is not base load.

So somehow you have to find a way to manage that intermittency. That means energy storage. So if you said to me what would be the one single thing which would really make a difference would be—

Senator CANTWELL. My question if you could, if you could comment on this is. Is the majority of the opportunity before us on renewables and efficiency and new technology verses drilling? I think we're having this debate around here as if everybody thinks that drilling is going to be the majority of solution impact for us.

I hear you all talking about the big opportunities in these new areas. That's why I wanted to know where you thought the majority of the opportunity existed?

Mr. DEUTCH. It is certainly not in drilling, but drilling is an important component of doing this because it tells other producers in the world that we're doing our share in trying to keep supply up.

Senator CANTWELL. Thank you.

Mr. Reicher.

Mr. REICHER. As I said I think the biggest opportunity is in fact to do more with less. Efficiency is the near term opportunity, I think. Added to that we're seeing a very heartening decline in the price of producing renewable electricity and renewable fuels and I think adding that to the mix.

So I think the big component is going forward that we can seize are in fact inefficiency and renewables. Obviously the traditional fuels are going to be with us for a long, long time. We need to ensure those supplies. But if we can lower demand and if we could start to aggressively move alternatives in, I think that we'll both be better off from an economic standpoint as well as an environmental stand point.

The CHAIRMAN. Senator Corker.

Senator CORKER. Yes, sir, Mr. Chairman. Thank all of you for your testimony. I think most of us have heard or been with all of you.

The CHAIRMAN. Did I cut you off, Dr. Yergin? Did you want to make a comment before?

Mr. YERGIN. Just very quickly. I think there's a little bit of apple and oranges. I mean wind is growing fast. It's 30 percent of our new electricity added last year.

But wind, unless all of our cars are plug in hybrids doesn't do much at all for oil because there's only about 2 percent of our electricity is generated with oil. I think in terms of the off shore, the EIA. It's very interesting what they have calculated.

But there's the evidence for it, is based upon 30-year-old, 35-year-old technology because there's no expiration. The example is Brazil started its ethanol program because they didn't have any oil. In their deep off shore they have just now discovered something that people are now saying may be as large as the North Sea. They didn't know it was there.

Senator CANTWELL. Not to have a debate, Mr. Chairman, but we, yes. We've had Brazil. Guess what? Did we see the price go down? No, we didn't.

Since Brazil's discovery we've had the ride of our lives. America cannot continue to have this kind of roller coaster.

The CHAIRMAN. Senator Corker.

Senator CORKER. Thank you, Mr. Chairman. I thank all of you for your testimony. The thing that I'm struck most by in your testimony is the commonality and that is that each of you seem to believe that we need to do all of the above.

I've just gone through and experienced with others to help craft a bill. We had a rule that said that unless everyone agreed, even though some of it may be hard to digest, it would not occur. As I listen to you and here we have a representative from big oil, ok. We have a representative, if you will, from the geeky side of energy, Mr. Reicher. We're glad you're here.

[Laughter.]

Senator CORKER. We are glad all of you are here. You have various, certainly varying backgrounds. I would like to ask the question. You've listened to each other's testimony. Do you disagree with anything that and I know you might weight them slightly different and that's what compromise is all about.

But is there anything that you disagree with that one of the other witnesses might have said? Yes, sir? Big oil.

[Laughter.]

Mr. ODUM. So maybe consistent with the way you ask the question, largely the answer is no. I don't think there's an inconsistency. I think this response that I hope is coming through, it's not this verses that. It's we need to do all of these, is important.

I think, if I could go back to the game changer comment. I hope that the game changer here is that we set a policy in place that's looking 20, 30, 40 and 50 years out and saying where does the U.S. want to be at that point in time and that we stick to that policy. Because we'll have lots of variation in between, but we have to stay focused on that long term picture.

Senator CORKER. Are there any disagreements? The geeky side is coming up.

Mr. REICHER. Again, the way you phrased the question, we do need to do everything. It is, though, the relative waiting when it comes to Federal policy, when it comes to appropriations, when it comes to tax incentives, when it comes to how we support R and D. We have limited time. We have limited capital, both public and private, so that—the devil is unfortunately in the details.

But indeed, we do need a broad portfolio going forward. If I had to weight this, I would say the big opportunity to first cut demand, lower what we need. So whether it's traditional or alternative supplies that we then meet remaining demand with, we lower those needs as well.

So cutting demand whether it's respect to transportation fuels or electricity, we've got to do that first. It's the low hanging fruit. Low hanging fruit grows back. There are always continuing opportunities that come up as a result of technological progress.

So that to me ought to be the going in for all of us across the board from the traditional to the alternative side.

Senator CORKER. Mr. Chairman, I know I have a little time left. I'd just like to say that these are really diverse witnesses and they each have said that we need to all of the above. I am absolutely convinced that if the Senate decided, that if leadership decided, that we really wanted to pass an energy bill, that we could pass an energy bill with 70 votes. I believe that with all of my heart.

I just hope that this summit leads to us, whenever leadership decides it's in the best interest of the Senate, that I hope that we will actually pass a bill. I thank you for having this. I think this testimony has shown from 5 very diverse people that in the energy community, that people that actually focus 100 percent of their time on energy, there's lots of commonality. I think that commonality is represented in the Senate too. I thank you for this hearing.

The CHAIRMAN. Senator Pryor.

Senator PRYOR. Thank you, Mr. Chairman. Thanks again for holding this hearing.

Mr. Odum, let me start with you, if I may? In the Congress right now, there's several proposals floating around about drilling. I think the House has a proposal, maybe a Republican proposal. I think that Senator Bingaman's working on a proposal. There's been several Senators grouped together in a bipartisan group.

By the way, Saxby, what's our number now? We started at G-10. Are we at 20?

Senator CHAMBLISS. We're at 20 today and growing.

Senator PRYOR. Twenty today and growing. So we have 20 plus Senators who are working together on a bipartisan solution. But let me ask you, if you could help us, all of us in the Senate understand about drilling. This is something that our group has talked about.

How much new drilling can the industry handle let's say over the next 7 years? I'll just pick that number. I mean some proposals are let's just open up all the Outer Continental Shelf, some are let's take the East Gulf Coast and maybe some other areas.

I think the group of 20 Senators, we've really talked about we want to go where we know where oil is and you have some infrastructure and some ability to get to that oil relatively quickly. So help us work through that if you can. How much should we open? How quickly should we open it?

Mr. ODUM. A couple of views on that. Where I would start is that I think what we shouldn't underestimate is the industry as a market, the industry's response to the higher prices and the higher demand for energy. I don't know that a lot of that response is very visible yet. But we can already see it on the demand side, for exam-

ple. You know, demand for oil being down over 900,000 barrels a day in 2008.

The industry is responding in a similar way. The piece I have pointed to is an example lately is the, and these are rough numbers, but deep water rigs, there's a lot of production. We talked about off shore and how important it is. Deep water rigs, there's 30 of those in the world right now and they're all 30 working, every one of them.

Senator PRYOR. Right.

Mr. ODUM. But in the next 5 years they're going to be somewhere between 80 and 90 deep water rigs because those are being built all over the world. So is the industry stressed in terms of infrastructure? Yes.

Is it stressed in terms of having enough people to do all of this work? Yes.

But there is a response to that and that is what's happening and during the process of opening up areas for leases, doing the proper environmental studies that you do before you open those areas, is the time that will be used to build up that infrastructure.

Senator PRYOR. Does it make sense to you though that we go first to where we're fairly confident that there is oil and infrastructure? Is that a good place to start?

Mr. ODUM. I do think it's, in terms of the quickest production that could come on. The closer you are to infrastructure, the better off we're going to be. I think that's true.

I think, you know, I'll go back to something I said in my statement. I just can't help it, which is we have areas that are open now, but we're being blocked from actually pursuing. I don't think we should lose sight of that either and that was my off shore Alaska example.

Senator PRYOR. We're aware of that. We've been talking about that in our group. Let me ask the group, all the panelists if I may a question.

That is in our group of 20 Senator's bill that we're proposing. These ideas we put out. I don't know if all of you all have seen sort of the concepts that we're all talking about?

They sound very consistent with what all the panelists said today. But one of the things we call for is an Apollo style project to try to get our vehicles off of oil. I think the goal we set is over the next 20 years we want to see at least 85 percent of all new vehicles sold in the U.S. use non-petroleum fuel sources.

First I'd just to hear from the panel if you think that is a good goal? Is it something we should as a matter of public policy pursue? Then second, I just like to hear from the panel if there's any concerns that you all have with the G-20 proposal as far as you know.

Mr. Deutch.

Mr. DEUTCH. Senator, I, first of all want to say how unfortunate I think it is to use analogies like Apollo Project and Manhattan Project for these kinds of issues. Those technology driven projects which were so successful in our country's history occurred in a completely government sector creation, application and execution. Here we're talking about having a technology deployed into a real economy where people are, you know, making consumer decisions.

So I just want to say that the issue here is much more demanding. That's the first point. The second point, I would also want to caution against specific targets, percentage targets. As again, as I mentioned in my comments I've been embarrassed about overly optimistic targets in the past.

The third point has to do with actually how are you going to displace the use of petroleum or natural gas in vehicles? I would say here the group should have a responsibility of tracking that they actually have the electricity, production, storage and distribution to carry it out as it grows. I think you are going to have some real strains if you really have the kinds of numbers you were referring to at producing in the United States the electricity generation capacity that you have in mind because I don't think we have an environment for new coal plants or for new nuclear plants.

As we know the renewable, geothermal and other electricity generating technologies are coming along slower. So I ask you to pay attention. When I looked at the plan, I haven't looked at it in great detail, I was worried about the accompanying management of the electricity supply.

The CHAIRMAN. Senator Chambliss.

Senator CHAMBLISS. Thank you, Mr. Chairman. Professor Deutch, I think what you just said just highlights the complexity of this issue. I'm more, frankly I'm disappointed that this room is not packed with all 100 Senators because as we think through this a lot of times things seem simple. You just produce more oil. You manufacture more gasoline. All of a sudden the price comes down.

But you just hit on something that is so critically important that I do wish that all Senators were here to hear that. Because it highlights, to me, and as we've been through this dialog over the last 3 months in our group, how truly complex this issue is.

Mr. Odum, I want to get back to you on a two part question. One thing that I hear about as I'm back home, well obviously, the No. 1 issue, the No. 2 issue and the No. 3 issue is gas prices. But one thing I consistently hear from folks is that we haven't had a refinery built in this country in 25 years. We need more refineries built. I'd like for you to address that as to whether or not you do have the capacity to manufacture additional supply.

Second, well, let me let you address that first. I don't want to complicate my second question.

Mr. ODUM. I'll try to keep the answer just as straight forward. As a company, I'll start by saying that we, along with our partners, are investing \$7 billion in a refinery in Texas on the Texas Coast, unfortunately in the path of the hurricane as we speak. But that will effectively increase the size on the order of a new refinery. It's an enormous project.

I think what should be done is an assessment of all the expansions that are taking place across the U.S. I think what you'll find is there is quite a bit of investment in refining capacity.

The second thing is to look and just to make sure we all understand how difficult it is then—that's a brown field expansion, of course, how difficult it is to build a refinery in a green field area to get a permit. Then be allowed to make that investment to build a refinery is very challenging, which is why we're focused on existing facilities and expanding those.

Senator CHAMBLISS. Second question, from an oil company perspective. Obviously you're in business to make money. But I think you're also clearly in the business to try to provide an energy source to your customers.

What, from an oil company perspective, can be done immediately to help lower gas prices? I don't mean over the next 30 days. I mean, I'm talking about realistically whether it's 12 months or 36 months, but short term, from an oil company perspective. What do you think could be done?

Mr. ODUM. I really wish I had something on the order of a magic answer to that, which I don't. So I think it's the things that we've already mentioned on this panel. It's efficiency and conservation are going to be the most near term, significant impacts that we can have on prices. I think beyond that it goes very quickly to the all of the above answer in terms of we need to bring the accessible oil and gas resources online as quickly as we can, but be working on these alternatives at the same time.

Senator CHAMBLISS. Right. There again that goes back to Professor Deutch's answer there that this thing is so complex and we've tried to address all of the above. I think it's the only legislation that's out there right now that seeks to do that. Obviously you're going to get a lot of criticism when you seek to address all of the above.

Dr. Yergin, I was recently made aware of a MIT study which concluded that speculative activity in the futures market was the driving force behind the increase crude oil prices. The study largely dismissed any relevance associated with the weak dollar, the political instability in some producing nations and the basic supply and demand situation. I'm curious to know whether you agree with this particular study's conclusion that a speculative bubble is the leading cause of the price increase and that these other factors, such as the dollar, such as production and instability in those countries and supply and demand for sweet, crude oil had little, if any impact on both the rise and fall of crude oil prices over the summer.

Mr. YERGIN. I haven't seen that study. I've just heard about it. I think that's probably not one of Professor Deutch's studies but from somebody else.

I think it's kind of absurd to say that. Look, in my testimony I cite the Federal Reserve that says between 2003–2007 a significant part of the increase in the price of oil before the final run up was because of the weakening dollar. So to dismiss the dollar seems to me to not make any sense. To dismiss demand is truly absurd because what we've had since 2004 is a demand shock.

In 2004 Chinese oil demand went up 16 percent. We went into 5 years of the best economic growth that we've had in a generation and low and behold the best economic growth in a generation with China and India coming into the picture was going to drive oil demand. I think, so demand, I think has actually been the starting point.

There are a lot of other things on top of it. I don't know if the study also dismisses disruptions in Nigeria losing 40 percent of their oil. Venezuelan capacity being down a million barrels a day. Mexican capacity going down. Russian production flattening out. I mean, so these are all part of this mix and those have been very

significant. So in short hand I would say I look forward to reading that study.

The CHAIRMAN. Senator Ben Nelson.

Senator BEN NELSON. Thank you, Mr. Chairman. Hopefully as a result of this effort and the gang's efforts we'll move from trying to score political points to finding solutions to the challenges that we all face and the questions that are raised when we go home about the energy issues. What we're going to do to find solutions. Hopefully this will help us along in the course, I think, that's been charted.

As we look at the efforts to find new sources and we look for new solutions and new technologies it's reasonably clear that we do face certain inhibitors and prohibitors to moving as quickly as we would like to. I'd like to ask a question, for example, on nuclear. Even if we were able to move the number of permits consistent with the applications as quickly as possible, is there U.S. construction capacity to build 23 nuclear plants in the United States in a reasonably short period of time?

I want to get to the nuts and bolts of what we're talking about so that we realize that no matter what policy we set forth, we have to deal with the reality. I'm not negative about it. I just want to be realistic about it. Would anybody like to respond to that?

Professor Deutch.

Mr. DEUTCH. We have looked at this in our MIT study on nuclear energy 2003. We're redoing that study right at the present time. It's no question about the fact that there is ability to build nuclear plants in this country.

I would say to you that 20 plants would take a good deal of time. I would also point out that—

Senator BEN NELSON. Can you be even more specific than a good deal of time or?

Mr. DEUTCH. It would certainly take and I might want to give you a more precise answer. It would certainly take 15 years, something in that order.

But what I would like to say is we've really reduced the amount of domestic U.S. industry expertise in nuclear energy. That would have to be built back over time if it's going to be a major contributor. That is if it's going to maintain its 20 percent contribution for electricity into the future.

So we have some questions about how to rebuild our domestic nuclear industry and not just rely—

Senator BEN NELSON. We could accelerate it, but there would be certain limits on how fast we could accelerate it.

Mr. DEUTCH. That's correct.

Senator BEN NELSON. Would it help if we took the approach that I understand the French are taking more of a standardized plant or a cookie cutter approach so that every new application doesn't have to involve the technical review that it gets today?

Mr. DEUTCH. Yes, but I think that is happening, sir. I think the industry and the NRC are and the Department of Energy are going for a standardized plant designs by two or three manufacturers. The real fact is we can do better. One plant per year would be nice. We don't have one plant under construction right now, but we have some capacity. A lot has to be done.

Senator BEN NELSON. How fast will standardization accelerate the permitting process? Because the rumors and some facts would indicate that it may take twice as long to get a permit as it does to build a plant.

Mr. DEUTCH. Senator, I want to say something. This goes back to a remark made by Senator Domenici. When I talk about the barriers to expanding the deployment of nuclear it is not principally because of licensing.

It has to do with the cost of these plants. It has to do with issues of giving confidence on waste management. There are several other elements that are required before nuclear really takes off. I did not ever imply nor do I believe that the most urgent matter is to get licenses out of the NRC quicker. It's these other issues that I think are important.

Senator BEN NELSON. But some of the staffing problems that were mentioned and making certain that we have them in the budgets of the agencies are adequate to take care of the technological work would apply to the electricity grid as well, would it not?

Mr. DEUTCH. Yes.

Senator BEN NELSON. Do you have any thoughts about whether there ought to be a single agency in charge of citing, permitting, so that it doesn't get caught in the bureaucracy between DOE and FERC?

Mr. DEUTCH. I'm going to get myself into trouble here.

Senator BEN NELSON. I'll try to help you out.

Mr. DEUTCH. I would say I'm a great believer that FERC should have an authority on nuclear, on all electricity, licensing—

Senator BEN NELSON. Citing.

Mr. DEUTCH. Locations, grid, you know, like we have for natural gas, ability to set high grid power lines. I think the authority for FERC should be greatly expanded in this regard relative to the states.

Senator BEN NELSON. If you don't do that, won't you be in a constant position of ambidextrous, ambiguity between the various agencies? The left hand doesn't know what the right hand is doing or they're at odds?

Mr. DEUTCH. That's my opinion, yes, sir.

Senator BEN NELSON. Is there any other opinion?

The CHAIRMAN. Please make the opinion brief.

Mr. REICHER. We're talking about two different things. One is nuclear licensing which I'm assuming we're continuing at the NRC. Then in terms of transmission citing we're talking about FERC.

I would agree that greater authority on the part of the FERC to build transmission capacity is important, but environmental standards, we're going to have to deal with State interest. But we need to build up transmission capacity in this country if we're going to have any hope of taking advantage of renewable capacity.

Senator BEN NELSON. Thank you for dealing with the nitty gritty. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Voinovich.

Senator VOINOVICH. You talked about the fact that the world has changed. I look at the geo-political situation that we're confronted with. A couple of years ago I attended a session of the National De-

fense University. I walked out of there quite frightened about the security implications of our being relying on foreign sources of oil in terms of interruption in the flow of oil to our country.

What I wonder about is if you look at the fact that someone else controls the price and the supply and then take into consideration that we're sending \$600 billion, that's what they're saying, overseas. About 60 percent of that is being picked up by OPEC nations. If you look at our national debt that's growing, it'll be over \$10 trillion. Since 2001 it's gone up 40 percent or more and 70 percent of its being purchased by the Japanese to Chinese and OPEC nations.

One of the things that's of concern to me is that this all has some national security implications. If somebody controls the cost of something that's very valuable or can control the supply of it, and they're also at the same time buying your debt and if you were in the business world you're probably going to put that company out of business. I know it's a little more complicated than that.

But I don't think the national security part of this has been given enough priority in terms of our considerations. I've talked about, you know, for years in the Department of Public Works Committee and I keep talking about harmonizing our energy, our environment, our economy and our national security. For some reason we aren't able to do that. That's part of the problem why we can't get legislation passed.

So I'd be interested in. Is this dimension something that's of concern to any of you or am I just exaggerating it? I'm talking about more/less energy, you know, conservation, all the things you're talking about. But I think there seems to be more of an urgency here than we're giving.

Mr. DEUTCH. Mr. Chairman, may I? First of all let me say that the first time I appeared here Scoop Jackson, this was his major point about the connection between energy and national security. I couldn't agree with you more about the severity of it. It's increasingly strong connection.

Again, my colleague, Jim Schlesinger and I have been talking about this. It is influencing our foreign policy and our freedom of action to pursue our other foreign policy objectives around the world. It is of major concern.

The issue is we can't do away with it because we are dependent and our allies are dependent. It is something that has to be managed and it has to be managed more carefully and more consistently.

Mr. YERGIN. I would add to that. We talk about the economic cost of high oil prices. There certainly is as your suggesting, a geo-political cost. That cost is also quite high.

Look at what's happening in Latin America in terms of the shift. Look at the shift. It's about \$500 billion a year that we're spending on oil imports, some of that going to Canada and so forth.

But we're seeing all together a shift of income on something like \$2 trillion this year from the oil importers to the oil exporters. With that goes a lot of power. I know Frank Verrastro mentioned the National Petroleum Council's study.

Two trillion is a big number. It's worth keeping in mind. Frank headed the geo-political part of the National Petroleum Council

study and I know that that was a very big part of it that you wrestled with.

Mr. VERRASTRO. Yes. If I just might add one thing. In the concept that the world is changing, the G8, the developed world, in 1997 controlled 65 percent of global GDP. By 2007 it was 58 percent and the projections are by 2015, it will be 45 percent.

So there's this emerging group of countries that will have more political weight, more leverage. Some are producing nations. Some are consuming nations. The landscape is changing. In that context I think the rule is changing.

I was also on Dr. Deutch's study at the Council of Foreign Relations. This idea of integrating energy policy into foreign policy, trade policy, economic policy, environmental policy, we like to have these silos. But as a practical matter, energy is a strategic commodity. It's being played around the world that has a lot more component pieces.

The CHAIRMAN. Next is Senator Conrad.

Senator CONRAD. Thank you, Mr. Chairman. Thank you so much for organizing this. Thanks to the witnesses.

We've been engaged in this effort that started as a gang of 10, 5 Democrats, five Republicans that then grew to 16 and now 20. We have other Senators ready to sign up in the coming days. We came together with the belief that it was urgently required that we act and that we act in a comprehensive way, that we don't do just one thing, that we don't bet the farm on one technology or one approach. But that we'd be broad based and that we'd look comprehensively.

So our proposal focuses on renewables and conservation and efficiency, electric plug in and geothermal and hydrogen and drilling off shore and nuclear and clean coal. Some of a lot of different things with none of us knowing precisely what has the greatest "bang for the buck" over time. But a belief if we plant a lot of seeds some of them will grow. That we absolutely have to have an ability to transition to whatever future technologies might be available.

Now, whether we have precisely the right goals or precisely the right numbers attached to them. I don't think any of us know. I think what we are confident of is that we have the only bipartisan, comprehensive approach. That other plans that are now coming along in many cases closely track what we have proposed. But none of them have the comprehensive approach that we have suggested.

In listening to each of you it sounds to me like all of you are endorsing a comprehensive approach. Can I just ask each of the witnesses if that's the case, if that's what you are recommending to us?

Mr. VERRASTRO. Senator, I think it is. The question is the amount of balance so those relative pieces here and the sequencing, I think, is important too. Conservation and efficiency, easiest to do, need to get started now. Technology, broad array and then keep in mind the timeframes that it takes to get things. You're preserving options for something else to come along.

Senator CONRAD. I think, Dr. Yergin.

Mr. YERGIN. Yes, I think the simple answer is yes. I think that's right. I think you said it, is that we don't know what's going to actually have the biggest "bang for the buck." We'll know a lot more

in 5 years. But to get to 5 years you've got to get going and we've got to be consistent.

Senator CONRAD. If I could just interrupt before we go to the next. On the question of efficiency, I just had a meeting in Dickinson, North Dakota which is in the middle of the oil patch. I had a man come representing a Fisher Industries.

They just had done an external review of all their operations to improve efficiency. They had somebody come in and evaluate all of their engines, were able to save 34 percent. Evaluate all of their lighting, were able to save 50 percent. Some of that lighting was only 1 year old. But they chose to replace it because they could get such greater efficiency.

So clearly that has got to be part of what we do. One of the things our group is now looking at is building codes because we've seen the very successful California effort and how dramatically their success was in savings there.

Mr. YERGIN. Senator, if I could say that one thing too. In terms of the balance that can have an impact. What you've just addressed is getting efficiency so it's not at the tail end, but that it is not something you can look at and say, this is efficiency. But when you add it up, it is a thing and to get it into that big piece at the top.

Mr. REICHER. Yes, and I would echo that. It's more than language. I think the better term is efficiency than conservation. Conservation is doing less with less. It's turning down the lights, putting on a sweater, sitting in the dark, whatever.

Efficiency is doing more with less. It's greater productivity that we can get out of our economy. The company you're referring to, they're going to do well. They're even going to do better. They've cut their costs. They're going to produce more. So language really matters in this regard. I would urge you to think in those terms.

The other thing is please don't forget the low income community, the people who really take in on the chin are people who are facing high oil and gas prices, who have to heat homes, buy electricity. You and I spend one or two or 3 percent of our take home income on energy. They can spend 15, 20, 30 percent.

We have unfortunately neglected the Home Weatherization Program. We've done 5 or 6 million homes. In 30 years, there are 28 million eligible homes.

We have put money into LIHEAP. But LIHEAP is a 1 shot buy down of energy bills. Where as weatherization goes in, 5 people's homes, and the returns are over 10, 20, 30 years.

We shouldn't be doing 100,000 homes a year. We should be doing a million homes a year for the next 10 years. At least get to a half or a third of the eligible families.

Senator CONRAD. You'll be pleased to know we have \$2 billion in this plan for weatherization.

The CHAIRMAN. Could you shorten your responses so we can get to a few more people here before we have the noon recess? Go ahead.

Mr. DEUTCH. The Energy Policy doesn't only have to be comprehensive. It has to be sustained. We've had problems both keeping it sustained and with your Fisher example, of efficiency in North Dakota points out the importance of best practice.

The government has not been good at having programs which it has deployed best practiced through the economy, especially to smaller companies and smaller businesses, which are usually less energy efficient. So getting best practice is very important.

Mr. ODUM. So yes to the comprehensive question. On the efficiency side, I mean, it is such an opportunity that when you talk about things and new energy sources that will create jobs. We have a new business around providing people with those efficiency ideas to large industrials and others. So it is a big opportunity.

The shift in technology in the future is to move that to the front end of the equation and think about how to build something, not just how to make it more efficient after it's built.

Senator CONRAD. If I could just make a concluding statement. We've also dedicated \$5 billion for battery technology because almost every expert that has come before our group said that is a huge opportunity for the country.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman. Gentlemen, thank you for your comments, your insights this morning. Hard to believe that it was just a couple months ago that we had a similar panel and it was sitting at \$145 a barrel and today it's \$100. Some would suggest, oh, the pressure is off.

I can tell you at home in Alaska the pressure is not off. We just had an energy hearing in the regional community of Bethel. The discussion about what folks are paying whether it's at the pump, it's six bucks a gallon at the pump.

Home heating fuel is anywhere between \$7 and \$10 a gallon. Food prices are absolutely astronomical, \$10 for a gallon of milk if you can get it. It doesn't make a difference the fact that we've gone down \$47 in the past couple months per barrel. The pain to the American public is there.

I want to ask a question about just the consistency and the predictability in our policies. I would suggest from the get go that there is not a lot of consistency, unfortunately or predictability for the industry. There in lies a part of the problem.

We do have to have solutions that are not either/or. We do have to have a comprehensive approach if we're going to advance a reasonable energy policy. We're struggling now as we wrap up this session with how we extend the tax credits for whether it's wind or some of the other renewables that are out there.

But in the meantime you've got an industry that says, are we on or are we off? What do we do? How do we invest?

There are some who are suggesting that if we should open up ANWR for drilling. If we do open up more areas off shore that in fact what will happen is the message then is that we're not really serious about the renewables and the alternatives because we can't get these tax credit extensions for more than a couple years. Then we send a signal that well, it's more of a focus on drilling.

How do we get out of this kind of fickle policy as it relates to the signals that are sent? You're saying, you're all saying that we need all of the above. We need to do more domestic production. We need to encourage that and enhance it. We need to go down the track of the next generation of energy which is alternatives and renewables.

But our policies are not helping the picture right now. What suggestions do you have? Professor, you're smiling like, well that's an obvious. Go ahead.

Mr. DEUTCH. It sounds to me like all 20 Senators who are here have exactly the same view of this that you just expressed, that you've got to do all of the above. So I'm saying if you all say we've got to do all of the above and it's all connected, there's not one piece of it that can go without the other. It doesn't make any sense. It should happen.

I mean, why isn't it happening? Because I couldn't agree with you more. You can't do this by selecting one thing. I'm impressed that everybody here sees that it's all of these things have to happen together.

Senator MURKOWSKI. Are any of you concerned that by doing more domestically when it comes to increased production that some how or another we're taking the ball off of advancing renewables and alternatives?

Mr. ODUM. I do think it's important to send the right signals. So I don't think they need to be incompatible by any respect. I do think it's exactly the way the message needs to be communicated is that we need both.

On the renewable and alternative side I think a more comprehensive program that allows for the kind of support those programs need early on in life, but have an understanding as to how then that would go way over time as you expect those technologies to develop. But a longer term picture would be part of that answer.

Senator MURKOWSKI. Mr. Yergin.

Mr. YERGIN. I've been writing a new book looking at the last 20, 30 years of energy policy. When you stand back and look at it you really do see. It's quite surprising how much it will change over a 3- or 4-year period in terms of commitment, non-commitment, stop and go.

But it sure seems to me that renewables need to address the production tax credit but have an awful lot of momentum, public support, venture capital money. It's a different environment for renewables than it was even 3, or 4, or 5 years ago. So I don't think there's a sense that they're going to be lost in the mix. The question is how to get them from being very small to start to being a significant part of the mix.

Mr. REICHER. I do think the on again/off again approach we have taken to incentives for renewables has been a big, big problem. Major investors come to the table, but pull back because you get a 1 or 2 year extension we've got to address it. It may not be that the tax code is the right place to be doing this.

Other countries do it in different ways. Feed in tariffs are used across Europe. If we have revenues from selling carbon credits, that may be another way to do it. The tax code that's so dependent on appropriations to find an offset, you know, that's a problematic way to be helping an industry get going.

But I do disagree some with Dan, the renewable energy industry is in a very immature state. It does need the support. Traditional industry does enjoy much more permanent subsidies.

If you look at nuclear liability insurance, it's a 20- or 30-year authorization. If you look at the oil and gas industry many of the sub-

sities there are in fact long term or permanent. This one or 2 year, on again/off again support we give to these emerging technologies just won't work.

The CHAIRMAN. Ok. We've got, let's see here.

Senator LANDRIEU. Mr. Chairman, could I ask if we could extend this ten after the hour?

The CHAIRMAN. I'm glad to extend it to 10 minutes after the hour. I may not be able to stay for the full time. We do have another panel starting at one.

So we will just proceed. If people could keep their questions short and their answers short, that will help. The line up I've got still here is in the order that people arrived: Klobuchar, Whitehouse, Salazar, Akaka, Landrieu, Lincoln.

Senator Klobuchar.

Senator KLOBUCHAR. Thank you very much, Mr. Chairman. Thank you for your leadership. I'm one of the gang of 20. As a former prosecutor it was hard to join, but I did.

I had our sign that Senator Conrad rejected of the E, you know, energy. But I had a question. The reason that it interested me, this proposal and the work that's being done, is I thought there was a reasonable approach to look at high potential for domestic production in certain areas. But also the thing that really interested me, that it was a bipartisan effort to try to extend the production tax credits.

I would agree with you, Dr. Yergin. It's been this game of red light, green light, on again/off again. There's actual studies showing how 8 months before it goes off the investment lags.

But the other thing that interested me was just the focus on the technology and trying to push that with cars and trucks. I thought you put it best, Mr. Verrastro, when you talked about, simply that I'm going to use that a 50 percent increase in efficiency turns \$4 a gallon gas into \$2 a gallon gas. My question is of maybe Mr. Reicher, Dr. Yergin, would be about where that technology really is. Because, you know, I've heard that maybe we have the technology, but it's a few years out or we're going to have to buy it from other countries or it's too expensive.

Mr. REICHER. So let me quickly say we built a fleet of plug in hybrid vehicles at Google. We converted Toyota Priuses and Ford Escapes. Our employees are driving them. We hired professional drivers to go and test them.

The Ford Escapes are getting 50 miles per gallon. The Toyota Priuses, plug in Toyota Priuses are getting 90 miles per gallon. We know how to build these cars. I do admit battery technology has some distance to go.

The good news is you have big automobile manufacturers from General Motors to Toyota stepping up and planning to build these. So this is near term technology. No doubt we've got to continue to improve some things inside.

But unlike, for example, a major move to hydrogen, for example, this is here today. So it does though require some government support. I do think incentives, like we provided for non-plug in hybrids, provided for plug ins would be very useful, continued R and D funding, Federal procurement for the U.S. fleet, all those things would help. But it's near.

Senator KLOBUCHAR. The idea here is to shift some of the resources and the incentives we've been giving to oil and to put some of those incentives into R and D.

Mr. REICHER. R and D and commercialization incentives. Agreed.

Senator KLOBUCHAR. One question on cellulosic ethanol. Minnesota is obviously like South Dakota as Senator Thune was explaining, has been one of the major areas for ethanol. We have, I think, 400 of the 1,200 pumps or 1,600 pumps that there are. We know how difficult it is, this chicken/egg possibility that we produce, but then there may not be enough vehicles that are flex fuel. Then there may not be enough places to get it.

So that's why this idea of developing these cars and trucks that are not only hybrids, but also are flex fuel, have the ability to go to flex fuel interest me. Also obviously going to the cellulosic ethanol, the next step with switch grass and prairie grass and LG and whatever we can do. My question is we have right now we're on E85, but there's some talk of looking at more blends going up from E10 to E20. That would be a way of doing this that would be more mainstream. Does anyone want to address that?

Professor Deutch.

Mr. DEUTCH. I think these are very, very important steps for the country to take. You can go to E80 without, E20, I'm sorry I'm going the wrong way, E20 without any problem. Cellulosic ethanol has a tremendous possibility in this country and it should be pursued as rapidly as possible.

Senator KLOBUCHAR. Alright. Thank you very much.

The CHAIRMAN. Senator Whitehouse is next and Senator Salazar you're after that. Maybe if you could preside for the balance of the panel? That would be helpful.

Then after you, Senator Akaka, Senator Landrieu and Senator Lincoln as long as the witnesses are able to stay and people still have questions.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Mr. Chairman.

Senator DOMENICI. Senator Whitehouse, would you yield for just a moment?

Senator WHITEHOUSE. Of course I would.

Senator DOMENICI. I wonder on our way out, are we going to startup again at one? Is that the plan?

The CHAIRMAN. That's the plan.

Senator DOMENICI. Then I will try to be here so we can start it together. If you would permit me as we plan to leave here to make one observation for the record. I really am pleased to hear that the panel, which is very divergent in many respects as to where they come from and where their interests have evolved to lay it almost to rest the idea that America—let me put a premise before us.

However we are going to go about diminishing our use of automobiles that use derivatives from crude oil as their source of energy, however we're going to do that. It seems to be the testimony that we're going to have to use crude oil for a long time, almost indefinitely and a lot of it and that we shouldn't let our supply fall from where it is now. We ought to try to keep it up.

I have been amazed, Mr. Chairman, at how many people have confused using American crude oil for this long term bridge, con-

fused that with, you shouldn't be using crude oil because you're trying to solve the problem of greenhouse gases. I mean, there is no question we're going to use automobiles. In doing that we're going to use our own crude oil or we going to use somebody else's. I think we finally got that that most people understand it.

But there seem to be some policymakers who just seem to say we shouldn't bring any more oil on board because we don't want to be using it. While you all seem to be telling us we're going to use it. I think that's a very important thing we finally have arrived at, Mr. Chairman.

Maybe there are some still out there that don't want to produce American oil, but I think we're getting there little by little and we've almost arrived at the time when most policymakers would concur. I think you've been part of leading us. I have. I'm glad we're there. I think it's desperately important we understand that issue.

The CHAIRMAN. Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman Bingaman. Gentlemen, we're in the middle of a near total mortgage system meltdown in this country. We have a health care system that burns 16 percent of our GDP in which the Medicare liability alone has been estimated at \$34 trillion. We're burning \$10 billion a month in Iraq.

This Administration has run up \$7.7 trillion in national debt by our calculation. There is worsening evidence everyday of global warming with worsening environmental, national security and economic ramifications.

In the light of those conditions do any of you seriously contend that drilling for more oil is the No. 1 issue facing the American people today?

[No response.]

Senator WHITEHOUSE. Now it doesn't seem so. If we're going to deal with conservation which strikes me as where most of the lowest hanging fruit and the highest return investment exists at this point, particularly immediately. We're looking for as practical suggestions as we can get into this legislation as it moves forward.

I've heard you talk about weatherization. I could not agree more. I think electric vehicles presents another huge opportunity. Are there other, even potentially smaller and more technical areas where you think there's room for what I might call a quick fix or something that isn't too heavy a lift that will make things right?

One example that comes to mind is in the commercial real estate industry very often the lease makes the operator entirely immune from energy cost in big malls and things like that. There may be a way to solve a specific technical problem like that. Could you give us a list of what you think are the best, quick, even if they're not big things, little things add up.

What are the best, smart, quick fixes that you can think of, even if they're not very big ones?

Mr. REICHER. Very quickly. More aggressive approach to applying standards, again, very boring, but if we could make our refrigerator—

Senator WHITEHOUSE. Boring can work.

Mr. REICHER. Boring can work. Boring has worked significantly. That's No. 1. I do think building codes. Building codes. Building codes, there's just extraordinary things you can do with that.

A third thing I would say is using information technology to better monitor and manage our energy use. You're seeing the emergence of that from all sorts of companies. I think that's going to be very interesting. If the Federal Government did its own procurement and its own building, its own operations, took much more of a lead than it is today, 500,000 buildings, 500,000 Federal vehicles. That could be 2 percent of all U.S. energy use could be a great laboratory.

Senator WHITEHOUSE. Professor Deutch had his hand up also. If you could touch briefly before you go on whether the metering in homes is something we should look at to a two way time of use and so forth. The meter in my house is a pretty antiquated piece of technology compared to almost any other piece of technology. It seems to be holding back the IT development.

But Professor Deutch, let me ask you first.

Mr. DEUTCH. The word quick sort of startled me because I think one important area is batteries for storage. I mean that really is an important point, but it may not be quick. I do recall that at one time the United States had a 50 mile per hour speed limit. That would give you immediate, enormous gains. I don't know how that would go down with the American people, but I will tell you that it would—

Senator WHITEHOUSE. Have you been on an American highway recently?

Mr. DEUTCH. But I will tell you that that would have an enormous payoff. With respect to smart metering in homes, I think that that's coming. It will have tremendous effects. It's certainly one of the things that Mr. Reicher has proposed. Again, will not come quickly, but it is extremely important and will have effects.

Mr. YERGIN. One quick thing that might make a difference. I don't know what the state is on for finding support for it, but within the Department of Energy is the demonstration, the group that can work with small and medium sized businesses to simply teach and communicate with them. I suspect that those are one of the things that funding goes up and down for and mostly down.

Senator WHITEHOUSE. My time has expired. I thank the Acting Chair.

Senator SALAZAR [presiding]. Thank you very much, Senator Whitehouse. Let me ask a couple of questions and then I think there's four or five other people that still want to ask questions so with the patience of the panel, Senator Akaka will chair the hearing after I leave because I have to leave in just a second.

Let me say first I think that what we have seen from all of you as a panel and I thank you for your testimony here today, is that there is an agreement on a lot of what we have to do. The question is whether or not there is a willingness and the political courage to do what it is that you as experts would ask us to all do. I think that's part of what we're trying to do with our gang of 20, or 24 now, that is trying to pull together a comprehensive energy package that is not a stop and go, but it is comprehensive and sustainable over a long period of time.

I have a couple of questions to ask of you. Let me just ask this one of Dr. Yergin and Professor Deutch and that is with respect to coal. We talked about hybrid. We talked conservation, briefly on that. We talked about some of the new technologies like hybrids and hybrid plug ins and things that are no-brainers that we ought to move forward with.

The question is, I think, Mr. Reicher raised has to do with whether electricity going to come from for these new national vehicle fleets. We're going to create nuclear coal. Those are possibilities.

My question is about coal because I think we have the types of coal resources. Coal is to us and oil is to Saudi Arabia. Our problem is that when you put the triangle together that I think you were describing, Mr. Verrastro, we have the carbon problems that comes with the burning of coal.

You said in the 2004 that we were going to move forward with carbon capture and sequestration and develop clean coal. I don't see frankly much of that happening, not a single demonstration project of any significance going on around the country. So is there a role for us to try an include a carbon capture or sequestration clean coal technology in a very major way as we move forward with energy policy.

Mr. YERGIN. Professor Deutch just finished his big study at MIT and has thought a lot about it.

Mr. DEUTCH. Bluntly put, there is no solution to our energy future without using coal. If you're going to use coal in a responsible way, we have to do carbon capture and sequestration. We're woefully behind.

Senator SALAZAR. Let's agree on that point then, Professor Deutch and let's say what is it then that we as the U.S. Senate should do?

Mr. DEUTCH. I believe that the program which is in place now for sequestration demonstrations in the Department of Energy is too small. Too small in both in terms size of projects, the scope of each project is woefully inadequate in terms of monitoring and verification and site selection. The process for setting a regulatory framework where you as a citizen and I as a citizen will be happy to have the CO<sub>2</sub> sequestered in saline aquifer has not begun to take place. So we're way behind.

Senator SALAZAR. The essence, Dr. Deutch, is that I share this with Senator Bingaman and Senator Domenici. Is that we're disappointed that we're not moving forward with the Department of Energy in that way in a more robust way to try to deal with clean coal technologies and carbon sequestration.

Let me ask you another question because of the shortness of time here and that is with respect to oil shale. I heard you, Mr. Verrastro, talk about oil shale and tar sands being very much a part of our comprehensive energy program. In the 2005 Act we did adopt an oil shale research and development program which is underway in my State where 80 percent of the oil shale is located in oil shale reserves.

We have six pilot projects that are underway and a lot of research and development in situ processes that are moving forward, but so many unanswered questions. How much energy is it going to take to heat up the shale to take the kerogen out of the shale?

How much water is it going to take to do all of that, just from your point of view?

I would imagine you're familiar with the regulatory program we had in place with the research and development and leasing program. Is that an adequate program for us to move forward with the development of oil shale? Why don't I start, Mr. Verrastro, with you?

Mr. VERRASTRO. Senator, I think you fit two of the pieces together. The climate change piece to me is the game changer.

I'm going to get to oil shale in a second, but one of the things that happening now that you're going to see next spring. We've stopped the development of at least 30 coal-fired power plants that I'm aware of because of either uncertainty or increased cost or regulatory burdens. We can't scale up nuclear in time.

Renewables have a great piece, but we have to solve the intermittency problem, the near term fix if demand stays high, is the compressors. We're going to go to gas. So while we have increased domestic production of gas we're going to use a lot more of it than we think we are and if the price goes up people are going to see in their electricity bill the increased price of gas just like we saw with oil.

On the issue of shale, after I left the government I worked with Tosco before I went to Pennzoil. So I'm familiar with shale in Colorado. There's a couple of different kinds of shale. Technology has certainly moved.

The big difference between the Green River Basin and the Bakken, for example, is that with horizontal technology now you can actually go in, if the rock is permeable and porous and push the oil through and produce it as liquid conventional fuel. In Colorado if you have to mine it and re-tort it. There are other problems but technology is moving and actually Shell has a project where they actually heat the subsurface for several years. They heat it up so that you can move it in a liquid state.

I think the technology funding has to go forward, but it is a question of priorities and timing. So as we go forward this whole climate change debate has to be rolled into the security debate.

Senator SALAZAR. Any other comments? Let me just thank all of you. Senator Akaka, it's your turn for questions, also your turn for chairing the Senate.

Senator AKAKA [presiding]. Thank you very much, Senator Salazar. Let me say thank you to the panel, an elite group of experts in energy. Many of my questions have been answered.

Just one that has been on my mind, I'm looking for the best way, and this has to do with policy. The best way to incorporate carbon reduction policies into a national energy policy to ensure consistency and we haven't been consistent. There's no question about that. You reveal that. But my question, what is the best way to do that, to incorporate carbon reduction policies with our energy independence and cost and reliability objectives?

Mr. DEUTCH. I think the single most important thing we could do is to set a significant charge for carbon emission from all fossil fuel uses, in transportation, electricity and elsewhere. There are two ways of doing that, the cap and trade system or a carbon charge directly. I would be happy with either one.

I think that's a question about which goes down better. I think there are reasons to prefer a direct carbon charge with recycling of that money to the economy. But that is the single most important thing we could do. Incidentally, it would permit you to get rid of a lot of other regulations because once you have a carbon charge, you add some of these offer incentives we've reached, more would be redundant.

Mr. REICHER. Senator, I would add just from a jurisdictional standpoint one of the challenges you face is the Department of Public Works has authority over that kind of regulation. Senate energy deals on the energy side of this equation. I think we've really got to take a more integrated approach to how we're going to deal with these, this mix of energy, environmental and economic and security problems that you've heard from the panel. Setting the price on carbon is not going to be adequate.

These energy fixes we're talking about are not going to be adequate in and among themselves. We need to do both. From a political standpoint these need to be integrated analytically and beyond.

Senator AKAKA. Thank you.

Senator Landrieu.

Senator LANDRIEU. Thank you all very much. I want to really again just say how pleased I am with the outcome of the summit. I was one of the ones that encouraged the summit to take place.

As a member of a group that has been working for the last several months. Our group has grown from an initial 10 to now 20 with Senator Conrad and Senator Chambliss who have given extraordinary leadership to this group. We have many more Senators very interested in our comprehensive approach.

Let me ask the question. Senator Whitehouse was a very experienced prosecutor, deftly crafted his question to get a non-answer from you all. But let me try to ask it this way.

Again, you stated this, I believe several times, but I did hear you say that more domestic production is essential to this challenge before us. Is that correct or not correct?

Mr. YERGIN. Senator, let me first say that down here at this corner of the table we have the strong sense that we haven't quite come to grips with that question. Now you explained why we couldn't do it.

Senator LANDRIEU. He is very crafty.

[Laughter.]

Mr. YERGIN. We're sort of saying what happened here. How could we miss that?

I don't want to speak for everybody, but my sense is that we're all saying that it goes back to either/or that domestic production is certainly part of the picture. If we look at the U.S. energy balance, I mean where else? I mean we're going to have alternatives, renewables. They're small, but growing, great potential for technological change, big conservation has a lot to offer.

Then there's conventional energy which is where most of our energy comes from.

Senator LANDRIEU. Mr. Reicher, let me ask you. A group of Democrats, and I am one of them, but there's a group to the left, way to the left that really appreciates your focus on this. So I want

to ask you this question. Do you believe that more domestic production is a part of this equation?

Mr. REICHER. We clearly are getting most our energy today from traditional sources. I expect we will be, that will be the case for some number of years into the future. So do we need to be producing more natural gas in a responsible way, domestically? Yes, I think that is something we need to be doing.

Senator LANDRIEU. Do you think we have to produce more oil domestically at least for the next 5 or 10 years?

Mr. REICHER. I think you know we have a limited domestic supply of reasonably attainable, economically obtainable oil. So I just think the risk we run here is that if we overstate what we can do domestically in terms of our oil supply. What results from that is we take our attention away from real options that I think we've all stressed which is what can you do with efficiency on the front end to lower demand.

What can you do in terms of vehicle technologies?

Senator LANDRIEU. Professor Deutch. Go ahead.

Mr. REICHER. Let me just add one more thing.

I do think that there are base load renewable resources. I mentioned geothermal being one of the major ones. I think biofuels offer a significant opportunity. So I just want to be sure that as we push for more domestic oil production let's be realistic about what we really can increase. Let's make sure that we don't in the process take our eyes off some of these, probably more significant, opportunities we have.

Senator LANDRIEU. I think you heard from the group of us that that is what we're trying to accomplish, is a balance between pushing for more domestic reserves of oil and gas as we push for these other efficiencies that you have so eloquently spoken about.

But Professor Deutch, would you please comment on this limited domestic endowment issue. Because I really take issue with the charge that we hear around here that there's just not enough oil and gas anywhere to do any good. I point to the Gulf of Mexico, which I'm familiar as you might imagine representing the State of Louisiana, that in 1982 the estimates from MMS were that there were like 3 billion barrels of recoverable oil in the Gulf. We've been drilling for 20 years since and today that estimate has now gone up to 30 billion barrels of recoverable oil.

So would one of you or any of you comment on is it true or have I been misled that technology is enabling us to find more domestic sources than we thought we had before of both oil and gas?

Mr. DEUTCH. Senator, I think it's clear that over time we've been using up our conventional oil and gas in the lower 48 and the Gulf and even in Alaska. As we use up the conventional oil and gas low cost production, we have to go to higher cost methods to either find new oil or get more oil in place out. So the trend, there's obviously more oil and more gas reserves in the United States and off its coasts, so you have plenty of oil there to pay the cost of getting it done.

But I want to underline that doing something to increase U.S. production of natural gas and oil is an integral part of a comprehensive approach to our energy future. You cannot do it by growing it or walking around it. Especially it is impossible to go

to countries in the Persian Gulf and say you must increase your production if they don't see the United States making some effort to keep up its production.

So I want to be clear that something has to be done to improve our production of oil and gas in the United States.

Senator LANDRIEU. Dr. Yergin.

Mr. YERGIN. Yes. I think the point that we're asking other people to increase their production. Frank mentioned the numbers in the growth in world demand. But we don't necessarily want to be part of it.

I think when you look at the history of it, you see there's always this pessimism and technology changes. It changes on the alternatives and renewables, but also changes in terms of the production of oil and gas. Discoveries are made and then it turns out the ultimate recoverable reserves are much greater because you learn more about the field.

So that the kind of estimates that are there now for other off shore areas are very preliminary. I think the other thing that gets lost in the discussion goes back to something very important Frank has said. If coal becomes more limited, nuclear doesn't happen with the speed that people might anticipate, that means we're basically going to burn more natural gas and electric generation. That's the course we're on.

When you explore off shore, you're not only exploring, as you know, for oil, you're also exploring for natural gas. So you're also exploring for keeping the lights on. So, you know, it's not only what we're going to put in our cars, but it's also the electricity side of it. I think that often gets lost in the discussion. That's going to be very important issue.

Frank mentioned what we might be looking at in terms of electricity.

Senator LANDRIEU. Thank you. As a pro-drilling Democrat I couldn't think of a more positive note to end on. Thank you very much.

Senator AKAKA. Let me thank the panel very much for your valuable responses and your contribution today. Thank you. This panel is concluded.

[RECESS].

The CHAIRMAN [presiding]. Ok, thank you all for coming back together here. This is the second panel on our energy summit. We'll try to have the same format here and ask our speakers to summarize the main points they think we need to try and understand in 3 to 5 minutes each. Then that will give us a chance for questions by Senators.

I hope we have a group of Senators who are still planning to arrive here. As I think we're all aware, as the Friday afternoon progresses it gets a little harder. We have a very distinguished group of folks to testify on this second panel.

Mr. John Krenicki, who is the Vice Chairman, President and CEO of General Electric Energy Infrastructure.

John Rowe is the Chairman and CEO of Exelon Corporation.

James Roberts is the CEO of Foundation Coal Corporation.

Douglas Steenland is the President and CEO of Northwest Airlines.

Mr. Gary Cohn is the Vice President, Managing Director and Chief Operating Officer of Goldman Sachs. Thank you very much for being here.

Rick Wagoner is the chairman and the CEO of General Motors Corporation. We very much appreciate you being here.

Let me just, before calling on the witnesses to make their statements, let me see if Senator Domenici had a statement he wanted to make.

Senator DOMENICI. Mr. Chairman, I do not other than to say thanks to the witnesses. We've been asked to hold this event, you and I, by our leadership. What a response we've received when people like these take of their time.

I hope some Senators come to share with us the opportunity we have to talk to those who are in the trenches in a real sense and a big part of the energy policy and energy problems that confront our country. I thank you for presiding. I'll be here for as long as I possibly can.

Hope that the witnesses know that we will consider what they say and what they share with us that's particular to their businesses. We clearly understand that that's appropriate and that's why you're here, to share what you think that you know about this energy crisis based on your reputations and your work. We thank you for that.

Thank you, Senator Bingaman.

The CHAIRMAN. Thank you very much. Let me just say at the outset that all of the written statements that have been developed here will be included in the record in their entirety. So Mr. Krenicki, why don't you go ahead and start. We'll just go across the panel.

**STATEMENT OF JOHN KRENICKI, VICE CHAIRMAN, PRESIDENT AND CEO, GENERAL ELECTRIC ENERGY INFRASTRUCTURE, ATLANTA, GA**

Mr. KRENICKI. Ok. Thank you, Mr. Chairman. I'm John Krenicki. I run the energy businesses for General Electric. I appreciate the opportunity to participate in today's energy summit and would like to commend you and Senator Domenici for your leadership in attempting to forge a bipartisan response to our current energy challenges.

GE's energy businesses offer a diverse portfolio of products and services in the area of fossil power generation, gasification, nuclear, oil and gas, water, transmission distribution, smart metering and renewable energy technologies such as wind, solar and biomass. I know policies for all of these technologies are of interest to you and your committee. But today I would like to focus on just one in my opening comments, the production tax credit for renewable energy.

By the time the gavel falls on the 110th Congress the world will know the answer to a very important question, will Congress and the U.S. Government be a reliable partner in the quest for a cleaner, more secure, energy future or not? Since entering the wind industry in 2002, GE has invested over \$700 million in technology, increased wind turbine production six fold and tripled our U.S. wind turbine assembly sites. We've expanded capacity from 10

wind turbines per week to over 13 per day. We have grown renewable energy jobs at GE to more than 2,500.

GE has also tripled the number of its suppliers in the wind industry. Who now cover 15 States and account for an additional 2,500 jobs. Last year we announced that two blade manufacturing companies will build brand new facilities in Aberdeen, South Dakota and Newton, Iowa to supply GE wind turbines, adding an additional 1,250 jobs.

The renewable energy tax credit is the foundation of this growth. In 2002 when we entered the U.S. market when energy added only about 1 percent of the new electric generating capacity installed that year. Last year, 34 percent of the new electrical generating capacity was wind.

We're proud to have played an important role in one of the world's most successful renewable energy policies. Mr. Chairman, you and your colleagues should be very proud of that success. However, complacency and inaction bear consequences.

According to a study last year, Navigant Consulting concluded that PTC expiration would place 76,000 jobs and more than \$11 billion in clean energy investment at risk. There is a global dimension as well. The connection between a stable domestic policy and a vibrant export sector for renewables is exemplified by Germany, whose incentive system has earned it a reputation as the world's leading green power country.

Wind power technology is the country's second leading export for Germany after automobiles. Yet this year the United States, thanks to the PTC, will surpass Germany in electricity generated from wind energy.

How does the United States win by stumbling into an outcome that disrupts the sufficient deployment of clean energy? By extending the PTC you will reaffirm United States global leadership in the deployment of clean, carbon free, renewable energy and send a signal that Congress stands ready to join others in addressing the more complicated problem of climate change. We are ready to help.

Thank you again for the opportunity to participate in today's summit. I look forward to your questions.

The CHAIRMAN. Thank you very much.

Mr. Rowe, please go right ahead. Thank you for being here.

**STATEMENT OF JOHN ROWE, CHAIRMAN AND CEO, EXELON CORPORATION, CHICAGO, IL**

Mr. ROWE. Thank you, Mr. Chairman and members of the Senate. I'm the Chairman of Exelon in Chicago. Through our retail utilities, ComEd and PECO, we serve over 12 million people which is the largest number of any electric company in the Nation.

Our generation company has fossil, hydro, nuclear and renewable generation facilities. Indeed our nuclear fleet is the largest in the Nation and the third in the world. I have had the privilege of chairing or chairing in the past, the Nuclear Energy Institute, that is an electric institute in the bipartisan National Commission on Energy Policy. I commend to the members of this committee NSEP's reports on climate change in increasing our energy security.

Our three priorities at Exelon are quite simple.

First, we believe Congress must pass legislation that limits greenhouse gas emissions. We know that is what brings you all here.

Second, and I apologize for a somewhat hackneyed phrase. We believe we need something akin to a Marshall Plan to jump start the whole array of low carbon energy resources.

Third, we believe we need continued support of wholesale, competitive markets.

I want to applaud you, Chairman Bingaman for your early leadership on carbon cap and trade systems and also for including cost containment provisions. I believe these components are necessary as Congress seeks to pass a bill that slows, stops and reduces greenhouse gas emissions while protecting the American economy. We need an economy wide bill with realistic targets and timetables and effective cost containment mechanism and rate protection for our customers by allocating allowances to regulated electricity delivery companies. Our industry needs prompt action or it will be hamstrung in making the right investments.

The reason I made the metaphor to the Marshall Plan is that nothing else will suffice. Changing from a carbon based economy to a low carbon economy is a very, very big deal. We obviously need every form of national commitment to energy efficiency possible.

Our research confirms that in some ultimately unknown quantity but it's very substantial. Energy efficiency is our most cost effective approach to lowering our carbon intensity. We need a firm commitment to low and zero carbon and greenhouse gas emitting generation resources.

That commitment should include an expanded loan guarantee program for nuclear and I thank Senator Domenici, especially for his work on this for a number of years. It also should include further support for carbon capture and sequestration. Here I would commend Chairman Boucher for his work in the House.

I agree entirely with my colleagues from General Electric. We need a commitment to a production tax credit for renewables. One that lasts. The on again/off again PTC is untenable. Indeed, energy policy must be sustainable in this country if energy is to be sustainable.

Finally, we need Congress' continued support of competitive, wholesale markets. The FERC has just completed a comprehensive re-examination of wholesale markets and has taken further steps to encourage energy efficiency and demand management.

Those seeking to undo competitive markets would undo work that the Congress and this committee has done for 30 years. To change course at this time in the face of massive investment requirements would be a grave error. Recent work by the Brattle Group predicts that the electricity industry will need \$1.5 trillion in investment over the next two decades, plus the investment to address climate change.

You simply can't do that efficiently without competition. Recent studies show that competitive markets have been the most friendly for wind generation development and also for inducing customers to respond to rising prices by adjusting their electricity demand.

Mr. Chairman, members of the Commission, we thank you for your attention. We urge early action on all three of these fronts. Meanwhile, we at Exelon have put together a plan to reduce, offset or displace our carbon footprint by 2020. We are hard at work on it and we'll try to do our part.

Thank you very much.

The CHAIRMAN. Thank you very much.

Mr. Roberts.

**STATEMENT OF JAMES ROBERTS, CHIEF EXECUTIVE OFFICER, FOUNDATION COAL CORPORATION, LINTHICUM HEIGHTS, MD**

Mr. ROBERTS. Good afternoon. My name is Jim Roberts. I am the Chairman and CEO of Foundation Coal Corporation, one of our Nation's leading coal producers.

I am also the Chair of the National Mining Association, the National Trade Association and voice of the U.S. Mining Industry. I thank you for the opportunity to appear today and participate in the summit on behalf of both Foundation Coal and the NMA.

There are three main messages or points I would like to leave you with today.

The first is quite simple. Coal is not merely important to the United States and the world, it is indispensable. Coal is a prime source of energy throughout the world including here in the United States where it generates more than 50 percent of our Nation's electricity. We cannot maintain U.S. electric reliability and energy security without coal nor can we realistically expect the increased use of coal elsewhere in the world to stop or reverse course.

My second point is in the response to those who would argue that increasing the use of coal in addressing climate change concerns are irreconcilable objectives. What is irreconcilable is trying to address climate change without supporting, full boar, the development and deployment of advanced clean coal technologies including, most importantly, carbon capture and storage, otherwise known as CCS. Between 1990 and 2030 global CO<sub>2</sub> emission are projected to increase by approximately 99 percent.

If the United States and every OECD nation stopped using coal altogether the projected increase in CO<sub>2</sub> emissions would still be 75 percent. In other words we could tear down every coal plant in the United States, in the entire industrialized world tomorrow without seriously addressing climate change concerns. To be clear, Foundation Coal and the National Mining Association support the timely adoption of comprehensive Federal climate legislation.

The current state of indecision on climate change is holding us back as a Nation from doing the things we need to do today to meet our current and future energy needs. But taking coal from our energy mix is not an answer. Today's energy crisis is about cost or price, principally the price of gasoline. If we don't begin to act soon, tomorrow's energy prices, as it relates to electricity will not just be about price, but about supply as well.

It's one thing to pay a high price for energy. It's another not to have it there at any price. All one need do is read the 2007 long term reliability assessment from NERC to see the handwriting on the wall as to the coming crisis in electricity. The question or chal-

lenge before us is how do we keep using coal to meet our energy needs but reduce CO<sub>2</sub> emissions? The answer is carbon capture and storage.

This leads me to my third point that the United States, namely the Federal Government must do much more to support and accelerate development and deployment of CCS. Over the past 10 years the Federal Government has spent approximately \$3.5 billion on clean coal R and D and demonstration projects. In the context of the challenge we face this is wholly inadequate. There's no greater example of Federal efforts falling short in this arena than the Department of Energy's incomprehensible decision to withdraw support from the FutureGen Project in Mattoon, Illinois.

We walk a fine line in attempting to deal with the energy climate equation. We need to push technology as hard and as fast as we can. Yet we cannot afford to get ahead of technology. Carbon mandates are restrictions that are not in sync with technology development, threatens great harm to our economy and the well being of our citizens and in turn public support of our efforts to address climate change concerns.

Let me speak to those who express support for carbon capture and storage and other advanced clean coal technologies but who suggest that we should not build any new coal fired generating capacity in this country until CCS is fully deployable. There are two very serious problems with this thinking.

One, by depriving us of much needed electricity generating capacity in the near term that threatens to drive us closer to the crisis in electricity supply of which NERC has warned.

Two, the moratorium on new coal fire capacity that does not include full scale CCS deployment will stop CCS development dead in its tracks.

It is important to understand no one will ever build an IGCC plant with CCS if we don't first build several IGCC plants without it. Likewise, we can't expect anyone to build a plant with a 65 percent carbon capture if we don't first build plants with 20 percent capture. As with any kind of technological advance we have to walk before we can run.

Michael Phelps would not have won eight gold medals in Beijing, if years ago he would not have been allowed in the pool until he was able to set a new world record. We have to start somewhere. We need to push advanced clean coal technologies including CCS as rapidly and as hard as we can. But we cannot afford to ban all new coal plants prior to those technologies being commercially ready.

To do so would threaten our economy and our energy security and would have the devastating impact from a climate perspective of squashing the very technology, CCS, that is absolutely central and an essential element of any realistic climate plan. We need to put the pedal to the metal on clean coal and CCS, not slam on the breaks on anything short of perfect. Otherwise we will solve neither the energy nor the climate challenges ahead of us.

I thank you for the opportunity to appear today. I look forward to your questions.

The CHAIRMAN. Thank you very much.

Mr. Steenland, go right ahead.

**STATEMENT OF DOUGLAS STEENLAND, PRESIDENT AND CEO,  
NORTHWEST AIRLINES, MINNEAPOLIS, MN**

Mr. STEENLAND. Thank you, Mr. Chairman. Thank you, Senators for the opportunity to appear today. I appear today in my capacity as Chairman of the Board of Directors of the Air Transport Association and as the CEO of Northwest Airlines.

I'd like to make the following points.

First, a strong U.S. airline industry is essential to the strength and growth of the U.S. economy. High oil prices are challenging our ability to meet the needs of our passengers and the communities we serve across the country. In today's environment, airlines are pure price takers. We have no choice but to purchase fuel irrespective of the price.

In addition to the historically high prices we face, we also have been faced recently with very significant price volatility which is making business planning extremely difficult. Fuel is now 40 to 50 percent of total operating costs of U.S. airlines. From June 2007 to July 2008, oil went from \$67 a barrel to \$147 a barrel, a 119 percent increase.

That \$80 increase has added over \$34 billion to the U.S. airlines 2008 fuel bill. Unstable, unpredictable, high oil prices have led to airline fare increases and significant service reductions. To help address that we advocate for a multi-faceted energy policy which includes the following.

First, expand domestic supplies by environmentally responsible drilling. Today we import nearly 5.5 billion barrels of oil a year at more than a \$600 billion cost to the U.S. Looking to increase supplies, including lifting the ban on OCS drilling will help reduce oil prices and boost U.S. and local economies.

We believe this can be accomplished safely from an environmental standpoint. As our own actions demonstrate we are also very strong advocates of conservation and technology. Unfortunately today, we cannot partake, as I said before, of alternative fuels.

In addition to addressing critical supply issues, we also want to address what we believe is excessive speculation in energy markets. In the opinions of many the high volume of paper future investments in contracts have helped accelerate the run up in oil prices. From 2003 to July 2008, commodity index investments grew from 13 billion to over 300 billion and commodity prices tripled in that time.

Changes in supply and demand fundamentals and the strength of the devaluation of the dollar while contributors cannot alone account for the massive oil spike we have witnessed. We believe that the amount of financial trading that has come in has clearly facilitated those price increases. We're not alone in that view.

Experts around the world have also acknowledged this linkage. Whether it's the United States Conference on Trade and Development, reports that have come out of MIT, Lehman Brothers and Citibank, a report earlier this week introduced by any number of Senators and where actions by the government of Japan, the European Central Bank and OPEC leaders have also acknowledged this linkage. We suggest that the mere threat of legislation to curb excessive speculation has contributed to the bursting of the oil bubble

that we have seen recently where over the last several weeks oil has gone from \$147 a barrel to \$100 a barrel yesterday. While this relief is important, we hope that permanent legislation will be enacted to help facilitate this.

Most of all we need transparent, well regulated markets to prevent excessive speculation from returning. To ensure that regulators can—

Senator DOMENICI. Could you hold a minute, sir?

Mr. STEENLAND. Sure.

Senator DOMENICI. Senator Bingaman, could we have him go back about two sentences or three in his testimony? I missed something in there.

The CHAIRMAN. Yes. Is it possible to just repeat the last few sentences of your testimony there so Senator Domenici could?

Mr. STEENLAND. Sure. I would be glad to.

The CHAIRMAN. Thank you.

Mr. STEENLAND. Recently the oil market's prices have gone from \$147 a barrel to \$100 a barrel over the course of the last several weeks. We believe a contributor to that reduction has been the introduction and the prospect of legislation to address financial speculation in the commodity markets. We need transparent, well regulated markets to prevent excessive speculation to ensure that regulators can detect and address concerns that could lead to a big run up in prices and to reduce volatility caused by big swings and speculative activity.

We urge the Congress to reach a comprehensive, bipartisan approach to energy legislation before this session ends this September. Thank you very much.

The CHAIRMAN. Yes, Mr. Cohn, go right ahead.

**STATEMENT OF GARY COHN, CO-PRESIDENT, MANAGING  
DIRECTOR AND COO, GOLDMAN SACHS, NEW YORK, NY**

Mr. COHN. Mr. Chairman, Senators, thank you. Good afternoon. I'm Gary Cohn, President and Co-Chief Operating Officer of Goldman Sachs.

Thank you, Senators Bingaman and Domenici for allowing me to participate and share Goldman Sachs' perspective. There are few topics more important than the subject of this hearing. Finding a solution to achieve a more secure, reliable, sustainable, affordable energy future for American people is very important. Goldman Sachs is a global investment bank and securities firm with more than 30,000 people worldwide. Our people are involved in numerous aspects of the energy markets.

As an active participant in the energy sector, our strategy is to act as an advisor, a financier, a principal and a manager of risk on behalf of our clients while operating at the center of global, financial markets. We work as an advisor to numerous leading energy companies worldwide.

As a financier for global energy projects and companies we have helped to raise over \$400 billion in the last 5 years.

As a co-investor in a diversified portfolio of energy companies, we have invested more than \$8 billion in companies globally that employ more than 100,000 people worldwide.

As a manager of risk, on behalf of our clients, we have facilitated approximately \$220 billion in hedges across a variety of industries and products from companies in the transportation, oil and gas, power, metals and agricultural industries.

Neither private capital alone, nor government policy is enough to incentivize the development of the advanced energy technologies our country needs. We must work together to bring balanced solutions. Otherwise high energy prices will be the only catalyst the market will respond to in order to invest in the modern energy economy.

Such solutions should also address the importance and the pressing challenges of protecting our environment and addressing climate change. Over the past decade, Goldman Sachs has invested heavily in the development of clean energy technologies including wind, solar, geothermal, biofuels and clean coal. We also have an environmental policy framework in place that requires our firm to take into consideration the impact of all our investment decisions may have on the environment.

Again, I commend you for convening this forum. Thank you for allowing me to share Goldman Sachs' perspective.

The CHAIRMAN. Thank you very much.

Mr. Wagoner, we're glad to have you here. Please go right ahead.

**STATEMENT OF RICHARD WAGONER, CHAIRMAN AND CEO,  
GENERAL MOTORS, DETROIT, MI**

Mr. WAGONER. Thank you very much, Mr. Chairman. Pleasure to be with you today. I really appreciate the opportunity to speak on such an important topic.

Last year Congress passed an energy bill that focused primarily on promoting energy conservation. Among the provisions in that bill was a dramatic 40 percent increase in fuel economy requirements for cars and light trucks. General Motors and our competitors are hard at work making sure that we can achieve this objective which requires a huge commitment of research and development, engineering and capital spending and access to capital to fund those investments.

We believe last year's energy bill has laid the ground work for a comprehensive and forward looking U.S. energy policy, one that addresses both energy demand and energy supply. Speaking for GM, we think it's time for the U.S. to take control of our energy future. As a Nation we have the capability to do this and faster than most people think.

It will require a massive investment in new technologies. It will require a commitment from all sectors of the U.S. economy, a partnership among government, industry, academia and the American public. It will require a constancy of purpose, a long term national commitment to improving our energy security despite the inevitable short term swings in the price of oil.

Most importantly it will require leadership, direction and vision from our government. In this regard I want to commend the work that the bipartisan gang of 10 is doing. This comprehensive approach of this group to promote new energy supplies and encourage the development of and purchase of advanced technology vehicles

is laudable. Many of the provisions being developed by this group should be included in the next energy bill.

Looking specifically at the automotive sector, our industry has a real opportunity to move away from our traditional, almost complete reliance on oil as the source of energy that powers our vehicles. In particular we see tremendous opportunities to develop and promote the use of biofuels, batteries and hydrogen fuel cells. To achieve the improvements that are possible in the transportation sector, it's important that we have a clear consensus on what's required to bring these new technologies to market in volume.

We as automakers need to take the lead by developing the technologies and then driving their cost down so consumers can afford them. But there are other important roles that need to be played as well. In short, we need a clear, long term policy, consistency of direction, alignment of regulation and a strong commitment from all sectors of American society to develop and implement the technologies that will allow us to achieve our mutual goals.

Thank you and I look forward to your questions.

The CHAIRMAN. Thank you all for your excellent testimony. Let me start and ask a question or two and then call on Senator Domenici.

Let me ask you, Mr. Wagoner. One of the issues that obviously we're struggling with here this week and the next couple weeks in Congress is the issue of additional government loan guarantees or loans for the auto industry. Could you describe your thoughts? We passed a bill that was signed into law by the President that made provision for loans to retool the auto industry.

What more do you think is appropriate or essential and what would be the benefit of Congress doing more in this area as you see it?

Mr. WAGONER. Yes, sir, Mr. Chairman. I think what we need to do next is enable those loans which were authorized under the Energy Security Act last year, 25 billion direct loans for suppliers and auto makers of all varieties. We need to provide the appropriation to enable those authorized loans to be extended. We need to very quickly draft the regulations to allow the loans to be extended. We need to make sure that the regulations under which they're extended are reasonable and consistent with the objective of the Energy Act.

If that is done, then I think the \$25 billion included in the Energy bill last year would be a very helpful in enabling the industry to move more rapidly. Particularly in the context that since the bill was passed last year, the capital market conditions have worsened significantly. So the availability of credit is much tighter for companies of all shapes and sizes whether they be the smallest supplier or the largest OEM.

Obviously the conditions in the U.S. economy and the U.S. market have weakened dramatically. So the ability to fund these investments from our normal cash-flow from our business is significantly retarded. So I think, particularly right now, if Congress could move rapidly to enable the loans that were approved to be funded and dispersed.

Again only against projects which bring significant improvements in fuel economy. That would be a tremendous help to the auto sector.

The CHAIRMAN. Let me just be sure I understand. Your thought is that the authorizing language that we included in last year's bill was the appropriate language to put in. You're saying we now need to fund the provisions that were previously enacted. Is that right?

Mr. WAGONER. What I'm saying is we think the amount 25 billion is a very good amount to ensure that we can stay on the path that we've been on. Regulations do need to be written. Funding needs to be authorized.

I would say the specific terms that were included last year are not comprehensive enough from our perspective. So we would like to suggest some amplification of those terms. I think very much in the spirit of the initial terms that were suggested. But I would say somewhat amplified.

The CHAIRMAN. Could you be a little more specific as to what you mean there by amplifying the terms?

Mr. WAGONER. Right.

The CHAIRMAN. What are the problems that you see with the language that we enacted last year?

Mr. WAGONER. The language enacted last year basically allows investments for products that improve fuel economy in a single step by 25 percent. The language we would like to see expanded would be to provide funding for projects which are consistent with the commitments in fuel economy. Actually 25 and then at 40 percent which we've agreed to, but don't require every single project to cover a full 25 percent.

Let me give you a specific example. It will be very expensive for us to apply our hybrid system, our General Motors hybrid system across a broad range of vehicles. Generally this hybrid system that we think has the broadest consumer appeal because it's lower cost will not by itself, in one step, get a 25 percent fuel economy.

So basically dramatically expanding this kind of hybrid system would not be eligible for funding under the rule as it's initially written. I understand from our competitors, many of the projects they would undertake, which would enact significant improvements in fuel economy, 10, 15, 20 percent, would not be eligible for this funding support.

The CHAIRMAN. So you—

Mr. WAGONER. So what we're talking about is trying to offer language which would, I think, be consistent with the spirit of the law, but enable projects that don't each individually get 25 percent or more improvement recovered.

The CHAIRMAN. Thank you very much.

Senator Domenici.

Senator DOMENICI. Mr. Chairman, let me say I don't think that I have enough time to ask each of you the questions that I would like to ask. You have raised some very interesting points, each one of you. You could be of more help than I'm going to be able to solicit in my questions. But I'm going to try a couple.

Let me just start with you, Mr. Rowe. First I want to complement you and your company for your far sightedness. You're a

big holder of nuclear power plants as part of your delivery system. That has proved to be very wise looking at the market.

You also are confident about the future in that you have put your company in a position where you would like to get licenses from the Nuclear Regulatory Commission to add to your fleet by building new power plants that are nuclear. Is that not correct?

Mr. ROWE. That is, sir.

Senator DOMENICI. I don't intend to treat you as if you're the one down there doing the applying. I know you're the head man at the top. But I think you know that the answer to these questions.

Today we have a much more modern way to file the applications than we did the last time they were filed. We used a disc, a little computer disc, that is the entire application. As before, we used to have a pick up truck full of those things that we were sending over to the Nuclear Regulatory Commission.

I guess that kind of surprised you when this process was taking place and you were spending your few millions of dollars to get the license work ready. Is that not true?

Mr. ROWE. The new processes at the Commission are in fact, very helpful. What is most helpful of all that they do is the approval of construction and operation being one basic proceeding. So you don't run the risk of re-litigating the same issues when you start and when you end.

Senator DOMENICI. I want to ask you, it's a matter of record that I don't expect you to know the answer. But we have been told unequivocally over and over by the Regulatory Commission, whom I personally have great confidence in. I think it's a fabulous commission for a difficult time in our history.

But we've been told that the first applications, there's no way to get around it, are going to take 42 months from the day they file it to completion. I would ask if you and your experts, without offending the Nuclear Regulatory Commission, don't worry about that. If you would tell us where there are places that we might save time, even if they are not general.

Maybe you save time only if certain conditions are met. There are a lot of power plants now that are applied that don't seem to have the opposition that we had 25 years ago. It might be that we could do some of this quicker. I would like to just pose that to you, not for now, but would you tell our committee that you will do that for us in due course?

Mr. ROWE. I would be happy to get you and the chairman and the members of the committee the best letter I can on that.

Personally I believe that the best thing the industry can do to help the Commission in this is to submit the most standardized designs possible. The best thing the Congress can do to help the Commission is remind them how badly we need nuclear energy in a low carbon economy.

Senator DOMENICI. Now let me move over to GE. I'm fully aware of what you do. I've had an opportunity to meet you before. You have a very wide portfolio under your particular hierarchy of your company.

But I might just ask you're also in the nuclear power business. Everybody should know that it isn't a non-competitive business even though we have not been in it for a while there's some power-

ful competitors from Arriva out of France to English companies to a lot of them, Japan with Toshiba. Let me ask, how are you, how is GE doing? Are you up front big competitors? How many plants do you—have you applied for that have GE power plants in them?

Mr. KRENICKI. We are very committed to nuclear power. My opening comments were centered around wind. But we're equally committed to nuclear power.

We've been in this business for over 50 years. We're working with the NRC and many of our customers on licensing the next generation of design. Roughly one-third of the world's nuclear plants are operated on GE technology.

So we are very committed. But we're going to need to see more demand in the United States. Today roughly there's about 104 reactors in the United States.

The United States is a leader in nuclear energy. We've done it before we can do it again. But I agree. As you look at a low carbon future, nuclear has to be part of the solution. It's a part of the GE strategy to aggressively invest in nuclear energy.

Senator DOMENICI. Mr. Chairman, I have only one last question. I would like to ask Mr. Roberts this question with reference to the military. The U.S. military is working with various developers of liquids from coal to use as transportation fuel for the military.

I would just like to ask you how important that activity is to the future of coal and how can it serve the country in your opinion?

Mr. ROBERTS. I think the first thing I'd like to point out about coal to liquids, Senator, is that it's not a research and development process. It's been around at least since the 1930s.

Senator DOMENICI. Correct.

Mr. ROBERTS. If anybody has ever flown from South Africa, Johannesburg, the plane that you have taken off in was probably fueled by a combination of aviation fuel from traditional sources as well as aviation fuel produced from coal to liquids. So it's already here. It's a process that we have.

We look at coal to liquids in the coal industry as an additional source of a domestic supply of energy that we have here at home. Coal makes up 90 percent of all the energy, fossil fuel energies that the United States has. It makes up for 64 percent of all the world's energy.

The coal to liquids, the fuel that's made from coal to liquids is cleaner than aviation fuel or diesel fuel that's made from petroleum products. It's made from a source that's domestic. It improves our energy security. It has the potential of creating thousands and thousands of jobs here at home.

So it's very important not only to the coal industry. We believe it's important to the national energy.

Senator DOMENICI. Let me just be very specific. I should have been. Section 526 is kind of commonly known now in your industry as the section of law that has passed that makes it very difficult to import Canadian fuel because of the requirement that it match up against a certain criteria that is hard to achieve. Are you aware of that problem are you not?

Mr. ROBERTS. I'm not specifically aware of the exact restrictions there, Senator.

Senator DOMENICI. Alright. I guess I'll ask somebody else about section 526. I think it's very important to the coal business. We're trying to solve problem that exists.

Mr. Chairman, I'm going to yield back now. I thank you for the time.

The CHAIRMAN. Alright. Thank you very much. Senator Nelson?

Senator BILL NELSON. Thank you, Mr. Chairman. Gentlemen, thank you for what you do and how you contribute to our country.

Mr. Steenland, I wanted to underscore on behalf of Senator Levin and me, a very important part of your testimony. You're the CEO of Northwest Airlines. You said when a bunch of us had filed speculation, anti-oil, future contract, speculation bills. And you said that in your testimony was a major contributing factor to the drop of oil from \$147 to \$100.

Is that a correct characterization of your testimony? If so, how much as a result of filing those bills did Northwest save?

Mr. STEENLAND. Senator, that was our testimony. I think it's very difficult to portion how much is due to the potential of additional regulation and lawmaking on the financial side of speculation verses strengthening of the dollar, weaknesses in global economies. But when you look at over the span of literally, 8 weeks, when oil goes from \$147 to \$100 and there's no other demonstrable, external change that can explain it.

Clearly a contributing factor, in our judgment, had to believe the leadership that you, Senator Levin and others provided on this issue. To just give you a sense of the magnitude, for us, every dollar of change in crude oil is \$42 million of annual costs. So that \$40 reduction was \$1.6 billion in savings that we would have realized on an annual basis.

So that is meaningful, significant and it's clearly going to help us avoid further reductions, look to minimize further increases in fares. We would encourage that the threat of legislation become the reality of law to try to provide additional reporting, additional transparency, the opportunity for the CFTC to impose position limits when appropriate and to be in a position to do that across the board.

Senator BILL NELSON. I hope so. Senator Levin, indeed, has been a leader in this for a number of years.

Mr. Wagoner, I wanted to ask you, first of all I want you to know that I learned to drive a pick up truck. I started driving, you could drive in Florida then at age 14. It was a General Motors product and ever since I've had either General Motors or Ford products.

I preface that by asking you, I believe that you really need financial incentives to retool the industry. But what's going to happen is because of your financial condition, that's not going to be enough. You all are going to come to us with some kind of rescue package and ask us to rescue you.

You're looking at somebody, when I was a young Congressman, I voted for the Chrysler buy lot. But I must admit it is hard for me to do that when each year that I've been in the Senate, you all, collectively Detroit, have posed us and beat us every year when we have tried to increase miles per gallon standards. So could you respond, please, as to why we should now come to the financial rescue?

Mr. WAGONER. Thank you, Senator. Yes, to be clear what we're asking for is basically the fulfillment of what was included in the Energy Act that was passed last year.

That Energy Act, as you know, included a significant increase, 40 percent.

Senator BILL NELSON. That was the first time in the 8 years that I've been in the Senate that we were able to get that through. But every year Detroit opposed us. We couldn't get any miles per gallon entries.

Mr. WAGONER. Senator, what I can tell you is that the increase that was approved last year as you recall was supported, I think, unanimously by the auto industry. As part of that significant retooling that would be required, the bill included direct loan provision of \$25 billion. So what we're asking for is that that provisions for the loans now be funded and be enabled to support the manufacturers to invest in these new technologies.

I'm not here today and I don't know of my colleagues from other auto companies either, asking for any bail outs. What we've said, very specifically, is the bill that we supported and you all approved, required a significant improvement of fuel economy which we agreed to. As part of that the loan program was included.

Particularly given the fact that industry conditions have gotten, not auto, but general industry conditions and credit conditions have gotten so difficult, it would be very helpful if that funding could be approved.

The CHAIRMAN. Senator Bond.

Senator BOND. Thank you very much, Mr. Chairman. I apologize for having missed this morning's session. I had a number of meetings set up.

I don't serve on Energy. I serve on Environment and Public Works and we have probably had a little too much activity in the energy field. I would join with Mr. Roberts in saying that the cancellation of FutureGen was incomprehensible. I said the same in much longer and more explicit letters to the Department of Energy and other relative bodies.

But I also serve on the Intelligence Committee where I have to go right now to talk about the national security implications of energy. We are seeing, I think, a real threat that energy has become, possibly, a next weapon in competition, not always friendly competition, with other nations. But we are here today to talk about doing something, as Mr. Wagoner said, to take control of our energy future.

Setting aside the national security implications, it is probably the most important thing I hear when I go back to people in Missouri. It doesn't matter whether you're a family, whether you're worrying about going to a job or taking your kids to work. Whether you're a farmer who's getting killed by high energy prices, workers who are seeing their jobs disappear. Airline travelers who find their services cutoff. I'm delighted we have representatives of airline and automotive industries today because you all are classic examples of why this is such a problem.

I think all of us recognize that a little price decrease is not good enough. We need to lower gas prices. That's why, I personally, don't think a little off shore drilling is enough. We need to open up

as much as we can. We don't need a little bit more, I think we need a lot more.

I have some questions that primarily are for the first panel. But I would like a comment from anyone who will offer it. The Gang of 10 proposal, which is a good step forward, which still leaves 70 percent of the offshore areas on our Outer Continental Shelf closed to production will opening up, I think it's about 14 percent more of the Outer Continental Shelf make a difference in oil prices in the view of any of you?

Mr. Cohn, maybe? You're in the financial area, maybe you could comment on that?

Mr. COHN. I would comment that any increase in supply will help the price of oil. Our fundamental belief is that we're in a supply/demand market and supply and demand basically set the price. Any time you can affect one of those two legs of the equation, you're going to help the equation out.

So either increasing supply or conserving on demand is going to be a help.

Senator BOND. We need to do all of them. But for example the House has come up with a plan that would only open up about 3 percent of the 10 billion barrels of oil off our Pacific coast. I imagine for that small an increment, you're not going to get much "bang for the buck." Is that fair?

Mr. Steenland.

Mr. STEENLAND. I think just echoing what Mr. Cohn said, the more the market perceives that additional supply is going to come online, I think the more favorably the market will respond. That will impact positively with respect to lower prices.

Senator BOND. That's an economic question. I want to bounce back to Mr. Cohn. We're talking about speculation. Obviously speculators provide a useful role.

From what I've seen the money in the market on long term energy futures are people investing for the long run, retirement funds, say predicting oil is going to go to \$200 or \$250. My question is how much did talking about dealing with speculation have an impact on the price or what kind of impact did lifting the executive moratorium on off shore drilling have?

Mr. COHN. Look, I think we're all happy that the price of oil has come down in recent days and recent months. That's a good thing for the economy. It's a good thing for the world economy. It's a good thing for everyone involved.

The reality of the price coming down, I think, may be just a mere coincidence that the price of oil came down while there was discussion going on on curbing speculation in the United States. Remember the oil market is a global market. A barrel of oil is fungible anywhere in the world. It can be delivered anywhere in the world. People can trade oil anywhere in the world.

I don't really ever believe in coincidences, but there seems to be a coincidence here between the talk and the economic picture that changed quite dramatically in the world. I think most of us are aware that we have gone through a fairly dramatic change in economic views and economic outlooks, not just here in the United States and Europe, but in Asia and the rest of the world. That has coincided with the decline in price.

You know, an interesting fact that I would just throw out here. I know that you're all aware that the CFTC just finished a very rigorous study of the oil market. I think for the first time ever, we've all been able to see all of the data accumulated in one place, where we've literally seen 100 percent of the index speculators disclosed, who they are, what they are.

The CFTC has done an interesting job in gathering the data and being able to tell you if we had exchange limits or if we had position limits in place, who would have been in excess of those position limits and who would have been in excess of those exchange limits.

I think there's been a rampant view that there have been hundreds of investors who have taken positions well in excess of the current existing exchange limits. What the data actually found out, in the non-commercial category, in WTI, which is the U.S. oil grade that delivered in this country, there were six clients that had a position in excess of current exchange speculative position limits. One of them was the United States Hedge Fund.

Ironically, it had the largest position. It was on the short side. They were short 14,700 lots of WTI. Two of them were European pension funds, long term investors, as you've talked about on the long side. One of them was an Asian sovereign wealth fund on the long side. One of them was a United States long only asset manager. The last one was a Canadian pension fund on the short side.

So when you've got all the data in one place trying to understand this dramatic effect of speculators. You found that there were six clients on a global basis that had positions in excess of speculative limits. So again, I get back to my original response. If we can increase supply in any way, shape or form and diminish demand any way, shape or form. We will have a better oil price and that will be better for all of us.

Senator BOND. Thank you, Mr. Cohn.

May I ask very quickly, Mr. Steenland and Mr. Wagoner?

The CHAIRMAN. If you could do so quickly.

Senator BOND. Just how much impact oil prices have had on your employment and your future prospect?

Mr. STEENLAND. Senator, Northwest Airlines along with most of the rest of the airline industry, we will be about 10 percent smaller in the fourth quarter of this year than we were in the fourth quarter of last year. That's almost entirely oil related and will be approximately 2,500 to 3,000 full-time equivalent employees fewer this year than last year.

Mr. WAGONER. It's hard to speculate just on one factor, but I would say the overall economic decline, partly driven by higher oil prices, financial market weakness, obviously has the U.S. auto market now running the weakest it's run probably since 1993. You know, the ramifications have been huge. We announced plans to eventually cease production at four truck plants which, you know, in and of itself, would be 10 to 15,000 people.

Frankly, the ramifications for us in our industry have been significantly greater. So obviously the latest economic downslide has been very difficult for the auto industry.

Senator BOND. Thank you very much.

The CHAIRMAN. Thank you.

Senator Klobuchar.

Senator KLOBUCHAR. Thank you very much, Chairman. Thank you to all of you. Welcome to Mr. Steenland. Northwest Airlines is, we hope for as long as we can in the near future, our hometown airline.

I was curious. I know Mr. Steenland, when this speculation issue came up you got many of your customers to write in. We were deluged with emails. Could you talk about what you heard from customers during that time?

Mr. STEENLAND. I think what we heard is not too dissimilar to what you and everyone here hears when you go home for your work periods. That energy is of an extraordinary high priority and concern. I think it's a reminder of how critically important air service is to economies, to the way people lead their lives these days.

We are entirely dependent on energy as it's now become 40 to 50 percent of our cost structure. The extraordinary run up in prices which we think is where speculation has been a contributor has clearly had an impact. Not just on us, but on the communities we serve and the customers that we have responsibilities for.

Senator KLOBUCHAR. I was listening to Mr. Cohn and I know there are other studies, recent studies showing different things about speculation. We have the mere fact that the prices went up. But 25 percent in a few month period and we didn't see that kind of increase in demand, certainly not in the United States, not worldwide.

Do you just want to talk a little bit about your interpretation on the front line of the speculation issue, Mr. Steenland?

Mr. STEENLAND. I think, you know, we, as to the CFTC study, we're glad they did it. I think there are some questions as to the accuracy and the dependability of it. We think there ought to be an institutionalized reporting obligation, so we're not simply dependent on, you know, an ad hoc study that the CFTC does. But where there's ongoing reporting obligations.

So they have a full, constant, regular view of the entirety of the trading market. There's transparency and that they are in a position to impose position limits, not just on the regulated exchanges, but on the over the counter markets as well.

We think that's very hard to argue with and we think that's a good bit of regulatory policy for this important agency to have on such a critically important commodity.

Senator KLOBUCHAR. Because I was frustrated, we had the Chair of the CFTC. I was saying to him when as a prosecutor I always liked all the tools I could have, even if I didn't use them. He didn't seem interested in having more tools to regulate those markets.

But, Mr. Wagoner, turning to the rest of the topic at hand that we focused on this morning, I'm in the group of 20 and one of the things that really interested me was the incentives to develop this next generation of hybrid and electric cars and trucks. I'll ask you what I asked this morning. One of the things I keep hearing is just the battery technology is just not where we want it to be, at least not produced in this country. I know the Chevy Volt is coming out in 2 years and those kinds of things.

But could you tell me where we are with the battery technology and how we could best tailor our incentives so it's produced in this country?

Mr. WAGONER. Yes, the premise of your question is, Senator, exactly in line with our findings as we sort of scour the world for capability to get the Chevy Volt to market on the timeframe that we've committed to. It is fair to say that much of the technology in battery today is outside the United States. I would say generally concentrated in Japan, where accessing the technology is difficult and Korea.

One Senator asked me earlier today why is that true? I think it's pretty clear because those countries have, for 20 years or so, made it a national policy to encourage the development of battery technology. We, in the U.S. have not done that. As a result are way behind. That's the bad news.

I think the good news is that as we look to a future where we shift automotive propulsion from mechanical to electrical, over time that would mean, if we were successful, demand for millions of batteries which provides a great business opportunity. So I don't think this is a battle that the U.S. has lost. But I do think heavy support and investment by the U.S. Government in battery research, productionizing batteries and certainly what would be very helpful to us and consumers, the early adopters of these technologies.

I can assure you the first few Chevy Volts we build are going to be very, very expensive vehicles. We will eat a lot of the cost.

Senator KLOBUCHAR. So I should wait for a while?

Mr. WAGONER. No. The good news is we will subsidize your purchase. But what would I think help and what is generally comprehended in much of the legislation in discussion of this topic are consumer incentives.

I think we have to recognize that as we bring these new technologies on we're running against a tough target, that the internal combustion engine fueled by petroleum is very low cost and very high quality. So as we bring in new technologies consumer tax credits, incentives are going to be very helpful as well.

Senator KLOBUCHAR. Then one last question. Mr. Krenicki, I liked what you said about how important the production tax credit is. Obviously that's in our legislation as well for a 3-year extension or something like that to make sure this thing has been going off 1 year, then it's off for 6 months. It's led to problems in investment.

I just got a report today from the Center for American Progress that showed that the U.S. can create 2 million jobs over 2 years by investing in rapid, green, economic jobs. It actually shows that with \$100 billion in investment you could create four times more jobs than spending the same of money within the oil industry. Could you talk a little bit about why you think that we could more quickly get more jobs in knowing that I also, you know, many of us support a combination of things?

But why these green jobs? Something new to so many people in this country, green technology, could support more jobs?

Mr. KRENICKI. You know if I look at the business I run we have over 10,000 engineers. Many of those engineers are working in renewable technology. Those jobs didn't exist at GE 6 years ago.

So as we build leadership in the United States, it's a source of tremendous exports in manufacturing, high-paying, engineering jobs. I think the same can be done in nuclear energy, cleaner coal. So as we build leadership in this country it will create exports and lots of high-paying jobs here at home.

Senator KLOBUCHAR. Thank you.

The CHAIRMAN. Senator Conrad is next. He's agreed to defer to Senator Levin for some questions. Go ahead.

Senator LEVIN. First, just to thank Senator Conrad for deferring just for a minute. That's all I will take. This is just for Mr. Wagoner.

You gave us some very good example of where minor modification in section 136 would make it more practical in terms of achieving its goals. If you could submit for the record, for the committee, the other needed modifications in order to achieve that part of the law which we passed last year. I think it would be very helpful. If you could do that for the record, if you would?

Mr. WAGONER. I'd be pleased to do that, Senator.

Senator LEVIN. I think the full committee needs to be familiar with that.

Mr. WAGONER. Be pleased to do that.

Senator LEVIN. Thank you. Also one other question, Mr. Wagoner, did you speak for the industry in your testimony?

Mr. WAGONER. Yes, I did. We have, even as recently as the last couple of days have had extensive conversations with my colleagues at Ford and Chrysler and Mr. Gettlefinger from the UAW and his staff, so within that group, yes.

Senator LEVIN. Thank you. Thank you, Senator Conrad.

The CHAIRMAN. Senator Conrad, go ahead.

Senator CONRAD. Thank you, Senator Levin. Thanks again to the chairman of the committee for organizing this summit. Thanks to the ranking member for his participation and thank you for really producing an outstanding day.

I think the witnesses have been just exceptional, Mr. Chairman and Senator Domenici. I think you can feel very good about what you've done to help the Senate grapple with this issue.

I'd say first to Mr. Wagoner, the gang of 10 as the press dubbed us, now a group of 20 and with more Senators ready to come on board over the weekend. In our proposals we have \$7.5 billion to help the domestic industry retool. That's not loans. That's direct money because we think it's critically important to reducing our dependence on foreign oil to move to the vehicles of the future.

No. 2, we have \$5 billion over 10 years in battery technology research because our group became convinced during the deliberations that that is absolutely essential to America's competitive position.

Could you help us understand if those investments are in line with what you're thinking is? Are they the right priorities?

Mr. WAGONER. Thank you, Senator. To be honest I wasn't familiar with all of the specifics of the items you're working on. So can't comment exactly on the numbers.

But I think the strategic direction you're citing is very much consistent with the conversation we just had on battery technology where we think that is a fundamental building block for the future

of the auto industry. While the U.S. is behind, it would be a shame not to get back into that tremendous opportunity. As a general rule, our thought is that actually the U.S. and the world is run with automotive technology driven by petroleum for 100 years.

We are now at an inflection point. Whether it's over the next 5, 10 years, or 20 years, the industry is going to fundamentally evolve in its sources of power. So it is, I think, a very appropriate time for obviously the manufacturers have a tremendous interest in it.

But I think from the perspective of the U.S. Government, if we wish to continue to have a robust and strong manufacturing, engineering sector in the automotive side, which is the largest manufacturing sector in the country. It's a very good time to get direction from the Congress and support for the key technologies. So we very much would like to participate and comment and contribute to your deliberations.

Senator CONRAD. Let me just say that I would say to all of you the group of 20, the basic concept is we got to increase production. We've got to reduce demand. We have adopted a strategy, not of just one thing or two things. We've adopted a strategy that involves support for renewables, conservation, improved efficiency, electric plug in, geothermal, hydrogen, drilling off shore.

The Senator from Missouri questioned how much we've expanded drilling off shore. We have a phased approach to opening up off shore. We open the Eastern Gulf. We open up off of Virginia, North Carolina, South Carolina, Virginia. We open up off of Alaska.

We do it on a phased basis. We then have time to go out and do the seismic work to see what additional areas have real opportunity. Because just opening up, frankly, you can open up everywhere, the problem is the testimony we heard this morning from the representative of the major oil companies was we've got only 30 offshore rigs in the world, every one of them spoken for.

So you can just say you're open up everything, but it doesn't have meaning. It doesn't have meaning unless you've got the rigs to do it, unless you've got the trained personnel to do it. The fact is we can only do it on a phase basis.

So, you know this notion that we're just going to open up everything. All of a sudden everything's going to happen, is not reality. Our group has tried to deal with reality.

In addition, we've got provisions for nuclear power because we think we're going to have to expand nuclear power. We have clean coal, significant investment there.

Let me just ask if I could, Mr. Krenicki. Do you think we're going in the right direction? This is 20 Senators, 10 Democrats, 10 Republicans.

Mr. KRENICKI. Absolutely. I think the answer is all. So we have to do a lot of many things. If I look at just what's happened in renewable energy in a relatively short period of time with good policy, the U.S. is leading the world. It's the most dynamic market.

The U.S. is the Saudi Arabia of wind. We're taking advantage of that. I think we've got to keep building it out. It'll have significant benefits. It'll be totally consistent with any climate policy that is tackled in the next Administration.

So I think the group of 20 is terrific. I applaud your efforts.

Senator CONRAD. Mr. Rowe, do you think we're headed in the right direction?

Mr. ROWE. Yes, sir, indeed I do. I'm very grateful for the effort. I think particularly your focus on the climate change legislation and coming up with a practical bill that includes the economy is very important.

Let me just say though that while I agree with Mr. Krenicki that the answer is all. They come at dreadfully different prices. We think that at least in the early stages, energy efficiency measures are the places where you get the most bang for the least dollars. We just don't know how long that lasts.

On the other hand, we look at wind and we may be the Saudi Arabia of wind, but sometimes it costs almost as much. We think the cost in terms of dollars per barrel—dollars per ton of carbon dioxide of relying on wind is in the \$80 to \$100 a ton, pre-subsidy. Whereas gas, you may be talking \$20 to \$40 and nuclear more like \$40 even at the high prices we're looking at today.

Senator CONRAD. Right.

Mr. ROWE. So the point I'm getting to is you need all. The group is entirely right to push all. But when we put our consumer hats on, the cost to the consumer is very different from one of these technologies to the other.

Senator CONRAD. Mr. Roberts.

Mr. ROBERTS. I certainly agree with the others here. To Mr. Rowe's point about cost and representing the coal industry. I want to make it clear on one point that we believe that the full panoply of resources is the way we should go, conservation, energy efficiency, oil, natural gas.

But what we have to realize is that we cannot do it without our most abundant and affordable source of energy here at home. That's coal.

Senator CONRAD. We have a substantial in our group of 20, a substantial investment in clean coal because we agree with you. It's got to be part of an overall comprehensive package.

Mr. ROBERTS. Yes it does, thank you.

Senator CONRAD. Mr. Steenland, what would be your reaction?

Mr. STEENLAND. Senator, we clearly support a broad based, multi-faceted approach. Unfortunately on our side, you know, airplanes don't work very well on wind and the nuclear powered airplane hasn't manifested itself yet. So we're still heavily, heavily dependent on crude oil and the refining of that crude oil into jet fuel.

We have taken and invested billions of dollars in terms of conservation efforts through purchasing new, more fuel efficient aircraft and the like to recognize the significant expense that we bear here. When we look at it, why we support a broad based bill, we tend to focus on what's in it to help control the supply or to expand the supply on the crude oil side and to the extent that there is expansion of areas available for drilling. We think that's a constructive approach.

Senator CONRAD. Mr. Cohn.

Mr. COHN. Senator, I agree with your premise. I agree with my distinguished colleagues on the panel. Look, I think the tax incentives that you have for wind and solar are very important.

I think the loan guarantee program, very important. I think nuclear power, very important. Conservation, very important. Smart growth technology expanding and upgrading the transportation network, all very important.

All this takes an enormous amount of capital. No one talks about the trillions of dollars we're talking about right now to rebuild the energy infrastructure of the United States. To attract that capital you're going to have to compete with other markets and other alternatives for the capital. The capital is going to tend to gravitate where it can get the highest rate of return with the most surety involved.

As long as we can create some rate of return with some predictability, we will be able to attract the capital into the system.

Senator CONRAD. Mr. Wagoner.

Mr. WAGONER. Just, I agree as well. I appreciate the leadership of your group. Because I think it very much is exactly the direction that we need to go to.

I would just go back to a point I made in my testimony that as we have historically looked at alternatives in our sector and others, we've seen that when oil prices are high, everybody wants to do something new. We're excited about it. We get the investment cranked up and oil prices go back down.

Consumers tell us what they're going to buy. They tell us everyday. So I would simply say as you and your colleagues look at this, the broad expanse is terrific but we have to recognize there will be market factors that will move up and down in those countries today that I mentioned earlier who are leading in battery technology had a persistent commitment to that technology even when oil prices went down to whatever it was, \$10 or \$20 a barrel not that long ago.

So I do think and would ask that your work comprehend a long vision and a commitment among all of us in a consistency of direction so we don't find ourselves in situations such as we're encountering today.

Senator CONRAD. That's what our bill contemplates, on the battery side, a 10-year commitment.

Mr. WAGONER. Terrific.

The CHAIRMAN. Let me see if Senator Domenici, do you have some additional questions or comments that you wanted to make?

Senator DOMENICI. Mr. Chairman, I'll follow, you go ahead.

The CHAIRMAN. Are there other members?

Senator Nelson, go ahead.

Senator BILL NELSON. Just one comment, Mr. Chairman. I just want to clarify to Senator Conrad's question to Mr. Steenland about the gang of 20 proposal. They omit in their proposal addressing speculation.

They say in their proposal they want to wait until the CFTC reports. So I want you to have that information as to how you would like to react to that because we're talking about action on this next week, Mr. Steenland. So tell me what you think.

Mr. STEENLAND. We've previously met with Senator Conrad and Senator Graham and we conveyed our views as to the appropriateness of what we thought in the urgency of including provisions in their package that addresses the speculation issue. We would en-

courage them and hope that they would get to that point before all is said and done.

Senator CONRAD. The report that is being referenced I think is coming September 15, but our group, the gang of 20. I've supported the speculation piece. Within our group there are differences on speculation. We tried in our proposal to influence the supply/demand relationship. But I strongly support the speculative legislation that Senator Nelson and others, Senator Dorgan and others have offered because I think that is a key component as well.

The CHAIRMAN. Senator Klobuchar, did you have another question?

Senator KLOBUCHAR. No, I'm just fine. I would like to—

The CHAIRMAN. Oh, sorry. I didn't realize Senator Nelson was still asking questions. Go ahead.

Senator BILL NELSON. I just want to conclude that thought about speculation. There was a report that was released Wednesday by Masters Capital Management Hedge Fund that said that "financial speculators drove up oil prices and then after the prices peaked on July the 11th began a mass stampede for the exits." That's a quote.

They pulled \$39 billion out of the crude oil market, Masters said leading to a sell off of 127 million barrels of oil futures. Mr. Cohn, that seems to contradict or be at variance with what you had said. What do you think about that?

Mr. COHN. I am quite aware of Mr. Master's piece. Just for those of you who don't know, Mr. Master's is a hedge fund manager, off shore in St. Croix who runs an equity fund that has very long transportation stocks and airline industries. I hope he does very well, by the way in his position.

Mr. Master's is not really an economist with formal training. There was a piece put out later in the week. You may be well aware of, Philip Verlinger put out a piece who is a quite recognized economist, has served here in the Capitol as an economist on energy policies. I'll take one moment to read his concluding paragraph for you. This is a piece after the Master's piece, he sort of responds to the Master's piece.

"Let me conclude with a simple comment. The accidental hunt brothers, act two by Michael W. Masters and M.K. White is the worst example of junk economic analysis published in a very long time. The author demonstrates nothing in the article that is devoid of any intellectual content. One can make a stronger case for a rooster's crow causing the sun to rise. Their report is utter and complete perversion of what we teach in economics."

Senator BILL NELSON. Let me ask you about the New York Mercantile Exchange Report. They concluded, this is about a week ago, that 81 percent of all of the oil futures contracts on the New York Mercantile Exchange were exchanges by speculators, not by commercial users of oil. Give us your opinion about that.

Mr. COHN. I think that the New York Mercantile, although I have enormous respect for them. I have served on their board and I've served on their Executive Committee in prior years. I think that unfortunately they lack the transparency of information. that was why the CFTC, by your body was asked to get involved and really create full disclosure and full transparency in what's going on in the market.

I would put a lot more confidence in the CFTC data where they have captured 90 percent of all market participants including the over the counter market which the NYMEX doesn't see. The NYMEX only sees those transactions which take place on their exchange, an equal and opposite transaction to that can take place in the over the counter market. Therefore even though I know what they see and I served on their control committee which controls the liquidity of the contracts, I know they don't have very good information.

That's why I was so interested in seeing the CFTC information that we were able to see yesterday which really did, for the first time in the history of the commodity markets in the United States, really paint a relatively clear picture of what's going on.

Senator BILL NELSON. Does Goldman Sachs—

Mr. COHN. Could I add one more thing to that? They tell you 81 percent of its speculative. Now that's also an interesting number because there are long speculators and there are short speculators. You could have longs and shorts net each other out.

So you could basically have 40 percent long, 40 percent short. They cancel each other out. The other 20 percent on the market be real end users but you could publish that you had 80 percent, 80 percent speculators in that market.

Senator BILL NELSON. Does Goldman Sachs engage in the speculative market on the oil futures contracts?

Mr. COHN. We engage in the oil market on behalf of our clients day in and day out. As I said in my opening comments we've been the facilitator of over \$220 billion of commodity hedges where we act as an intermediary between our clients and the exchange. We provide our clients like Northwest Airlines, jet fuel hedges, there's no jet fuel contract in the world. We take the risk of selling the jet fuel hedges. We then hedge that into other similar products where we inherit the risk. So we are engaged in the markets on a global basis, day in and day out.

Senator BILL NELSON. Your client, Northwest Airlines uses that oil from those futures contracts. Do you engage in the buying and selling of future oil contracts for clients that do not use that oil?

Mr. COHN. The way the futures contract actually works, they engage in a financially settled hedge with us. They use that as an insurance policy against price protection. They actually source their jet fuel from a third party, physical provider.

We do engage in transactions with people who are not ultimate producers or consumers of the commodity.

Senator BILL NELSON. Ok. So the answer to my question is yes. Now the simple follow up question is—

The CHAIRMAN. Let's do this one follow up and then Senator Klobuchar's going to be anxious to get in her questions.

Senator BILL NELSON. Then are you of the opinion that buy and sell in this marketplace and obviously one of the premier firms in Wall Street, is it your opinion that speculation has no effect on the price of oil that we've seen in the run up and the reduction?

Mr. COHN. It's not a simple yes/no answer. The speculators are in every market in the world. We need speculators to be in the markets. So in any given moment of time can a speculator have an

influence on the market? Absolutely. Anyone who would say that would be naïve.

So markets are meeting places for buyers and sellers. Buyers need to enter the market, drive the market price to a place where it attracts sellers. That is the natural balancing act that goes on day in and day out.

Why you need the speculator in the market and why the commodity index was created many years ago is our industry, 20 years ago was a very difficult industry. We had only clients that wanted to sell future production forward. So we had many clients that wanted to go drill oil wells, but they needed some predictability of the price of oil they were going to receive out of the well to go borrow money.

They tried to enter the market and sell the oil. There was no natural long in the market. The consumers are so fragmented that they don't amalgamate to a big enough position.

So we actually, as a firm, came up with the idea in the early 1990s to create a long only, static investor in the commodity markets. We created the commodity index where we could allow people that were willing to commit large pools of capital into the market for a very long period of time to facilitate the actual producers and allow them to be able to hedge their production forward to increase their production.

So without speculators in the market, the market doesn't exist. The speculator is sort of the rubber band or the spring in the middle that allows buyers and sellers to transact. It just doesn't work that well that a buyer wakes up in the morning and says, I want to buy at this price and the seller wakes up simultaneously and says, I want to sell at that price.

If the world worked like that, it would be a great world. But there's not a market in the world that works like that. So you need people to absorb all those price movements and those people are the speculators.

Senator BILL NELSON. So you don't want us to do anything against speculators. Ok. Mr. Chairman, thank you.

Mr. COHN. By the way, I'm in total agreement with what Mr. Steenland has said on transparency and creating more disclosure.

The CHAIRMAN. Senator Klobuchar.

Senator KLOBUCHAR. Thank you very much, Mr. Chair. Mr. Cohn, I just want to talk about how it looks from our vantage point here. It's not just about CFTC.

It's about a government that's been broken in terms of watching some of these financial transactions. Whether it's on Wall Street where there's been admissions on all sides where these things have broken down. Whether it's Fannie Mae or Freddie Mac, whether it is toxic toys coming in, that a lot of these agencies are shadows of their former selves.

When you see things happen like that Enron loophole, you know in the middle of the night it just gets changed. Change is the way that these markets can be regulated. I understand that you're going to have speculators and people in these markets. But you have to understand from our vantage point that the people that are the victims of this.

You can survive it if your things go up and down. These are people who can't. In Minnesota who are filling up their trucks half with gas and they can't go up to their cabins in the summer. So the problem with this is that the people who have most been affected by it, have the least disposable income.

So what we're trying to do and I would agree with Senator Nelson, that we need to give them more tools. We don't want to mess up the market. We're happy to listen to you. But we need to give them more tools.

I guess just to make this real and why I'm supporting the gang of 20 thing when it does have speculation. I'm going to try to get it on there, if we can. The reason I'm supporting it is that we have to move as a country forward. I understand I can't get everything that I want in this.

But I just want to ask to make this real. Mr. Krenicki, did you say that you believe that if we don't keep these investment strategies in place, how many jobs will we lose from your own company alone?

Mr. KRENICKI. If the PTC goes away, history has shown us when that happens the industry declines 90 percent. Will that happen again? We think directionally it will decline and American Wind Energy Association estimates about 76,000 jobs would go away.

Senator KLOBUCHAR. Thank you. Mr. Wagoner, if we keep going the way we are in the auto industry and we don't think ahead to these green jobs and new economy, what do you think will happen?

Mr. WAGONER. You would have to tell me what's going to happen to the price of oil, right? Because basically that's what is driving the, you know, the demand for our products and frankly extends across the entire economy.

So when oil prices are low everything goes great. When they go high then we, you know, we get into situations like we are today. From a business perspective we much prefer to have a diversity of sources. We think that would provide a longer term stability and conditions for the U.S. economy to continue to grow which I think is at the root cause of addressing some of the issues of your concern.

Senator KLOBUCHAR. Thank you. Then Mr. Steenland, our hometown airline, if we just keep going the way we're going and we don't do more with our own domestic supply and we don't do more with wind and solar and all these things that can feed into new energies. What do you think will happen to the airline industry and all the employees we have in Minnesota?

Mr. STEENLAND. I certainly think if you dial back, you know, to the middle of July and you look at the world where oil is at \$147 a barrel. I think the U.S. airline industry and the economy as a whole would be looking radically different in that airfares would be materially higher, service would be materially reduced. All that means for hubs that for which corporate headquarters have expanded service to small communities and the like would be, clearly would have been adversely affected.

Hopefully we can stabilize with the type of legislation that's being proposed, you know, a lot of the experts for, take it for what's its worth, say that the sort of the long term, natural supply and demand price of oil ought to be in the \$70 to \$90 a barrel range.

If that's true, I think we can, you know, manage through this in a relatively decent way. But if we see the return of oil with that's in the \$140 range. I think the world is going to look much different.

Senator KLOBUCHAR. Very good. I have to go be on a Moorhead radio station. So I'll tell them all that you're supportive of us moving ahead.

I am serious about that we need support from the corporate community as we try to move these things going forward in Congress. We need, if you're truly supportive of these things what I've seen so many times when we try to move climate change legislation, Mr. Rowe or other things is people kind of say they're for it and then people are making calls against it.

We just can't afford to have that happen. We're going to need your help. Thank you.

The CHAIRMAN. Senator Domenici, go right ahead.

Senator DOMENICI. Yes, thank you, Mr. Chairman. I want to say again to all of you how much we are indebted to you for taking time off to come to talk with us. I believe, Mr. Cohn, your explanation from the marketplace standpoint of supply and demand and how it has an impact on the price of oil whether we like it or not, whether we like the result or not, is very necessary.

You see an environment here where we can't help it. We are very much affected by emotions and most of the time it's emotions of our constituents. Frequently the emotion button is pushed by the wrong set of facts or the wrong interpretation.

We have a difficult job, as you can tell, trying to put together an energy bill. In fact the Chairman and I, who put three of them together in the past 7 years, one being the very large package that most of you are aware of and two others. Among the other two we had, we finally passed CAFE changes.

I say to you, Mr. Wagoner, I'm not sure that you smiled as I said that. But a few years ago, you would not have. But Congress finally came around and said it's obvious. We've got to have smaller cars, lighter cars. We've got to take the chance of increased injuries that might occur if that's one of the facts.

But we did that and we also did whatever was necessary to bring nuclear power on. It's coming pretty strong. Now we have an issue that is, boy, right up to the top. It has to do with a very collateral issue to what you have been speaking of as witnesses today. That's if we have additional reserves that are American should we open them up for development?

That's what brought us to where we are. We started that moving along. From that came a well of support from the American people to drill for what was ours. That now we have an argument going. How much of that which is ours should we open up?

It's strange that we would go from not wanting to do any to those of us who started this debate wanted to open all of it and let that be decided in the future as we needed. I was very pleased to hear the oil companies that are out there using these platforms, that you all know about even though you're not in the business, the giant platforms that the oil developers put out in the water. It turned out to be technologically speaking very, very exciting products. There's no leakage. There's no spillage.

When they get down they can have 10 or 12 wells off of one footprint. They can have directional drilling. It's just rather incredible feat of ingenuity with reference to off shore drilling.

If you were here this morning you would have heard the witness whose company does most of that, tell us that there are 30. All 30 are busy and they plan to double or triple that amount, especially since they think they are going to have the American off shore market be put up for acquisition so they can plan on using what they build, what they add to this fleet of 30. That's rather exciting. It ought to be exciting to you as businessmen to think that finally the American oil industry is going to be turned loose.

We have a lot of complaints about the oil industry, but what it all comes down to the bottom line, we're the only country that has any oil companies of real significance left in the world. I guess you know that. All the oil businesses are owned by states. They're government owned with just our American big five. They're the only companies that are privately owned.

I think in the final analysis we probably have to be proud of them, whether we want to be or not. We're lucky we've got them. Some people think they make too much money. But when it comes to developing our resources, they're pretty darn good. When it comes to developing resources around the world, they're very good. I think they're pleased if we open up more of our own property so they can do it here rather than run around the world fighting with the kind of dictators and other people, personages, that they've been confronted with as you've watched them over the years.

So if we open up the Outer Continental Shelf and it gets let out for bid, in time we will have perhaps as many as 80 or 90 offshore rigs of significance. They will be producing oil for us for a long time. The previous witnesses have told us, yes, indeed we will be using oil for a long time, even as we move through all these new things we're going to do. It's not that we want to. It's just that we have to. We can't avoid using it for quite some time.

I used to say one generation. I'm wrong. They're saying it's much more than one generation. It's perhaps as many as 30 or 40 years that we will continue to use it.

The issue that brought this to boil was should it be ours or should it be somebody else's as we continue to have to use oil. That's the issue. It should be ours if it can be and rather than somebody else's. The only place we know that it's ours is the off shore of the United States. That's where it is in abundance.

My last observation is we speak much of producing green jobs. General Electric has told us precisely what it means. I would say we have to be careful.

We didn't have time to inquire. But we want to make sure that a lot of that work is done here. I do know that some of it is not that we are importing a lot of it from Germany.

I hope if we make permanent or get 5 years or 10 years to this credit so that it's got its strength, it's pinned down. I hope more of the business will come to our country and be done here. I would ask, my last parting shot, if General Electric would tell me their observations about that because it's very important.

Will these jobs come here in more abundance than now in your opinion?

Mr. KRENICKI. Absolutely. You see many non-U.S. manufacturers investing significant amounts of money in the United States today. One of the dynamics of the wind business is transportation costs are astronomical. So transporting large parts like wind blades and towers, that work has to be done close to the markets. So it will bring jobs to where the market is.

Senator DOMENICI. So that will help us.

Mr. KRENICKI. Absolutely.

Senator DOMENICI. Thank you, Mr. Chairman. It's good to be with you. Thank you all.

The CHAIRMAN. Thank you all again. This has been excellent testimony. We appreciate you taking your valuable time to talk to us today.

Thank you. That will conclude our summit.

[Whereupon, at 2:45 p.m. the summit was adjourned.]