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# THE FUTURE OF OIL

## HEARING

BEFORE THE

## SELECT COMMITTEE ON ENERGY INDEPENDENCE AND GLOBAL WARMING HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

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# THE FUTURE OF OIL

**WEDNESDAY, JUNE 11, 2008**

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON ENERGY INDEPENDENCE
AND GLOBAL WARMING,
*Washington, DC.*

The committee met, pursuant to call, at 10:05 a.m. in Room 1300, Longworth House Office Building, Hon. Edward J. Markey [chairman of the committee] presiding.

Present: Representatives Markey, Inslee, Larson, Solis, Herseth Sandlin, Cleaver, Hall, McNerney, Sensenbrenner, Shadegg, Walden, Sullivan, Blackburn, and Miller.

Staff present: Jonathan Phillips.

The CHAIRMAN. This hearing is called to order, and we welcome everyone to the Select Committee on Energy Independence and Global Warming for this very important and timely hearing dealing with the energy crisis that is affecting our country. And that raises a question, and the question is when does a daily supply of higher oil prices become a third energy crisis? That is the question we are reviewing at today's hearing.

I think it is obvious to all Americans, at least those outside the presidential bubble, that America faces a huge energy problem and it is not going away soon. Since President Bush took office, oil has embarked on one of the greatest price run-ups in history. This energy spike is different. It was not brought on by an oil embargo, nor by a surprise revolution in the Middle East. That is what we saw in the 1970s. This time it is different. This long, painful run-up is the direct result of an oil President and a Republican Congress executing an oil-centered energy policy.

Today we will hear that without fundamental changes oil demand will rise 30 percent worldwide over the next 2 decades. Where will all that additional supply come from? Our Republican friends say go drill in pristine areas like the Arctic Refuge and deep waters off the Outer Continental Shelf. It sounds like a simple answer. But like so many other simple answers, it is misleading and it is wrong.

The United States sits on less than 2 percent of the world's oil reserves. And we consume one-quarter, 25 percent, of the world's oil. Our own proven oil supply without foreign imports would last just 3 years. We simply cannot drill our way out of this crisis because we don't have the reserves.

Who does have the oil to meet this rising demand? The answer is easy: As always, follow the money. Follow the tanker ships of American dollars that we have been shipping month after month

to the Middle East. According to the International Energy Agency, OPEC countries would need to ratchet up production by 57 percent over the next 2 decades to meet projected demands.

Does our President have a problem with this scenario? His visit to Saudi Arabia last month indicates not. In exchange for nothing more than a gentlemen's agreement that Saudi spigots will stay open, the President agreed to provide assistance to Saudi Arabia in developing their nuclear power capacity. While American consumers gives Saudi Arabia $135 for each barrel of oil, President Bush is giving the Saudis the priceless and dangerous gift of nuclear technology.

Even if we are able to drill every last drop of domestic reserves and are able to prod OPEC into further feeding our addiction by increasing capacity, we are left with a much greater problem. Our planet will choke on all of that $CO_2$.

If a frog is placed in boiling water, it will jump out. If it is placed in cold water that is slowly heated, it will never jump out. The heat has slowly been turned up on the American consumer. Now they are being boiled alive. The same thing could be said for our planet.

A fundamental change is needed in the way America uses energy. Plug-in hybrid cars that get 100 miles to the gallon, advanced cellulosic biofuels that power the fleet on grasses and crop waste, public transportation and more livable cities that reduce the necessity for people to drive everywhere.

Today we will hear that the consensus view is that oil above $100 a barrel is going to be with us for some time. So we have two choices. One, continue exporting our wealth overseas, which drives down the value of the dollar, and hope that American consumers can outbid the Chinese and Indians in the world oil market.

Or two, we can commit to blazing a new path, one that frees our country from the shackles of oil and unleashes the renewable energy revolution that will save the planet and drive our economy in the 21st century. The choice is simple. This hearing is very important.

Let me turn now and recognize the ranking member of the committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

[The prepared statement of Mr. Markey follows:]

**"The Future of Oil"**
**Opening Statement of Chairman Edward J. Markey (D-Mass.)**
**June 11, 2008**

When does a daily surprise of higher oil prices become a third energy crisis? That is the question we are reviewing at today's hearing. I think it is obvious to all Americans – at least those outside the Presidential bubble – that America faces a huge energy problem and it is not going away soon. Since President Bush took office, oil has embarked on one of the greatest price run-ups in history. But unlike the energy spikes of the 1970s and 80s, this energy spike is different. It was not brought on by an oil embargo, nor by a surprise revolution in the Middle East. Instead, this long, painful run-up is the direct result of an Oil President and Republican Congress executing an Oil-centered energy policy that sacrificed fuel efficiency and conservation policies on the altar of drill, drill, drill.

Today we will hear that without fundamental changes oil demand will rise 30 percent worldwide over the next two decades. Where will that additional supply come from? Our Republican friends say, "Go drill in pristine areas like Arctic Refuge and in deep waters off the Outer Continental Coast." It sounds like a simple answer, but like so many other simple answers, it's misleading and wrong. The United States sits on less than 2 percent of the world's oil reserves and we consume one-fourth of the world's oil. Our own supply, without foreign imports, would last just three years. We simply can not drill our way out of this crisis because we don't have the reserves.

Who does have the oil to meet this rising demand? The answer is easy: as always, follow the money. Follow the tanker ships of American dollars that we've been shipping month after month to the Middle East. According to the International Energy Agency, these OPEC countries would need to ratchet up production by 57 percent over the next two decades to meet projected demand.

Does our President have a problem with this scenario? His visit to Saudi Arabia last month indicates not. In exchange for nothing more than a gentleman's agreement that Saudi spigots will stay open, the President agreed to provide assistance to Saudi Arabia in developing their nuclear power capability. While American consumers give Saudi Arabia $135 for each barrel of oil, President Bush is giving the Saudis the priceless, and dangerous, gift of nuclear technology.

Even if we are able to drill every last drop of domestic reserves and prod OPEC into further feeding our addiction, we are left with a much greater problem. Our planet will choke on all that CO2.

If a frog is placed in boiling water, it will jump out. But if it is placed in cold water that is slowly heated, it will never jump out. The heat has slowly been turned up on the American consumer and now they are being boiled alive. The same could be said for our planet. A fundamental change is needed in the way America uses energy: plug-in hybrid cars that get 100 miles to the gallon; advanced cellulosic biofuels that power the fleet on grasses and crop wastes; public transportation and more livable cities that reduce the necessity for people to drive everywhere.

Today, we will hear that the consensus view is that oil above $100 per barrel is going to be with us for some time. So we have two choices: 1) continue exporting our wealth overseas, which drives down the value of the dollar, and hope that American consumers can outbid the Chinese and Indians in the world

oil market. Or 2) we can commit to blazing a new path. One that frees our country from the shackles of oil and unleashes the renewable energy revolution that will save the planet and drive our economy in the 21st century. The choice is simple.

Mr. SENSENBRENNER. When a Member of Congress starts out by calling his colleague distinguished, that means he disagrees with everything he said. So I thank the distinguished chairman for giving me this time.

Today's hearing gives the select committee a chance to explore what could be the biggest energy issue facing the planet over the coming decades, oil powers, our allies, and the economy making it a vital part of our future. It is not hard to imagine how some of the reckless policies of the Democratic majority will create a future where energy is scarce and expensive in our country. And by expensive I mean far more expensive than the Pelosi premium driven $4 a gallon gas that is already causing great problems across the country and stretching everybody's budget.

While we are hearing calls for energy independence from my friends, we are seeing little action particularly in the area of gas prices. While prices are skyrocketing, foreign countries like Saudi Arabia and Venezuela are raking in the profits, thanks to the aching pocketbooks of millions of Americans.

The United States has many energy resources, so many that I think most Americans would be surprised to know exactly how much energy is available right here in our own country. I am sure they would also be surprised to learn how diligently my distinguished colleagues are fighting any expansion of America's capacity to explore for and produce oil and gas.

On Monday Investor's Business Daily laid out exactly how much energy there is out there. In the western U.S. it is estimated that there is the equivalent of 1 trillion barrels of oil and shale rock. The Democratic majorities in both the House and Senate voted within the last year to keep shale rock off limits to exploration despite the fact that these reserves could be as much as three times as large as Saudi Arabia's.

While China and India are drilling 60 miles off Florida's shores, Investor's Business Daily noticed that Congress continues to keep 85 percent of America's offshore oil and gas off limits. I don't think that Congress should be picking winners and losers. I believe that all energy options should be open for consideration. That includes renewable resources, like wind and solar. That also includes nuclear power and improve energy efficiency. Certainly expanding our oil and natural gas exploration in production should be a top priority because we know it is there.

While technology will help produce demand for gasoline, the only other thing that can reasonably bring down gasoline prices is an increase in domestic supplies. America needs relief now from high gas prices, and increased production is the best way to get there.

After taking control of Congress, the Democrats created this select committee partly to address the issue of energy independence. Yet it seems that the Democrats are throwing up roadblocks to any reasonable proposal that would help free the United States from its reliance on foreign oil. With so much potential oil available, the U.S. should have a bright energy future. However, unless my distinguished friends over here begin to drop some of the roadblocks, I can see a future where gas prices rise higher and higher while Americans suffer more and more.

That is not the kind of future I want to imagine, and I hope that my distinguished friends in Congress will work with Republicans in coming months to help create a brighter future for all of us. I thank the Chair and yield back the balance of my time.

The CHAIRMAN. I thank the gentleman. We now turn and recognize the gentleman from Connecticut, Mr. Larson.

Mr. LARSON. Thank you, Mr. Chairman.

The CHAIRMAN. Your microphone.

Mr. LARSON. Thank you very much, Mr. Chairman, and all the distinguished members of this panel. I am glad that our esteemed colleague was discussing, I think you said, the Pelosi premium. Does that come from the Bush barrelhead of oil? I think it is pretty clear especially in recent testimony when we see that on our own continent where this administration has already granted in excess of 10,000 permits on millions of acres that companies could be drilling on, that 67 million acres already permitted aren't being drilled on today. One has to wonder why that is the case.

Secondly, the policy of this administration, best described by Thomas Friedman, leave no moolah behind, where we see the United States going hat in hand to Saudi Arabia to try to get from the Saudis some help and esteem and receive basically a slap in the face.

Clearly when we have the opportunity to invest in alternative energy and we see the Senate time after time block the funding, block the funding necessary to make sure there is an appropriate investment in fuel cell technology, in solar, wind, these are important aspects that need to be followed through as part of any integrated policy. And I hope to be able to ask the distinguished panelists also how they feel about speculators and whether or not speculators are artificially driving the price up. Are the laws of supply and demand suspended during this time because of speculation?

And I will wait to hear and yield back my time.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentleman from Arizona, Mr. Shadegg.

Mr. SHADEGG. I thank the gentleman for yielding and appreciate him holding this hearing. I think everyone recognizes it is time to do what we can and to be as aggressive as humanly possible at moving off of a fossil fuel-based economy. But no expert has come before this testimony and no expert has come before this committee and no expert has come before the Subcommittee on Energy of the Commerce Committee on which I serve and said that we can move off of these oil-based fuels overnight, certainly not for a period of years, some as long as beyond 2030.

In the meantime the question is what do we do as Americans face gas prices? They say the average in the country today is $4.04 a gallon. In my State of Arizona it is over $4.15 a gallon for regular. And I would suggest for the sake of this Nation this Congress needs to act and it needs to act now.

America is the third largest producer of oil in the world and could be doing far better. We have enacted policies that lock up billions of barrels of oil and natural gas, and we are choosing not to pursue those. Those policies may have made sense when we could buy oil or buy gasoline at 2.50 or $3.00 a gallon. But when we are forcing on the economy gas prices of over $4.00 a gallon, quickly

moving to $5 a gallon and perhaps moving to $6 a gallon, those policies simply makes no sense.

I would echo the comments of the ranking member on issue after issue. Whether it is Outer Continental Shelf, whether it is the Intermountain West, whether it is oil shale where the U.S. House recently imposed a moratorium, or whether it is ANWR, we have made a decision as a nation to lock up our current supply, and virtually 90 percent of the Democrats in this Congress have voted against supply vote after vote after vote for the last 15 years, and virtually 90 percent of Republicans have voted to increase supply on vote after vote after vote over the last 15 years.

I don't think you can look backward at those votes and criticize them now. It is important to look forward because we have to do something about this problem for the sake of the working men and women of America and for the sake of our Nation's economy.

And with that, I yield back.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentlelady from California, Ms. Solis.

Ms. SOLIS. Thank you, Mr, Chairman. And I want to again thank you and our witnesses for being here to hold this very important hearing on the future of oil.

The price of oil hit a record high of 138 per barrel in June of this year, an increase of over 600 percent since 2002. In the district that I represent in East Los Angeles in California, the price of gasoline is over 4.60 and that is not even premium. Our economy and our national security, as you know, is very vulnerable as a result of our Nation's dependence on oil.

Government owned and operated companies such as the National Iranian Oil Company in Iran represent the top 10 holders of oil reserves internationally. While domestic demand is expected to grow from 21 million barrels per day to about 25 million barrels per day in 2030, our domestic supply of oil as we know is limited. This includes reserves which are already accessible to oil companies for production yet are not being developed. Why?

Domestically companies have stockpiled nearly 10,000 drilling permits, as was stated earlier, which they are not developing. Again, why? One-quarter of the public lands and water available for energy development are actually in production. Why? Why can't we drill—well, in my opinion we can't drill our way out of this problem.

If the United States was to rely on domestic resources to meet all of our current consumption, all proven reserves would be exhausted in 3 years. The only long-term, sustainable, secure solution is to reduce our demand on oil. And I do believe that the Pelosi solution is and was the Energy Independence and Security Act which became law last December, which increased the fuel economy standards to 35 miles per gallon at a 40 percent increase over current levels. Those are the kinds of activities that this Congress is undertaking. I am proud to be a part of that plan that Speaker Pelosi has put forward. We need more revitalization, renewable energies and other sources of fuel to get our security independence in order.

I yield back the balance of my time.

The CHAIRMAN. The gentlelady's time has expired.

The Chair recognizes the gentlelady from Tennessee, Mrs. Blackburn.

Mrs. BLACKBURN. Thank you, Mr. Chairman. Thank you for the hearing and to our witnesses we appreciate very much that you are here.

I don't think there is anyone that denies that the current global market is enduring a period of record prices and tight supplies and increasing demand. That is where I think we need to focus, is on that supply and demand issue. As we hear the platitudes and the prognostication we know that what we have done in this country is we have kept our ability to get to our supply.

Quite frankly, I am one of those Members that I think the smartest thing that we could do would be to repeal the provisions from last year's Energy Independence and Security Act because we are making it impossible to explore for American oil on American soil. And the American people are really quite offended that the most creative thing that has come out of this 110th Congress to address energy issues is to repeal the light bulb. That does not help them when they are paying over $4 a gallon at the pump. We know that there are worldwide reserves that would take care of the next 30 years. At the current rate of consumption we know that there are American reserves that are off limits and it would handle, it would give us a sufficient supply for 100 years. So yes, we need to be looking at what we are going to do as Americans to find an American solution to this problem, short-term, mid-range and long-term answers that will address the needs of our Nation.

And I am looking forward to hearing from each of you how you think we should best address it, in the short term, right now, mid range with the next 20 years, and in the long term. Where is thoughtful innovation heading?

Thank you, Mr. Chairman. Yield back the balance of my time.

The CHAIRMAN. The gentlelady's time has expired.

The Chair recognizes the gentleman from New York, Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman. The reality is as we sit here today discussing our future and oil's future, we are really taking a look at whether our country's future will be prosperous or painful. We are at a clear fork in the road and must choose which path to take.

In one direction there is the path that leads in the direction of business as usual, based on oil as the prime mover of our vehicles and our economy. With gas prices at record highs, all we hear from the oil companies, their allies in Congress is we need to drill, drill, drill, drill for more oil here at home. I would ask you with all deference to my distinguished colleagues on the other side of the aisle, who is stopping you? About 75 percent of the oil in the United States is on land that is already open for production, but less than one-third of that land is actually being used by the oil companies. They are literally sitting on 10,000 permits and millions of acres of leased land that they have already paid for that would let them start pulling more oil out of the ground.

Our President George W. Bush said when oil was only $50 a barrel there should be no need for more incentive for oil companies to drill for oil. Now at 135, I can't imagine that there is more incentive. So I am wondering why are they sitting on millions of acres

of already leased land here in the United States? It is ready to drill. Drill away.

But at the same time if we are going to move further toward the drilling and burning of oil, we must be also ready for more extreme weather events, more tornadoes, more floods, more 11 inches of rain one day in Indiana or Kansas, three record 50-year floods in my district in the space of 5 years, more drought in the Southeast, et cetera. These are the computer projections of climate change that the consumption of oil and other carbon-based fuels lead to.

So I just say we can and we may wind up drilling for and using a lot more oil, but we should be moving for the economy and for the environment's sake toward a renewable future. I yield back.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognize the gentlelady from Michigan, Mrs. Miller.

Mrs. MILLER. Thank you very much, Mr. Chairman. And I appreciate you calling this very important hearing. I think the American citizenry is looking toward this Congress to work in a bipartisan fashion to effect some change and some hope for what is happening with these gasoline prices, with the oil prices.

I think the cost of gas has got the ability actually to cripple our economy probably more than any other single factor, and it is manifesting itself in so many various ways. I mean, we see the airlines merging, with Northwest and Delta merging for a number of reasons but probably foremost because of the price of fuel.

From Michigan, coming from Michigan I see what is happening with our auto industry. Certainly just in the last couple of weeks we have had General Motors announcing they are closing a number of plants that are producing SUVs and trucks and various things. And you hear the folks at GM saying that almost overnight the buying patterns of the American public is changing and they think it will be a permanent thing.

We see it impacting the rail, every mode of transportation, and because of the way we structured our society with so many people commuting long distances, et cetera. As I say, it has the ability to impact more than anything. As we go into a tourism season it is impacting in Michigan and every State I think in the agricultural industry in every way. I think there are a number of proposals that are out there and I am very interested to hearing the panel today. And again, I think the American public is looking to this Congress to effect some meaningful, comprehensive energy policy that will have an impact on their ability to fill up their gasoline tanks. And I look forward to hearing the witnesses' testimony.

The CHAIRMAN. The gentlelady's time has expired.

The Chair recognizes the gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Thank you, Mr. Chairman, for calling this timely hearing. The high price of gas is hurting businesses in communities throughout our country. In fact, the most recent Lundberg survey which compares average fuel prices nationwide was Stockton, California in my district as having the highest average gas prices anywhere. At more than $4.50 a gallon, people are struggling. And with these high prices people are inevitably asking why are the prices of gas so high and what are we doing about it?

Thankfully, we can tell them that the Congress has taken some badly needed steps, both in the near term and the long term.

It is essential that we pursue policies that will lower prices now and we double our efforts to increase efficiency, investing in new technology, and ultimately work to wean our country from foreign oil.

Today's hearing should answer some of the questions of why oil prices and gas prices are so high. Clearly the world demand is up while production has stagnated, rampant speculation drives the price of oil higher. We remain at the mercy of government controls, oil companies, and international cartels. We have taken action by stopping Strategic Petroleum Reserve deposits, by mandating new efficiency standards, and by providing explicit authority to the administration to investigate gas gouging.

While oil companies are demanding additional drilling rights which they claim will lower the price of gas, they are only using 26 percent of the area they already have for drilling. If we encourage innovation to increase efficiency and find new forms of energy, we can keep ahead of the oil price increases and maintain our high standard of living.

This is America's great historic challenge and our opportunity. I yield back.

The CHAIRMAN. I thank the gentleman.

And now we will recognize the gentleman from Washington State, Mr. Inslee, for an opening statement.

Mr. INSLEE. I thank you. We know one thing for sure, as long as we remain dependent on dead dinosaurs for our transportation, we are doomed to price hikes, global warming and the security concerns associated with the fact that the dinosaurs went to die under the Mideast sands. We don't know how it happened, but it did. We have got to replace an old resource of oil with a new resource of intellectual capital. That is happening across America today.

Our fundamental challenge is to get on with the business of hastening this giant clean energy revolution that is now happening across the country. It is happening at the Sapphire Energy Company. California is developing a gasoline made from algae. It is happening at the A–123 Battery Company in Boston that is making the lithium powered batteries that are going to power the GM Volt, a plug-in hybrid car. It is happening at the Phoenix Motor Car Company, a company I am meeting with this afternoon. They are going to have an electric car that runs 100 miles just on a charge. It is happening at the Bright Source Solar Thermal Company that is developing solar thermal energy with zero $CO_2$ input.

What do all of those companies have in common? They are not based on dead dinosaurs, they are based on living geniuses, and those are living American geniuses.

One of the things Mr. Shadegg, my friend, said that this revolution is not going to take place overnight, none of us can promise the American people the congressional snap of the finger to create the new technologies over night. They are going to take years, if not decades. That is a reason to start today, not to wait another 3 years. The fact that this may take a year or two means it is more important to start today rather than less important. And that is why the debates we are having, the debates between the optimists

on this side of the aisle who believe in the power of this intellectual capital and some pessimists who want to remain addicted to dead dinosaurs, that is what the debate is. Let's move forward on clean energy revolution.

The CHAIRMAN. The gentleman's time has expired. All time for opening statements for the members of the select committee has been completed.

[The prepared statement of Mr. Cleaver follows:]

**U.S. Representative Emanuel Cleaver, II**
**5th District, Missouri**
**Statement for the Record**
**House Select Committee on Energy Independence and Global Warming Hearing**
**"The Future of Oil"**
**Wednesday, June 11, 2008**

Chairman Markey, Ranking Member Sensenbrenner, other Members of the Select Committee, good morning. I would like to welcome our distinguished witnesses to the hearing today.

As the price of gasoline continues to soar, Americans are struggling to balance the cost of fuel with expenses like groceries and health care. The national average of a gallon of gas is now over $4.00, which is a dollar more than just one year ago. This may be hard to believe, but it is part of a difficult reality for middle-class Americans, including those in my hometown of Kansas City, Missouri.

Future prices of oil and gasoline are predicted to continue to increase, and this would further negatively impact consumers, as the cost of fuel absorbs steadily more of their income. While we cannot accurately predict the cost of fuel, we can plan to utilize less oil and gas in the future. We must assess and invest in alternatives to conventional fuel like biofuels and renewable-powered electricity like solar and wind power. My mobile office in my district is powered by French fry grease, for example. We cannot continue to be beholden to foreign countries for our fuel supply, but drilling in protected areas is not the answer either. Ingenuity and innovation is the answer. However, until we have changed our national energy portfolio to secure and renewable resources, we must learn why prices are at their current levels in order to form a solution now.

I thank the panel in advance for their answers and insight, and I appreciate them taking the time to visit with our committee today.

Thank you.

Now we will turn to our very distinguished panel. And our first witness, who is Mr. Paul Caruso, he has been the Administrator of the Energy Information Administration for the past 6 years. And obviously there can't be a more important job in the United States Government today than Mr. Caruso and the recommendations which he makes to Congress and to the American people.

So we welcome you, sir. Whenever you are ready, please begin.

**STATEMENTS OF GUY CARUSO, ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION; ADAM SIEMINSKI, CHIEF ENERGY ECONOMIST, DEUTSCHE BANK; AMY MYERS JAFFE, ENERGY STUDIES FELLOW AT THE JAMES BAKER INSTITUTE FOR PUBLIC POLICY; ATHAN MANUEL, DIRECTOR OF LAND PROTECTION PROGRAMS, SIERRA CLUB; AND KAREN A. HARBERT, MANAGING DIRECTOR AND EXECUTIVE VICE PRESIDENT, INSTITUTE FOR 1ST CENTURY ENERGY**

**STATEMENT OF GUY CARUSO**

Mr. CARUSO. Thank you very much, Mr. Chairman. I appreciate the opportunity to appear today to discuss the long-term outlook for oil in the United States and globally.

The Energy Information Administration, EIA, is the independent statistical and analytical agency within the Department of Energy. As such we do not promote, formulate or take positions on policy matters, and our views should not be construed as representing those of the Department of Energy or the administration.

In your invitation letter you asked about our current forecast for gasoline prices. Our June short-term energy outlook yesterday projects that regular grade motor gasoline retail prices will average $3.78 per gallon this year. That is 97 cents per gallon above the 2007 average, with the monthly average prices projected to peak at 4.15 in August nationwide. Crude oil prices for low sulfur light grade are projected to average $122 per barrel in '08 and $126 per barrel in 2009 compared with $72 last year.

I think it is important when you are discussing the long-term outlook for oil and liquid fuels to start with a clear set of definitions. First table in my written testimony shows the estimated global quantities for six categories of liquid fuels. We use the term "oil" to refer to the first four, which are conventional crude oil, lease condensate, natural gas liquids, refinery gain, and unconventional crude oil, including Canadian oil sands, shale oil and very heavy crude oil. We use the term "liquids" to refer to oil plus biofuels and liquid fuels manufactured using coal and natural gas.

These distinctions are important because the conventional crude oil share of total liquid fuel supply, which was 84 percent in 2006, is projected to decline to between 62 and 72 percent of total global liquid supply in 2030 in the reference and high price cases as discussed in the written testimony.

Last December, as several members have noted, the Energy Independence and Security Act was passed and signed by Congress and signed by the President. The specific provisions that have the most significant implications for future oil markets are the updates to the corporate average fuel economy, CAFE, standards, for new light duty vehicles and the renewable fuel standard. Taken to-

gether the updates to these two standards in EISA produce a substantial reduction in oil use and oil imports in our long-term outlook. EIA estimates that the combined affects of the CAFE and RFS update are to reduce U.S. oil use by about 2 million barrels per day by 2030.

EIA's annual energy outlook illustrates the importance, the impacts of high oil prices by developing and reporting projected projections for several alternative oil price paths. Higher oil prices can be expected to reduce U.S. liquids consumption, increase domestic production and reduce the Nation's reliance on imported oil.

Generally the responsiveness of both supply and demand to higher prices grows over time. Reflecting consumers' response to high prices, oil use in the transportation sector in 2030 is nearly 6 percent lower in the high price case than in the reference case. Higher prices also result in fuel switching between liquids and other energy in the industrial sector.

Turning to supply, projected domestic crude oil production in the high oil price case, as shown in figure 4 of the written testimony, is 6.4 million barrels per day compared to the 2006 level of 5.1. By dampening the demand for liquid fuels and increasing the domestic production of crude oil and biofuels, higher oil prices together with the CAFE and RFS provisions in EISA substantially reduce projected U.S. oil imports.

In 2006, U.S. oil imports were 12.4 million barrels per day accounting for 60 percent of our total liquid fuel use, and in the AEO 2008 high price case, oil imports are expected to provide 44 percent of our total projected liquid fuel use in 2030.

Higher oil prices will also effect global liquid fuels in oil markets. In the AEO 2008 high price case global liquid consumption grows from 85 million barrels a day in 2006 to 98 million barrels per day in 2030, significantly below the reference case consumption level of 113 million barrels per day in 2030.

Higher oil prices also affect the projected mix of global liquids production. Liquids production from sources other than conventional oil in the AEO high price case is 19 million barrels per day higher in 2030 than in 2006, compared to an increase of only 11 million a day in the reference case.

In conclusion, Mr. Chairman, both the reference and high price case in the AEO 2008 suggests that liquid will continue as a primary global fuel through 2030, although they are expected to represent a declining share of the total energy mix. The share of oil and especially conventional oil in the overall liquids mix is also expected to decline. In the high oil price case overall liquids to 2030 use grows by about 15 percent while conventional crude oil production declines by more than 15 percent.

Policy decisions taken by this body and others will make is expected to be a key driver in changing this business as usual outlook. And we certainly look forward to working with you Mr. Chairman, members of committee and other committees in this Congress to provide the best data and analysis to help you make your choices.

[The statement of Mr. Caruso follows:]

**STATEMENT OF GUY CARUSO**

**ADMINISTRATOR**

**ENERGY INFORMATION ADMINISTRATION**

**U.S. DEPARTMENT OF ENERGY**

**before the**

**SELECT COMMITTEE ON**

**ENERGY INDEPENDENCE AND GLOBAL WARMING**

**U. S. HOUSE OF REPRESENTATIVES**

**June 11, 2008**

**Mr. Chairman and Members of the Committee:**

I appreciate the opportunity to appear before you today to discuss the long-term outlook for oil, both in the United States and globally. Enactment of the Energy Independence and Security Act of 2007 (EISA) and rising oil prices have changed the long-term outlook, and this morning I would like describe our analyses of those changes.

The Energy Information Administration (EIA) is the independent statistical and analytical agency within the Department of Energy. We do not promote, formulate, or take positions on policy issues, and our views should not be construed as representing those of the Department of Energy or the Administration. Our mission is to produce objective, timely, and relevant data, projections, and analyses that are meant to assist policymakers, help markets function efficiently, and inform the public. The energy projections that I will discuss today are widely used by government agencies, the private sector, and academia as a starting point for their own energy analyses.

**Defining "Oil"**

Discussions of the long term outlook for oil and liquid fuels should start with a clear set of definitions. **Table 1** in my testimony shows estimated global quantities for six categories of liquid fuels in 2006. We use the term "oil" to refer to the first four of those categories: conventional crude oil and lease condensate, natural gas plant liquids, refinery gain, and unconventional crude oil. We use the term "liquids" to refer to "oil" plus biofuels and liquid fuels manufactured using coal (CTL) or natural gas (GTL) as a feedstock.

We also make a distinction between conventional and unconventional crude oil. Conventional crude oil comes from underground reservoirs for which the geophysical properties of the reservoir rock and characteristics of the crude oil permit the oil to flow readily to a vertical wellbore. Unconventional oil is oil which, due to the characteristics of the reservoir rock or the fluid, is not easily extracted using vertical wells, including Canadian oil sands, shale oil, and very heavy crude oil (e.g., Orinoco crude oil from Venezuela).

These distinctions are important because the conventional crude oil share of total liquid fuel supply, which was 84 percent in 2006, is expected to decline to between 62 percent and 74 percent of total global liquids supply in 2030 in the two analysis cases discussed later in this testimony.

**Effects of the Energy Independence and Security Act of 2007 (EISA) on Oil Markets**

Last December, the Congress passed and the President signed the Energy Independence and Security Act of 2007. The specific EISA provisions that have the most significant implications for future oil markets are updates to the corporate average fuel economy (CAFE) standard for new light-duty vehicles and to the renewable fuel standard (RFS).

The EISA requires new light-duty vehicles, including both cars and trucks, to reach an average fuel economy of 35 miles per gallon (MPG) by 2020, based on the Environmental Protection

Agency (EPA) test value used to measure compliance with the CAFE standard. The EPA CAFE test value generally differs from the estimated MPG value on the fuel economy label and typically exceeds the actual on-the-road fuel economy of a new vehicle by a significant margin. Despite these differences, the higher fuel economy standards in EISA significantly improve the in-use fuel economy of the stock of light-duty vehicles. In the reference case, the average in-use fuel economy for the stock of light-duty vehicles in 2030 is 38 percent above its 2006 level.

By amending Section 211(o) of the Clean Air Act, EISA also accelerates the use of renewable liquid fuels. The updated RFS sets a requirement for 36 billion gallons of total renewable fuels by 2022, including 21 billion gallons of advanced biofuels. While the situation is very uncertain, the current state of the industry and our present view of projected rates of technology development and market penetration of cellulosic biofuel technologies suggest that available quantities of cellulosic biofuels prior to 2022 will be insufficient to meet the new RFS targets for cellulosic biofuels, triggering both waivers and a modification of applicable volumes as provided for in the RFS as amended by EISA. The modification of volumes expected by EIA would reduce the overall RFS target in 2022 from 36 billion gallons to 32.5 billion gallons. The modified cellulosic biofuel requirement is projected to be met by a combination of domestic cellulosic ethanol, imported cellulosic ethanol, and biomass-to-liquids diesel, but the specific mix is again highly uncertain.

Taken together the CAFE and RFS updates contained in EISA produce a substantial reduction in oil use and oil imports. EIA estimates that the combined effects of the CAFE and RFS update are to reduce U.S. oil use by 0.2 million barrels per day by 2015 and 1.8 million barrels per day by 2030. The reduction in oil imports is 0.4 million barrels per day in 2015 and 1.5 million barrels per day in 2030. The estimated reductions in both oil use and imports would be significantly higher if they were measured against a baseline that assumes that vehicle fuel economy would be frozen at the levels mandated prior to enactment of EISA absent its passage.

Implementation of these EISA provisions will also reduce oil's share of overall U.S. carbon dioxide emissions. In 2006, oil accounted for about 44 percent of total U.S. energy-related carbon dioxide emissions, but this falls to 40 percent in 2030 in the *AEO2008* reference case projection, which includes EISA.

**Effects of Higher Oil Prices on U.S. Liquids and Oil Markets**

EIA recognizes that oil prices are highly uncertain and that their future path has a significant impact on energy supply and use. The *AEO2008* illustrates these impacts by developing and reporting projections for several alternative oil price paths. In developing the oil price paths used in *AEO2008*, EIA explicitly considered four factors: (1) growth in world liquids consumption, (2) the outlook for conventional oil production in countries outside the Organization of the Petroleum Exporting Countries (OPEC), (3) growth in unconventional liquids production, and (4) OPEC behavior.

For the *AEO2008* reference case, real world crude oil prices (defined as the price of light, low-sulfur crude oil delivered in Cushing, Oklahoma, in 2006 dollars) decline gradually from current levels to $57 per barrel in 2016 ($68 per barrel in nominal dollars), as expanded investment in

exploration and development brings new supplies to the world market. After 2016, real oil prices begin to rise (**Figure 1**), as demand continues to grow and higher-cost supplies are brought to market. In 2030, the average real price of crude oil is $70 per barrel in 2006 dollars, or about $113 per barrel in nominal dollars (**Figure 2**).

For the high price case in the *AEO2008,* prices fall back to $79 per barrel in 2010 and then gradually rise to $90 per barrel in 2015 and $119 per barrel in 2030 (2006 dollars). In nominal dollars these prices for 2010, 2015, and 2030 are $86, $107, and $186 per barrel, respectively. The high price case assumes more limitations on access to resources and high development costs in non-OPEC regions. The case also assumes OPEC holds total production nearly constant at 36 to 37 million barrels per day through 2030. Current oil prices, driven by recent strong global economic growth; weaker-than-expected global supply additions; shortages of experienced personnel, equipment, and construction materials in the oil industry; and instability in some major producing regions, exceed both the reference and high price case paths in the *AEO2008*.

Although today's oil prices are higher than both the reference and high price case paths in *AEO2008*, a comparison of these two *AEO2008* cases, both of which include EISA provisions that EIA could model, provides a useful illustration of the impact of sustained higher prices on energy supply and use. Generally, the responsiveness of both supply and demand to higher prices grows over time. Higher prices can be expected to reduce U.S. liquids consumption, increase domestic production, and reduce the Nation's reliance on imported liquid fuels.

The annual average growth in liquids consumption in the high price case is 0.15 percent per year, less than half of that in the reference case. Similar to the reference case, liquids demand in the high price case is mainly driven by transportation uses, which account for 74 percent of total liquids consumption by 2030. For this reason, changes in consumer habits and decisions regarding transportation have a very large impact on overall consumption of liquids. Higher oil prices result in both an increase in efficiency and a decrease in miles traveled. The result of consumers' reaction to higher prices is that liquids use in the transportation sector in the high price case is 4.7 percent lower than in the reference case (**Figure 3**).

Higher oil prices also result in fuel switching between liquids and other energy sources, primarily in the industrial sector. In the reference case, industrial uses of liquids decrease at an average annual rate of 0.3 percent from 2006 to 2030, reaching 9.3 quadrillion Btu in 2030, or 26.4 percent of total industrial energy use. However, in the high price case, liquids consumed by the sector decrease at an average annual rate of 0.7 percent, amounting to only 8.4 quadrillion Btu in 2030 or 23.0 percent of the sector's energy consumption.

Turning to supply, U.S. crude oil production grows from 5.1 million barrels per day in 2006 to a peak of 6.3 million barrels per day in 2018, primarily due to increased production from the deep waters of the Gulf of Mexico and from the expansion of enhanced oil recovery operations in onshore areas supported by higher crude oil prices. Domestic production subsequently declines to 5.6 million barrels per day in 2030, as increased production from new smaller discoveries is inadequate to offset the declines in large fields in Alaska and the Gulf of Mexico (**Figure 4).** Crude oil production is more profitable in the high price case, resulting in higher projected domestic production. By dampening the demand for liquid fuels and increasing the domestic

production of crude oil and biofuels, higher oil prices, together with the EISA CAFE and RFS provisions, substantially reduce projected U.S. oil imports. In 2006, U.S. net oil imports were 12.4 million barrels per day, accounting for 60 percent of our total liquid fuel use. In the AEO2008 high price case, crude oil and petroleum product imports in 2015, 2022, and 2030 are projected at 10.8, 9.7 and 9.4 million barrels per day respectively, with total petroleum imports providing 52, 46, and 44 percent of our total liquid fuels use in those respective years. (**Figure 5**) In the reference case, with lower oil prices, demand is higher and domestic production is lower, raising the share of petroleum imports in total liquids fuel use in 2015, 2022, and 2030, to 52, 50, and 54 respectively.

**Effects of Higher Oil Prices on Global Liquid Fuel and Oil Markets**

Higher oil prices will also affect projected growth in global liquid fuels demand. In the *AEO2008* high price case, liquids consumption grows from 85 million barrels per day in 2006 to 98 million barrels per day in 2030, significantly below the reference case consumption level of 113 million barrels per day in 2030.

Economic and population growth – which are major drivers for liquids consumption – are much lower in the OECD than the non-OECD, thus most of the liquids consumption growth occurs in the non-OECD (**Figure 6**). Strong economic growth in China, India, and the Middle East oil-producing countries drives growing demand for liquid fuels. Overall, non-OECD liquids consumption increases from 35.5 million barrels per day in 2006 to 50.8 million barrels per day in 2030; roughly 9 million barrels per day lower in the 2030 than the reference case. Liquids consumption in China grows from 7.3 million barrels per day in 2006 to 13.2 million barrels per day in 2030, roughly 2.5 million barrels per day lower than in the reference case.

On the OECD side of the market, liquids consumption in the *AEO2008* high price case is projected to decline from 49.2 million barrels per day in 2006 to 46.9 million barrels per day in 2030, significantly below the reference case consumption level of 53.3 million barrels per day in 2030. OECD-Europe consumption will decline by 2.1 million barrels per day, and Japan consumption will decline by 0.7 million barrels per day, relative to 2006. Small increases will occur in other parts of the OECD.

In addition to affecting consumption growth, higher oil prices also affect the mix of liquids that are produced globally, encouraging more unconventional liquids while less conventional oil makes it to the market due to OPEC production policies, limitations on access of oil resources, and slower technology development, relative to the reference case. Global conventional crude oil and lease condensate production in the high price case is projected to decline by 11 million barrels per day from their 2006 level to 60 million barrels per day in 2030, a sharp contrast to the 12-million-barrel-per-day increase in production over the same time period in the reference case. In the high price case of the *AEO2008*, natural gas plant liquids are projected to increase by 6 million barrels per day, which is similar to the reference case.

Unconventional liquids production in the *AEO2008* high price case is 19 million barrels per day higher in 2030 than in 2006, compared to an increase of only 11 million barrels per day projected in the reference case. Coal and natural gas conversion to liquids provides the largest portion of

this increase at 9 million barrels per day. Canadian oil sands and Venezuelan extra heavy crude add a combined 5 million barrels per day increase between 2006 and 2030. Similarly, biofuels on an oil equivalent basis provide a combined 5 million barrels per day increase between 2006 and 2030.

**Conclusion**

Both the reference and high price cases in *AEO2008* suggest that liquids will continue as a primary global fuel through 2030. However, liquids will represent a declining share in the total energy mix as the effect of high prices and EISA reduce world consumption from levels that would otherwise be expected. Furthermore, the share of oil, and especially conventional oil, in the overall liquids mix, is also expected to decline. Our high price case illustrates a scenario where overall liquids use grows by about 15 percent from 2006 to 2030, while conventional crude oil production declines by more than 15 percent over the same period. Policy decisions by conventional oil resource owners to limit access to oil resources are expected to be a key driver behind higher oil prices and the proportion of conventional oil relative to production of unconventional oil and other liquid fuels through 2030. Policy decisions by consuming nations and possible technological breakthroughs, both of which are not included in the analysis cases I have discussed today, could also play an important role in determining oil's future role in the U.S. and global energy picture.

As I noted at the outset, while EIA does not take positions on policy issues, provision of energy information to policymakers is an important part of our mission. In addition to the work on baseline projections that I have reviewed this morning, EIA has also recently responded to requests from congressional committees and others for analyses of the energy and economic impacts of alternative proposals to limit greenhouse gas emissions and other policy proposals. We look forward to providing whatever further data and analytical support that you may require on energy-related topics. We believe that such analyses can help to identify both potential synergies and potential conflicts among different energy-related objectives that are currently under discussion in this Committee and elsewhere.

This concludes my testimony, Mr. Chairman and members of the Committee. I would be happy to answer any questions you may have.

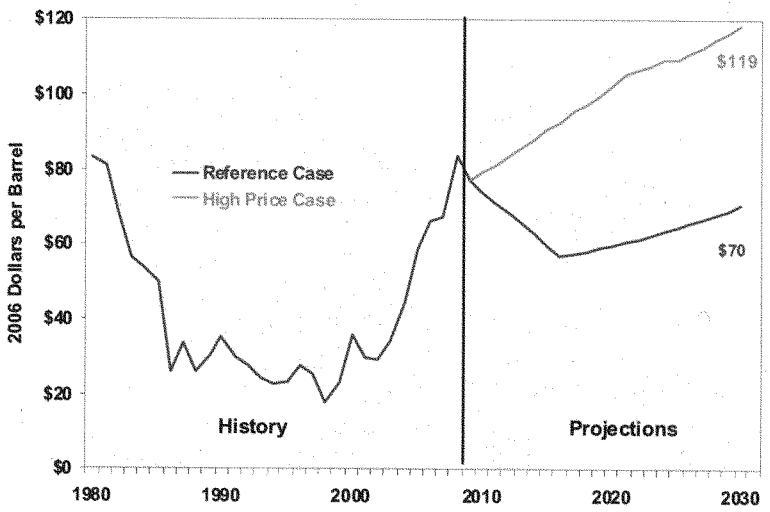
## Table 1. The Distinction between "Liquids" and "Oil" is increasingly important.

| (MMB/D) | 2006 | Reference Case 2030 | High Price Case 2030 |
|---|---|---|---|
| Conventional Crude* | 71.5 | 83.4 | 60.3 |
| Natural Gas Plant Liquids | 8.0 | 13.0 | 13.7 |
| Refinery Gain | 2.4 | 2.9 | 2.1 |
| Conventional Subtotal | **81.9** | **99.3** | **76.1** |
| Unconventional Crude** | 1.8 | 5.2 | 6.6 |
| CTL and GTL | 0.2 | 4.8 | 9.0 |
| Biofuels (oil equivalent) | 0.8 | 4.0 | 6.1 |
| Unconventional Subtotal | **2.8** | **14.0** | **21.6** |
| **Total Liquids** | **84.7** | **113.3** | **97.7** |

* Crude oil and lease condensate ** Oil sand production, extra-heavy crude oil, and shale oil

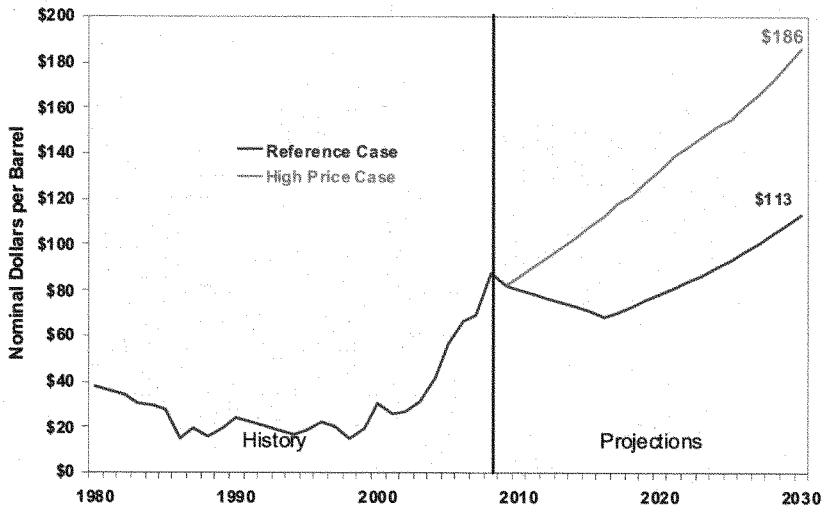
Source: Annual Energy Outlook 2008. Published Reference Case; preliminary High Price Case.

## Figure 1. AEO2008 reference and high oil price cases (2006 dollars per barrel).



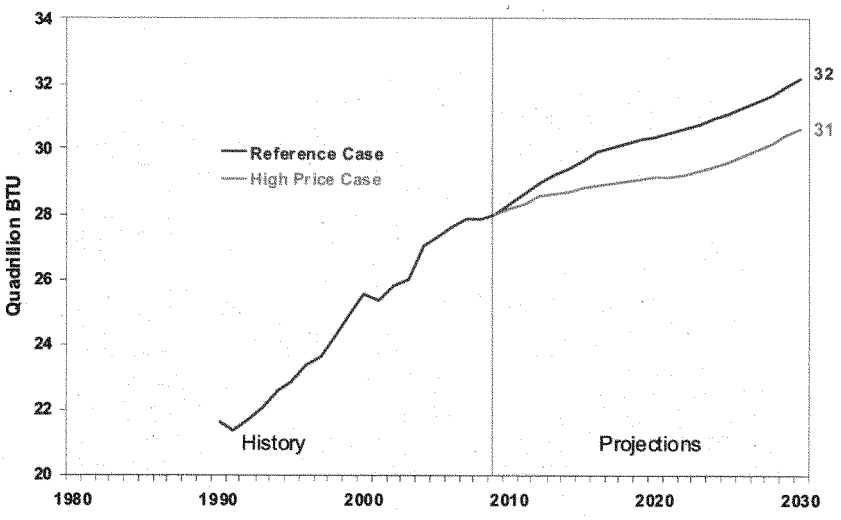

Source: Annual Energy Outlook 2008. Published Reference Case; preliminary High Price Case.

Figure 2. AEO2008 reference and high oil price cases (nominal prices).



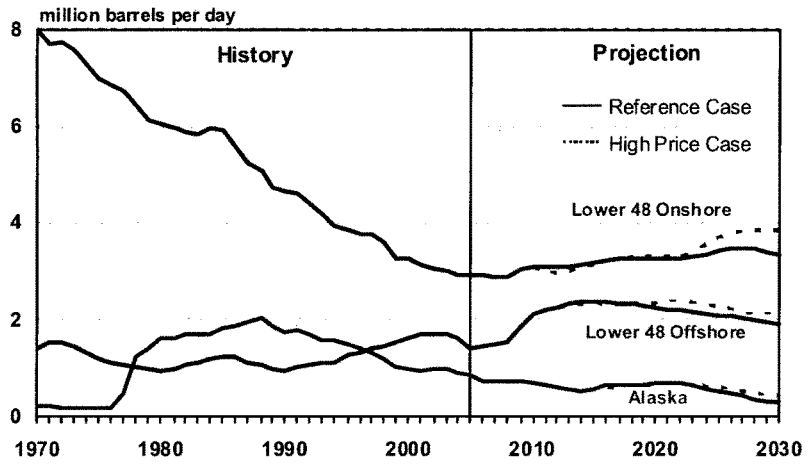

Source: Annual Energy Outlook 2008. Published Reference Case; preliminary High Price Case.

Figure 3. Use of liquids in the transportation sector changes with price.



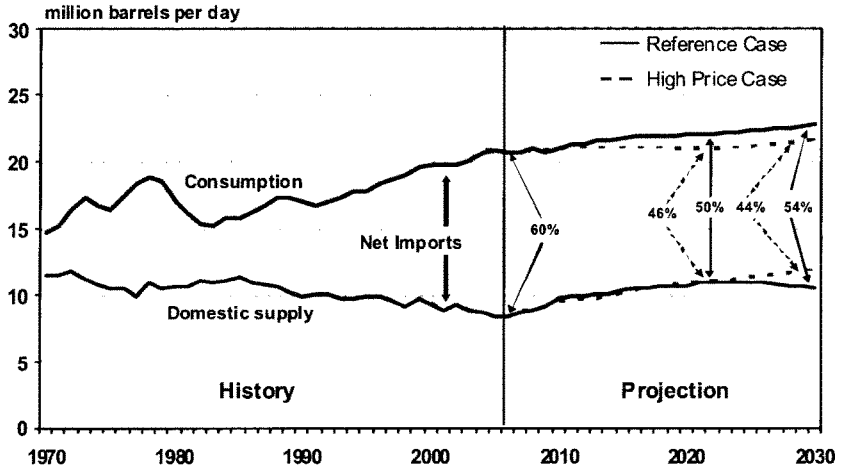

Source: EIA, IEO2008

Figure 4. Domestic crude oil production grows in in the near-term.



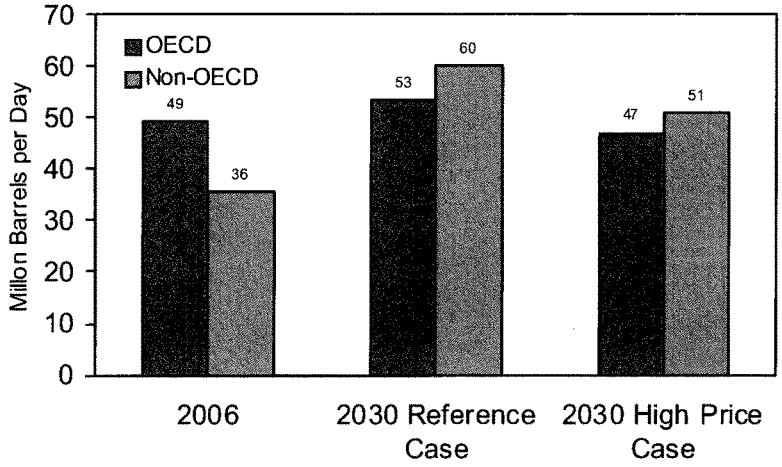

Source: Annual Energy Outlook 2008. Published Reference Case; preliminary High Price Case.

Figure 5. The import share of total liquids use falls from its current level.




Source: Annual Energy Outlook 2008. Published Reference Case; preliminary High Price Case.

Figure 6. Most growth in world consumption of liquids occurs in the non-OECD region.




Source: EIA, IEO2007

The CHAIRMAN. Thank you, Mr. Caruso, very much.

Our next witness is Adam Sieminski, who is the Chief Energy Economist for Deutsche Bank. He has spent his life analyzing energy markets and climate change, commodity prices and energy economics, and we welcome you, sir. Whenever you are ready, please begin.

**STATEMENT OF ADAM SIEMINSKI**

Mr. SIEMINSKI. Mr. Chairman, thank you very much for inviting me. And in the spirit of the discussions I had when I was asked to come today, I was talking with both the majority and the minority staff and listening to some of the discussions going back and forth here this morning, what I would like to offer as a suggestion is that the ideas that have been proposed on both sides of the aisle are not mutually exclusive. In fact, the National Petroleum Council did a report about a year ago, came to the same conclusion, saying that we are having supply problems but we are not running out of resources. And to mitigate the risks on the supply side we need to expand just about everything that we can do. All economic energy sources are going to be required to solve the problems that we are having, coal, nuclear, renewable, unconventional, oil and gas.

Getting acreage opened up or worrying about the low proportion of acreage that is being drilled on doesn't seem to me to be the heart of the issue. The heart of the issue is what is the resource that is on those acres? And where are the resources? And can you get at those resources? If the oil is in Alaska or offshore, then those are the acres that need to be opened up, not the other ones.

The other thing was that the Natural Petroleum Council said was that we really do need to look at demand management on the energy side. Policies designed to moderate a growing demand for energy and increasing efficiency in transportation or residential and commercial and industrial uses should really be encouraged.

So I applaud the ideas and I think we should move on all of these, not some of them. There is no silver bullet to solving the problems that we have in the energy area. We have got to do it all, and we needed to do it yesterday. So the sooner we get on with it, the happier I believe the American consumers and voters are going to be.

I tried to answer the questions that were submitted to me by the staff and they are in my testimony and they will be in the record, but rather than to go into all that, what I would like to offer is another suggestion about what has changed.

Everybody is looking at the price of oil and saying, well, nothing has changed in the last year. Why is the price of oil up so much? There must be some underlying conspiracy or problem. Let me offer two things that have changed very dramatically in the last year and that I think have given us the situation that we are in.

First, the U.S. economy has slowed down, but it has not spilled over into the rest of the world where energy demand and especially oil demand are still growing very strongly. And in fact if you look at the projections, we may be on an overall global basis be at 110 million barrels a day of demand by the year 2030, some 95, 96, or 97 million barrels a day by 2015.

The second thing that has changed is that there is an accumulating amount of evidence suggesting that we may actually run into a problem of being able to deliver more than 95 or 100 million barrels a day of oil, not because of a resource issue but because of access issues, getting access to the places that have the oil.

If we can't do that, then there is going to be a problem, because demand is going to be a lot higher than supply. That situation or potential situation I think is what is informing the markets that are lifting prices to try to find some way to rebalance in everybody's models for where the future of the oil market lies, to rebalance those models and it is probably going to require a higher price.

Well, since we are looking for what are these reasons, let me just mention some of them. Underlying drivers for prices in my view are very diverse and involve a lot of fundamental supply and demand issues: One, OPEC production and capacity issues; two, demand in China, the Middle East, where consumption is subsidized and economic growth has been fast; three, the normal lags in capital spending in the oil industry and the erosion of that spending by cost inflation; four, central bank policies, very low interest rates fostering high economic growth, cheap money, and a very weak dollar; five, geopolitical issues in places like Russia, Venezuela, Iran, Iraq, Nigeria and elsewhere that are keeping supplies off the market.

Mr. Chairman, we haven't had a huge energy crisis appear, but a series of mini crises. It is sort of we are having the after quakes without having the big one ahead of time.

Sixth, political decisions themselves. Corn ethanol is a good example of unintended consequences, and the ability to get other legislation passed on both conservation efficiency and supply is an issue.

And finally, Mr. Chairman, since I think I am probably going to be asked about this, I have excluded speculation in the sense of rising funds flow into the futures markets from index funds and hedge funds as a reason for the price increase. Volumes in futures really don't matter as much as sentiment. The sentiment is that supply isn't growing fast enough to meet demand, and that is causing prices to rise.

If we can do things in the United States with the help of our elected representatives to get demand to slow down and to get the supply of all of our energy sources to begin to rise, I am not allowed to give guarantees as a financial analyst but as close as I can come to giving a guarantee, I believe that you will see oil prices going back down if we can get supplies growing and demand slowing down.

Thank you, Mr. Chairman.

[The statement of Mr. Sieminski follows:]

# Oil Market Issues and Outlook

**Select Committee on Energy Independence and Global Warming**
**US House of Representatives** **June 11, 2008**

**Adam Sieminski**
Chief Energy Economist
Deutsche Bank

The following material reflects the personal views of the author and not necessarily those of Deutsche Bank or any of its subsidiaries.

## Summary

- Global oil demand has been rising at a rate of about 1.5%/year over the last 5 years and although demand growth is slowing noticeably in the OECD countries, it is still rising sharply in the developing nations (many of which have reached the point where accelerating wealth results in rapidly rising consumption) and this growth is being exacerbated by consumer subsidies.
- Global spare production capacity resides almost entirely in the OPEC countries and amounts to some 2.5 million barrels per day (mmb/d) or only about 3% of global demand. Much of OPEC's spare capacity consists of heavy high sulfur oil that is difficult to refine given that sophisticated spare refining capacity is also relatively low. Some of the higher-quality spare capacity is not available due to security and operational issues.
- Estimates of decline rates for "existing production" vary by fields and regions, and depend on definitional issues, but most of the work done recently suggests that base oil production is likely falling off at about a 5% rate. This rate may be faster now than in the past because of improved production techniques. This implies that the oil industry must work very hard to replace "base" production levels and even harder to meet growth in demand.
- New oil discoveries are being made in an ongoing process that includes the addition of reserves from existing fields as reservoir knowledge accumulates and recovery techniques improve. The line between what petroleum engineers consider conventional and unconventional blurs as technology changes. What matter most in these matters are costs and returns, not static definitions. Future projects are likely to be more complex and remote, resulting in higher costs per unit of energy produced.
- The level of investment required to meet historical levels of demand growth is being hampered by access issues. Conventional oil and natural gas resources are increasingly concentrated in a handful of non-OECD countries. The national oil companies and energy ministries in these countries play central roles in policy decisions about how to develop and produce their resources and these sovereign decisions do not always result in resource development patterns that are often seen in the OECD countries.
- Under our current assumption, we see global demand expanding from about 87mmb/d in 2008 to about 97mmb/d in 2015 and 111mmb/d in 2030. With the OECD nations possibly stuck at a supply level near 50mmb/d (a plateau in the 2010-2015 timeframe), most of the growth in supply to meet this demand will be come from OPEC, rising from some 35mmb/d of output in 2008 to 45mmb/d by 2015 and some 85mmb/d by 2030. Although supply growth above 95-100 mmb/d is not impossible, it will require a level of investment by the national oil companies that central-government budgets may not accommodate, or a return of the international oil companies to countries where they are currently either excluded or largely unwelcome.



## Summary p.2

- We do not see a "peaking" of oil in the sense that production must imminently decline because of resource constraints. Such theories exclude the impacts of technology and prices. The world is not running out of energy resources, but there are accumulating risks to continuing expansion of oil and natural gas production from the conventional sources relied upon historically. To mitigate these risks, expansion of all economic energy sources will be required, including coal, nuclear, renewables, and unconventional oil and natural gas.
- Consumers in the US are already reacting to higher gasoline prices by reducing vehicle miles traveled, buying more fuel efficient vehicles, and increasing their use of mass transportation where it is available. Policies designed to moderate the growing demand for energy by increasing efficiency of transportation, residential, commercial, and industrial uses should be encouraged.
- In our view, there is a tug of war occurring in the oil markets based on two distinct views of how the marginal price of oil is set. One view is that "marginal cost of supply" should dominate, and we see this price being driven by changing cost and access issues; for now it might be near $65/barrel. The other view is that prices are rising toward the level required to destroy demand, or to get it to slow dramatically. This could require oil prices in excess of $150/barrel that would presumably bring demand growth under control over the next 5 years and thus eliminate the market worry (expectations) that demand growth trends are running well in excess of supply growth trends.
- Since we think that demand is showing signs of slowing, our forecast for next year is that oil prices should average about $105/barrel but we see the risk to the upside. We offer the warning that since 1995, the analyst community has consistently under-estimated the crude oil prices by an average of close 21%. Our forecast for the longer-term is predicated on the belief that prices will eventually settle toward the cost of marginal supply, or $65/barrel (real).
- The underlying drivers for prices now are very diverse and involve fundamental supply and demand issues, many of which we have already discussed: (1) OPEC production and spare capacity issues; (2) demand growth in China and the Middle East (subsidies on consumer prices; fast economic growth); (3) lags in capital spending in the oil industry and the erosion of that spending by cost inflation; (5) central bank policies (unsustainable economic growth fostered by cheap money, and the weak US dollar); (6) geopolitical issues in countries like Russia, Venezuela, Iran, Iraq, Nigeria, and elsewhere; and (7) policy decisions (corn ethanol as an example of unintended consequences, and the inability to open up federal lands to energy leasing, etc).
- Among the drivers for prices, I have excluded "speculation" in the sense of rising funds flow into futures from index and hedge funds. The level of speculation in the crude oil markets has remained relatively constant in percentage terms as prices have risen, suggesting that this driver has not played as significant role in price determination. Volumes in futures do not matter nearly as much as sentiment, and that is being driven by consideration of the supply and demand fundamentals. If it appears that demand is slowing and supply is rising, speculation will put downward pressure on oil futures prices.



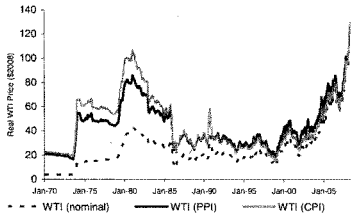
## What Made the Bull Case in Oil?

**Five key factors that drove oil higher**

- The emergence of China and other emerging market countries as new super-commodity consumers
- A strong base of oil demand in the US; and the role of oil non-OECD subsidies subsidies
- Underinvestment and lagging investment in new production and refining capacity
- Rising geopolitical risk
- Falling US dollar and low interest rates

## Oil Prices Adjusted for Inflation Are High

**WTI crude oil adjusted by the US PPI and CPI**




Source: Haver, US Dept of Commerce



## Oil Prices Adjusted for Income Measures Are Not Extreme

**When Do Oil Prices Hit Extreme Levels?**

| Indicator | Oil price level |
|---|---|
| In real terms (PPI) | USD68 |
| Analyst forecasting error | USD115 |
| In real terms (CPI) | USD115 |
| Versus the US dollar | USD120 |
| Futures market forecasting error | USD130 |
| Relative to per capita income | USD134 |
| As a percent of US disposable income | USD145 |
| As a share of the S&P500 | USD148 |
| As a percent of global GDP | USD150 |
| **Average** | **USD128** |

**Risk Neutral Probabilities For WTI Dec08**

| WTI crude oil price (USD/bbl) | Probability Below | Probability Above |
|---|---|---|
| USD30 | 0% | 100% |
| USD50 | 0% | 100% |
| USD70 | 1% | 99% |
| USD80 | 3% | 97% |
| USD90 | 7% | 93% |
| USD100 | 14% | 86% |
| USD125 | 41% | 59% |
| USD150 | 68% | 32% |
| USD200 | 92% | 8% |

Source: DB Global Markets Research

**Outlook**

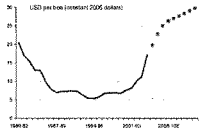
- According to the variety of measures we track, on average oil prices start to move into extreme territory above USD128/barrel.
- At the moment, the WTI options market attaches a 8% probability of the Dec'08 WTI contract expiring above USD200/bbl.
- Meanwhile the WTI options market attaches only a 35- probability at the Dec'08 WTI contract expiring below USD60/bbl



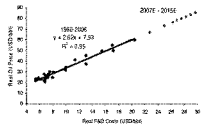
## What Does It Cost to Find a Barrel?

**Finding and development costs are rising rapidly and are expected to rise further over the next few years.**

**Worldwide Finding Costs (USD/bbl)**




**Oil Prices & Finding Costs Are Related**




Source: DOE/EIA, Author

**Outlook**

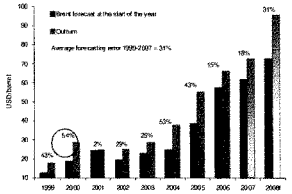
- Worldwide full finding and development costs have risen 20% per annum in real terms over the 2006 to 2008 period, and slower rates after that. This implies that F&D costs are likely to hit USD25/bbl in 2009 and possibly USD30/bbl in 2015.
- F&D costs have tended to be closely related to the oil price. Since 1990 we find that the oil price has tended to equal to 2.6x F&D costs plus USD7.5. This multiplier take into account taxes and gross margin.
- To get oil to USD200/bbl on a cost basis seems like a stretch. F&D costs of USD40/bbl and a multiple of 5x, however USD80/bbl in the 2012-13 timeframe is very consistent with this data and USD110/bbl oil is possible



## Analyst Forecasts Are NOT Making Oil Prices Go Up

**Oil price forecasts have tended to be highly sensitive to the current oil price.**

**Analyst Price Forecasts & Outcomes**




Source: DB Global Markets Research, Reuters

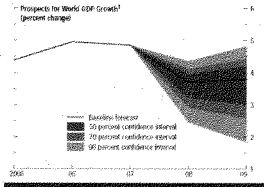
**Outlook**

- Since 1999, the analyst community has consistently under-estimated the crude oil price by an average of +31%
- If this forecasting error persists it would imply the Brent crude oil price averaging USD96/barrel in 2008. However, if oil prices average USD110/bbl this year it would represent the largest forecasting error among the analyst community in recorded history.

## Can a Recession Bring Down Oil Demand / Prices?

**IMF's View of Global Economic Risks**

**The US accounts for about 22% of global GDP.**




**Outlook**

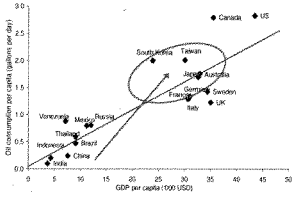
- Average economic growth levels over the last few years have accelerated 5% compared to a long-term
- Nearly half of the world's GDP is now generated outside the "advanced economies" (measured on a purchasing power parity - with US treasury still over)
- According to the IMF, risks to the global outlook have revised "squarely to the downside" for 2008-09. Latest IMF confidence levels suggest a low risk of sub 2 (-2.5% world growth
- Global oil demand tends track about 2% below global GDP growth.



## Long-Term Still Looks Relatively Bullish for Oil Demand

**Per Capita Oil Consumption Relative to GDP**

**Twenty five years ago, South Korea and Taiwan were where China and India are now.**




**Outlook**

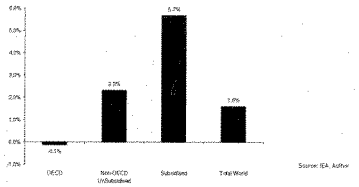
- One third of the world's population is just entering the middle class and want the oil-consuming lifestyle that goes with that.
- The questionable characteristics of Asian financing - subsidized loans and the tendency to prioritize full employment and expansion of market share above rates of return, efficiency and profitability - have not disappeared since 1998.
- Some economists argue that sooner or later that this too-rigid system in China will crack, just as occurred at different times in Japan, South Korea, Thailand, Malaysia, Taiwan and Indonesia.



## Oil Demand & Consumer Price Subsidies

**Oil demand growth has been strongest in countries with price controls**

**If consumer subsidies are removed in countries like China and India, oil demand growth could slow below consensus forcasts.**




**Outlook**

- Of the roughly 85mmb/d of oil use in 2008, 47mmb/d in the unsubsidized OECD and has the lowest growth rate. 25mmb/d is subsidized, and the remaining 13mmb/d in the non-OECD is mostly unsubsidized. The demand growth rates from 2000-2008E are highest in the non-OECD subsidized countries.
- The 25mmb/d of subsidized oil consumption is split roughly 2/3 in importing nations and 1/3 in oil exporters. The oil importers have less incentive to reduce their subsidies in a period of high oil prices. All of the growth in oil demand in 2008F is coming from the group of subsidized nations.

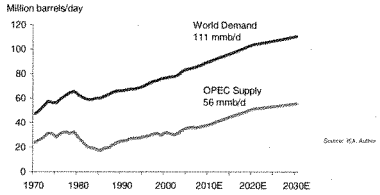


## Addicted to Oil

**Oil demand projected using recent historical growth rates**

**Over the coming decades, energy demand will grow to increasingly higher levels as economies and populations expand. This will pressure the supply system and require increased emphasis on energy use efficiency.**

**NPC 2007**




**Outlook**

- Increasing reliance on OPEC post 2010
- Rising doubts about ability of supply to reach the levels implied by demand

## OPEC Spare Capacity

**Spare capacity is currently about 2.5 mmb/d, but most of that is not useable**

**Spare capacity is mainly in heavy, high sulfur crude oil that can only be processed in sophisticated refineries.**

**There is a mismatch between spare refining capacity and spare oil production capacity.**

Source: IEA, Author

**Outlook**

- OPEC effective spare capacity (excluding Iraq, Indonesia, Nigeria and Venezuela which face ongoing security, operational or investment issues) has now slipped below 2 mmb/d, about 3.5% of global demand. Much of the spare capacity is very difficult to raise.
- OPEC (and especially Saudi Arabia) is investing in new capacity, but the pace of development may not keep up with demand. OPEC faces the same infrastructure bottlenecks that are derailing project completions globally.
- Many analysts believe that refining capacity growth could exceed demand growth in 2008-09, and this should help free-up some effective spare capacity.

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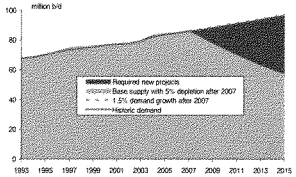
## The Global Oil Challenge

**Fighting the natural depletion curve: Not impossible, but not easy**

**With demand growing by 1.5% annually, and a 5% average depletion rate on all fields currently in production, OPEC output will have to rise by 10mmb/d and non-OPEC stay on plateau to make up the difference.**




Source: IEA, Author

**Outlook**

- Global oil supply has grown by 1.3%/ year since 1982. But the challenges over the next ten years to supply in both the non-OPEC countries (the US, the North Sea, Mexico, and Russia) and in OPEC (Nigeria, Venezuela, Iraq, Iran) are serious.
- Output growth from new projects in non-OPEC areas such as in the Caspian Sea, Sakhalin Island in far-eastern Russia, Africa, Brazil, and the US Gulf of Mexico will help prevent non-OPEC supplies by 2-3mmb/d from today's level of 50mmb/d, but not much higher.
- OPEC's current production of 30mmb/d might have to reach 45mmb/d by 2015 and although this is not impossible, it will require a level of investment by the national oil companies that national government budgets may not accommodate, or a return of the international oil companies to countries where they are currently either excluded or largely unwelcome.

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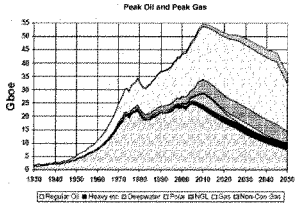
## Peak Oil?

**Not enough of a good thing?**

**Some analysts think that global oil production will peak within the next few years.**




Source: Association for the Study of Peak Oil

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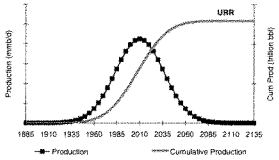
## Are We Really Running Out? Probably Not

**Hubbert Peak Curve (Idealized)**

**"Peak Oil" Theory**

**(1) requires a "final" estimate of the level of ultimately recoverable reserves (URR)... but URR estimates have been rising.**

**(2) assumes that once half of the world's reserves have been used up, production must fall... but that point keeps moving ahead in time.**




Source: Author

**Outlook**

- King Hubbert, a geologist for Shell and the USGS, used a bell curve to correctly predict the 1972 peak in US oil production. Followers have attempted to extend Hubbert's methodology to forecast a world oil peak this decade.
- Most famous among Hubbert's followers is geologist Colin Campbell, whose views about oil resources have been disseminated through the press and have influenced many opinion makers.
- Hubbert models do not account for changes in technology, costs, prices, or politics - all of which can have a huge impact on the actual shape of the production curve. Hubbert peak oil models assume a symmetric curve.
- Increases in subsoil knowledge, the spread of technological progress, and the advancement of drilling – along with political decisions and oil price changes – have shown time and again that peak production can be increased and delayed.

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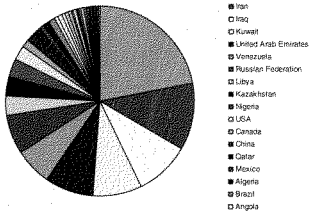
## The Geopolitics of Oil

**Remaining oil reserves are in places where risks often accumulate**

**Iran is the 2nd largest reserve holder, the 4th largest oil producer, and the 5th largest exporter.**




Source: BP Statistical Review

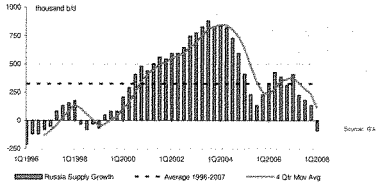


## The Geopolitics of Oil

**Russian production declines for the first time in a decade**

**President Putin's oil policies in his first term worked**

**...but in his second term have been a disaster.**




Source: IEA

**Outlook**

- The Russian government's policy of hostility to its own oil entrepreneurs, growing disdain for foreign capital, and desire to maximize taxes regardless of the impact on capital investment has brought an end to the growth in production.
- Although "peak oil" proponents are citing the development as proof that global production is faltering because of geological constraints, we see the situation as offering strong evidence that oil production problems are being driven more by "above the ground" problems.

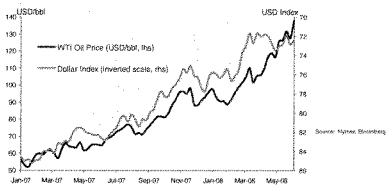


## Weak Dollar Is Driving Oil Higher

**What is the falling dollar doing to commodities and oil?**

**The dollar-oil regression is not perfect, but traders like it...**

**...and a recent study by the IMF says that gold and oil are sensitive to movements in the dollar.**




Source: Nymex, Bloomberg

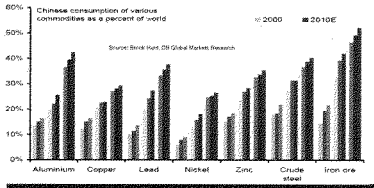
**Outlook**

- According to the IMF, in the long run, a 1% depreciation in the US dollar is associated with increases for gold and oil prices of more than 1%.
- In the short run, the elasticity is close to 1, but higher for gold than for crude oil, says the IMF.



## Iron Ore ...lessons for the oil outlook?

**China's voracious appetite for iron ore**




Source: Brook Hunt, Citi Global Market Research

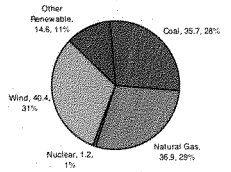
**Outlook**

- Iron ore is one of the most abundant commodities in the world. During this decade China has become the world's largest consumer and importer of iron ore. Since 2001, China's share of world use of iron ore has risen from 18% to over 40%.
- Global iron ore demand has been rising strongly in response to the global surge in steel production, most notable in China.
- On the supply side, unexpected operating problems in a number of mines and the difficulties in bringing new productive capacity on stream will likely continue.
- We expect iron ore prices will continue to move higher in response to tight market fundamentals. We note that there is no developed futures market in iron ore.

## US Power Outages

**Planned US Electricity Capacity Additions (Giga Watts)**

**Inability to get coal plants permitted, is increasing the potential for power shortages after 2010.**




Source: Wood Mackenzie

**Outlook**

- There are 189 GW currently under development or proposed in North America out to 2013.
- Coal plants are 29% of the mix. Wind looks big, but for power availability purposes, only 10-15% of that can be counted on reliable. If we can not get coal plants permitted, the potential for power shortages after 2010 rises dramatically.
- Nuclear has growing potential but not until well after 2013, and maybe not then, depending on energy policies.
- Demand growth requires at least 75 GW of power additions

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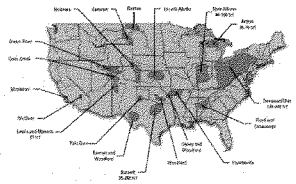
## US Gas Supply Bubble Coming?

**Major US shale basins... some analysts think a production surge is coming**



Source: Schlumberger

**Outlook**

- Independent natural gas producers are increasingly optimistic about their ability to develop shale plays around the US.
- The Barnett shale in Texas has been a huge success. DOE's gas supply models may be underestimating the potential strength of domestic production

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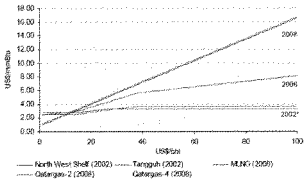
## LNG Pricing Issues

**China's deal with Qatar could have global implications for natural gas prices**




Source: Wood Mackenzie

**Outlook**

- PetroChina and China National Offshore Oil Company (CNOOC) signed agreements for a total of 3 mmtpa of Qatar LNG. China has accepted that in order to procure LNG for near term delivery, market prices have to be paid – there is no cheap LNG in the current climate.
- Qatar's pricing demands for oil-gas parity forms in new long term contracts has not discouraged a huge boom.
- China's moves should set alarm bells ringing in Japan where most buyers have been refusing to commit to minimum or long term volumes at these price levels, and something of a stand-off between Japan and Qatar has prevailed.

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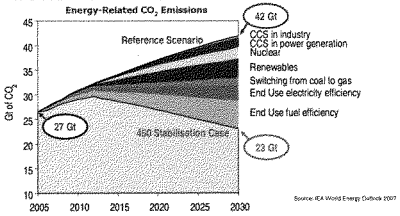
## Energy Implications of Stabilizing Carbon Dioxide

**Accomplishing This Goal Probably Requires A Complete Energy Policy Rethink**




Source: IEA World Energy Outlook 2007

**Outlook**

- Fossil fuels account for about 80% of the world's total energy use.
- Most forecasts (DOE/EIA, ExxonMobil, IEA) expect this percentage to remain relatively stable over the next 20-25 years.
- Even with double-digit growth in wind and solar power, and a strong effort on biofuels, the necessity continues for conventional oil and natural gas to meet requirements for population and economic growth.

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## What Are the Policy Prescriptions?

**There is no single, easy solution to the global challenges ahead**

- Encourage energy efficiency across all sectors
- Encourage all fuels – diversity is key
- Price externalities (carbon is an externality)
- Encourage trade and investment
- Avoid "easy" solutions that make problems worse
- Establish global standards for measuring carbon
- Enhance science & engineering capabilities

*Source: Author*

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The CHAIRMAN. Thank you, Mr. Sieminski, very much.

Our next witness is Amy Myers Jaffe. She is the Wallace Wilson Fellow for Energy Studies at the Baker Institute for Public Policy at Rice University. We welcome you to the select committee. Whenever you feel comfortable, please begin. Could you turn on your microphone, please?

**STATEMENT OF AMY MYERS JAFFE**

Ms. JAFFE. I really appreciate the opportunity to be here today and am honored to be able to address this committee that has done excellent work over the past year. I want to give you the visual image of two things. If you remember the cartoon Road Runner, so imagine that America is Wile E. Coyote and he is running off the cliff and he is still spinning his legs. The gravity hasn't hit. That is where we are on the energy crisis right now. We are still on the level land and we don't understand how deep the problem is.

If you will excuse me for saying this, in thinking about the Congress you are like deer with your eyes in the headlights, right? People understand the magnitude of the problem, but they haven't understood how large the magnitude is in terms of the need to get beyond partisan ideas, right? So I second Adam in his suggestion that the body needs to get beyond its current thinking, because we are in a serious problem that over time could become a catastrophic problem, but it could become a manageable problem if we would have smart and sound public policy.

Let me just say that ethanol was not a sound and smart public policy. And so therefore, in thinking about what we need to do, we need to think comprehensively, because we are importing between 12 and 13 million barrels a day of oil. Our imports last month were 13.5 million barrels a day of oil. And ultimately that volume is so large and it is going to grow so much more that coming up with these little solutions that help somebody's district is not going to solve the problem.

So we need to move away from false choices, right? We need to come up with concrete policies. We need to both curb demand growth, we need to increase what I call the substitutability. One of the reasons why you are having a hearing on oil and gasoline and not on electricity is because we have many different fuels we use to generate electricity in this country and none of them are oil, right? That was something that was a positive future of the 1970s. Most Americans no longer heat their homes with heating oil, right? So there is a whole range of problems that have been sort of eased since the seventies because we have enhanced our substitutability in certain areas.

We need to do that in transportation. Transportation is now 100 percent or 99 percent oil based. We now see the emerging technology where we could diversify that, right? And if we look at the wonderful projections that the DOE and others have done, we know that something like 75 percent of the increase in world demand for oil is going to come from the transportation sector.

Now getting at this issue between drilling versus demand, the reality is and Rice University spent 2 years going into the SEC filings of all the American oil companies, and I welcome you to have your staffers to come to the Web and look at that study. The reality

is that between 2006 and 2007 the five largest oil companies only increased their exploration spending by 10 percent. I mean that is pretty shocking. I could understand that in 2000 or 2002 when we all said, geez, they should be spending more, they felt cautious about how much of their cash flow to spend. Over the last year it seems kind of amazing. I think all of you are important people in your own right, in your own areas.

If you were the chairman of a company and saw the commodity price for your entity rising the way it has, I would think that you would have increased spending a little bit more, right?

The second thing that has happened in the last year is not only did the majors not increase their exploration spending dramatically, though in fairness to them they did make some big boosts in 2006, but remember costs have gone up 100 percent, so even if they are increasing under 50 or 100 percent, they are not increasing at all, right? That we also see in 2007 that OPEC has announced virtually no new projects for expanding oil fields. And in fact Saudi Arabia announced within the last few months that they are freezing their expansion plans and that they are happy with their plans to go to 12.5 million barrels a day by 2009. But their previous plans to add new fields to go to 15 million barrels a day seem unnecessary so they are not going to continue with those plans.

In addition, if you look at the research and development spending of our five largest oil companies that are collecting $160 billion in operating cash flow in 2007, they spent together, all five companies, $3.3 billion on R&D. That is half the annual R&D budget for General Motors or Microsoft.

So again in an age where we need new technologies and a new investment, we are not getting the momentum.

Now, just a couple of quick facts. We have done simulations. If the offshore continental shelf was open to drilling without restrictions, we could expect a 7 or 8 percent rise in natural gas production. So that is about 1.5 trillion cubic feet higher. And then after about by 2015 and then after that we could expect a 10 percent increase each year.

The CHAIRMAN. If you could please summarize.

Ms. JAFFE. Sure. And then in oil we could expect another million to 2 million barrels a day. If we could get our cars in America to average 50 miles to the gallon that would mean we could shave 6 to 7 million barrels a day off demand by 2025.

The CHAIRMAN. If you could summarize, please.

Ms. JAFFE. Okay. So in summary we have seen other countries have more effective energy policy. Japan is a leader now in automotive technology. Instead of closing factories, they regulated their industry and also gave them R&D tax breaks to make sure that the cars that they would be selling now would get 30 to 50 miles to the gallon.

Thank you very much.

[The statement of Ms. Jaffe follows:]

JAMES A. BAKER III
INSTITUTE FOR PUBLIC POLICY
RICE UNIVERSITY

June 9, 2008

**Testimony of Amy Myers Jaffe**
Wallace S. Wilson Fellow for Energy Studies
James A. Baker III Institute for Public Policy
Rice University

To the Select Committee on
Energy Independence and Global Warming
U.S. House of Representatives
Washington, DC

June 11, 2008

Introduction: The Oil Price Premium, Roots and Causes

Since 2004, a growing scarcity of energy commodities worldwide has heightened concerns about key geopolitical risks and threats. Concerns about these threats and other factors have led to an almost 250 percent strengthening in oil prices between April 2004 ($36/barrel) and May 2008 ($125/bbl).

Those threats included:

*A politically-motivated cutoff of oil or natural gas supplies by a major exporter (such as Russia to a European country or Venezuela to the United States) or group of exporters;

* A confrontation with Iran over its nuclear aspirations that results in sanctions against Iranian oil exports, an American or Israeli attack on Iranian nuclear facilities or an Iranian and/or terrorist threat to oil shipping through the strategic Strait of Hormuz, through which 16 million b/d to 17 million b/d of Mideast oil passes each day;

* Terrorist attacks on major oil production facilities or export infrastructure;

*The possible spread of conflict or instability from Iraq into other oil producing countries or the escalation of a proxy war involving Saudi Arabia, Syria, Turkey and Iran over the outcomes in Iraq;

* A cutoff of oil or natural gas exports or a delay in resource investment and development due to resource nationalism, domestic unrest, or crises in succession of political leadership;

* A work stoppage or strike by oil workers, possibly motivated by political trends involving power-sharing or human rights issues related to internal instability in a major oil-producing country;

*Destruction of oil production or fuel manufacturing infrastructure following a severe storm or natural disaster.

These threats are all real, and they justified a rise in the price of oil above the $36 level seen in May 2004. Still, it is hard to quantify how much of a risk premium is built into the current price of oil, how much is based on perceptions of long term fundamentals such as supply and demand, how much of the oil price today reflects a speculative mania linked to negative trends in other financial markets and instruments.

Ironically, in the case of the terror premium, many of these oil supply and security risk factors have actually eased in recent months (public threats from Israeli politicians of early June notwithstanding), leaving the question about the extent to which other factors are contributing to the recent skyrocketing of oil prices ahead of the U.S. summer driving season. According to a new Baker Institute study called "*The Global Energy Market: Comprehensive Strategies to Meet Geopolitical and Financial Risks –The G-8, Energy, Security and Global Climate Issues*" taken individually, many of the risks driving the oil price premium may be less catastrophic than they seem at first glance and have, in some cases, actually eased over the last year.

The Baker study concludes that:

1) While Al-Qaeda cells have been more focused on attacking oil facilities in the Middle East following directives starting in 2004, their operational reach is reduced and to date, attacks on facilities have not been successful. These cells have been weakened in Saudi Arabia and Iraq.
2) Iran's recent election shows that sanctions policy, especially the tightening of Iran's access to international credit, has been effective in influencing Iranian internal politics against the radical populists led by President Ahmadenejad. Washington and Tel Aviv have more leeway to give diplomatic and other means a chance to run their course. Washington should avoid being drawn into a direct military confrontation with Iran, a development that would only strengthen the hands of the radicals at the very moment that they are losing domestic support and likely the Presidency.
3) According to Baker Institute simulations, a cutoff of Russian natural gas to Europe would cause a large spike in prices temporarily but European markets would likely show resilience relatively quickly in attaining alternative supplies. Russia could wind up being the long term loser to such a proposition, with its long term market share negatively affected for over a decade.
4) New, tighter U.S. and Chinese corporate automobile efficiency standards will have a significant impact in lowering oil demand over the next decade from previously projected levels, easing the possible gap between potential supply and demand in the future. Even

stronger efficiency standards of 50 mpg, currently backed by U.S. democratic candidates, could shave over 7 million b/d of oil demand in the United States by 2030, if implemented by 2015.

It has become a standard mantra in the oil market that higher oil prices are being driven primarily by the ongoing rise in oil demand and that this rise in demand is defying the normal impact of rising prices given the strength of developing economies like China and India. However, in reality, demand has responded strongly to high prices and is currently falling significantly. April U.S. oil demand is running 3.5 percent below a year ago (first quarter was down 4.3 percent) while EU-15 demand has seen a 1.1 percent drop against the spring of 2007. Oil demand in Pacific industrialized nations (Japan, South Korea, Taiwan, Australia and New Zealand) is also down over 4 percent. Overall, while Chinese demand remains healthy with stockpiling to prevent shortages ahead of the Olympics, global oil demand is still faltering, growing only by 0.4 percent so far this year or a small gain of 350,000 b/d (compared to the 2.5 million barrel a day gain predicted). The argument that Asian consumers are shielded against oil price impacts by generous government subsidies is losing water, given that India, Malaysia, Indonesia, Bangladesh and Sri Lanka have all been raising government set domestic fuel prices. In China, demand for unregulated products –naphtha and fuel oil- fell 2 percent in the first quarter of 2008, a sign of what will come if China eases its other fuel subsidies after the Olympics.

Today's Speculative Bubble

So if demand is weakening substantially across the globe, why has the price of oil been climbing?

The risks which used to be referred to as the "terror premium" or the "war premium" have been replaced by a dangerous interplay of complex financial forces that are propelling continued rise in oil prices –perhaps one that could be classically defined as a speculative mania-- and the Fed is devoid of tools that can offer a solution.

Following the classical pattern famously described by economists Hyman Minsky and Charles Kindelberger, the original rise in oil prices was driven by legitimate demand-and-supply conditions. Triggering this initial price rally into a mania, wherein speculators buy oil because prices are rising and prices are rising because speculators are buying, Minsky and Kindelberger argue that it takes an excessive supply of credit. This piece of the puzzle has been provided in spades by the seemingly-perpetual expansionary policies of the U.S. Federal Reserve, which has been desperately seeking to avoid recession following the serial implosions of previous credit-driven speculative bubbles. The Fed's policies of lowering interest rates gave rise to the dynamics of a self-fulfilling prophesy where the dollar could be counted on to fall, giving oil producers who are paid in dollars for their commodity the impetus to cut supply to raise prices to defend the purchasing power of their dollar-denominated oil revenues. At the same time, investors seeking a refuge from inflation, the weakening dollar and/or a possible collapse in the value of other financial investment vehicles related to real estate and other markets have rushed to invest in commodities, especially oil and commodity futures funds and oil trusts, to garner more favorable returns, thereby boosting prices further. The link to financial and dollar trends was highlighted during the week of June 2 when pronouncements that the U.S. Federal Reserve

would not likely continue to lower interest rates caused liquidations in oil futures, temporarily easing prices.

While paper profits from the rising price of oil helps hedge funds and pensioners whose money is invested in the commodities markets, the impact on average Americans has been devastating. Lower income Americans are now spending over 13 percent of household income on gasoline, up from 8 percent in 2001. Speculative profits earned during the dot.com boom are one thing, but speculative profits that damage the overall U.S. economy and hurt working class Americans mobility and economic survival is another. Creative avenues need to be considered to both allow commodity futures markets to function and offer a dynamic place for hedging and price clearing, while at the same time, preventing dangerous and risky bubbles.

Several policy tools exist that could be utilized to cool the speculative bubble in oil futures markets. One option that has been discussed in policy circles is to raise the financial commitment that must be paid up front to buy oil futures (the so-called margin). Another option is to better investigate the role the U.S. Strategic Petroleum Reserve and IEA strategic stock system can play in discouraging market manipulation and rampant speculation.

In recent years, consuming countries have not been effective in tapping the leverage of strategic stocks in negotiating with OPEC about its responses to supply disruptions or tightening markets. The Bush administration, by making clear its intention to use strategic stocks only under a narrow range of circumstances in an emergency related to war, has weakened the leverage that could have been gained from a more flexible management of consumer country strategic stocks. The administration of George W. Bush, by signaling to oil markets and OPEC that it would not use the Strategic Petroleum Reserve to calm markets or ease prices under any circumstances except major wartime supply shortfalls, has given free rein to speculators and OPEC to manipulate oil prices upwards, without fear of repercussions and revenue losses from a surprise release of U.S. or IEA strategic stocks. Thus, the next U.S. president should make it known that he or she will be more flexible in the interpretation of when to order the use of strategic oil stocks.

Long Term Supply Issues

Putting the current speculative bubble aside, there are long term fundamental signals that point to continued high prices and the possibility that the amounts of oil needed by the United States may simply fail to materialize in the coming years.

Over the past few years, OPEC has been slow to respond to rising oil prices by bringing on investments to create additional supplies—even as prices reached $125 per barrel. OPEC's total sustainable production capacity did not expand between 1998 and 2005, despite a rising call of demand for OPEC crude oil supply. Capacity gains made through added investments in Iran, Saudi Arabia, Kuwait, Algeria, Qatar and Libya have barely managed to offset the losses in Iraq, Venezuela and Indonesia.

In the past year, as prices have been rising, OPEC has announced few new capacity expansion projects. Saudi Arabia has stated that it will sit tight with its previously planned expansion that

will raise the Kingdom's production capacity by 1 to 2 million b/d by 2010. Last week, Libya announced plans to raise its output to 3 million b/d by 2012, up from 1.85 million b/d currently. Kuwait has signed a deal with ExxonMobil to develop 900,000 b/d of heavy oil capacity at its northern Lower Fars field, but the plan faces some domestic political opposition, and Abu Dhabi is also pursuing some smaller capacity expansions with ExxonMobil. Energy Intelligence Group (EIG) has projected OPEC could add up to 3.5 million b/d by 2010, but most of this represents gains from Saudi Arabia and Angola that were announced several years ago, before prices began the latest run-up. Cartel members have announced no major changes in spending so far this year in response to prices, with Saudi Arabia in fact indicating it is going to cancel plans to add another 2. 5million barrels a day of capacity beyond 2010. Furthermore, many of the countries projected by EIG to have planned gains in the next two years may falter (such as Nigeria, Iraq and Iran) in the face of internal turmoil, technical problems, and worsening output declines in older fields.

The oil and gas supply response in the United States is expected to be better, with a tremendous boom in drilling by smaller investors and independents for natural gas in the shales of Texas, Arkansas, New York and Pennsylvania. Moreover, the Baker Institute projects that lifting access restrictions would lead to an increase overall in Lower 48 natural gas production of about 1.5 tcf in 2015 (or a 7.5 percent increase), increasing to 3.1 tcf greater production (or a 10.1 percent increase) in every year from 2015 through 2030. More specifically, Offshore Continental Shelf production would total 5.0 tcf in 2015 and 6.1 tcf in 2025 as compared to only 3.5 tcf in 2015 and 3.9 tcf in 2025 if the restrictions remain in place. Easing conditions for drilling in the Rocky Mountains could add another 0.10 tcf by 2015 and 0.93 tcf by 2025.

Today, national oil companies (NOCs) hold nearly 80 percent of global reserves of oil; they also dominate the world's oil production. The challenge of meeting growing demand for oil will be daunting in the years ahead. Many emerging economies, such as China and India, have made substantial per capita income improvements in the past decade and are at the launching point where private automobile ownership and related fuel demand is likely to jump as much as twentyfold.

In fact, unless consuming countries institute more effective energy policies, oil consumption is expected to rise by more than 30 million barrels per day (b/d) by 2030; the investment required to provide this petroleum could run to four trillion dollars or more. Fifteen percent of that added demand is projected to come from the United States alone and another 24 percent from China.

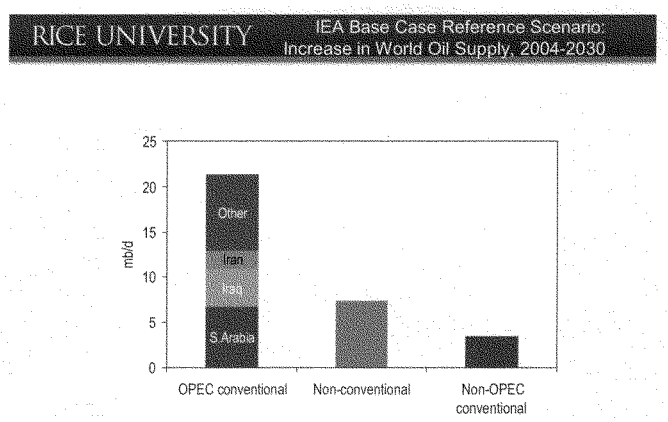
Since oil supply from member states within the Organization of Economic Cooperation and Development (OECD) is potentially limited, NOCs will be responsible for a lion's share of this increased output and investment. The picture is similar when it comes to natural gas. NOCs or state-owned natural gas companies already play a substantial part in international markets, and their role could become even more critical as more natural gas is needed from Russia, Iran, Iraq and perhaps some day, Saudi Arabia.

Global oil demand is expected to rise at a rate of roughly 1.6 percent per annum over the next two decades from about 76.4 million bpd in 2001 to 90.4 million bpd in 2010 and 106.7 million bpd by 2020. Almost 75 percent of this increase in demand will come from the transport sector

where renewable energy and nuclear energy are not expected to play a significant role without a major technological breakthrough toward electric cars.

Under a "business as usual" scenario, much of this increased demand for oil, roughly 60 percent, will have to be supplied by rising production from OPEC over the next 25 years. The reality of conventional oil and natural gas geology is that approximately 62 percent of remaining proven resources lie in only five countries. In the case of oil, the five largest resource holders are all Middle Eastern countries. In projecting future supply potential, more than half of that volume is projected to come from just three countries shown in Figure 1: Iraq, Iran, and Saudi Arabia. These forecasts might prove unrealistic given the political and economic conditions in those countries. Conventional oil production from non-OPEC countries is expected to play a markedly smaller role by providing just 10 to 15 percent of increased supply.

Figure 1: Future New Supplies of Oil




***Under a business as usual scenario, world will increasingly rely on Persian Gulf and unconventional oil, including about 3.5 to 4 million b/d of Canadian tar sands production, 1.5 to 2 mb/d of upgraded heavy oil, 2.4 mb/d of gas to liquids and 1.7 mb/d of coal to liquids, oil shale, etc***

This means that nonconventional resources will play an increasingly important marginal supply role by supplying 25 to 30 percent. Canadian tar sands production would represent the largest possible diversity away from Middle East supply at over 3.5 to 4 million bpd. Upgraded heavy oil could yield another 1.5 to 2 million bpd, while an additional 1.7 million bpd of production expected from coal-to-liquids and oil shale production. Gas-to-liquids output is expected to reach 2.0 to 2.5 million bpd. Without the development of these unconventional resources, the world will be even more dependent on Middle East supply. However, the pursuit of these unconventional resources is not without a downside. They all tend to have a higher carbon footprint, pitting energy security goals against climate priorities.

The need to diversify the heavy dependence on Saudi, Iraq and Iranian oil in the United States is driven home by the tensions and conflict that now plague the Persian Gulf. Many Persian Gulf nations currently face both internal instability and future succession problems. A severe oil supply shock could potentially materialize from any number of possible events emanating from the Middle East.

Over the past two decades, the U.S. oil policy has been to rely on allies in the Persian Gulf, such as Saudi Arabia, the United Arab Emirates, Kuwait, Qatar and Oman, as well as major exporters like Venezuela and Nigeria to provide the oil we need. In 1990, when Iraq invaded Kuwait, cutting off 5.0 million bpd of oil supply, Saudi Arabia, the United Arab Emirates, Nigeria, and Venezuela increased production to make up the difference, limiting the effect on world oil supply and price.

But the internal stability of many of these large oil producing countries looks a lot shakier now than it did in the 1980s and 1990s. In fact, the list of oil exporting countries where production has been stagnant or falling in recent years despite ample reserves due to civil unrest, terrorism, inefficiency, government mismanagement, or corruption is long and diverse. Projections that OPEC will increase capacity by an additional 10 to 20 million bpd in the next 20 years to meet the rising demand discussed above run counter to historical experience. OPEC's capacity has fallen, not increased, over the past 25 years, from 38.76 million bpd in 1979 to roughly 31 million bpd today.

Many factors have contributed to OPEC's inability to expand its sustainable oil production capacity. In the late 1980s, OPEC had planned to increase its oil field production capacity to 32.95 million bpd by the mid-1990s. Instead, OPEC production capacity stagnated at 29 million bpd for most of the decade, only creeping higher in recent years. Even so, large capacity expansion programs in Saudi Arabia. Iran, Libya, and Iraq have all failed to achieve production targets due to international sanctions. Venezuela's planned expansions were thwarted by a change of government, related civil unrest and a redirecting of funds away from the oil sector to social welfare programs, and the country's oil potential has been slipping in recent years. Regional and ethnic conflict and civil unrest also plagued Nigeria's efforts to expand production while domestic politics has blocked oil field investment in Kuwait.

Implications of the Rising Role of National Oil Companies

As the world becomes more dependent on NOCs for future oil supplies, major oil consuming countries are questioning the ability of these firms to bring online new oil in a timely manner in the volumes that will be needed. The list of NOCs with falling or stagnant oil production in recent years is long. Production has been affected by civil unrest, government interference, corruption and inefficiency, and the diversion of corporate NOC capital to social welfare, is long. Moreover, in several important resource-holding countries, important violent and non-violent social movements in major energy producing nations are raising the costs of investment, disrupting exploration and production, and generally interfering with the flow of primary commodities. This is especially true in Latin America where hyper-mobilized social movements have created new political risks, which have in turn had negative consequences for international investment and have also curtailed energy supplies in the region.

In the 1980s, the investor-owned international oil companies (IOCs) moved to reinvest their high profits to find more oil, and this investment helped produce rising oil output in countries outside of OPEC. But the investment response from the IOCs has been slow to materialize over the past several years.

Are the IOCs Investing Enough?

The exploration spending of the five largest IOCs was flat to lower between 1998 and 2006. Thus, given the rise in costs of material, personnel, and equipment such as drilling rigs, the five largest IOCs have in effect cut exploration spending levels in real terms over the past ten years. This trend appears, however, to be easing, with exploration spending by the five largest IOCs rising by 50 percent in 2006, from 2005, and up 10 percent in 2007, from 2006. Instead of favoring exploration, the five largest IOCs have used fifty-five to fifty-six percent of their increased operating cash flow on share repurchases and dividends in both 2006 and 2007. The IOCs have increased spending on developed resources over the past few years (develop spending increased 10 percent between 2006 and 2007), presumably to monetize these assets quickly while oil prices are high. As a result of these spending decisions, aggregate oil production from the IOCs fell from the early 1990s to 2005, before starting to recover recently. The large amount of capital that has been used over the past few years and is still being used for share repurchases and dividends does not bode well for growth in long term oil supplies which requires a long lead time of increased exploration spending to identify new resources.

By contrast, thankfully for the U.S. domestic picture, spending of the next 20 largest American independent oil firms has not followed a similar pattern. Instead, they have steadily been increasing exploration spending since 1998 and their exploration spending levels are now equal to that of the five largest IOCs. This differing pattern comes despite the fact that the five largest IOCs have access to operating cash flow that is three times the size of the next 20 largely traded American oil firms. Oil production of the next 20 American independent firms has grown over the last decade, linked to their successful exploration activities.

Research and development spending of the five largest IOCs has risen significantly in the past year from $2.6 billion in 2006 to $3.3 billion in 2007. This spending is still small compared to companies in other industries such as GE ($4 billion a year), Microsoft ($6 to $7 billion), General Motors ($6 to $7 billion). Generally speaking, the IOCs have increased their spending in alternative energy over the past two years, with some companies such as Shell, BP and Chevron taking a leading role, but their expenditures are still relatively small when compared with the companies' overall operating cash flow.

The U.S. Energy Tab and Future Dependence

The United States, as the world's largest energy consumer, is facing daunting energy challenges. Demand for oil has been rising steadily, but growth in supplies has not kept pace. The United States is the third largest oil producer in the world, but its production has been declining since 1970 as older fields have become depleted. The United States is now more dependent on foreign oil than ever before. It imported 12.3 million barrels per day (bpd) in 2006 or about or about 60 percent of its total consumption of roughly 20.7 million bpd. That is up from 35 percent in 1973.

The share of imported oil is projected to rise to close to 70 percent by 2020, with the United States becoming increasingly dependent on Persian Gulf supply. U.S. oil imports from the Persian Gulf are expected to rise from 2.5 million bpd, about 22 percent of its total oil imports, in 2003 to 4.2 million bpd by 2020, at which time the Persian Gulf will supply 62 percent of total U.S. oil imports, according to forecasts by the U.S. Department of Energy (DOE).

More than three decades after the 1973 oil crisis, U.S. supply of oil is no more secure today than it was thirty years ago. Moreover, its dependence on oil for mobility has never been stronger. All told, there are over 242 million road vehicles in the U.S., or one vehicle for every person. Each vehicle is driven over 12,000 miles annually, and virtually all vehicles are powered by petroleum-based fuels, either gasoline or diesel. As a result, despite the fact that the United States accounts for only 5 percent of the world's population, it consumes over 33 percent of all the oil used for road transportation in the world. By comparison, China, even with its growing economy, has about 13 million vehicles and consumes only about 5 percent of all the road fuel produced in the world, despite having a population that is more than four times the size of the United States.

That rising U.S. oil imports have strengthened the hand of oil producers is fairly clear. Soaring U.S. gasoline demand was a significant factor strengthening OPEC's monopoly power in international oil markets in the 1990s. U.S. net oil imports rose from 6.79 million b/d in 1991 to 10.2 million b/d in 2000 while global oil *trade* (that is, oil that was exported across borders from one country to another) rose from 32.34 million b/d to 42.67 million b/d. In other words, the U.S. share of the increase in global oil trade over the period was a substantial 33 percent In OPEC terms; the U.S. import market was even more significant, representing more than 50 percent of OPEC's output gains between 1991 and 2000.

Strong U.S. import demand not only enhances OPEC's monopoly power, it also has had a deleterious long-term impact on the U.S. economy. The U.S. oil import bill totaled $327 billion in 2007 and is expected to top $400 billion in 2008. The latter represents an increase of 300 percent from 2002. The U.S. oil import bill accounted for as much as 40 percent of the overall U.S. trade deficit in 2006, compared to only 25 percent in 2002. This rising financial burden is stoking inflation and creating ongoing challenges for the U.S. economy.

To meet this long term supply challenge, there are many policies that can be put in place. The United States needs to consider a more comprehensive approach –one that enhances environmentally sensitive domestic drilling while at the same time channels sufficient funding and incentives to alternative energy, energy efficiency and conservation.

Unfortunately, the reality is that no single solution will lead to a *decrease* in U.S. gasoline consumption or achieve U.S. energy independence. The problem of U.S. oil import dependence is a complicated one to solve. It is going to take a portfolio of policies aimed at improving efficiency, encouraging alternative fuels, promoting public transportation, etc., to curb gasoline use in the United States. It may also require changes in lifestyle and perhaps, depending on circumstances in the future, personal sacrifices. That is the reality of our situation and the barometer through which proposed energy policies should be judged. The bottom line is that in order for us to decrease oil consumption, many of the proposed policies would have to be

implemented all at the same time. Any single policy, implemented without the others, is unlikely to do anything more than eliminate only a small part of our projected future increase in oil import requirements.

Given the large scale of U.S. purchases, incremental U.S. acquisitions of oil affect the overall international market price of oil. A reduction in dependence on imported fuel supplies would enhance energy security. An *increase* in the *elasticity* of demand for oil imports into the United States also could reduce oil prices. The elasticity of demand for imports can be raised by increasing either the domestic demand or supply elasticities, through an increase in the substitutability between energy sources.

Encouraging the *diversification* of energy supplies is one very important way governments have limited the negative macroeconomic effects of events that cause the price of any single energy commodity to rise. A portfolio of different types of energy fuels with a more stable composite price is likely to lead to greater macroeconomic stability, all else equal. By contrast, if oil prices increase unexpectedly without similar increases in other energy commodity prices, the negative macroeconomic impacts would be larger, as the share of oil in total primary energy increases.

There is also some evidence that declining energy intensity has moderated the negative effects of rising energy prices by reducing the increases in the cost of goods and services resulting from energy price increases. Reductions in energy intensity have in turn resulted from a shift to less energy-intensive activities and improvements in energy efficiency in many industries. These types of adjustments represent another way to improve energy security.

The Energy Independence and Security Act of 2007, passed on December 18, 2007 and signed by President George W. Bush, raises automobile fuel efficiency standards (CAFE) to 35 mpg by 2020, with first improvements required in passenger fleets by 2011. The new 35-mpg standard for new passenger cars by 2020 that is mandated under the 2007 energy bill is a step in the right direction. However, it will likely only be able to ameliorate the projected *increase* in U.S. oil imports over the next 10 years, and it is not likely to reduce the nation's imports from current levels. By 2020, the new standards would put U.S. gasoline demand at 11.6 million b/d, 2.3 million b/d below previously-projected levels but 0.3 million b/d above 2006 demand levels, assuming the average rate of new vehicle purchases experienced in recent years.

U.S. lawmakers should give serious consideration to strengthening automobile fuel-efficiency standards even further and also providing greater incentives to American automakers to develop better automobile technologies more rapidly. If, for example, a major breakthrough in car technology and innovation were to occur such that new vehicle fuel efficiency accelerated after 2015 to an average of 50 mpg by 2020, the implications would be substantial, cutting U.S. gasoline demand by 6.6 million b/d by 2030 compared to projected levels, or almost 2 million b/d below 2005 levels.

As demand has risen, the United States has ceased to be self-sufficient in its refined products manufacturing capability, and imports of gasoline have risen to peaks as high as one million b/d. Historically, gasoline inventories have been increased on a seasonal basis with the approach of the summer driving season and been depleted as the summer drew to a close. This is to be

expected as inventories are used to meet seasonal increases in demand and are replenished during periods when demand is low. But year-on-year demand has grown steadily while inventories have not. Absent significant increases in refinery capacity or improvements in product management, the latter of which would facilitate "just-in-time" production, this situation has resulted in increasingly large swings in summer gasoline prices. U.S. gasoline manufacturing capability has not kept pace with demand growth, and gasoline imports have been required to make up the difference, rising on an average annual basis by about 500,000 b/d with peak imports even higher.

On-hand stocks of gasoline are needed to protect consumers from sudden outages and extreme events. One possible policy fix would be to regulate the minimum level of mandatory refined product inventories. Such a system exists in Europe and has allowed Europe the flexibility to provide gasoline to the United States during the production shortfalls that occurred following Hurricanes Katrina and Rita, preventing worse dislocations. A U.S. government program reserving the right to use regulated private industry gasoline stocks for strategic national emergency releases would ensure that needed supplies of gasoline would always be available in times of unexpected, major supply outages. The industry could be required to hold extra mandated refined product stocks of five percent or 10 percent of each refining company's average customer demand. The U.S. federal government and states bordering hurricane-prone regions should also consider strategic stockpiles of motor fuel to be used to supplement supplies during evacuations from severe storms to prevent fuel outages along key evacuation routes as was experienced during hurricanes Rita and Katrina.

Alternative energy supplies provide ready substitutes if the price of oil rises too extremely and can shield the economy from the negative impact from disruption of any one fuel source. It has been shown that the lower a country's energy consumption to gross domestic product (GDP) ratio or the shorter the period that oil prices will remain higher, the lower the cost of the tradeoff between inflation and GDP loss. New technologies exist on the horizon that could allow more gains in energy efficiency. Examples include micro-turbines for distributed power markets, improved car technologies, including plug-in hybrid automobile technology, household solar technologies, among others. Electricity in the United States is generated without recourse to oil-based fuels, providing a unique opportunity for creative avenues for alternative energy policy that would promote the use of electricity in the transportation sector.

The CHAIRMAN. We appreciate it very much, Ms. Jaffe, and you'll have plenty of opportunity in the question and answer period to expound upon your points.

Let's turn to our next witness, who is Athan Manuel. He is the Director of the Lands Protection Programs for the Sierra Club. We welcome you, sir. Whenever you are ready, please begin.

**STATEMENT OF ATHAN MANUEL**

Mr. MANUEL. Thank you, Mr. Chairman and ranking minority member and members of the committee. Good morning, my name is Athan Manuel, and I direct the Lands Program for the Sierra Club. And I am here representing over 750,000 Sierra Club members who belong to more than 65 chapters and 45 groups around the country. That makes us the largest grassroots environmental organization in the country.

Before I start, I am a little confused as to how I should begin. I have come to some of these hearings before, and I know a lot of times witnesses open by hailing the Red Sox, but now with the Celtics in the finals I am not sure what is the correct way to pander to the chairman on that.

The CHAIRMAN. You are doing a good job.

Mr. MANUEL. Turning to the future of oil, I want to mainly discuss two issues. One is gas prices and the second one is access to resources here in the United States. A lot of the members have mentioned this and some of the panelists have mentioned it, too, that we all know Americans are paying a record amount of prices for a gallon of gas, over $4.00 a gallon. It is disappointing when you consider that we were first put on notice about gas prices almost 40 years ago in the first Arab oil shock. And it is disappointing from our perspective to see that 35, 40 years later we are still dependent on fossil fuels, oil, natural gas and coal.

And in addition to pandering about the Red Sox, I have got to talk about myself a little bit more. I am a Greek American and my parents love quoting the ancient Greeks, like Homer, but in this case I have to quote Homer Simpson. So I am not making the first cartoon reference, but Homer Simpson said, stupidity got us into this mess and stupidity will get us out. And that is the disappointing part about some of the energy policies being promoted, that it calls for more drilling when drilling is really the problem. All we have got to show for a pretty aggressive drilling for the last 35 years is again $4 for a gallon of gas.

If we are truly addicted to oil and gas, as President Bush said in a recent State of the Union Address, we clearly think the answer is not to seek a bigger fix by drilling in special places like the Arctic Refuge or off of our coasts and off of our beaches.

In looking at the Arctic Refuge, in particular the Energy Information Administration admitted or released a report last week that mentioned that peak production, which wouldn't be until 2027, the effect on prices at the pump, if any, would be a few pennies from drilling in the Arctic Refuge. So we don't think drilling there is the solution or would reduce prices. By contrast, the EIA research indicates that clean energy and energy efficiency technologies could do ten times more to help reduce our dangerous dependence on foreign oil and fossil fuels.

The same example holds true for the Outer Continental Shelf. If you look at the eastern Gulf of Mexico in particular, which is kind of an area of highest industry interest, only about 930 million barrels of oil are thought to be in that area. Again against current rates of consumption that is just not much oil, certainly not enough oil to again reduce the price of gas that consumers pay at the pump.

Again looking at the OCS, a vast majority, 80 percent of the Nation's undiscovered, technically recoverable oil and gas is located in areas that are already open for drilling, according to the Department of the Interior.

Ms. Solis mentioned that in her opening statement, that even if we drilled everywhere in the United States we wouldn't have enough supply to impact prices or to help consumers at the pump.

Finally on access, again many of the opening statements mentioned how the oil companies have access to quite a few areas, both on and offshore. A new report by the Natural Resources Committee here in the House mentioned that the permitting of drilling permits has exploded in recent years going from 3,800 5 years ago to more than 7,500 in 2007. The same is true with onshore and offshore, whether we are looking at our public lands, BLM lands, or offshore.

Clearly we think that more drilling and leasing in the United States will not lower gas prices. We simply don't have that much oil and gas left in the United States. Other panelists have said this morning the price of oil is influenced in the world market largely by OPEC. It is also influenced by speculation, increases in demand in Asia, and China, and India and by a weak dollar. And again, we don't think leasing and drilling is going to solve that problem.

This year there have been two huge leases held in the Chukchi Sea and in the Gulf of Mexico, and obviously prices have still gone up. Again these large leases indicate, underscore the issue that there is no lack of access to areas here in the United States. And if you look back 30 years since the first era of oil shock in the early 70s, the U.S. has produced almost 90 billion barrels of oil since then. So we have tried drilling our way out of the problem, and it just hasn't worked.

We think now this new Congress is going to take steps to solve the problem. Last year under the leadership of Mr. Markey and other Members, Congress did pass increases in fuel economy standards for the first time. There are many innovative programs being offered this year by Members of Congress to get us off fossil fuel and use more renewables, and we think that is clearly the best way to go when looking at the energy policies.

So when we look at the future of oil we hope that we really see a future of clean renewable energy and energy efficiency programs. We really are optimistic that America can innovate our way out of this problem and instead of doing the failed policy of the past, which is again more and more drilling everywhere here in the United States, we should look forward to energy efficiency solutions, clean energy programs and renewables that would get us off of fossil fuels, reduce global warming pollution, greenhouse emissions, and put Americans to work on a clean energy future, not a future of oil.

Thank you for the time, Mr. Chairman, and for the invitation.
[The statement of Mr. Manuel follows:]

Testimony of
Athan Manuel
Director, Lands Protection Program
Sierra Club

Before the
Select Committee on Energy Independence and Global Warming
United States House of Representatives

Regarding:
The Future of Oil

June 11, 2008

Prepared by:
Athan Manuel, Director, Lands Protection Program,
with help from Keren Murphy and Kristina Johnson, Sierra Club,
and Peter Van Tuyn, Bessenyey & Van Tuyn.

Mr. Chairman and members of the Committee, good morning. My name is Athan Manuel, and I am the Director of Lands Protection for the Sierra Club. I am here representing over 750,000 Sierra Club members who belong to more than 65 chapters and 450 groups nationwide. We are the largest environmental grassroots organization in the country. I am very appreciative of the opportunity to testify this morning regarding "The Future of Oil" before the Select Committee on Energy Independence and Global Warming.

I was asked by the committee to address five issues as they relate to "The Future of Oil":

1. Estimates of current global petroleum liquid reserves vary from 14 to 24 trillion barrel. EIA uses a base case of 20.6 trillion barrels. Approximately how many barrels of oil have already been recovered and combusted? What contribution has this made to increased atmospheric greenhouse gas concentrations? What are the global warming implications of combusting a significant portion of these remaining reserves?
2. How would drilling in the Arctic National Wildlife Refuge and expanded drilling in the offshore regions impact the price of gasoline for American consumers? When would that impact be felt?
3. Beyond greenhouse gas emissions, what are the other major environmental consequences to drilling in these areas?
4. What percent of recoverable reserves are already open to drilling? How much land in the United States is already held by oil and gas companies? How much of this land is currently not being utilized?
5. How do other energy options - increasing energy efficiency or advancing oil substitutes like cellulosic biofuels and electric vehicles - compare to drilling in terms of economic and environmental impact?

**The Future of Oil**

When considering the future of oil, it helps to look at the present. More than ever before, Americans are paying the price—a record-breaking $4 a gallon—for our dependence on fossil fuels. More than 30 years after the first oil shock of the early 1970's, America continues to be dependent on fossil fuels like oil, natural gas and coal.

When contemplating that past, as a Greek-American I am reminded of a favorite phrase from Homer - Homer Simpson: "Stupidity got us into the mess, and stupidity will get us out."

Unfortunately, some members of Congress and the Administration think like Homer Simpson, that the solution to our energy problems is the actual problem itself – a continued dependence on fossil fuels and more and more oil and gas drilling. If we are truly addicted to oil, as President Bush admitted in a recent State of the Union address, the answer is not to simply seek a bigger fix by drilling off of our beaches and in our last special places like the Arctic National Wildlife Refuge.

The Bush Administration's own Energy Information Administration (EIA) admits that at peak production—which wouldn't be until 2027—the effect on prices at the pump, if any, would be a few pennies from drilling in the Arctic Refuge. By contrast, EIA research indicates that clean

energy and energy efficiency technologies could do *ten times more* to help reduce our dangerous dependence on foreign oil.

Fortunately, last year Congress increased fuel economy for cars and light trucks, and this year members of Congress have offered sensible plans that promise consumers real relief and will help put us on the path toward a clean energy future.

It is not hard to see this future of clean energy. In addition to federal action on fuel economy, states are promoting renewable energy and clean technologies.

Finally, we hope that instead of a future of oil, the United States enjoys a future of clean, homegrown renewable energy, and a future of aggressive energy efficiency. It is time to embrace the clean energy solutions that will put America back to work, help end our dangerous dependence on fossil fuels, and fight global warming, as well as protect our special places and vulnerable coastal communities. That is the future our nation should pursue.

**Oil and Gas Drilling, and the Price of Gas**

Regarding additional drilling and the price of gas, we do not think that drilling anywhere in the United States will significantly impact the price of gas or help consumers. Conservation, efficiency and clean energy technologies far outweigh the meager benefits of any oil and gas thought to be in the Arctic Refuge or the outer continental shelf.

The most recent U.S. Energy Information Administration (EIA) May 2008 update report[1] concludes that drilling in the Arctic Refuge would do little to ease world oil prices. The report -- an analysis in response to a request from Alaska Senator Ted Stevens – on the petroleum potential of the coastal plain of the Arctic Refuge concludes that:

- Based on the U.S. Geological Survey mean resources estimate, EIA reports that leasing and development on the Arctic Refuge Coastal Plain region would result in production of approximately 2.6 billion barrels of oil between 2018 and 2030;
- Production from the coastal plain of the Arctic Refuge would peak in 2027 at approximately 780,000 barrels per day (0.78 million bpd) and would average approximately 657,000 bpd (0.657 million bpd) between 2018 and 2030;
- During the decade between 2021 and 2030, Arctic Refuge production would reduce prices at the gas pump by approximately $0.032 (3.2 cents) per gallon. At peak, the gas pump reduction would be less than $0.04 (four cents) per gallon, based on a $0.78 per barrel reduction in the price of crude oil (all figures in 2008 dollars);
- At most, EIA projects that new oil from the Arctic Refuge would lower the world price of oil by no more than $1.44 a barrel and possibly as little as 41 cents a barrel;
- Due to geologic and logistical constraints, EIA has not increased its estimate of Arctic Refuge production potential through 2030 since its last review in 2004, despite high oil prices;
- If Congress authorized leasing for the coastal plain of the Arctic Refuge production would not start for another ten years.

[1] Energy Information Administration, Analysis of Crude Oil Production in the Arctic National Wildlife Refuge, May 2008.

For more on the Arctic Refuge and the price of gas, please see the attached report, "Existing Conservation and Alternative Technology Gains Far Outweigh Arctic National Wildlife Refuge Potential: Oil Imports Have Declined Significantly Since 2005" by Richard Fineberg.

The same is true for America's Outer Continental Shelf. There are an estimated 930 million barrels of oil in the entire eastern Gulf of Mexico, the area with the most industry interest. Against current rates of consumers, that breaks down to approximately 47 days worth of oil. As is the case with the Arctic Refuge, such a small amount of oil will not significantly impact the price of gas or solve America's energy challenges.

Finally, more off shore drilling does not automatically lead to lower prices. The price of gas is set on the world market, largely by OPEC. Consider gas prices in these countries that allow and promote offshore drilling: United Kingdom: $8.37; Norway $7.33; Germany, $6.72; Canada, $4.34; Japan, $4.16.[2]

It is disappointing that in the face of skyrocketing gas prices, some members of Congress and the Bush administration can only come up with the same 'solution' that got us into this problem: drill for more and more oil and gas. If we're truly addicted to oil, as President Bush admitted we were long ago, the answer is not to simply seek a bigger fix by drilling off of our beaches and in our last special places like the Arctic National Wildlife Refuge.

**Environmental Consequences of Drilling**

Despite better technology and know-how, oil and gas drilling, both on shore and off shore, is a dirty and risky business.

*Arctic National Wildlife Refuge*

*Oil Spills*
Just two years ago, BP, the largest operator on Alaska's North Slope, had to shut down the entire field due to pipeline corrosion. BP's problems at Prudhoe Bay caused the largest oil spill in North Slope history – over 200,000 gallons of crude oil and a temporary, but massive shutdown of the nation's largest oil field.[3] Worse yet, BP couldn't guarantee that corrosion in their negligently managed oil field would not cause further environmental devastation. BP was subsequently fined for criminal negligence.[4]

The corrosion problems experienced by BP highlight the hazards of drilling for oil and gas on Alaska's North Slope. On average, there are "about 500 oil spills . . . in the Prudhoe Bay oil fields and along the 800-mile pipeline each year," according to the Alaska Department of Environmental Conservation.[5] The spills occur despite the fact that the daily "throughput" of oil has declined from about 2 million barrels a day in 1987 to less than half that today.[6]

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[2] *(AA Motoring Trust; USA Today, April 18, 2008)*
[3] http://www.usdoj.gov/opa/pr/2007/October/07_ag_850.html
[4] http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7020563
[5] Brad Knickerbocker, *The Christian Science Monitor*, August 09, 2006
[5] Id

Last year, after investigation of fires and other safety problems on the Trans-Alaska Pipeline System (TAPS), the federal Pipeline and Hazardous Materials Safety Administration levied the largest proposed fine issued in 2007 against the operators of TAPS, the Alyeska Pipeline Service Company.[7]

*Infrastructure*
The U.S. Geological Survey (USGS) reports that Arctic Refuge oil production, if it occurs, would come from many relatively small oil fields and not one large filed like Prudhoe Bay. The result would be a sprawling industrial complex of drilling sites spread throughout one and a half million acres of critical wildlife habitat. Hundreds of miles of pipelines and roads, airstrips, power lines and pumping stations and housing for workers, as well as tankers calling at the port of Valdez to transport this oil, risk further oil spills in critical habitat.

Drilling in the coastal plain of the Arctic Refuge would replace wilderness with oil derricks, roads, long pipelines connected by feeder pipelines, power plants, oil processing facilities, landfills, air pollution (particularly nitrogen oxides and methane, a greenhouse gas), oil spills, drilling wastes and sewer sludge.

Existing oil development in Prudhoe Bay and 13 other fields on Alaska's North Slope spans nearly 1,000 square miles – an industrial footprint larger than the state of Rhode Island.[8] Superimposed on the East Coast, the development proposed for the Refuge would stretch from Washington, D.C. north almost to Philadelphia and out to the Eastern Shore.

*Offshore oil and gas drilling*
New off shore oil and gas drilling is bad for our coastal environment, our beaches, for marine life and their habitat, and for the broader environment. While there have been many advances in oil and gas recovery technologies in recent decades, many serious consequences still result from exploration and drilling for either oil or gas.

*Harm to wildlife*
America's coasts are a complex mosaic of sea grasses, wetlands, estuaries, beaches, and dunes. Off shore drilling is simply not compatible with this fragile ecosystem.

The Gulf of Mexico alone is home to more than twenty species of marine mammals, four species of shark, seven species of tuna and five species of sea turtle. All five turtle species found in the Gulf are either endangered or threatened, making any adverse effects very significant to the overall populations.

This area is the heart of one of the most important migration corridors in the world, traveled by hundreds of species of birds[9]. Offshore oil rigs interfere with migratory routes, spawning, and feeding areas for target species, generate pollution that destroys crucial nursery habitat for larval and juvenile stages, and cause large and small oil spills that reduce catches.[10] In addition to

[7] http://ops.dot.gov/library/saferep/SRC_2002.pdf
[8] http://www.arcticrefuge.org/
[9] Deepwater Gulf of Mexico Environmental and Socioeconomic Data Search and Literature Synthesis. Volume I: Narrative Report. 2000. Minerals Management Service.
[10] Interactions Between Migrating Birds and Offshore Oil and Gas Platforms in the Northern Gulf

migratory birds, the eastern Gulf of Mexico supports large populations of brown pelicans and bald eagles.

America's coasts host a number of environmentally sensitive animals such as, sea turtles, whooping cranes, bald eagles, brown pelican, and manatees, among other charismatic species.

Important beach areas include the: Florida Panhandle, southwest Florida, the Grand Strand of South Carolina, North Carolina's Outer Banks, popular beaches in Maryland, Delaware, New Jersey, and Cape Cod. All these environmentally sensitive and economically important beaches could be damaged by a large oil spill and by the routine pollution that accompanies off shore oil and gas drilling.

*Onshore damage*
The onshore infrastructure associated with offshore oil or gas activities causes significant harm to the coastal zone. The shoreline processing infrastructure for offshore drilling often requires industrialization within the coastal zone of affected states, using installations similar to onshore storage and processing facilities including miles of pipeline and roads and other industrial apparatus like ports, helipads, and dorms.

For example, OCS pipelines crossing coastal wetlands in the Gulf of Mexico are estimated to have destroyed more coastal salt marsh than can be found in the stretch of coastal land running from New Jersey through Maine.[11] Years of wear and tear by the oil and gas industry has torn apart the coastal wetlands of the Louisiana Bayou. Thanks in part to drilling operations, Louisiana is losing 25 square miles of coastal wetlands each year, eating away at natural storm barriers.

*Water pollution*
Drilling muds are used to lubricate drill bits, maintain downhole pressure, and serve other functions. Drill cuttings are pieces of rock ground by the bit and brought up from the well along with used mud. Massive amounts of waste muds and cuttings are generated by off shore oil and gas drilling operations – an average of 180,000 gallons per well.[12] Most of this waste is dumped untreated into surrounding waters. Drilling muds contain toxic metals, including mercury, lead and cadmium. Significant concentrations of these metals have been observed around drilling sites.[13]

A second major polluting discharge is "produced water," the water brought up from a well along with oil and gas. Offshore operations generate large amounts of produced water. The Minerals Management Service estimates that each platform discharges hundreds of thousands of gallons of produced water every day.[14] Produced water typically contains a variety of toxic pollutants, including benzene, arsenic, lead, naphthalene, zinc and toluene, and can contain varying amounts of radioactive pollutants. Most major field research programs investigating the fate and effects of

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of Mexico. Final Report. 2005. Minerals Management Service.

[11] Boesch and Rabalais, eds., "The Long-term Effects of Offshore Oil and Gas Development: An Assessment and a Research Strategy." A Report to NOAA, National Marine Pollution Program Office at 13-11.
[12] MMS, 2000. Gulf of Mexico OCS Oil and Gas Lease Sale 181, Draft Environmental Impact Statement (DEIS), p. IV-50.
[13] *Id.*
[14] *Id.*, p. IV-32.

produced water discharges have detected petroleum hydrocarbons, toxic metals and radium in the water column down current from the discharge.[15]

*Air pollution*
Drilling an average exploration well for oil or gas generates some 50 tons of nitrogen oxides (NOx), 13 tons of carbon monoxide, 6 tons of sulfur dioxide, and 5 tons of volatile organic hydrocarbons. Each OCS platform generates more than 50 tons per year of NOx, 11 tons of carbon monoxide, 8 tons of sulfur dioxide and 38 tons of volatile organic hydrocarbons every year.[16]

*Oil spills*
If offshore areas are leased for gas exploration there is always the possibility that oil also will be found. There is no known example of a case where a lease prohibits an oil company from developing oil if oil is found in a "gas prone" region. There is no documented instance of any company ever agreeing to such a condition in the history of the OCS leasing program. Without such a restriction included in a lease there would be no assurances that oil would not in fact be developed, raising the possibility of an oil spill. According to statistics compiled by the Department of the Interior, there were some *3 million gallons* of oil spilled from OCS oil and gas operations in 73 incidents between 1980 and 1999.[17] Oil is extremely toxic to a wide variety of marine species, and as noted by a recent National Academy of Sciences study, current cleanup methods are incapable of removing more than a small fraction of the oil spilled in marine waters. It is important to note that, with the exception of oil spills, the environmental damages described above result from drilling or exploring for either oil *or natural gas.*

*Hurricane risks*
The Gulf Coast and East Coast - the two offshore areas most coveted by the oil and gas industry - are no strangers to destructive hurricanes that could wreak havoc on offshore drilling operations. The 2005 hurricane season highlighted the danger of depending on this vulnerable offshore oil and gas infrastructure. It was the first year in recorded history with three category 5 storms--- Katrina, Rita, and Wilma.

In 2005, Hurricanes Rita and Katrina caused massive spills of oil and other pollutants and seriously affected the production, refinery capacity, and price of oil in the United States. The storms caused 124 oil spills into the waters of the Gulf of Mexico. During Hurricane Katrina alone 233,000 gallons of oil were spilled. There were 508,000 gallons spilled during Hurricane Rita.[18] The U.S. Minerals Management Service reports that Hurricanes Katrina and Rita destroyed 115 petroleum production platforms in the Gulf of Mexico. The storms also damaged 457 pipelines connecting production facilities in the Gulf and bringing oil and natural gas to shore[19].

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[15] *Id.*, p. IV-32-33.
[16] *Id.*, p. IV-40.
[17] MMS, 2000. Gulf of Mexico OCS Oil and Gas Lease Sale 181, Draft Environmental Impact Statement (DEIS), pp. IV-50.
[18] U.S. Minerals Management Service. Estimated Petroleum Spillage from Facilities Associated with Federal Outer Continental Shelf (OCS) Oil and Gas Activities Resulting from Damages Caused by Hurricanes Rita and Katrina in 2005. 8 August 2006.
[19] U.S. Minerals Management Service. News Release. MMS Updates Hurricanes Katrina and Rita Damage. 1 May 2006.

A full year after Katrina, BP admitted that a damaged oil well valve in the Gulf of Mexico was still leaking oil. The knee-jerk reaction to throw up more rigs offshore – especially in hurricane-prone waters like Florida's Gulf Coast and the Eastern Seaboard – is precarious at best and not smart energy policy.

*Drilling and testing*

*Seismic Surveys*
The first step to drilling for oil and gas involves doing an inventory of estimated resources. One technology used for this type of inventory is a "seismic survey." This technology involves ships towing multiple "airgun" arrays with tens of thousands of high-decibel explosive impulses to gather geologic profiles of seabed rock structures. These airgun arrays fire regular bursts of sound at frequencies in the range of 20 to 150 Hz, which is within the auditory range of many marine species, including whales.

As the National Marine Fisheries Service explains:

> Aside from explosions, the loudest human noise in the oceans is from airgun arrays used in oil and gas exploration. . . . With source levels of up to 255 dB, and capable of shooting every 10 seconds around the clock, any one of these surveys can put more acoustic energy into the ocean annually than [Navy Low Frequency Active] sonar.[20]

The noise generated by seismic airguns can "substantially harass and injure" marine mammals in numerous ways.[21]

> Increased noise levels could interfere with communication among whales, mask important natural sound, cause physiological damage, or alter normal behavior, such as causing avoidance behavior that keeps animals from an important area or displace a migration route farther from shore. Noise from various sources has been shown to affect many marine mammals in ways ranging from subtle behavioral and physiological impacts to serious injury and death.[22]

Marked changes in behavior in marine species in response to loud underwater noises in the ocean have been well documented. Seismic survey devices and military sonar (which operate at a similar decibel level) have been implicated in numerous whale beaching and stranding incidents, including a December 2001 mass stranding of 16 whales in the Bahamas, an incident of Cuviers beaked whales being beached and stranded in the Galapagos Islands and a more recent stranding in the Canary Islands.[23]

The auditory organs of fish are particularly vulnerable to loud sounds such as those produced by survey airguns. As fish rely on their ability to hear to find mates, locate prey, avoid predators,

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[20] 67 Fed. Reg. 46,712, 46,718 (July 16, 2002)
[21] Minerals Management Service, Draft Programmatic Environmental Impact Statement, Alaska Outer Continental Shelf, Seismic Surveys in the Beaufort and Chukchi Seas, Alaska (OCS EIS/EA MMS 2007-001) (February 2007).
[22] Id.
[23] NMFS, NOAA Fisheries Status Report: Preliminary Findings on the Stranding of Beaked Whales in the Bahamas (June 14, 2000); NMFS, NOAA Fisheries Status Report; NMFS, NOAA Fisheries Status Report on the One Year Anniversary of the Stranding of Beaked Whales in the Bahamas (Mar. 26, 2001).

and communicate, damage to their ears can seriously compromise their ability to survive.[24] In addition, mortality is possible in species like salmon that have swim bladders (the flotation organ that fish use to orient themselves vertically in the water), which have been shown to rupture on exposure to intense sounds.[25]

*"Dart Core" Seabed sample extractions*
"Dart core" sampling, another survey technique, consists of dropping large hollow metal tubes from ships to vertically puncture the seafloor. The samples are retrieved and analyzed for information about subsea rock structures. This technique is extremely destructive to seafloor benthic organisms and fish habitat, discharging silt plumes that are transported on ocean currents and smothering nearby life on the seabed.

*Seafloor "Grab samples"*
"Grab samples" are retrieved from the seafloor sediments with large hinged "buckets" dropped from the shipboard into the seafloor to analyze silt, rocks, and seabed sediments and seafloor organisms. These buckets damage benthic organisms at the seafloor and cause silt plumes.

*Directional Drilling*
Directional drilling has been used to access oil and gas reserves under our National Parks, the Great Lakes, and the Gulf of Mexico. In the case of drilling off shore, the wellhead is on shore while the bottom of the well may be thousands of feet offshore. In 1997, Governor Engler of Michigan directed the Michigan Environmental Science Board to study the impacts of directional drilling on environmental and human activities. This study concluded impacts from directional drilling could result in the contamination of groundwater aquifers and loss of habitat while also increasing noise levels, odor, and congestion, impacting recreation and tourism.[26]

*Impact on coastal economies*
Our coasts and marine waters provide the economic lifeblood for thousands of tourism and fishing communities, providing billions of dollars of economic activity and millions of jobs. They are destinations for thousands of vacationing families each year, sanctuary for fish and wildlife and a critical part of America's "sea to shining sea" natural heritage. Offshore drilling is simply not compatible to the quality of economy and life this fragile ecosystem supports.

There are five main economic benefits attributed to beaches and coastlines.

1. Increased sales, income and employment opportunities resulting from spending.
2. Enhanced property value,
3. Expansion of the federal, state and local tax base.
4. Protection of developed shorefront property from storm surges,
5. Provide recreational opportunities for people

Tourism in America is a $1.2 trillion industry with coastal communities representing over $700 billion annually[27]. Travel and tourism is one of the largest employers in America, employing

[24] McCauley.R.D., J. Fewtrell and A.N. Popper, 2003. "High intensity anthropogenic sound damages fish ears." J.Acoust.Coc.Am. 113, January 2003.
[25] Id.
[26] Long, D.T., W.E. Cooper, W.B. Harrison III, R.H. Olsen, B.J. Premo and K.G. Harrison. 1997. *Evaluation of Directional Drilling under the Great Lakes,* October 1997. Michigan Environmental Science Board, Lansing, Michigan.
[27] Houston, James R. (2002). The Economics Value of Beaches. U.S. Army Engineer Research and Development Center.

approximately 16.9 million people[28]. It is estimated that in 1992 beaches contributed approximately $170 billion annually to the national economy[29]. In South Carolina alone, beaches generate $1.54 billion in wages and earnings[30].

Florida is one of the world's top travel destinations with 825 miles of beaches.[31]. With nearly 80 million tourists in 2005, the hospitality industry generated approximately $57 billion for Florida's economy and helped create nearly one million jobs. Florida's tourism industry is responsible for 20 percent of Florida's economy. Miami Beach alone reports approximately 21 million tourist visits annually. In 1992, about 40 million tourists visited Florida, spending nearly $14 billion and creating about 630,00 jobs with a payroll of $8.9 billion [32].

In addition to potentially catastrophic effects on the tourism industry, drilling for gas and oil off our coasts could have significant negative impacts on commercial fishing. Florida generates more then 800 million dollars worth of commercial fish caught annually. Florida also has more then $5.6 billion in annual recreational fishing expenditures.

In a Norwegian study conducted in the central Barents Sea, seismic shooting severely affected fish distribution, local abundance, and catch rates over a large geographic area. In this study, catch of cod and haddock fell precipitously within a 38-nautical-mile by 38-nautical-mile area, and remained depressed for at least five days following the conclusion of seismic survey activities.[33]

In addition, the Canadian T. Buck Suzuki Environmental Foundation and the United Fishermen and Allied Workers Union – CAW recently weighed in on the Canadian Statement of Practice on the Mitigation of Seismic noise, citing their concern for the B.C. marine-based industries, which employ over 20,000 and contribute over $2 billion in revenues and $600,000 in total GDP. These groups point to mortalities in fish eggs, fish and shellfish larvae, and adult fish with swim bladders; trawl catch declines from 50 to 70 percent and long line catch declines by 44 percent for 5 days after cessation of seismic shooting; and the particular concern about seismic activity during salmon migration or herring spawning. Salmon are of particular concern because of the endangered status of some populations off the Atlantic and Pacific coasts, and because of their apparent inability to detect and avoid low-frequency sound until damaging levels are reached.

III. **There is no shortage of places to drill in the United States**

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[28] World Travel and Tourism Council. (2001). Year 2001, World, United States, TSA Research Summary and Highlights. www.wttc.org/ecres/pdfs/a111/pdf

[29] U.S. Travel and Tourism (1993). World Tourism at the Millennium. U.S. Department of Commerce.

[30] Marlowe, Howard. Assessing the Economic Benefits of America's Coastal Regions. Trends and Future Challenges for U.S. National Ocean and Coastal Policy.

[31] Murley, James, Lenore Alpert, William Stronge. (2005). Tourism in Paradise: The Economic Impact of Florida Beaches. 14th annual Biennial Coastal Zone Conference.

[32] Strong, W.B. (1994) Beaches, tourism and economic development. Journal of the American Shore and Beach Preservation Association. 62(2).

[33] Engas, Arill, Svein Lokkeborg, Egil Ona, and A.V. Soldal. Institute of Marine Research, 1996. Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddc (Melanogrammus aeglefinus). Can. J. Fish. Aquat. Sci. 53: 2238-2249.

There is no shortage of places to drill in the United States; in fact, the opposite is true. Companies hold thousands of unused oil and gas leases. There are more than 7,500 active leases in the outer continental shelf and only 1,655 in production. [34]

According to a new report by the House Natural Resources committee, the number of drilling permits has exploded in recent years, going from 3,802 five years ago to 7,561 in 2007. Between 1999 and 2007, the number of drilling permits issued for development of public lands increased by more than 361 percent, yet gasoline prices have also risen dramatically contradicting the argument that more drilling means lower gasoline prices. There is simply no correlation between the two.[35]

In the last four years, the Bureau of Land Management has issued 28,776 permits to drill on public land; yet, in that same time, 18,954 wells were actually drilled. That means that companies have stockpiled nearly 10,000 extra permits to drill that they are not using to increase domestic production.

Further, despite the federal government's willingness to make public lands and waters available to energy developers, of the 47.5 million acres of on-shore federal lands that are currently being leased by oil and gas companies, only about 13 million acres are actually in production, or producing oil and gas. Similar trends are evident offshore as well, where only 10.5 million of the 44 million leased acres are currently producing oil or gas. Combined, oil and gas companies hold leases to nearly 68 million acres of federal land and waters that they are not producing oil and gas.

The vast majority – 80 percent – of the nation's undiscovered technically recoverable oil and gas is located in areas that are already open to drilling, according to the Department of the Interior's 2006 Report to Congress: Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources. [36]

There are estimated to be 86 TCF of Undiscovered Technically Recoverable Resources (UTRR Mean Estimate) in all OCS areas withdrawn from leasing compared to 479 trillion cubic feet (tcf) of Reserves, Reserve Appreciation and UTRR in the total OCS of the U.S. Therefore, all the potential gas placed off limits to drilling at present constitutes less than 20 percent of the gas thought to exist in the OCS.

Furthermore, according to the 2003 Energy Policy and Conservation Act (EPCA) report issued by the Department of the Interior, 85 percent of federal onshore oil resources and 88 percent of federal onshore natural gas resources (122.6 trillion cubic feet, or tcf) occurring on federal lands in Montana, Colorado, New Mexico, Utah and Wyoming are already available for leasing and development. Only 12 percent of federal onshore natural gas resources are off-limits to leasing.[37]

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[34] *(Sources: Department of the Interior, unpublished table entitled "Total Number of Acres Leased, Data from FY 1994 through FY 2007" from Response to Questions for the Record from the House Appropriations Subcommittee on Interior, Environment, and Related Agencies, February 7, 2008; MMS, "Producing and Nonproducing OCS Oil, Gas, Slat, Sulphur Leases under Federal Supervision by Year Since 1960," Region's Quarterly Reports, as of April 2006.*

[35] The Truth About America's Energy: Big Oil Stockpiles Supplies and Pockets Profits, Rahallreport.pdf, June 2008

[36] Inventory of Onshore Federal Oil and Natural Gas Resources and Restrictions to Their Development, U.S. Departments of the Interior, Agriculture, and Energy; May 2008

[37] BLM, "EPCA Inventory Fact Sheet," 1/15/03, p. 3

In addition to availability for leasing, Bureau of Land Management (BLM) data indicates that the vast majority of federal lands currently under lease are not being developed. Of the more than 35,000,000 acres of public lands under lease, development is occurring or has occurred on approximately 12,000,000 acres.[38] Drilling permit approvals on Western public lands by the BLM increased by 62 percent in 2004, to a record number of 6,052, while the number of new wells that were drilled declined by nearly 10 percent, to 2,702.[39]

Based on this data, it is clear that the vast majority of federal oil and gas resources occurring on federal lands and waters are available for development. The oil and gas industry clearly has plenty of access to our public lands already; there is no reason to grant access to additional areas currently under moratorium for additional leasing.

**Solutions**

Sacrificing America's Arctic and our coasts and beaches will not bring down — and keep down — energy prices. The bottom line is the United States has about 5 percent of the world's population but consumes about 25 percent of the world's energy.[40] Instead of more drilling, which will only add to the billions in profits already being made by ExxonMobil and other oil companies, Congress should continue to raise the fuel economy of our cars, encourage the use of renewable energy like wind and solar power, and adopt other, existing energy-saving technologies that cut pollution, curb global warming and create good jobs.

For example, if our cars, trucks and SUVs together averaged 40 miles per gallon — something that is achievable with existing technology — we would save as much oil as the United States currently imports from the Persian Gulf, with another million barrels to spare. And the average driver would save nearly $600 a year at the pump[41]. A single modern wind turbine can produce enough power to meet the annual electricity needs of 500 average homes.[42]

There are other examples of clean energy solutions and alternatives to off shore oil and gas drilling. Many states have adopted renewable energy standards. By simply making our homes, offices, cars and trucks more efficient we will save energy and money today and far into the future. Instead of relying on volatile and expensive sources of oil and gas, we can use better technology to reduce our energy demand while producing more energy from renewable sources of energy like wind and solar power. These cheaper, cleaner and faster policies reduce short-term demand and costs while also providing long-term solutions to our energy needs. And it does not require you to put our most sensitive ecosystems and our favorite vacation spots on the chopping block.

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[38] BLM, "Total Number of Acres Leased" (unpublished table, January 31, 2005) and BLM, "Number of Producible Acres on Federal Lands" (unpublished table, January 31, 2005)

[39] BLM, "Number of APDs approved by Year on Federal Lands" (unpublished table, January 31, 2005) and BLM, "Number of Well Spud During the Year on Federal Lands" (unpublished table, January 31, 2005)

[40] *Energy Information Administration, "U.S. Crude Oil, Natural Gas and Natural Gas Liquid Resources, 1999 Annual Report," DOE/EIA-0216 (99) (December 2000).*

[41] Freidman, David, et al. "Drilling in Detroit: Tapping Automaker Ingenuity to Build Safe and Efficient Cars." Union of Concerned Scientists. June 2001. p. 41.

[42] American Wind Energy Association – http://www.awea.org/pubs/documents/FAQ2002percent20-percent20web.PDF.

The CHAIRMAN. Thank you, Mr. Manuel, very much.

And our final witness is Karen Harbert, the President and Managing Director of the Institute for 21st Century Energy. She has been an Assistant Secretary for Policy and International Affairs at the U.S. Department of Energy. We welcome you, Ms. Harbert. Whenever you are ready, please begin.

**STATEMENT OF KAREN HARBERT**

Ms. HARBERT. Thank you, Mr. Chairman and the Ranking Member and members of the committee.

At the Institute for 21st Century Energy, we believe an affordable, diverse and secure energy supply is fundamental to our future national security and the expansion of American economic opportunity and prosperity. America needs a comprehensive, commonsense energy policy with a long-term view and durable policy and fiscal commitments. It is no surprise to tell you all that we do not have that now.

It will take unprecedented political commitment from the Congress and the executive branch, better partnerships with local and State governments and much-improved relationships with the private sector. We need to be honest about what it is going to take. We need to stop penalizing, demonizing, regulating, and picking winners. We need to instead stimulate investment, incentivize and innovate solutions to address the greatest threat to the 21st century.

I am not going to talk about demand growth, because that has been covered. I am going to talk a little bit of what is happening in the oil market and then what we need to do about it.

Resources are located in places that are geologically difficult to get to, geographically very difficult. They are in places that are politically unstable, and they are unfriendly to new investment. National oil companies own 50 to 80 percent of the world's proven oil reserves. Energy-sector exploration and development costs have risen, and yet the share devoted to exploration has fallen. We are seeing growing resource nationalism around the world. We don't have enough energy professionals. We don't have enough equipment. And NIMBY is a thing of the past; we are now on to BANANA, build absolutely nothing anywhere near anything, and even NOPE, not on planet earth, not on planet earth. That is an unsustainable path to sustain our economic competitiveness, if we want to do that.

We are not running out of resources. That is simply untrue. We are running out of access to the resources. The International Energy Agency estimates we have 6 trillion to 7 trillion barrels of conventional oil in place around the world. Our U.S. Geological Survey estimates that we have 3.345 trillion recoverable barrels around the world. And if you take out what has already been produced, that leaves anywhere between 1.5 trillion to 3.5 trillion barrels of oil still available.

But we have to be able to open markets. We have to be able to have transparent trade. And we have to have fair market pricing of energy. And we need to capitalize on our resources here at home.

The U.S. is still the largest producer of energy, but we still have significant resources that the Congress and the executive branch

have put off limits for exploration. Our Minerals Management Service estimates we have 139 billion barrels of undiscovered oil here in the United States. Eighty percent of the Outer Continental Shelf is off limits. That part alone, if we would just use that part of the oil, we would have actually a 35-year supply of gasoline for our cars. We would have heating oil for the millions of homes in the next hundred of years. We are depriving the American consumer of choice and opportunity.

May, there was a Gallup poll that demonstrated huge change in public opinion. 41 percent used to believe that drilling off our coast and in wilderness areas should be off limits. 57 percent now support it.

We need to listen to the American people and their pocketbooks. We need to develop a comprehensive plan, and we need the comprehensive plan to embrace the following concepts: We need to increase and diversify supply. We need to increase our suppliers. We need to improve energy efficiency. That is the next best source of energy, is the one we currently waste. We have to accelerate technology, development and deployment and invest in it with regularity and predictability. We have to increase the use of alternatives and renewable sources of energy. Yes, we need to improve our environmental stewardship. We have to modernize our infrastructure. It is not enough to get the hydrocarbons if we can't get them to where they need to be. And we have to exert international leadership.

We need it all. We must allow for increased domestic oil and gas supplies. We have to recognize the role of nuclear power, an emissions-free source of power. We need clean coal. We need to use the 250 years of coal we have here. We have to emphasize energy efficiency and renewables. We have to update our aging energy infrastructure. We have to be better environmental stewards. And we have to develop and deploy those clean technologies that will improve our trade imbalances and accelerate American competitiveness.

If we unleash that entrepreneurial power that has helped us in many crises in the past, we can make widespread use of technology to use our coal. We can create a second generation of biofuels that will not conflict with fuel demands. We can build safe, emissions-free nuclear power plants. And we can drill responsibly on and off of our shores.

But we have to inform the public and policymakers with due respect about the huge challenge we are in, the choices we have and the urgency of this matter. We have to consider the tradeoffs, the costs and the feasibility and viability of what we are proposing. We need less rhetoric. We need more facts. There is no single solution, no single fuel. We must embrace all sources.

I would like to leave you with the thought that the decisions we make, this Congress makes, the next Congress and the next President, those decisions we make in the next few years, we will be with those decisions for generations to come. We need to take it responsibly, seriously. The stakes are enormous for our competitiveness and for our national security. And we at the Institute for 21st Century Energy look forward to being a constructive and integral part of the deliberation this country desperately needs.

Thank you.
[The statement of Ms. Harbert follows:]

United States House of Representatives
Select Committee on Energy Independence and Global Warming
Hearing on "Future of Oil"
Wednesday, June 11, 2008
9:30 a.m.
1300 Longworth House Office Building
Testimony by
Karen A. Harbert
Managing Director and Executive Vice President
Institute for 21st Century Energy
U.S. Chamber of Commerce

Thank you Chairman Markey, Ranking Member Sensenbrenner and the rest of the members of the House Select Committee on Energy Independence and Global Warming. I am Karen Harbert, Managing Director and Executive Vice President of the Institute for 21st Century Energy, an affiliate of the U.S. Chamber of Commerce.

## INTRODUCTION

U.S. national and economic security depends on keeping America strong at home and abroad. Keeping America strong requires access to reliable, affordable and diverse sources of energy. Energy is the lifeblood of the U.S. economy - it fuels our competitiveness in the world economy and maintains our quality of life. Energy underpins our innovative high-tech economy, our resilient manufacturing base, our bountiful agricultural sector, and our courageous U.S. military. The solution to our energy security challenge requires a long term view and durable policy and fiscal commitments. Our energy challenges did not occur overnight and the solutions will not materialize overnight.

As the world's largest producer and consumer of energy resources, the U.S. must play a leading role in addressing the world's energy challenges and ensuring a secure energy future. To achieve this goal, America needs a comprehensive, common sense energy policy. We need to be honest with the public and policy leaders about what it is going to take to address one of the greatest threats of the 21st century — our growing energy insecurity.

At the Institute for 21st Century Energy, an affiliate of the U.S. Chamber of Commerce, we believe an affordable, diverse, and secure energy supply is fundamental to our future security and the expansion of economic opportunity and prosperity. We are fostering a well-informed discussion on our energy realities and working to build consensus on sensible and sustainable energy solutions to the grave challenges we face.

## CONTEXT

Global energy consumption will increase by roughly 57% by 2030, with 70% of that growth coming from the world's emerging economies – 30% from China alone, 15%

from India. The International Energy Agency estimates that to meet world energy consumption in 2030, over $20 trillion in investment is needed.

Electricity growth is expected to be particularly steep, rising more than 100% over the next 25 years. However, 1.6 billion people in the world today still lack access to electricity.

Our world in 2030 will likely look entirely different. China today has 30 million cars on the road and by 2030, China could have over 300 million cars on their highways. How these cars are manufactured and powered will have a significant impact on the global marketplace. Oil consumption in India has increased sixfold over the last 25 years and China, once a net exporter of oil, is now a net importer.

**TRENDS**

However, some recent energy trends are of concern.

*Most energy is derived from fossil fuels found in a small number of producers.* Resources are often located in places that are geographically hard to reach, geologically difficult to develop, politically unstable, or unfriendly to new foreign investment. The world's dependence on a few countries is neither responsible nor sustainable over the long term. Record high oil prices indicate limited spare oil production capacity in the world market due to a lack of investment in new supply and high levels of demand growth in many parts of the world.

*Access to reserves is limited.* Roughly two thirds of the world's oil and gas reserves are in countries that provide limited access or are completely closed to foreign investment. National Oil companies own between 50-80% of the world's proven oil reserves.

*Energy sector exploration and development costs have risen.* Investment is more costly than some companies originally conceived.

*Upstream investment has risen but not the share devoted to exploration.* Upstream oil and gas investment doubled from 2000 to 2006. However the percentage of this investment allocated to exploration has averaged around 12% during the same timeframe due to a shift towards production as companies move to capitalize on higher prices.

*Increased manipulation of natural resources* in countries with large resource bases manifests itself by:

- Limiting access to the resources for commercialization
- Renegotiating contracts or expropriating assets
- Renationalizing assets
- Cutting off supply
- Subsidizing prices in order to offer "cheap" petroleum to citizens and "friends"

*Shortage of qualified staff and available equipment will constrain new investment.* The U.S. energy industry employs well over one million people today yet nearly half of this workforce is expected to retire in the next 10 years.

**WE ARE NOT RUNNING OUT OF RESOURCES, JUST ACCESS TO THEM**

While some have suggested that we are running out of oil and gas resources, we are actually running out of access to energy resources for commercialization – thereby limiting supply. We are also lacking data off of our shores and in many producing countries that could provide certainty and a clear picture of proven reserves to enable robust investment.

Open investment climates and stable regulatory frameworks for investment in the energy sector are needed to ensure sufficient supply of energy for a growing global economy. Market-based pricing of energy resources worldwide will also encourage responsible and efficient consumption. Energy projects are complex, capital intensive and take years to bring new resources on line. Therefore, the investment needed to unlock these untapped natural resources needs to be mobilized now.

It is important to remember that the U.S. is still the largest producer of energy in the world, yet it imports approximately 60% of its oil. The top ten suppliers to the U.S. are Canada, Mexico, Saudi Arabia, Venezuela, Nigeria, Iraq, Algeria, Angola, Russia and the United Kingdom. We import 15% of our natural gas principally from Canada, Trinidad and Tobago and Algeria.

Here in the United States we have significant reserves that the Congress and the Executive Branch have put off limits for exploration. 80% of the Outer Continental Shelf is off-limits for exploration and production. The OCS is estimated to contain 420 trillion cubic feet of natural gas and more than 85 billion barrels of oil. If all U.S. imports of oil and natural gas were to cease, the natural gas located on the OCS off the lower 48 states alone would satisfy all domestic industrial and commercial needs for almost 30 years. This amount of oil would provide a 35-year supply of gasoline for 81 million cars and heating oil for the millions of residential homes in the U.S. for over 100 years.

It is important to recognize that our most important energy partner in the world is Canada, a stable, reliable ally. They are the number one supplier of oil to the United States. The Canadian provinces of Alberta, British Columbia and Saskatchewan provide the vast majority of our natural gas imports, and Canada provides more than 80% of all natural gas entering the United States. There are a number of new oil and gas projects on the horizon in Canada.

Mexico, our second largest supplier also has great potential to increase its output. However, provisions in its constitution prohibit private investment in the oil and gas sector, limiting the country's production and ability to access new technologies that would spur output. Mexico ranks fourteenth in world proven oil reserves with 12.9 billion barrels.

Beyond the North American market, much of the world's untapped hydrocarbon resources are controlled by governments and national oil companies with limited access afforded to international energy companies. New resources are concentrated in the Middle East, North Africa, Russia and Central Asia.

Saudi Arabia is estimated to have over 260 billion barrels of oil reserves and is making significant investments to increase its daily production by almost 30%. Iraq has tremendous reserves as do the United Arab Emirates and Kuwait. In Africa, Nigeria and Libya with combined reserves estimated at 75 billion barrels will be important suppliers to the world market. Continued violence in Nigeria poses a significant challenge for current and prospective investors.

Resource estimates for the Central Asia-Caspian region vary widely because many areas of the region have not been fully explored. The Energy Information Agency (EIA) indicates that proven oil reserves are somewhere between 17 and 72 billion barrels. Russia has vast oil and gas reserves. Its proven oil reserves are conservatively estimated at about 60 billion barrels and the world's largest natural gas reserves of about 1680 trillion cubic feet. However, Russia does not make its reserve data public so there is uncertainty over these figures.

There are significant challenges in both Russia and Central Asia to tap these reserves, including problems with the investment and business climates, corruption, rule of law, and transparency. Each country faces its own challenges in improving the environment that will encourage more energy investment and business.

## WHAT TO DO

To cope with the full spectrum of energy challenges, America must develop a comprehensive plan to deal with growing demand and constrained supply. The current level of energy insecurity poses an unacceptable risk to our economy and national security.

To start, there must be recognition that we operate in a global economy and an international energy market. Thinking in terms of energy interdependence and not isolation will lead to sounder and more realistic policies.

The overall approach must embrace the following concepts:

- **Increase and Diversify Supply**
- **Increase Suppliers**
- **Improve Energy Efficiency**
- **Accelerate Technology Development and Deployment**
- **Increase use of alternative and renewable sources of energy**
- **Improve Environmental Stewardship**
- **Modernize and protect critical infrastructure**

To address our growing energy crisis, we must allow for increased domestic oil and gas supplies, recognize the role of nuclear and clean coal, emphasize energy efficiency and renewable energy, update and expand our ageing energy infrastructure, be better environmental stewards, and develop and deploy the clean energy technologies of the future. These are clear but challenging, even difficult things we have to start doing now as a nation. They won't deliver a quick fix - there is none - but they will deliver results over time. The longer we delay, the longer it will take to solve our energy problems.

Transforming the way we produce, distribute, and consume fuel and power will be anything but easy or cheap and will require unprecedented political commitment and compromise. Still, the American track record of technological innovation should give us all hope. By unleashing our entrepreneurial power, we can make widespread use of carbon capture and storage technologies to allow us to use our 250 years of coal supply. We can create a second generation of biofuels that will not conflict with growing food demands. We can build new safe, emissions free nuclear plants and we can responsibly drill on our lands and off our shores.

Energy infrastructure is every bit as important as energy supply. Since 1990, our electricity demand has increased by 25%, while construction of transmission facilities has decreased by 30%, according to the U.S. Department of Energy. As the demand for energy grows and greater supplies are needed, we must ensure we have an adequate infrastructure to produce, transport, deliver, and store that energy.

Finally, we must develop and implement strategies to better inform the public and our policymakers about America's energy needs and choices. We have to change the terms of the energy debate in our country to make it more understandable, broaden and deepen it, and elevate it with the facts. We can no longer base critical policy decisions on supposition, contradiction, and ignorance.

As we divine the solutions to the growing demand for energy it is important that we consider the trade-offs, the costs, and the feasibility of what we are suggesting. We don't see enough of that in Washington or on the campaign trail. We all need to bring more facts, more reality, and more good American common sense to this critical challenge facing our future. There is no single solution, no single fuel, no single country that can provide adequate supplies of energy—America must embrace all possible sources.

The decisions we make in the next few years will be with us for generations, and we owe it to those future generations to make the right far-sighted decisions. The stakes are enormous and our competitiveness and security compel us to take common-sense action now. The Institute for 21st Century Energy looks forward to being a constructive and integral part of this important national debate.

The CHAIRMAN. Thank you, Ms. Harbert, very much.

And now we will turn to questions from the select committee members. And the Chair recognizes himself.

Mr. Caruso, I am wondering why it is that your agency is predicting that the price of oil is going to go below $57 a barrel in 2016 and then, even further out, you are predicting that the price of a barrel of oil is going down to $70 a barrel by 2030. So, on the one hand, America believes that we are in an energy crisis, and I think that all of us really feel that, but your projections are, in your agency, is that by 2016 the price will be pretty much cut in half and by 2030 it really gets even better, because these are constant dollars.

How can you explain that? It doesn't make any sense to people that the price of oil is going to be going down.

Mr. CARUSO. Well, just to start off with a point of clarification, those prices you quoted are the assumptions for the world oil price in our annual energy outlook that was released several months ago. And they are only one of a number of scenarios that we look at.

The CHAIRMAN. But the problem with that is that NHTSA, the Department of Transportation uses those projections to then determine what the cost-benefit analysis is for increasing the fuel-economy standards for the vehicles that we have to drive in 2016 and 2020 and 2030. So if you give them that number, then the cost benefit of course is much lower in terms of the benefit to America. The higher the prices—if you were projecting $4 a gallon or $5 a gallon, well, then NHTSA is free to increase by five or six or seven miles per gallon the efficiency of the vehicles by 2030.

So your number is very relevant, because it goes right to the question of the pressure which is going to be applied to the wilderness areas in the United States. The more efficient the vehicles—we put 70 percent of all oil we consume in vehicles—the less pressure there is to drill in pristine wilderness areas.

So your projection is, I think, way off. I don't think it is even remotely close to where the price of oil is going to be. And it has a profound impact then on all the other decisions which are made.

Mr. CARUSO. Well, the point is well taken that NHTSA does use the reference case. We do give them the high price case, which in nominal dollars goes to $180 in 2030.

The CHAIRMAN. Would you recommend, Mr. Caruso, that the Department of Transportation used the high case scenario in planning for what the efficiency of the vehicles that Americans drive in 2020 and 2030 should be? Or do you think that they should use $2.26 a gallon in 2016 and $2.51 in 2030 as the basis for their planning as to what the efficiency of the vehicles that we drive should be?

Mr. CARUSO. Well, of course, that is obviously the prerogative of NHTSA. But we are on the higher price path right now. If you would ask me today what I would use, I would use the higher price.

The CHAIRMAN. You would use the higher price, but NHTSA doesn't. NHTSA has to use your lower price. So I would recommend to the Bush administration that they change this formula and that they not use this low cost per gallon of gasoline as the basis for the fuel-economy incentive for the vehicles which we drive.

Let me just go down, yes or no. Mr. Sieminski, should they use the high cost? Do you think $2.26 per gallon in 2016 is a good way for America to plan the efficiency of our vehicles?

Mr. SIEMINSKI. Mr. Chairman, my experience with forecasting is that it hasn't worked out all that well. So I would suggest——

The CHAIRMAN. As a Nation, what would you plan for?

Mr. SIEMINSKI. I would think looking at a range would make a lot of sense.

The CHAIRMAN. No, what would you plan for if you were the Government? Would you plan for $2.26 a gallon in current dollars in 2016 and $2.51 in 2030, or would you plan for $4 a gallon in terms of what our automotive fleet should average?

Mr. SIEMINSKI. If I were making this as a policy decision, I would plan for the worst, which is higher.

The CHAIRMAN. Okay, thank you.

Ms. Jaffe, what would you plan for?

Ms. JAFFE. I think that we should plan for the worst and that we shouldn't have a fixed price for planning. We should just have a standard that ought to be optimal technology ability.

The CHAIRMAN. I appreciate it.

Mr. Manuel, what would you plan for?

Mr. MANUEL. Well, like everyone, you plan for the worst and hope for the best.

The CHAIRMAN. Thank you.

And, Ms. Harbert, what would you plan for, if you were the Bush administration right now, using what the projected price for gasoline for consumers would be in 2016 and 2030?

Ms. HARBERT. As you know, it is a little more complicated than that because you have to affix the mandates that you are going to impose with technology availability. You have to introduce, when is the technology going to be available——

The CHAIRMAN. I understand that. What would you plan for? You are the Chamber of Commerce. You are planning, the Chamber of Commerce is planning for what the price for all of its members are going to be in 2016 and 2030, Ms. Harbert. Would you plan for $2.26 a gallon for all of your members by 2016, $2.51 in 2030? Or would you recommend that the Government plan that there be a much higher price and therefore adjust what the expectations are from the transportation sector?

Ms. HARBERT. I will note that the BP statistical outlook, which just came out, noted that they thought $105 was a fair price. That was according to BP.

The CHAIRMAN. $105 a barrel. So, in other words, you don't think that planning for $2.26 makes any sense at all?

Ms. HARBERT. I think we have to be realistic about the prices going forward. And I don't know exactly how everybody does the different forecasting, but clearly the trend is up.

The CHAIRMAN. Well, your original testimony was very frightening. And now I am asking you, do you think it makes sense for them to be projecting $2.26 a gallon?

Ms. HARBERT. I don't think we need to make our policy decisions based purely on forecasts. We need to make common-sense, comprehensive solutions available that are not just based on forecasts.

The CHAIRMAN. I agree with you. I am asking you a specific question. We put 70 percent of the oil into gasoline tanks. That is 70 percent of all oil. Do you think that this is realistic?

Ms. HARBERT. No forecast can adequately predict why last Friday the price of oil went up $11. So forecasts are useful guideposts, but you cannot make concrete policy decisions based solely on forecasts.

The CHAIRMAN. Well, if we are not going to be basically learning from what is going on right now in our economy with these high prices, the testimony about India, about China, about all the other pressures, and turn to the transportation sector and solve the problem, then I am afraid that the Chamber of Commerce in 2016 and 2030 is going to be ravaged by prices that will be $6 and $7 and $8 a gallon. Because it is surely not going back down to $2.26 a gallon in 2016 in current dollars, okay? That is just not going to happen.

Ms. HARBERT. I think we are all in violent agreement that——

The CHAIRMAN. I know, but I wish that we could get some agreement in terms of how high then the fuel-economy standard should go in order to get that result.

And, by the way, your price projection per barrel of oil is higher than EIA is projecting, $105 a barrel. They have it lower than that in the out-years, okay?

So, again, this is a big problem that we have in terms of what the Bush administration continues to propose in the long run for what we have to do as a society in order to protect ourselves.

My time has expired. Let me turn and recognize the gentleman from Arizona. And I will be generous to him in his time.

Mr. SHADEGG. Thank you, Mr. Chairman.

Mr. Sieminski, I want to begin with you. I have listened carefully to your testimony, and you stated that we are not running out of oil. You said that we need to look at what is out there and where the resource is on the acres that are available. And then you talked about the importance of being able to get to those resources. And you said that if the resources are on lands that are essentially locked up, those are the lands that need to be released.

I take it, then, that you believe that there are lands where we have locked up the supply and cannot get to them at the current time, is that correct?

Mr. SIEMINSKI. That's correct.

Mr. SHADEGG. You also said, and I thought it was important, that we may be reaching a point where we have a problem getting to the acres where the supplies are. Are there some that you can identify?

Mr. SIEMINSKI. Yes, sir. We know that there is natural gas off of the coast of Florida. It has already been discovered. And it is not being produced because of environmental concerns that seem to me to be overreacting.

Mr. SHADEGG. The last legislation that failed in that issue, if I am correct, proposed that we would not allow a natural gas well to be closer than 50 miles from the shore. And that was found to be objectionable because of sight pollution.

Do you happen to believe that you can see 50 miles out into the ocean and see an oil rig?

Mr. SIEMINSKI. It actually gets worse than that. The Cuban Government will be drilling closer to the shore of Florida than the United States will be drilling.

Mr. SHADEGG. So that is not an urban myth, that is a fact?

Mr. SIEMINSKI. That is a fact.

Mr. SHADEGG. There is concern about environmental concerns, and I think every witness acknowledged those; I would certainly acknowledge those.

Do you know what happens at a natural gas rig where there is a leak? And have there been any leaks at natural gas rigs recently?

Mr. SIEMINSKI. Well, this is one of the factors that pains me when I think about this, is, in talking with a county representative, elected county representative that I have been friends with for years in the Tallahassee area, I said, "Can you convince your constituents to think about looking at this gas field? You are going to need it in Florida." We have a power problem, as Amy mentioned. We could very easily have electricity shortages 3, 4, 5 years from now. Natural gas is going to be the only way to do that. Natural gas is clean. If you do have a spill, it is not going to foul the beaches in Florida. The pipelines could come in underground, so nobody would see them. And yet the reaction of his constituents seems to be that they are afraid that it is going to hurt the tourism industry. And I am, frankly, more concerned that the tourism industry will be hurt by brownouts in Florida than it is going to be hurt by drilling the gas that we know is already there.

Mr. SHADEGG. Absolutely.

Ms. Harbert said that she thought that if we explored the Outer Continental Shelf, went after the oil and natural gas there, we would have a supply of 35 additional years, I believe, just in natural gas. I will ask her in just a moment. Do you agree that the supplies are in that neighborhood?

Mr. SIEMINSKI. That we need to get from——

Mr. SHADEGG. That we could get from the Outer Continental Shelf.

Mr. SIEMINSKI. You know, those numbers, Guy Caruso will have those, or the people at EIA. But it is substantial.

And let me just make one quick comment on that. The idea that it is only a small proportion of our energy needs when you look at it over an annual basis or over a period of time I think is really missing the whole point.

I get paid every 2 weeks. And, frankly, I don't—and one of my paychecks is a small proportion of my annual income, but I don't want to give up one of those paychecks, and I don't think other people do.

Mr. SHADEGG. I am running out of time. I want to get to Ms. Harbert.

Ms. Harbert, give me the statistic again, because I would like to know it.

Ms. HARBERT. And I will ask your other question. The human eye can see 16 miles. So that is how far you can see.

Mr. SHADEGG. Less than a third of what we are talking about.

Ms. HARBERT. Right.

According to the Minerals Management Service, we have 139 billion barrels of undiscovered oil reserves in this country. Of that

139, 86 are in the Outer Continental Shelf, which means that 62 percent of the Nation's resources for oil are in the Outer Continental Shelf.

Mr. SHADEGG. And they are currently prohibited from——

Ms. HARBERT. Eighty percent of that is off-limits for exploration and production. And I am just talking about oil. The other ones that you were talking about were gas, but that is just oil.

Mr. SHADEGG. That is just oil. That does not include natural gas. Do you have figures on natural gas?

Ms. HARBERT. I can get those for the record.

Mr. SHADEGG. Okay.

So, obviously, we have a huge supply in the Outer Continental Shelf, which we could be going after and increase our supply for a substantial period of time, but we have politically decided not to do that. Is that correct?

Ms. HARBERT. That is correct. And our friendly neighbors to the north and the south also have significant supplies to increase our North American energy security.

Mr. SHADEGG. And we are just talking about oil. There is natural gas on top of that?

Ms. HARBERT. Yes.

Mr. SHADEGG. The numbers I have on natural gas show 287.82 trillion cubic feet of natural gas. That is just in the lower 48 in the Outer Continental Shelf.

I want to switch to oil shale. The United States Congress, the House, just less than a year ago, put a moratorium on oil shale. The chairman mentioned that he thought the predicted supply of oil shale was in the neighborhood of 1 trillion barrels of oil shale in place. I have heard a figure as high as 1.8 trillion.

Can you tell us about the available oil we could get from oil shale?

Ms. HARBERT. There is a tremendous potential in the Midwest, but unless we actually have an incentive out there for the companies that are out there to develop the technology to actually be able to produce this even more cleanly and better, without an opportunity to explore, there is no opportunity to develop the technology.

There are several companies, including Shell, that are out there that have developed the technology to extract three times the size of Saudi Arabia's resources out of that area. But if you can't open it up, who is going to develop the technology, which is hugely expensive to do this in an environmentally sustainable way? We have got to incentivize our way out of this crisis, not penalize and put things off-limits.

Mr. SHADEGG. And currently that is a political decision again. We put a political moratorium on the production of oil shale?

Ms. HARBERT. Correct.

Mr. SHADEGG. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Connecticut, Mr. Larson.

Mr. LARSON. Thank you, Mr. Chairman.

Mr. Caruso, would you advise the next administration then, as they set out to put together their energy policy, whether it be Sen-

ator McCain or Senator Obama, would you recommend that they do that behind closed doors, in secret, or do you think it should be a transparent, open policy?

Mr. CARUSO. Well, I am head of a statistical agency, and we believe in transparency and openness, so I certainly think that works best.

Mr. LARSON. Do you think that that in part and parcel is a problem with the American public, when they, as everyone is working toward solutions, that when you do things behind closed doors in the dark of night, that it seems to the American people, especially when you come from a background of oil yourself, that somehow—not you personally, but the Vice President—that somehow these things aren't transparent?

Mr. CARUSO. I am obviously not familiar with——

Mr. LARSON. Is there anyone on the panel who doesn't believe that we shouldn't have a more open and transparent policy with respect to our energy policy?

Ms. JAFFE. I would just like to add to that, that there is a tremendous amount of disinformation that goes out to the public on the factual, indisputable technicalities of oil and gas. And to the extent that people feel the need to fulfill what they think their constituencies want to hear and they go on CNN and tell the public something that is factually incorrect, that makes the work of everybody on this panel 10 times harder, because we have to spend a tremendous amount of time publishing documents that put out factual things about what car technology is available, about how many lands are available for drilling. And it makes it very uphill.

Mr. LARSON. Well, we just received some very good testimony. I thank the panelists, et cetera.

And one of them, in talking about this, was going through the notion that you can't explain why oil went up $11 a barrel; I think it was Harbert who said that.

Are the laws of supply and demand suspended? And isn't it the fact that the dark markets have taken over, in terms of speculation? Is speculation part and parcel of what is driving the cost of oil up artificially so that we can't, from a policy perspective, get our arms around this?

Mr. SIEMINSKI. If I could try a quick answer to that, the $11 move that we had last week, two of the factors that played into that were, one, an outage on a significant natural gas pipeline in Australia that has raised the demand for distillate fuels in that country to keep their mines open, so the metals mine——

Mr. LARSON. The funny thing is my constituents, when I go back home and talk to them, they say, how is it that something happens and then immediately the next day the prices go up in gasoline, or in any kind, and yet when things happen where they say demand is less, the prices stay the same, they don't come down?

Are the laws of supply and demand suspended, and is the industry at the whim of speculators, especially those that are unregulated and unseen with the capability of driving the marketplace up artificially? Yes or no, do you think that that is the case? Is that a problem or not?

Ms. JAFFE. Yes, I think it is a problem. We are in a bubble——

Mr. LARSON. Good. Yes.

So what about you, Mr. Manuel?

Mr. MANUEL. Well, I don't think it is one thing. I think speculation is part of the problem, increased demand is part of the problem, the weak dollar.

Mr. LARSON. Ms. Harbert, does speculation have any role in this?

Ms. HARBERT. We have a very, very tight market between supply and demand. And to the extent that our economy, the receding dollar, et cetera, are exacerbating that——

Mr. LARSON. Should we regulate the dark market?

Ms. HARBERT. If you look at speculation, it is adding volatility into the market, but it would do nothing to turn around and reduce and reverse the price increase.

Mr. LARSON. We want the transparency that everybody——

Ms. JAFFE. We want the markets to clear and to function, because otherwise it will be even less orderly. And we had that in the 1970s.

Mr. LARSON. Should we look at the dark markets?

Ms. JAFFE. Well, what we need to do——

Mr. LARSON. Should they be regulated?

Ms. JAFFE. No. Well, they are regulated.

Mr. LARSON. Who? Who regulates the over-the-counter market?

Ms. JAFFE. The Commodities Futures Exchange.

Mr. LARSON. No, it doesn't.

Ms. JAFFE. What we really need to do is think about how much speculation and what kind of speculation it is and what are the solutions.

Mr. LARSON. How can you determine that if they are unregulated?

What do you think about that, Mr. Caruso?

Ms. JAFFE. One solution might be——

Mr. LARSON. Excuse me, Ms. Jaffe. Thank you.

Mr. Caruso, what do you think about that? Should we be regulating these unregulated dark markets?

Mr. CARUSO. I think we need more information from those markets to be able to understand what is going on.

Mr. LARSON. How do you get it if they are not regulated?

Mr. CARUSO. Well, they may need to be. And the CFTC, FTC and Department of Justice are meeting tomorrow in their first task force meeting to look at that issue.

Mr. LARSON. After more than 2½ years of our pleading that they do so. But it still doesn't answer the question of the dark markets and their ability to be unregulated and to speculate on what is happening and drive these costs up. People in my district call that economic terrorism. That is something we ought to be making sure that the Justice Department is involved in.

Mr. MANUEL. Mr. Larson, if I may, all of this stuff is just another reminder that we need to get off of oil. I mean, this stuff is—you know, it is not sustainable, the way the markets are working and where it is located. We just need to wean ourselves off of fossil fuels.

Mr. LARSON. I agree wholeheartedly. But in the meantime, as my grandfather would say, trust everyone but cut the cards. We not only need to cut the cards, we need a new deal here.

Ms. JAFFE. We also need to think more flexibly about how and when we use these strategic petroleum reserves and the IEA stockpiling system. This administration, unlike previous administrations, has said that the SPR is off the books except for national war emergencies. And we are not using a tool that we have that was used successfully by the Clinton administration to cap speculators out of the market. So we haven't looked at that, we haven't debated it.

I would guess from my long experience in watching the way, as Adam put it, market sentiment has determined that if the markets felt that some player with strategic stocks was going to come in and possibly make a release, they would be a little less confident about buying the market long.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Oregon.

Mr. WALDEN. Thank you, Mr. Chairman. I appreciate the hearing, and I think there has been some good information come out of it.

Ms. Harbert, I especially appreciated your testimony. And I keep hearing from Mr. Manuel that we need to stop using oil, natural gas and coal, I think he said, or sort of the evil energy sources of the United States, and that we need to wean ourselves off of those sources.

My question for you and for Mr. Caruso is, what is the practicality of that? What do you replace them with? And how soon could you do that?

Ms. HARBERT. For the benefit of our economy and our national security, we want to reduce our dependence on any single fuel. In this case, it happens to be oil. We do need a diverse supply.

However, it is unrealistic to think that we will not have hydrocarbons as a very large part of our future for the foreseeable future. And we need to figure out how to make that a stable, secure supply. We need to find new places where that exists. We want to have control over those so they exist right here at home. And so we have to be able to use our oil, our gas, our coal responsibly. We have the technology to do that.

Mr. WALDEN. All right.

Mr. Sieminski, we have heard a lot about the dark markets and the effect of speculators on price. About 3 years ago or so, I actually led an effort asking the Government Accountability Office to investigate those markets, and they produced a rather lengthy report and recommended some changes in those markets. And I think there is a certain element of speculation that drives up price.

But I thought you made a pretty good point about why the speculators are in those markets. Is what you were saying is that has a lot to do with the fact that we lock up most of our new resource or available resource in this country, not just the global market with increasing demand?

Mr. SIEMINSKI. Well, I think it is a concern that supplies are looking more and more limited, and demand, at least outside the United States, so far hasn't been reacting all that much to prices. So I think that we are involved in a very painful economic experiment to try to find out what price is required to get supplies to rise and demand to go down.

As far as the dark markets are concerned, let me make three comments. Guy attended a meeting at the Commodities Futures Trading Commission yesterday. I listened very carefully to the testimony there.

The CFTC is very concerned about three major areas: the over-the-counter trading, which doesn't have the same reporting requirements; swaps dealers, where who is defined as speculators versus nonspeculators are at issue; and foreign exchanges, where some of the contracts traded on the NYMEX here in America are also traded overseas.

The staff at the CFTC has actually looked into a number of these things. And so far, from the data that they have, they don't think that there are big issues there.

I am all in favor of switching the light on the dark markets.

Mr. WALDEN. You bet.

Mr. SIEMINSKI. The people I work with on the trading desk are all in favor of transparency. I don't think there will be a monster in the room when the light goes on.

Mr. WALDEN. All right. Then, if that is the case, then it really does get back to a supply and demand curve.

Now, I don't know about anybody else. I drive a hybrid here, and I drive a hybrid back in Oregon. I have increased my mileage by 60 percent in Oregon and doubled it here. Not everybody has the luxury of investing in a hybrid.

I don't know how many of you shop at Wal-Mart. I get in there about once a week back in my hometown. There are a lot of Wal-Mart moms and a lot of diesel-truck-driving dads that are having a hell of a time making ends meet. And that is the case.

And, Mr. Manuel, I have heard from the Sierra Club on this issue of no new drilling anywhere, it won't help us anyhow. And I have to tell you, I am coming down more on the side that says access to proven reserves in America creates American jobs, American energy, and it will have an effect on price over time. So I am going to have to respectfully disagree with you, but it wouldn't be the first time, because I know your group doesn't want us to cut any trees in the national forest either, so we let them burn. But that is another subject for another day.

But I want to get back to this issue. Mr. Sieminski, if Congress were to act to open up the OCS or ANWR or shales or tar sands, if we were just to pass a law, knowing that we wouldn't actually extract those resources for 10 or 20 years, do you think the simple act of Congress saying we changed America's energy policy would have an effect on markets and speculators?

Mr. SIEMINSKI. Yes, sir, I do. I think that, as I said during the course of my first remarks, it is the sentiment that matters. Right now, everybody in the oil markets is making this assumption that demand isn't going to go down and supply is going to be fixed. If we can change that thinking—and changing that thinking would be, look, we are going to open up the Outer Continental Shelf, we are going to start building nuclear power plants 5 years for the next 20 years, and we are going to pass even stricter fuel—efficiency standards on automobiles than we did before, and even do things like the light bulbs—I mean, that is not the wrong thing to do. That is, like, one of the small steps you have to take. We have

to take all of these small steps, and we have to do it all at the same time.

Mr. WALDEN. Yeah, it seems to me that the data show that Americans need to conserve, but even when we conserve at a rate greater than any time since World War II, reducing our consumption of oil in our driving, according to the statistics, I believe that is correct, it is not having the effect it used to have.

Mr. SIEMINSKI. Well, it is beginning to work here. I mean——

Mr. WALDEN. Oh, it is killing us here.

Mr. SIEMINSKI. The statistics are that demand is down 4 percent on a year-over-year basis. Americans are buying smaller cars; they are driving fewer miles.

Mr. WALDEN. They are not going to their kids' away games anymore because they can't afford the gas. They are showing up at work 2 hours early so they can carpool with their spouse. You know, they are making tough decisions in their lives. You know, I want people to conserve, but I don't—Mr. Chairman, everybody has gone at least a minute and a half over, so——

The CHAIRMAN. You are at a minute and 6 right now.

Mr. WALDEN. You were 2:23.

The CHAIRMAN. I did not say a word. I just tapped lightly to give you a notice that you are way over time.

Mr. WALDEN. I am worried about that other hand of yours, though, with that club thing on it.

The CHAIRMAN. Well, I would give my right arm to be able to say what I really want to say right now. But you are over, and I am just tapping lightly.

Mr. WALDEN. I will give up.

Well, I was just—I don't know where I was going with it. I will quit at that.

Ms. JAFFE. If everyone in the country telecommuted one day a week starting tomorrow, we would save 20 percent of our oil use.

Mr. WALDEN. And that is great, except I represent a district that is 70,000 square miles where you don't pull a horse trailer with a Prius. I own a Prius. You can't drive a horse——

Ms. JAFFE. You telecommute. In other words, you work from home 1 day.

Mr. WALDEN. Ma'am, have you ever been on a cattle ranch? A lot of them work from home. You still got to haul the hay out to the field; you got to bring it back. If you are on a wheat ranch, you still got to run the tractor. Fertilizer costs a buck——

Ms. JAFFE. I am just talking about commuters. I am just talking about commuters.

Mr. WALDEN. We are all representing the people we represent. And I don't disagree, and I have supported telecommuting efforts and funding in my district. I think it is wonderful. But I am saying there are a lot of other folks out there in real America that can't do that, that can't do that. Their costs of commuting now are higher than their mortgage costs. And they lived in a different town because the housing costs were cheaper. These are real people going upside-down in this country, and we don't want to do anything about it here, and that is wrong.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from New York, Mr. Hall.

Mr. HALL. Thank you.

And my friend, Mr. Walden, I think we do want to do something about it. I certainly do, and I think all of us do here. And there are certainly areas, as the witnesses have reminded us, of agreement and areas of overlap, and I think we should work as fast and as hard as we can on those.

So the EIA has run a lot of assessments about oil prices based on projected supply and demand on a base case. And I would just like to ask Mr. Caruso, has EIA run any estimates incorporating an assumption that America's auto fleet will be significantly more efficient than 2030?

Mr. CARUSO. We have in the latest outlook incorporated the new law, so we have about a 40 percent increase in miles per gallon in this 2008 outlook.

And we haven't specifically run a scenario where we took a much larger increase, but we have done improved technology cases which try to simulate that. So there are about 30 different cases in our long-term outlook that try to simulate different policy changes and economic conditions.

Mr. HALL. Thank you very much. That is good. And I have noticed that every State that has had, for instance, a renewable energy standard, including Texas where our President signed one for 10 percent RES, when as President of the United States—as Governor, I should say, Governor of Texas, he signed one; as President, he has been unwilling to sign one for the whole country. But the State of Texas exceeded their 10 percent and has eclipsed California now as the largest installed wind capacity State in the country.

So there is some evidence that when you put a goal out there, Americans exceed it, be it with electricity or with transportation fuels or vehicles.

Indeed, the Chevy Volt, I was just reading, which will be coming out next year or the year after that, will basically have a—it is an electric car that will have an internal combustion engine for the purpose only of charging the batteries, the lithium ion battery bank, which will drive the vehicle. And they say on long-distance travel it is a commuter vehicle which will run on electric for commuter distances of 100 miles or less. On intercity or long-distance travel, it will average 150 miles per gallon based on technology they have that they are bringing to market in the next couple of years.

Toyota just announced, I think yesterday or the day before, a car that they are planning to release that will get 500 miles to the gallon.

So I think we are going to see an exponential growth in efficiency, as well as in substitute power for transportation, which is a good thing, because we need the liquid fuels for air travel for a considerably longer time, I think, as we figure out how else we might be able to fly.

If the overall market was made up, say, 50 percent hybrids, can you theorize what that might do to consumption?

[Insert for the record by Mr. Caruso follows:]

COMMITTEE: HOUSE SELECT COMMITTEE ON ENERGY INDEPENDENCE AND GLOBAL WARMING

DATE: June 11, 2008

WITNESS: Guy Caruso
PAGE 53, LINES: 20-21

INSERT FOR THE RECORD

Hybrid Stock. If the overall market was made of, say, 50 percent hybrids, can you theorize what that might do to consumption?

Requiring a majority presence of a particular technology will have uncertain impact on the projected average fuel economy of new vehicles because manufacturers will continue to produce a mix of vehicles that complies with Corporate Average Fuel Economy (CAFE) requirements while meeting the needs of a very diverse market.

Vehicle manufacturers produce and sell a mix of vehicles that meet consumer preferences while complying with fuel economy improvements required by the CAFE Standards. The Energy Independence and Security Act of 2007 requires that the average new light duty vehicle fuel economy increase from 25.4 miles per gallon (mpg) in 2006 to at least 35 mpg by 2020. Meeting the new fuel economy standards will require significant investment in the development of new technologies and redesign of vehicles. The investments needed to achieve significant hybridization of the vehicle fleet could reduce investments in lower-cost fuel economy improvements that could be achieved via the development of advanced conventional technologies.

The National Energy Modeling System (NEMS) was used to analyze the fuel economy and energy impacts realized assuming sales of hybrid vehicles increase so that 50 percent of the light-duty vehicle stock was hybrids by 2030. In the reference case, hybrids represent 12.9 percent of the stock of light-duty vehicles (LDV) in 2030 and the light-duty vehicle stock average fuel economy is 28.5 mpg. If hybrids (plug in, gas-electric, and diesel-electric) accounted for 50 percent of the stock of light-duty vehicles in 2030, light duty vehicle consumption drops slightly by (120 trillion Btu) and the stock average fuel economy increases to 29.5 mpg.

Stock average fuel economy improvements are minimal because by 2030 new vehicle fuel economy only increases from 37.5 mpg in the reference case to 39.7 mpg in the hybrid case. Due to the increased penetration of hybrid technology, the need for additional fuel economy improvements from conventional technologies is alleviated because current CAFE requirements are exceeded. As a result, the average fuel economy of all vehicle types declines in the hybrid case relative to the reference case. In 2030, the average new vehicle fuel economy of hybrids decreases from 44.6 mpg in the reference case to 42.5 mpg in the hybrid case and for conventional vehicles from 36.4 mpg in the reference case to 34.0 mpg in the hybrid case. The only way to get a larger impact would be to require some minimum efficiency in conventional vehicles independent of the CAFE requirements or to raise the CAFE standards.

Mr. CARUSO. Not off the top of my head. I know our base case has 45 percent new car sales of alternatively fueled vehicles in 2030. But that is a ramp-up, so it takes a long time, as you alluded to.

Mr. HALL. People wear out their cars, and it takes a while before they buy a new car.

Mr. CARUSO. But certainly that calculation could be made. I could supply that for the record.

Ms. JAFFE. We have done the calculation that if, starting in 2015, all new cars got 50 miles to the gallon, it would save 6.7 million barrels a day at the current rate of car turnover.

Mr. HALL. Did you see the article, I think it was in the New York Times, about the impact on different areas of the country of fuel prices, for instance, the southern and more rural districts where trucks are in heavier use and they tend to be old and very inefficient? It had a map with different colors. It was really interesting.

And it made me think that perhaps we should be trying to help those States and those districts where people have historically driven trucks for work and for transportation and are driving ones that get less than 10 miles per gallon and older models and can't afford to upgrade to a new hybrid truck that shuts down half of the eight cylinders when it is on a straight-away at constant speed, which are being made currently by GM and Ford in this country.

Anyway, I just want to make a comment about substitutability, which I think you mentioned, Ms. Jaffe. When I was in Israel, I was pleased to learn about a company there that is making electric vehicles and interchangeable batteries. And their concept is you pull into a service station, and rather than charging your battery, they just take one out and put another newly charged one in, hook up the wires, and you drive away in a few seconds, as opposed to taking a few minutes to fill your tank with fuel.

And I am wondering if anybody has considered this sort of thing, at least in commuter areas of the United States?

Ms. JAFFE. One of the things I think the Israeli Government said when they announced that program was that they really feel that they are, sort of, meeting global needs, that they have a small country and it is easy for Israeli commuters to do that because they don't drive more than 2 hours, you know, from one end of the country to the other, 3 hours.

But that would have applications in large cities. It would have a great application in Manhattan, a great application in a place like Singapore, or even in some other larger U.S. cities where you have a very dense population that has a limited geographic area that they drive.

We actually did the calculation, back when gasoline prices were $3, that if today I could plug in my car—because in Houston I live what we call inside the loop, and I really never go more than 10 or 15 miles a day—I could have spent 2 cents a mile if I could have plugged my car into my house and not bought gasoline versus, say, 17 cents a mile at that time.

So there really is an advantage. And there is this advantage for us in terms of national security, if you can imagine, our either getting cut off by the Middle East or having a major hurricane in the Gulf Coast that knocked out refining and we suddenly had a tem-

porary hiatus in the ability to have enough gasoline. If some Americans could plug in, I mean, then some people would be able to drive without recourse to gasoline, then the need for rationing or the kinds of things we saw in 1973 would be greatly eased.

Mr. HALL. Thank you very much.

Thank you, Mr. Chairman. I yield back.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Oklahoma, Mr. Sullivan.

Mr. SULLIVAN. Thank you, Mr. Chairman.

I appreciate the panelists for being here today.

And when I look at the energy issues, I talked to people on this panel, other Members of Congress on both sides, I think we all agree that when we look at some way, some comprehensive energy plan to reduce prices, to lessen the emissions in the world, we have to look at it from a multi-pronged approach, many different approaches. It is not just one thing.

And, you know, one of the things, we need to lessen our dependence on foreign oil, we need to maybe use less oil and gas, that is true. We need to look at alternative energy sources—wind, solar, nuclear. All those things are very, very important. I think a lot of people—Ms. Harbert even talked about that. Others have talked about that on this panel.

But right now we are getting a lot of our—and the technological advances aren't in place right now where we can just shoot the horse on gas and oil right now and jump on another horse right now.

And so I guess I will ask Mr. Manuel, you know, one of the things you said that really disturbed me that I think was less than truthful is that we don't have any gas and oil here to explore here in the United States. You said that. And I can tell you right now, I got a thing here and I will give it to you, but we have, just in the offshore, in the Pacific offshore, we have 10 billion barrels of oil we could get here in our own backyard. We also have 18 trillion cubic feet of gas. That is in the Pacific. Offshore Alaska, we have 27 billion barrels of oil that we could get, and we have 132 trillion cubic feet of gas. On the Atlantic offshore, we have 4 billion barrels of oil and 37 trillion cubic feet of gas. Offshore Gulf, we have, deep water, 45 barrels of oil, 233 trillion cubic feet of gas. In the lower 48 inaccessible—and these are inaccessible; the Government says it is against the law to do—we have 20 billion barrels of oil in the lower 48 onshore and 162 trillion cubic feet of gas.

And what I am saying is, until we develop the technologies that we can do other things, why do you think it is so wrong to get some in our own backyard? Do you prefer that we go to the Mideast to get it or outside this country? Why is it so wrong to get it here while we are developing those technologies so we can get prices down?

Mr. MANUEL. Well, just to point out, I said that the U.S. has about 2 to 3 percent of the world's proven oil reserves. I didn't say we had none. On the contrary, I pointed out that we have opened up thousands and thousands, millions of acres to new oil and gas drilling in the last 30, 35 years.

And if you look at just this past year, the Minerals Management Service has had two very large lease sales, one in the Chukchi Sea, one in the central Gulf of Mexico. So it is not a question of access. We have all these leases that have been sold to oil and gas companies that aren't being used, but——

Mr. SULLIVAN. These are off-limits, what I just said, they are off-limits.

Mr. MANUEL. I know, but the point is the stuff that is open now is not being utilized. And, again, if you look at the MMS figures, we think that 80 percent of the resources that are available offshore are in areas that already opened. Most of the oil and gas found in the United States is in the central and western Gulf of Mexico. That is where the companies want to go. That area has been open for 20, 30 years.

Mr. SULLIVAN. Do you see anything wrong with going in these areas that I mentioned?

Mr. MANUEL. Well, I do. I don't think we should open up any new areas for new offshore drilling.

Mr. SULLIVAN. So you don't think it is a good idea to get more at home, in our own backyard? You think we should get it elsewhere?

Mr. MANUEL. We don't think it will make any difference on the price of a gallon of gas. Because, again, we have tried that. The lease sale that happened in the Chukchi, that didn't drop the price of a gallon of gas. When we opened the trans-Alaska pipeline system in 1975, 3 years later the Shah of Iran fell and Iranian oil became off the market. Our prices went sky-high, even though we had opened up the largest oil field in the United States.

There is no historical data to show that opening up individual fields in the United States has had any impact on the price of gas in the United States.

Mr. SULLIVAN. You wouldn't agree that this is part of the puzzle, though? When we look at multiple issues that we have to look at to address our energy issue, you don't think this is part of the puzzle to address that? As we develop the technologies where we can move to other types of energy, you don't think that we should do that?

Mr. MANUEL. Well, we acknowledge that it is going to take us a while to wean ourselves off of fossil fuels, but there is plenty of areas that are opened right now that will allow us to do that.

Mr. SULLIVAN. That is not adequate.

Mr. MANUEL. Well, we think that is the way to go for a variety of reasons: environmental damage to these areas, but also global warming, greenhouse gas emissions. We think the better path for our country is a future of clean energy sources, renewables, energy efficiency, fuel economy. That would save more oil and gas than are thought to be off of these areas that are currently off-limits.

Mr. SULLIVAN. Is that the mission of the Sierra Club, to lessen our dependence on oil and then also to reduce greenhouse gas emissions? Is that your primary purpose?

Mr. MANUEL. Our goal is to reduce greenhouse gas emissions and wean ourselves off of fossil fuels.

Mr. SULLIVAN. Okay. Do you support nuclear power?

Mr. MANUEL. No, we don't right now because of the——

Mr. SULLIVAN. That has no emissions, do you know that?

Mr. MANUEL. Well, it has a lot of nuclear waste, which I am sure you are familiar with.

Mr. SULLIVAN. So you don't support nuclear power at all?

Mr. MANUEL. No, we don't.

Mr. SULLIVAN. Does a former member of your group, I read, now supports the use of nuclear power?

Mr. MANUEL. Pardon me?

Mr. SULLIVAN. Did someone in your organization that was in your organization that is not in your organization now support nuclear power?

Mr. MANUEL. Well, I can't comment for former members of the Sierra Club.

Mr. SULLIVAN. Well, he does.

Ms. Harbert, could you tell us again just very quickly, what do you think we should do—I mean, we need to look at this from multiple approaches. We are going to try to wean ourselves off gas and oil. We probably will move toward that direction as technology develops. But what do you think we should do in the meantime?

Ms. HARBERT. We need to responsibly exploit the resources we have here at home, you know, play the home team, play to our advantages. We are investing now, right now, less in research and development than we did after the Arab oil embargo. We have to get serious and invest in advanced technologies.

We have to streamline permitting for energy infrastructure, and that includes new nuclear plants so that it is emissions-free, and we have got secure, available, local supplies of nuclear energy.

Mr. SULLIVAN. Do you believe what Mr. Manuel said about we already have enough going on and we don't need even need to go into this because we have plenty already here in the United States to address this and that while we are in this gap looking for——

Ms. HARBERT. Well, energy demand is forecasted to go up by 30 percent in this country. We don't have the same amount of growth in production planned for this country. So there is a growing gap between supply and demand that has to be met somehow.

Mr. SULLIVAN. Okay. Also, on the markets, you mentioned the speculation and all of that. There may or may not be some in the price of crude oil, but probably is a little bit. If you did regulate here, and we do to a certain extent some of the markets, what would keep them from, you know, traders just trading in another country?

The CHAIRMAN. The gentleman can answer the question.

Mr. SIEMINSKI. I think that we need to do what we can do in our own markets and then with the foreign agencies that we can work with, like in London and in Dubai, where there are actually initiatives under way to cast some light on the dark market question.

Mr. SULLIVAN. Okay.

Well, thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Thank you, Mr. Chairman.

I want to thank the panelists. There has been some very interesting testimony today, some of it very specific, some of it very general. And I think it illuminates the issue quite a bit.

One of the things that I hear—or there are two real salient points. First of all, we need to work on a bipartisan basis to find reasonable solutions that will make our energy future stable. And I think everybody agrees with that. The other one is that we need to encourage innovation to develop a stable and reliable energy future.

Personally, I believe that energy efficiency is our best resource. And there was some very impressive testimony. For example, Mr. Caruso said that our current CAFE standard of 35 miles per gallon would save 2 million barrels a day. And Ms. Jaffe said that 50 miles per gallon will save 6.7 million barrels a day.

What I would like to ask Mr. Caruso, how much do you think that would affect our price of gas at the pump if we saved 2 million barrels a day?

[Insert for the record by Mr. Caruso to follow:]

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"Well, how much do think that would affect the price at the pump today if we were saving 2 million barrels a day?"

This question is a follow-up to the discussion on the impact of the new CAFE standards on long-term petroleum consumption. In EIA's 2008 *Annual Energy Outlook*, we estimate that by 2030 CAFE standards and the Renewable Fuel Standard (implemented under the Energy Independence and Security Act (EISA)) could save 2 million barrels a day from what consumption would otherwise be without those provisions in EISA. As stated at the hearing, new CAFE standards combined with new supplies would have an impact on the long-term real price of oil. The price benefits of both CAFE standards and increased supplies accumulate over time.

The resulting impact on today's oil prices due to a sudden drop in U.S. consumption of 2 million barrels a day is more difficult to address. Consumption declines of that magnitude (2.3 percent of daily global oil production) would likely be largely offset by supply declines in OPEC countries to balance the market, and thus maintain price to the extent possible. Price elasticities that are used under current market conditions are estimated using recent, actual changes in price and demand, but are not applicable when considering changes that lie

significantly outside historical norms, such as a demand reduction of 2 million barrels a day.

Mr. CARUSO. Well, we think that, as the Chairman mentioned, that if we can bring consumption down, in this case 2 million barrels a day, and increase supplies, that we can see the real price of oil go down. The prices that the Chairman was quoting are in 2006 dollars.

Mr. MCNERNEY. Well, how much do you think that would affect the price at the pump today if we were saving 2 million barrels a day?

Mr. CARUSO. I don't have that number right off the top of my head, but I would be happy to provide that. It certainly would put downward pressure on price.

Mr. MCNERNEY. Do you have an estimate, Ms. Jaffe, or a guess?

Ms. JAFFE. Some of it gets to the issue that Adam brought up, which is this, sort of, what is driving the speculative fervor. So I will say, just factually, U.S. demand for oil is down 4 percent this year versus last year. And part of what you are trying to do is create an atmosphere where people see that as a long-term trend line and they start to trade oil with that mentality in mind.

Mr. MCNERNEY. Do you think a 6.7-million-barrel-per-day savings in our oil consumption would lower the price of gas substantially?

Ms. JAFFE. Yes, I think it would make a substantial lowering of the price.

Mr. MCNERNEY. You know, you mentioned a couple of things also that I think were interesting—the Strategic Petroleum Reserve, using that to reduce the speculation in the market. Do you have a specific proposal, and how effective do you think that would be?

Ms. JAFFE. Well, let me give you a specific example. There was a period of time, and I can't remember what the risk factor was in the market, but when Secretary Richardson did a quote/unquote "test sale" of the SPR and the effect it had at the time, because prices were sort of creeping above $40 a barrel. And it spooked people in the market briefly, and prices went back down into the 30s.

What happened then is, every time the price would subsequently get to $39 or something like that, people would automatically naturally assume that the SPR might be released again, and so they would take their profits at a certain number.

Mr. MCNERNEY. So this is a very effective tool that is in the hands of the administration that is not being used. In fact, it is being forbidden from being used. It has been taken off the table by the administration.

Ms. JAFFE. By taking it off the table, the administration has not only meant that you could trade up with impunity, it has also discouraged OPEC. Because if you are OPEC and you know that we might use strategic stocks, then it behooves you to raise your production because you might as well get the money, whereas if we release the SPR, the Treasury gets the money.

So it has had a negative effect, in my opinion, on both the dynamic of having OPEC respond the way they did, say, in 1990 by increasing their output, and it has a negative dynamic on the, sort of, way speculators feel about the upside of the market.

Mr. SIEMINSKI. I think you might want to be very careful about using the Strategic Petroleum Reserve, just solely looking at the price alone. The obvious exceptions to using the Strategic Petro-

leum Reserve that the administration did not use was the strike in Venezuela. If you actually have a shortage of oil caused by something like a strike or an accident or weather using the SPR at that time, and not only ours but the product inventories in Europe, it makes a lot of sense. Doing it for price alone I think takes you down a path that you might not want to go.

Ms. JAFFE. I would agree with that, but I would like to add to that something. When we had Hurricane Rita and Katrina, another time the administration didn't really strongly use the SPR, the point is we had to borrow gasoline from European strategic stocks of gasoline. And if the outage had lasted longer, they were not going to lend to us a second time.

We do not require oil companies in this country to carry a minimum inventory. That is required in Asia, and that is required in Europe. Had we had that requirement, then the buildup in prices we get every spring would be less likely to happen. Part of what causes the speculative run-up in gasoline prices in the spring is we need to attract imports because we can't manufacture to meet demand.

When the companies don't carry inventory, if we have an accident like the Venezuelan strike that accidentally lowers inventories, we never catch up, and that is reflected immediately in the pump price.

Mr. MCNERNEY. Now, another thing you discussed, I liked the idea, was substitutability. You compared the electricity market to the transportation market. But the way you envision substitutability applying in the transportation market, what would be the carbon footprint impact of that, as compared to the current supply for the transportation market?

Ms. JAFFE. This is what we need to think through. We know that there is a problem in the power-generation sector, because we are so heavily reliant on coal. But we need to have, what I call, an infrastructure paradigm shift. So, over time, if we bring cars that have substitutability, so we bring some cars that can work off electricity. Right now we have different things. Some things in the supply stack for electricity are clean, and some things aren't. But if then, over time, we can move our policies so that we move to things like more distributed energy—like, say we all had better technology for solar rooftops, then you could plug in your car, and it would be—in California, I would be plugging it into solar, right? So we would have a transition where we can marry the two things together.

Mr. MCNERNEY. Great.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentlelady from South Dakota, Ms. Herseth Sandlin.

Ms. HERSETH SANDLIN. I thank the chairman, and I am indebted to the gentleman from a Washington, Mr. Inslee, for allowing me to take this set of questions now.

Let me begin by saying that I agree with Mr. Sullivan that parts of the area of the map that he showed us that are currently inaccessible are a piece of the puzzle, and I hope that he agrees with me that biofuels production is also a piece of the puzzle. And so I would like to explore with Administrator Caruso the issue of

biofuels production and the testimony that we received on April 1st of this year from executives of the big five oil companies.

Four of the five that testified acknowledged that increased biofuels production has reduced oil and gasoline prices, although they didn't agree with the magnitude.

The analysis that I raised with them that I want to raise with you now comes from a March 24th article in the Wall Street Journal reported that Francisco Blanch, an analyst at Merrill Lynch, who has concluded that oil and gasoline prices would be 15 percent higher but for the expanded production of biofuels.

So my question, Mr. Caruso, is has the EIA calculated the degree to which increased biofuels production has lowered oil and gasoline prices in the United States?

Mr. CARUSO. We haven't done the similar analysis as you just referred to, but we did look at the 2008 increment of biofuels compared with 2007 and looked at what impact that may have had on gasoline prices. And our conclusion was somewhere, I think, in the 10 to $0.15 per gallon reduction in the price of gasoline that we believe can be attributed to the incremental production of corn ethanol.

Ms. HERSETH SANDLIN. And so reduction where it might otherwise be in that the 1-year period?

Mr. CARUSO. Yes, yes.

Ms. HERSETH SANDLIN. Do you have any plans to perform a broader analysis?

Mr. CARUSO. Not at this time.

Ms. HERSETH SANDLIN. And why is that?

Mr. CARUSO. We haven't been asked to. We try to use our resources as best we can.

Ms. HERSETH SANDLIN. I would look forward to talking with the chairman at greater length about a formal request in light of some of the analysis that we think currently exists that the EIA could supplement as it relates to the positive impact of increased biofuels.

Now you did say that in your testimony—what are the key reasons for your testimony that while, "very uncertain," you conclude that available quantities of cellulosic biofuels prior to 2022 will be insufficient to meet the new RFS targets for cellulosic biofuels, triggering both waivers and a modification of applicable volumes such that the overall RFS target in 2022 will be reduced from 36 billion to 32½ billion gallons.

What are the key reasons for that testimony? And what level of confidence does EIA have in an analysis that is explicitly very uncertain?

Mr. CARUSO. Well, I agree that we should start off by how much uncertainty there is about that technology, and that is one of the reasons we make that statement. And we——

Ms. HERSETH SANDLIN. You are referring to the technology that exists.

Mr. CARUSO. Yes, technology and the two of course are interrelated and we have worked with the National Renewable Energy Lab in Golden to come up with what they think the best outcome is likely to be.

Ms. HERSETH SANDLIN. If they are developing——

Mr. CARUSO. As of when that annual energy outlook was produced.

Ms. HERSETH SANDLIN. Which was early this year. So in light of——

Mr. CARUSO. Yes, that is my best judgement.

Ms. HERSETH SANDLIN. The investments and the advancements that I see in the advanced biofuels cellulosic ethanol industry, if within the next year to 18 months it is demonstrated that the technological advancements are much further along than when you produced the study, that would be a factor that would lead you to the conclusion that production cellulosic biofuels will indeed meet the RFS.

Mr. CARUSO. Oh, definitely. We reevaluate our assumptions every year. And I think Congressman Inslee in his opening remarks mentioned a few of these areas where very significant changes can take place.

Ms. HERSETH SANDLIN. So would you be willing to provide the committee the full analytical basis for the testimony regarding the RFSs of today and the report that was issued earlier?

Mr. CARUSO. Certainly, we publish that every year.

[Insert for the record by Mr. Caruso to follow:]

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RFS Forecast. Why does EIA project that the cellulosic biofuels requirement will not be met? What is the basis of EIA's technology assumptions regarding cellulosic biofuels?

EIA has met with numerous outside experts in order to evaluate current research efforts and understand how cellulosic biofuel technologies might progress in the future. Based on this fact-finding process, the construction costs of cellulosic ethanol facilities and biomass-to-liquids diesel facilities are assumed to decline over the projection period (to 2030). However, cellulosic biofuels production capacity will be starting from a relatively low level which presents a challenge in meeting the rapid increase in the cellulosic mandate scheduled between 2012 and 2017. For example, the Energy Department's first round of funding for development of cellulosic biofuels technology is expected to result in 4 plants being built with a combined capacity of 105 millions gallons of cellulosic ethanol per year by 2011. Second and third rounds of financing are expected to result in an additional 19 million gallons by 2012.

While the situation is very uncertain, the current state of the industry and our present view of projected rates of technology development and market penetration

of cellulosic biofuel technologies suggest that available quantities of cellulosic biofuel, prior to 2022 will be insufficient to meet the new RFS targets for cellulosic biofuel, triggering both waivers and a modification of applicable volumes as provided for by paragraphs 7(D) and 7(F), respectively of Section 211(o) of the Clean Air Act as amended by EISA2007. The modification of volumes beginning in 2017 reduces the overall target in 2022 from 36 billion gallons to 32.5 billion gallons. The modified cellulosic biofuel requirement is projected to be met by a combination of domestic cellulosic ethanol, imported cellulosic ethanol, and biomass-to-liquids diesel, but the specific mix is again highly uncertain.

Ms. HERSETH SANDLIN. One last area to explore. Ms. Jaffe, I agree with you on this administration's inflexibility as it relates to using the SPR in a more strategic manner. I met with Propane Marketing from South Dakota yesterday. The hedging tools that they typically use simply aren't an option for them anymore, and I know that in addition to utilizing the SPR more strategically they actually called for higher margin requirements. And some of the other commodity folks that I represent farmers, ranchers, grain elevators, they actually have proposed the idea of making the traders take delivery of a percentage of the commodity that they are trading.

Could you comment on either of those options?

Ms. JAFFE. Yeah, I think that it is important to have financial clearing for the futures market for oil. The whole purpose of having a futures market for oil is to have a smooth and transparent way that buyers and sellers can meet and have transparent and open pricing.

In 1979, you had to know Marc Rich to be able to figure out if you could or couldn't get oil on the spot market and what price he was selling it at. We don't want to go back to that. So speculators do play a constructive role. Academics have done studies that show that having a functioning futures market actually lowers volatility, not the other way around.

But within that spectrum we are in a very unusual market today, where people's perceptions about the dollar, the rising price of oil has become sort of a circular self-fulfilling motion. We are getting to the point where the dangers of an overinflated bubble in these facilities are a much larger danger to the average American than a normal market.

And so under those situations it is important to have regulatory bodies looking at it, and if it is just a mania, right? We have had another market. It is just a mania. People just believe it is going higher so it does go higher. We still want to think about things we can do to slow that down, and one option is to tighten the amount of contracts you can buy on margin.

The CHAIRMAN. The gentlelady's time has expired.

The Chair recognizes the gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. Listening to the panel, I think there are two truths I would like to talk about, one short term and one long term to help our people who are taking it in the chops with $4 a gallon gas. First, the short term. It is clear that we have seen this movie before; it was the Enron debacle. We lived through it with 1,000 percent price hikes in 30 days with electricity because the market was broken. And it is clear that the market is broken now.

And you know, you just listen to some unlikely sources. A quote from Iyan Madani, Saudi Arabia's Info and Culture Minister. It says, "There is no justification for the current rise in prices. Others calling the surge in crude unjustified. Saudi Oil Chief Ali Naimi says, "It is linked to tremendous speculation in crude oil futures."

When you get Andy Pettitte and Jose Canseco telling you you got a steroids problem in baseball, you probably do. And when you get the Saudis telling you have a broken market based on speculation, you probably have a problem. And that is why we have to get these

dark markets regulated. It is very disappointing the administration has refused to do so. And I look forward to the passage of Bart Stupak's bill that I am helping him on in fact bring into the regulatory destruction of these speculative markets. We have seen this movie before. Now that is the short term.

I want to ask Mr. Caruso about the long term. Because in the long term it is clear to me that we have to decarbonize our transportation sector largely, as soon as possible, or we are going to be stuck with these prices for a long, long time. And when I think about the predictions of the future, Mr. Caruso, you told us about some predictions. What is the assumption we have of the percentage of our private cars that can be either electrified or based largely on domestically produced substitute fuels in the next 20 years, what prediction does the agency make?

Mr. CARUSO. Our current assumption on alternatively fueled motor, light duty vehicles is 45 percent of the new car sales in 2030 would be what we call alternatively fueled vehicles. That is hybrids, it also includes turbo diesels and flexible fuel vehicles or E85. Those are the three.

Now the point you made earlier about plug-in hybrids, as of now, as you alluded to, that technology is still not commercial. So we have very few plug-in hybrids in that outlook.

Mr. INSLEE. I think that prediction could be hugely expanded if Congress will act. We got to the Moon in 10 years, in 10 years this country got to the Moon. Right now our policy can't even get to Cleveland. We have got to have a more aggressive policy, and I think we need to be much more optimistic. We went from making 3,000 planes in 1939 and then we made 300,000 airplanes in the next 4 years in World War II. We have no have a similar ramp-up of ambition.

A paper came up by a professor at Stanford just a couple of weeks ago, Mark Jacobson. He is the Professor of Energy Resources at Stanford. He said that using today's technology, today's technology, without technological advances, if we build about 100,000 wind turbines of 126 diameter blade length, we could power our entire transportation fleet with electricity, using today's technology.

The reason I point this out is 100,000 wind turbines sounds like a lot, right? But in 4 years we built 300,000 airplanes because we had to do it. I think that all of us need to raise the level of our ambition from that 45 percent to a much higher number, much more quickly. I believe the technology is there to do it.

By 2011 we are going to have plug-in hybrid cars mass produced in the United States, something no one would have predicted 5 years ago. The lithium ion batteries are making huge strides forward. We have potential commercialization of something that can be 50 times more productive than corn-based ethanol or algae based gasoline and even biodiesel taking place.

I just point out that I just believe that the only way to tell Americans that their prices are going to come down long term is that if all of us become much more ambitious on this technology. I know we can do it, we did it in space, we did it in World War II, we have to raise our eyes.

Do you have any comments, Mr. Caruso? Go ahead.

Mr. CARUSO. Yeah, I want to say it is clear, I think that almost everyone agrees, that the solution lies with improved technology and innovation and dedication to it. That includes R&D spending.

Mr. INSLEE. Right, that is right. And the problem is we are not doing it. We spend one-third as much in R&D in the entire national Federal government as Microsoft does in research. Our energy budget in R&D is one-third Microsoft, one company's budget for R&D. We have no cap and trade system to create a demand. And unfortunately, President Bush has been against it. We have no renewable portfolio standard. We have no feed-in tariff. We have no building standards. Congress and the next President of the United States has to, and I believe will, set us on a course for a clean energy revolution, and I am looking forward to that on January 20th, 2009.

Thank you.

The CHAIRMAN. Gentleman's time has expired.

The Chair recognizes the gentleman from Missouri, Mr. Cleaver.

Mr. CLEAVER. Thank you, Mr. Chairman. Do any of you know where we got these new contraptions, the cell phone? What created this? Good. I will tell you, Star Wars. And way before most of you are too young to remember Star Trek, but the captain would always flip out his phone. Anyway, that gave engineers the opportunity to do this. So Star Trek. Okay, Mr. Spock.

I am obsessed with horror movies and probably because the monsters are rarely after black people, but I watch this stuff and try not to become paranoid or join any cult. But what I am wondering from all of you and I have one question, we had this crisis occur first during my lifetime in 1973 or close. That was generated—I think history will say it was generated by OPEC, okay? Okay. And then we had another in 1979, the Ayatollah Khomeini in Iran. And here we are again in 2008. Difference may be that during the first two we really had not hit the oil peak.

There are some who believe that the movie that I just saw about 3 weeks ago, when the world ran out of gas and it showed the cataclysmic impact of what happened, food crises, people standing in line—you have seen these futuristic movies—begging. Well, that is happening all over the world right now. In Ethiopia in particular people are dying, not to mention what is going on in the Sudan. But the food prices have caused a worldwide panic. All of it is depicted in a movie. But we know that oil is finite and there are some, including some big names in the oil industry, who believe that we hit an oil peak and that we are actually having a crisis that is not like the first two, that this one won't go away. This is going to be a problem until we deplete the supply for fossil fuel deposited in the Earth.

Is that science fiction or have we again hit reality through the science fiction?

Ms. JAFFE. We don't even have to go there, because we know we have global warming and we know we have to take carbon out of our fuel system. And because we know that it makes it different anyway, right? The way we would handle—let's say we have a recession and we have a global recession and demand for oil goes down, the price will come down, right? I mean that is one scenario that could happen, right? And I know there are a lot of people who

feel that won't happen again, but that does not change the reality that the oil reserves are finite at some point and it doesn't change the reality that a lot of the oil we have left to produce is in places like Venezuela, Saudi Arabia and Iran, right? But the bottom line is we know that we want to decarbonize our economy over time. We know that. And since we know that, a lot of the same solutions, energy efficiency, right? Alternative energy, R&D. Some of those solutions are the same. So it really doesn't matter whether 1973, it is exactly the same or not exactly the same. The reason that it is different is we know we have to do something for a variety of reasons, not just national security, but even environmental reasons we know we have to do something different. We know that the lead time on scale-up is decades, not months. And so that is why we have to start now.

Mr. SIEMINSKI. Mr. Cleaver, you are absolutely right, we have seen this movie before. We saw it in 1973, 1974 and again in 1978 or 1979 and 1980. The kinds of solutions that I think made it work out the last time were encouraging energy efficiency across all the sectors, encouraging fuel diversity, encouraging trade and investment, R&D and especially what we need to do this time I think is enhance our science and engineering capabilities so that the technology will come out to take care of some of these problems.

I really don't think it is speculators that are driving up the oil price. I think it is an actual fear of shortfalls in the coming years, and we need to take steps now to turn that psychology around. I think we can. This is not a horror movie with a bad ending, it has got a good ending. We just need to move along.

Mr. CLEAVER. Anyone else?

Mr. MANUEL. Well, I agree generally that we need to—as my colleagues just said, we need to innovate our way out of this. We need to start transitioning away from fossil fuel so that it is not a horror movie. And the technology is available now. Mr. Inslee was talking about some of these things, wind mills, fuel efficient cars, plug-in hybrids. All that stuff is available now. We just have to aggressively move forward and start that transition.

Mr. CLEAVER. I know my time is running out. I apologize for being late. I am on the Financial Services. We are holding a hearing today on whether or not Congress should enact legislation that would require HUD to construct energy efficient public housing units. And we are in a battle because some folks don't think that is the direction we ought to go. And it is just amazing that if somebody took footage of our hearing they could use it in a futuristic movie listening to all the people give reasons why we shouldn't do this. And so my concern is—my concern is actually heightened by the fact that people are not taking it seriously and, you know, this administration is just acting as if all we need is an oil change.

Ms. HARBERT. I will agree with your analogy.

The CHAIRMAN. The gentleman's time has expired.

The gentleman from Oklahoma seeks recognition.

Mr. SULLIVAN. Thank you, Mr. Chairman. And I would like to ask that the testimony submitted by Carl Michael Smith, Executive Director of the Interstate Oil and Gas Compact, be entered into the record.

The CHAIRMAN. Without objection, that document will be included in the appropriate place in the record.

Mr. SULLIVAN. Thank you, Mr. Chairman.

[The statement of Mr. Smith follows:]

**TESTIMONY SUBMITTED TO**
**THE HOUSE SELECT COMMITTEE ON ENERGY INDEPENDENCE AND GLOBAL WARMING**

**BY CARL MICHAEL SMITH, EXECUTIVE DIRECTOR OF THE INTERSTATE OIL AND GAS COMPACT COMMISSION**

**June 11, 2008**

My name is Carl Michael Smith. I am the Executive Director of the Interstate Oil and Gas Compact Commission (IOGCC).

The member states of the Interstate Oil and Gas Compact Commission (IOGCC) produce more than 99% of the oil and natural gas produced onshore in the United States. Formed by Governors in 1935, the IOGCC is a congressionally ratified interstate compact. The organization, the nation's leading advocate for conservation and wise development of domestic petroleum resources, includes 30 member states, 8 associate states, and 10 international affiliate countries and provinces. The mission of the IOGCC is two-fold: to conserve our nation's oil and gas resources and to protect human health and the environment during the production process. Our current chairman is Governor Sarah Palin of Alaska.

The purpose of this testimony is to give the IOGCC's perspective on the "Future of Oil". While most of us in the United States realize that the burning of fossil fuels is not without some negative environmental consequences, too few of us realize that there is no quick solution that is going to allow our economy to replace its reliance upon fossil fuels with another fuel source any time soon. It is wishful thinking to suggest otherwise.

While we clearly need to do all that is within our power as a country to conserve the use of our oil and natural gas resources, we need to be producing as much oil and natural gas as possible at home and on the North American continent. Every barrel of oil produced in the United States is a barrel that doesn't have to be imported. Every barrel of oil produced in the U.S. means that dollars will remain in the American economy, helping to provide Americans jobs. Every barrel of oil produced in the U.S. means that we as a country are that much less vulnerable to geopolitical instability.

I have attached to this testimony a copy of the IOGCC publication "Oil and Gas Policy Evaluation for Energy Security." I have also delivered enough copies of the publication for every member of the committee. The publication arises out of a resolution approved unanimously by the IOGCC in 2006. The resolution (06.052) called for the creation of a policy document based on an analysis of the nation's energy situation, including potential solutions to identified problems. The resolution directed the policy analysis to "avoid choices that will exacerbate our nation's energy situation by discouraging domestic production".

The report contains 5 key recommendations:

1. Improve dialogue with the American public about energy policy and its consequences to them.

2. Promote the expansion of research to recover domestic oil and gas resources.

3. Re-examine federal and state policies as they relate to oil and natural gas development in consideration of new incentives for exploration and production.

4. Encourage conservation of fossil fuel resources by the public and efficient production technologies.

5. Address the chronic shortage of skilled manpower for the American domestic oil and natural gas industry. Today some domestic exploration and production activities must be being delayed because of the shortage of skilled labor.

Too often we have resorted to an either-or mentality in the U.S. on energy policy. We have, for some reason, viewed energy policy as a zero sum game. In other words, we can encourage either development of renewable sources of energy or development of oil and natural gas but not both. My message to this committee today is that we can and must do both. Rational energy policy demands we address both elements, as well as, of course, conservation.

Thirty one states produce oil and/or natural gas in this country. Oil and natural gas producing states appreciate how blessed they have been to have had oil and natural resources within their borders. They understand the positive economic impact that having those resources has meant to their states. As the regulators of oil and natural gas production, states also realize that oil and natural gas can be extracted in an environmentally safe and responsible manner. It is the states' job, in fact, to ensure that production is developed in a manner protective of human health and the environment.

States also understand that most of the drilling for oil and natural gas here at home is done by small, independent oil and natural gas producers, and, that a large portion of our domestically-produced oil (onshore in the lower 48 states) comes from wells producing a small volume of oil on a daily basis. This production does not come from "Big Oil" but from the oil and gas industry's equivalent of the family farmer in small town America. These small producers do not have the resources to conduct oil

and gas R&D, yet they are affected by the meager amounts of federal R&D that might otherwise enable the small independent producer to keep his wells producing longer. Unfortunately, this small producer gets lumped into a groupthink that regards all oil and gas production in this country as "Big Oil" or all federally funded R&D as "corporate welfare". States know that neither is true. Indeed, without state incentives to the marginal oil and natural gas producer when oil prices were low for so many years, our country would be producing less oil than it is, making it that much more vulnerable to the vagaries of the international market.

In closing let me suggest that in reaching conclusions as to the "future of oil" that all Americans re-examine existing perceptions about oil and natural gas production in this country. States have an advantage being closer to where production actually takes place and are ready and willing to join an educational process.

Thank you for the opportunity to participate in this hearing. If I can provide any additional information, please do not hesitate to contact me.

# Oil and Gas Policy Evaluation for Energy Security

Interstate Oil and Gas Compact Commission

February 2007

**PREFACE**

This document responds to a resolution of the Interstate Oil and Gas Compact Commission (IOGCC) approved unanimously at the 2006 Midyear Meeting. The resolution (06.052) called for creation of a policy document after an analysis of the nation's energy situation, with potential solutions to identified problems. The resolution directed the policy analysis to "avoid choices that will exacerbate our nation's energy situation by discouraging domestic production." This analysis took place over the summer of 2006 through a series of conferences sponsored by Congressional Quarterly in which the IOGCC participated. A team of experts identified by the IOGCC Steering Committee then developed the policy document.

# Oil and Gas Policy Evaluation for Energy Security

**BACKGROUND**

After many months of high crude oil prices, the country has been re-awakened to the volatile nature of the world's oil supply, demand and price. With natural gas, heating oil and gasoline costs hitting consumers in the pocketbook, there is growing pressure on elected officials to act. Unfortunately, natural gas and oil are taken for granted in the United States, and thoughts of national energy policy surface only in response to perceived crises. When prices ease, so does the outcry for government action.

Represented by the Interstate Oil and Gas Compact Commission (IOGCC), governors have been calling for state and federal action on energy policy for years. Now, as debate about the country's energy future grows, the governors must serve as leaders in the evolution of America's energy policy. Before 1973, the elected leaders of the oil producing states virtually directed the nation's energy policy because, among other reasons, a policy-making vacuum existed at the federal level – particularly relating to oil and natural gas. The energy policies of the United States prior to 1973 went largely unnoticed by the public and untended by the federal government as long as the states were able to provide cheap oil and natural gas in abundance. The reality shifted when consumer demand and poor national policies overtook domestic production capacity.

Lack of an effective energy policy is hurting consumers, small businesses, industry and the nation. States have been leaders on a number of critical national issues when the federal government proved unable to develop a long-range, consistent policy position. While states can continue to be the leaders on energy policy, a more cohesive, consistent national energy strategy is long overdue. To that end, the IOGCC has conducted an evaluation, with recommendations to help states and the nation address oil and gas as part of a balanced energy strategy.

Many states have developed a state energy policy. The Texas Energy Policy, for instance, was developed in 2004 after a year of work by a task force created by Gov. Rick Perry's executive order. Similarly, the Oklahoma Energy Policy was developed at the initiative of the Oklahoma energy secretary. States across the country have put individual energy policies into their official records and some have acted on the recommendations in the policy documents. IOGCC looks forward to continuing to advise states on key energy policy issues in an effort to help develop a more cohesive domestic energy policy, in the absence of comprehensive federal action. IOGCC should consider model legislation/resolutions to develop for states as a part of that effort.

However, energy policy cannot be a one-time exercise. The best energy plan will be useless if it is announced with fanfare and then put on a shelf to gather dust. States should dedicate resources to implement a policy during all cycles of the volatile energy market. If energy prices plummet, states should remain just as vigilant concerning policy implementation as when the public becomes keenly aware of skyrocketing prices.

**ENVIRONMENT**

Looming on the horizon is the likelihood of an increasingly volatile natural gas market as the fuel gains a greater role in new electric generation facilities while representing 58 percent of the home heating market. Consequently, there is a need for well-designed, consistent federal and state policies to help address the natural gas market. The need to examine current policies relating to natural gas exploration and production, deliverability, incentives, and research and development

has never been greater. The National Petroleum Council (NPC) issued an important report identifying challenges to meeting growing consumption with domestic natural gas production.[1]

Increasing dependence on foreign crude oil and barriers to increasing domestic oil and natural gas production have captured the attention of governors of oil and gas consuming and producing states. Governors are keenly aware of the importance of conservation, efficient energy use, and development of alternate energy sources.

Cooperation among the states to conserve oil and natural gas began with the organization of the IOGCC in 1935. By virtue of its charter, the IOGCC is dedicated to conserving domestic oil and natural gas through orderly development and maximization of efficient production while protecting human health and the environment. For example, due to IOGCC efforts encouraging the application of secondary water-flooding, expectation of maximum efficient production from domestic oil fields increased from about 10 percent in 1935 to about 30 percent by the mid-1960s.

By early 1973, surging world demand for oil and natural gas caused by economic expansion and waning supplies resulting from the maturation and decline of many productive domestic oil fields brought the United States to a turning point. Our dependence upon foreign oil would become abundantly clear when the Arab Oil Embargo slashed crude oil imports from the Middle East. Our dependence has grown dramatically since 1973. But only recently has the national risk of our energy supply and its volatility started to receive growing attention. For instance, the U.S. Air Force accounts for more than half of the fuel the government uses each year. A reliable source of fuel must be part of our national defense strategy.

Crude oil is a world commodity. Countries with rapidly expanding economies, such as China and India, are accelerating world demand. This demand is pushing oil prices and will continue to do so. For instance, the potential expansion of the vehicle market in other countries will affect U.S. crude oil prices for decades to come.

As existing fields have matured, proven, available resources have not been brought on-line to replace them – primarily as a result of a long-term, coherent energy strategy that balances and incorporates ecological and environmental interest. As a result, America no longer possesses excess crude oil production capacity to meet the nation's cyclical oil and gas needs.

The nation continues to be self-sufficient in natural gas, producing 83 percent of the gas used in this country, with 14 percent imported by pipeline from Canada and the remaining 3 percent being liquefied natural gas (LNG) from overseas. The importance of LNG imports will continue to grow, and attention must be given to developing LNG facilities. The natural gas market is likely to mirror the oil market and rely on imports, unless we change course by accessing the huge natural gas supplies undeveloped in the Outer Continental Shelf and elsewhere in the United States.

Increases in demand for oil, or declines in domestic production, will continue to be offset by imports from foreign nations. Since the 1940s, America has been assisting foreign countries to develop their petroleum resources. It is no coincidence that foreign producing nations took two steps in their own best interest:

1. They wrested control of their resources from many American corporations that had developed the reserves; those corporations became managers of production, not owners.
2. They created an alliance called the Organization of Petroleum Exporting Countries (OPEC).

What happened next shocked the average American consumer. Governors of oil and gas producing states, under the auspices of the IOGCC, had been sending unheeded warnings of our precarious energy situation for years. OPEC flexed its muscles, showing its enormous political and economic strength, with the Arab Oil Embargo of late 1973. The price of crude oil went from an average of $9.70 per barrel in 1972 to more than $14.80 per barrel in 1974 (Figure 1). During succeeding price and supply shocks initiated by OPEC and driven by the world market, crude oil has reached prices exceeding $75 per barrel. However, in 1973, we were importing only 36 percent of our crude oil and in 2006 we imported 65 percent (Figure 2).

Figure 1- Oil Price Fluctuations (1970-2006)

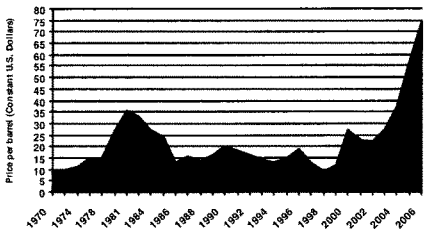
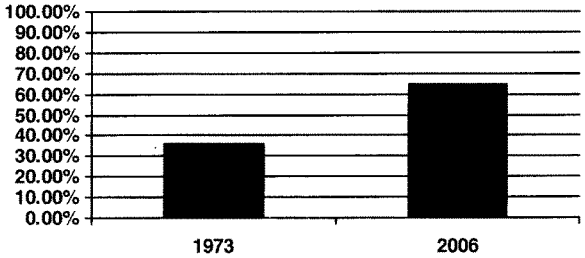


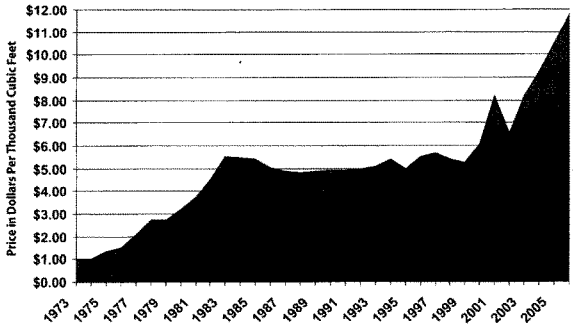

Figure 2- Imported Crude Oil




Although the states remained active, the direction of energy policy and regulation shifted to the federal government, which made several attempts to write, control and implement a national energy policy. Since the inception of the U.S. Department of Energy (DOE) in 1977, eight plans have been enacted. Some results have been positive, such as domestic research to increase production efficiency and to develop unconventional resources. Others such as the Windfall Profits Tax and price controls on crude oil – when an increase in price would have curbed demand – have been counterproductive and in some ways harmful to the nation's energy needs.

Similarly ill-advised price controls on natural gas, with complicated pricing tiers and definitions, created confusion in the marketplace and skewed the focus of exploration and production (E&P) efforts. Price controls have been blamed for manipulating the market to the point of creating artificial shortages (Figure 3). Yet, despite this sad result, there are those in Congress again suggesting price controls as a solution.

**Figure 3- Natural Gas Price Fluctuations (1973-2006)**



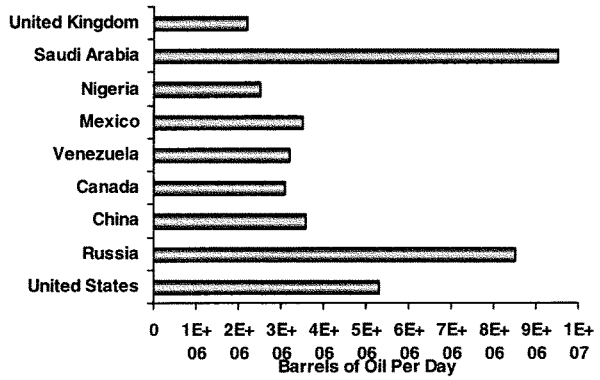

Source: U.S. Energy Information Administration

During this tumultuous period, many important facts regarding the domestic oil and natural gas industry were lost in the rhetoric. For example, the oil and natural gas that states produced made it possible for America to become an industrial power with a competitive edge in the world marketplace due to low energy costs. Oil and gas resources also provided Americans with the highest ratio of motor vehicles per citizen in the world and the means to fuel them. They have fueled a thriving and expanding airline industry, which has helped break down barriers to travel, communications, and domestic and international commerce. These fuels have provided the means to heat, cool and light homes and businesses providing comfort and convenience.

At the same time, American capital and know-how were applied around the world as developing oil regions were identified. The entire world benefited from the expertise and education supplied by the U.S. petroleum industry. Our state universities have trained, and continue to train, the world's petroleum scientists.

Meanwhile, the domestic industry maintained the distinction as the world's most efficient conservator of oil and natural gas. The United States is the only country that captures significant quantities of oil and natural gas from marginally economic wells. Through efficient operating practices and the application of advanced technologies, marginal wells accounted for nearly 316 million barrels of oil and 1 trillion cubic feet (Tcf) of natural gas in 1998, according to the IOGCC's survey of such wells, *Marginal Oil and Gas: Fuel for Economic Growth.*[2] The latest IOGCC survey of states for 2005 marginal well production indicates 321 million barrels of oil and 1.76 Tcf of natural gas harvested. This represents a sizable increase in production since 1998 and an indication of the importance of these small wells in meeting domestic demands. Marginal wells represent 17 percent of domestic oil and 8 percent of natural gas production. Some 400,000 of the 550,000 domestic oil wells (73 percent) produce an average of 2.2 barrels per day. Production in the United States averages slightly more than 5 million barrels of oil per day. This contrasts sharply with a daily average production of 9.5 million barrels in Saudi Arabia (Figure 4). Nowhere else in the world can operators maintain economic production from a well that produces only 2 barrels per day. America has been able to continue to produce its maturing resource at such rates which is testimony to the industry's hard work and ingenuity and the untiring efforts of groups such as the IOGCC.

**Figure 4- Daily Average Production (Selected Countries)**

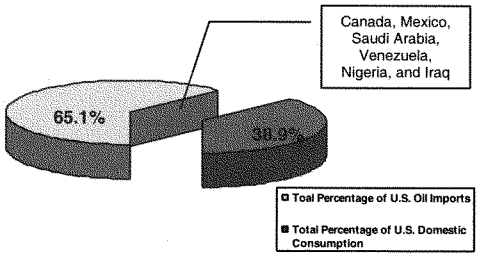



Events in the Middle East continue to affect oil prices as OPEC exerts market control. Current military operations in Iraq and Operation Desert Storm in the 1990s underscored the nation's reliance on Middle East oil and the political instability that characterizes the region. The U.S. has moved toward other sources of foreign crude, notably Latin American countries, which now are growing increasingly less stable. Perhaps as another policy misstep, recent gasoline price increases spurred the U.S. House of Representatives to consider legislation to enable the president to investigate price fixing by OPEC and oil companies.[3]

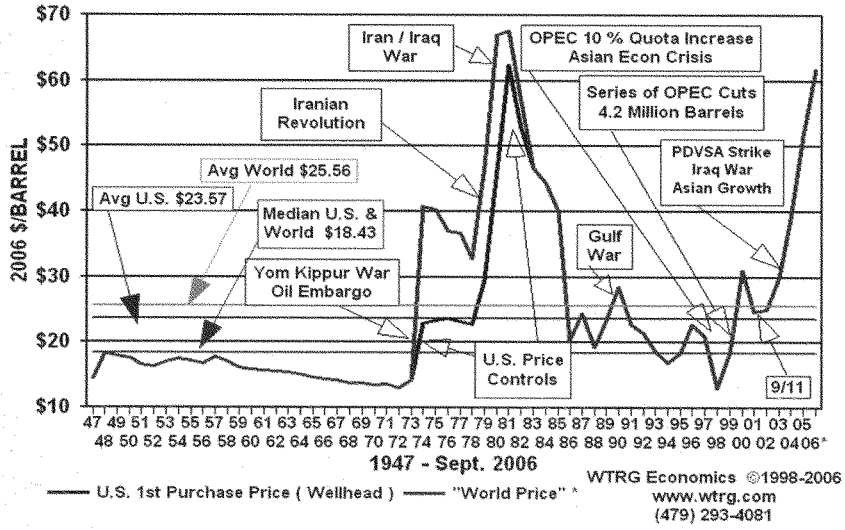
The country faces a serious threat to national energy security. According to DOE, the U.S. currently consumes about 21 million barrels of oil per day. This demand is expected to grow unabated to 28 million barrels per day by 2025. Recently, oil prices have consistently remained above $60 a barrel, with frequent spikes approaching $80 a barrel. Natural gas prices have remained near $9 per Mcf for the past several years. High natural gas prices not only hurt residential consumers, they cost American farmers $6 billion more in 2004 than in previous years. They also increase costs to our manufacturing base, making American products less competitive in the global marketplace and often driving investment overseas. Meanwhile, gasoline, diesel and electricity prices have remained near historic highs.

The top six sources of U.S. oil imports - Canada, Mexico, Saudi Arabia, Venezuela, Nigeria and Iraq - account for 65.1 percent of all foreign crude reaching our shores and 38.9 percent of total domestic consumption. Of these, Saudi Arabia, Venezuela, Nigeria and Iraq provide 38.2 percent of oil imports and 22.6 percent of total consumption. For a variety of reasons, none of these currently can be considered a reliable source of supply (Figures 5 and 6). Only Canada and Mexico can be considered reliable long-term suppliers. Nigeria's production has been disrupted repeatedly by civil unrest, and some 135,000 barrels of oil per day are lost to theft.

**Figure 5-Imports vs. Domestic Consumption**




## Figure 6- Crude Oil Prices 2006 Dollars




A terrorist attack in 2006 on the massive Saudi oil processing facility at Abqaiq was barely thwarted, but not before two of the terrorists' explosive-laden cars were detonated. This was not the only instance of an attempt to disrupt the flow of Saudi oil. In the summer of 2002, Saudi Interior Ministry forces blocked an al-Quaida plot to attack and cripple the loading dock at Ras Tanura, which handles 10 percent of the world's oil supplies.

According to the National Defense Council Foundation,

> "Given the instability that characterizes four of our top six sources of oil, the question is not whether we will experience a supply disruption, but rather when. The disruption could occur as a consequence of a terrorist act, or could result from a politically motivated embargo. In the end, it doesn't really matter why a disruption occurs, because the consequences would be identical, and severe.
>
> "The supply disruptions of the 1970s cost the U.S. economy between $2.3 trillion and $2.5 trillion. Today, such an event could carry a price tag as high as $8 trillion – a figure equal to 62.5 percent of our annual GDP, or nearly $27,000 for every man, woman and child living in America."

Increases in oil and natural gas prices result from geopolitical instability as well as growing United States and global demand that has not been matched by equivalent increases in available supplies. Unless supply can be increased, prices will continue to rise and become increasingly more susceptible to frequent spikes. A recent survey by the National Association for Business Economics found that high energy prices are the biggest short-term problem facing the U.S. economy.

In 1994, the U.S. Commerce Department concluded that volatile oil imports were a serious threat to national security. A second study, reaching a similar conclusion, was delivered to President Bill Clinton in November 1999.[4]

The White House waited to respond until March 18, 2000. President Clinton called for the creation of a home heating oil reserve similar to the Strategic Petroleum Reserve and tax incentives for both the domestic oil and natural gas industry and renewable energy sources.[5]

Oil imports are at record levels. U.S. demand for crude oil continues to grow despite higher prices for gasoline. U.S. petroleum demand in 2006 averages 21.07 million barrels per day and is expected to reach 22.2 million barrels by 2010, according to the Energy Information Administration (EIA) of the U.S. Department of Energy. Additional demand for transportation fuel, which accounts for two-thirds of U.S. petroleum consumption, is largely responsible for the increase. Oil imports of 4,527,024 million barrels for 2006 would supply nearly two-thirds - 57.8 percent - of U.S. demand.

The United States is engaged in a global war against terrorism, the geographic focal point of which is the Middle East and the world's largest conventional oil reserves. Our strategic vulnerability is accentuated by the fact that U.S. domestic oil production has been declining since 1973, and now stands at only 5.1 million barrels per day; compared to U.S. consumption of 21 million barrels per day.[6] This gross imbalance between domestic production and demand cannot be allowed to continue. The United States <u>can and must</u> produce more oil and gas domestically – to do otherwise is irresponsible. The United States. <u>can and must</u> curb demand through increased conservation and use of viable alternatives to crude oil where practical, such as ethanol in the Midwest and nuclear and coal in other regions.

Due primarily to congressional actions, and despite the safe environmental track record of industry, access to significant quantities of conventional domestic resources have been thwarted. For example, the undiscovered, technically recoverable oil and gas resources in the Outer Continental Shelf and offshore Alaska are enormous:

**OCS and Offshore Alaska: Undiscovered Technically Recoverable Resources**

| **Region** | **Oil** | **Natural Gas** |
|---|---|---|
| Pacific Offshore | 11 billion barrels | 21 Tcf |
| Gulf Offshore | 37 billion barrels | 244 Tcf |
| Atlantic Offshore | 4 billion barrels | 33 Tcf |
| Alaska Offshore | 26 billion barrels | 122 Tcf |
| **Total** | **78 billion barrels** | **420 Tcf** |

Collective Sources*: Minerals Management Service, U.S. Geological Survey, Bureau of Land Management, National Petroleum Council, and American Petroleum Institute.*

The above table does not include undiscovered and technically recoverable resources on federal lands that presently are off-limits to domestic exploration and production.

**Onshore Federal Lands: Undiscovered and Technically Recoverable Resources**

| Region | Oil | Natural Gas |
|---|---|---|
| Lower 48 States | 7 billion barrels | 148 Tcf |
| Onshore Alaska | 18 billion barrels | 69 Tcf |
| **Total** | **25 billion barrels** | **217 Tcf** |

Collective Sources: *Minerals Management Service, U.S. Geological Survey, Bureau of Land Management, National Petroleum Council, and American Petroleum Council.*

Combining potential onshore and offshore resources in the lower 48 states with those of Alaska onshore and offshore, produces an estimated 103 billion barrels of potential oil and 637 Tcf of potential natural gas. This amount of natural gas is enough to heat 60 million homes using natural gas for 120 years. In addition, 103 billion barrels of oil would power 55 million vehicles and heat 24 million homes for 30 years. [7]

With the full and environmentally safe use of these vast domestic resources coupled with current proven domestic oil reserves of 21 billion barrels, the United States could substantially reduce or eliminate its current oil demand of 2.3 million barrels a day from the highly volatile Middle East and the 1.3 million barrels/day from politically unstable Venezuela.

Combining our nation's 21 billion barrels in proven oil reserves with the potential 103 billion barrel reserves onshore and offshore presently controlled by the federal government would catapult total U.S. reserves to 124 billion barrels – more than the proven reserves of Iraq (115 billion barrels), Kuwait (104 billion barrels), the United Arab Emirates (98 billion barrels), Venezuela (80 billion barrels) or Mexico (13 billion barrels). [8]

While advances have been made in the techniques of finding, producing and transporting natural gas, challenges lie ahead if United States natural gas demand continues to increase as expected from 22.21 Tcf in 2005 to 23.35 Tcf in 2010. The country needs aggressive conservation of natural gas from the wellhead to the consumer's usage patterns.

Canadian imports are expected to increase from 3.68 Tcf in 2005 to 5 Tcf by 2010 and will continue to supply 13-14 percent of U.S. demand. [9] New supplies clearly must come from domestic resources and conservation must be viewed as a "supply" along with new development of the resources. The National Petroleum Council (NPC) concludes that, for domestic production to satisfy demand, the issues of access to resources, technological advancement, financing for infrastructure and exploration, availability of skilled workers and drilling rigs, long lead times for production, and changing customer needs must be addressed in a comprehensive way. [10]

Governors, state legislatures, chief state agency executives and the public have become increasingly concerned that the energy policy of the United States is adrift and does not address the nation's energy needs.

The Energy Policy Act of 2005 (EPACT) was enacted after years of work with a broad-ranging variety of provisions needed to appease various energy interest factions. EPACT was an attempt at energy policy and included some provisions that move the country forward on key energy issues, but more needs to be done.

The Oil and Gas Journal recently said, "The central problem, in fact, is that the (federal) government seldom really makes energy choices for consumers; it makes them for energy producers on purely political grounds. This type of politically motivated fuel selection would rot the core of any Manhattan Project for energy, such as has been proposed regularly since oil prices

began to climb. The 'comprehensive energy legislation' that became the Energy Policy Act of 2005 took an ill-fated step in that direction.

"So, how does a government stay on a constructive course with energy? It does so by establishing and following principles. Political pragmatists cringe at such behavior. They dismiss anyone asserting principles as 'ideologues' and, in the name of political pragmatism, fashion energy legislation by dispensing favors to special energy interests, the most politically aggressive of which tend to be producers of energy types no one wants to buy."[11]

There is perhaps no larger contributor to the high quality of life in the United States than energy, the largest sources of which are oil and natural gas. Yet the nation lacks a comprehensive policy to guide oil and natural gas producers, regulators or consumers that would ensure these vital energy forms continue to contribute to the nation's economic growth and security.

The federal government has worked to develop "energy policies," including the Energy Policy Act of 2005 and current efforts to modify the offshore production moratorium, but with marginal success. Regardless of the cause, the federal government cannot establish comprehensive energy policy on its own.

The leadership role in developing energy policy again has fallen to the states. Many have developed policy documents and some have initiated follow-up plans to those state policies.

Throughout its more than 71 years, the IOGCC, with 30 member states and seven associate states, steadfastly has supported the development of a national oil and natural gas policy to minimize the loss of domestic resources, protect the environment, enhance economic development, safeguard national security and lessen dependence on foreign sources of petroleum. These are the building blocks for a more secure energy future.

**CONSUMER IMPACTS**

Because of this lack of cogent national energy policy, U.S. consumers are faced with tighter energy supplies, fewer real options and ever-increasing energy prices – in all sectors of the energy industry. Since 1980, U.S. energy consumption has increased by 30 percent, while U.S. energy supply has increased by only 15 percent.

Since 1995, U.S. energy consumption has increased by 12 percent, while U.S. energy supply has increased by only 1 percent.

By 2025, U.S. need for energy will dramatically increase for all energy resources:

- Petroleum by 47 percent;
- Natural gas by 54 percent;
- Renewable energy by 46 percent; and
- Coal by 30 percent.

Higher energy prices have had a significant impact on the U.S. economy, from various industries to the small business owner to the individual consumer. In all, high energy prices (particularly natural gas) have cost the economy 2.8 million United States jobs since 2000. Since 2004, high energy prices have slowed United States economic growth by 0.5 to 1.0 percent.[12] Many sectors across the U.S. economy have had to compensate for their increased energy costs by passing

along these costs to their consumers. For those not able to pass along the costs, they have experienced significant financial losses.

**Agricultural Sector**
Petroleum-based products and natural gas are required for all aspects of farming, including food processing, agricultural chemicals, fertilizers, irrigation energy, crop drying and heating farm buildings. The abundance of cheap oil and natural gas long made such necessary elements affordable for American farmers.

However, at today's oil and natural gas price levels, the American agricultural sector faces some tough challenges. The ability of American farmers to produce a sufficient and affordable food supply for the American public is in danger. Rising energy prices have created higher production costs and increased fertilizer prices. Fuel expenditures for farmers increased 36 percent during 2004/2005. Further, many farmers are unable to fully transfer those costs to the consumer. The result could be a serious decrease in net farm income, which could alter the landscape of rural America and force difficult employment, travel and lifestyle decisions upon families.[13]

Yet, the average American consumer is not far from feeling the effects of this problem. If farmers cannot maintain the current food supply, the entire American food system will be threatened. The American public will undoubtedly face the challenge of changing their consumption habits. Representing more than 140 members across a range of foodservice distributors, the International Foodservice Distributors Association (IFDA) reports their members identified increasing fuel costs as the industry's third largest expense after labor and health care costs. IFDA members travel more than 75 million miles a year and consume more than 85.6 million gallons of fuel annually.[14] Although many food service operators expect growth in their sales and profits for 2007, some analysts project modest sales increases, which mean operators will need to concentrate on efficiency and cost-management strategies to sustain margins.[15]

**Small Business Sector**
While the agricultural and foodservice distributor industries have been struggling with augmented energy costs, many other segments of the U.S. economy have also been dealing with similar issues. In particular, the small business sector has been considerably affected by rising energy prices. Representing more than 150,000 small businesses, the National Small Business Association conducted a June 2006 survey of 409 small business owners. When asked how their businesses were impacted by rising energy prices, 75 percent of respondents replied they were moderately to significantly affected by rising energy costs. Moreover, 43 percent of those surveyed had to pass these costs along to their customers, most often in the form of increased prices.

Surprisingly, 76 percent of the business owners said reducing energy costs would increase their profitability. However, more than half of them reported they did not plan to invest energy efficient methods of operation for their facilities. Despite large policy strides toward implementing energy efficiency programs for businesses, many small business owners felt that cash flow, lack of resources and available technology were obstacles in making their organizations and facilities more energy efficient.[16] For many of those operating within the small business sector, energy price stability is a fundamental part of maintaining a profitable organization.

**Transportation Sector**
Though mounting energy costs have impinged on a wide range of industries, the individual consumer has undoubtedly linked increasing costs to the notable spikes in the cost of gasoline. Due to increasingly volatile energy prices and increased reliance on imports, the consuming public keeps paying more than it can afford to its power cars and trucks. In fact, the average American household will spend approximately $2,500 on gasoline this year, almost twice more than what it might spend on total energy costs for the year.[17]

What was the biggest factor? It was the dramatic increase in the price of crude oil, which alone comprises more than 50 percent of pump prices.[18]

Although market forces have lowered the price of crude to around $56 per barrel, it rose to record levels at more than $70 per barrel several times in 2006.[19] However, should some of the U.S. domestic and imported oil sources become less secure, a drop in supply would have a major impact on crude oil prices and would undeniably hit gasoline retailers and energy consumers hard. Coupled with federal, state and local taxes, the cost of gasoline could cause significant problems for the average energy consumer commuting, traveling, conducting business and even flying. In fact, higher fuel prices cost U.S. commercial air carriers $9.6 billion in fiscal year 2005.[20]

While there has been growth in the alternative fuels and vehicles industries, it may take some years to turn over the entire fleet of vehicles driven by Americans. The average life span of a car or light truck is almost 17 years, so traditional fuels will be needed for many years to come, even if each new vehicle purchased utilized an alternative fuel.[21] Much of the same can be said for the full development of certain alternative fuels and energy resources, which may take years before they are commercially viable. Even the onset of ethanol use has faced challenges, as the transition to ethanol blends has caused the change over of tanks at terminals, the need for a more expensive gasoline blendstock to combine with ethanol and logistical problems delivering ethanol to some areas.[22] Though the United States must continue efforts to seek such alternatives, near-term available supplies of oil should be sought and better utilized.

**Housing Sector**
In addition to absorbing increased transportation costs, consumers have been heavily impacted by rising energy prices in their own homes. Approximately 8.1 million American households use heating oil as their main heating source.[23] Thus rising crude oil prices (which, in 2004, accounted for 57 percent of the cost of heating oil[24] can significantly impact the average American household.

For low and middle-income families, increasing energy costs (and, in particular, the cost of home heating and gasoline) comprise a notable portion of the household income. If household energy expenditures are calculated as a percentage of income, middle-income households experienced a cost increase of approximately 1.5 percent from 2004 to 2005, from 5.1 percent to 6.6 percent of the household income. For low-income households with a vehicle, the cost increase is even greater at 5.5 percent, from 16 percent to 21.5 percent.[25] Such price volatility has made it extremely difficult for some families to operate within their normal budget structures, particularly those living on a more limited income.

Fluctuations in energy prices have been a key concern for many industries, small businesses and individual energy consumers for some time. Many aspects of modern life require the power

provided by a range of petroleum products. However, many factors are threatening American access to such products, which could result in dire consequences for the nation economically. Securing the nation's access to oil and natural gas resources and encouraging the efficient utilization of all energy sources will benefit the entire energy consuming public.

**RECOMMENDATIONS -**

1. **Improve dialogue with the American public about energy policy and its consequences to them.**

National and state policies and those recommended by various government and non-government organizations need to examine and communicate the consequences of the proposed energy policy on consumers. Consequences should include costs to taxpayers, impact on consumers, environmental consequences, and how much energy can be provided, and when, as suggested by the Oil and Gas Journal. [26]

Americans pay only a fraction of the true cost of imported oil at the pump. Their tax dollars, in effect, subsidize the economies of foreign countries by ensuring shipping lanes remain open and safe, oil fields are protected, and capital is available to improve deteriorating infrastructure. Meanwhile, Americans and the world populace will share in future costs of massive environmental remediation that will occur in foreign countries with lax or nonexistent oil and natural gas environmental regulations. These costs must be quantified and communicated.

The American taxpayer heavily subsidizes renewable fuels. A proper national energy policy appropriately supports new domestic fuels to create incentives for their production, and the American public deserves to know what is being paid.

While current prices have softened the impact on consumers, the economies of states and the nation can be hard hit when prices fluctuate, with the decrease in royalties and taxes associated with domestic production, the elimination of 529,000 high-quality jobs (according to data complied by the U.S. Bureau of Labor Statistics and the IOGCC), and the loss of billions of dollars in revenue.

Stripper (low-volume) wells are important contributors to the nation's economy. In 2005, stripper wells alone were responsible for $3.5 billion in employment earnings, $40.7 billion in economic activity and $192.6 million in state severance taxes. [27] These important wells must not be ignored by state and national energy policies.

To create meaningful energy policy, the American public must first be allowed to evaluate the true cost and consequences of all tax subsidies and the actual cost of imported oil and then consider cost-effective options to stimulate domestic production.

While determining the precise cost of a barrel of imported oil is a challenge – especially considering the massive world environmental costs associated with poor production practices in countries other than the United States and Canada – a range of cost estimates could be developed. More importantly, the cost of imported oil to the United States economy should be established so policy makers have a clear basis for making decisions.

The arguments for including United States military costs are clear and logical – our Middle East presence is influenced in part by the presence of oil.

A December 1996 study, *Energy Security: Evaluating U.S. Vulnerability to Oil Supply Disruptions and Options for Mitigating Their Effects*, by the U.S. Governmental Accountability Office (GAO) has underscored the importance of understanding hidden costs. The GAO reached a shocking conclusion: the economic benefits of imported oil outweigh the costs of supply disruptions. The GAO admits that some hidden costs of imported oil were not included, such as those cited in this recommendation. The report leaves a startling, but unwritten impression that all U.S. oil needs should be filled by imported crude.

The highly questionable methodology used by the GAO in reaching its conclusions indicates problems encountered in establishing domestic oil and natural gas policy. Petroleum is increasingly used as leverage in international relations, so discussions of domestic policy are clouded by the potential use of petroleum as a diplomatic or political weapon.

An equally inappropriate use of oil for political posturing involves use of the Strategic Petroleum Reserve (SPR) for short-term concerns, such as a temporary increase in gasoline costs driven by market demand. The entire cost of building, stocking and maintaining the SPR is a factor that must be considered as we assess the cost of imported oil to the United States economy. The interest on that investment, as well as the operating cost, tops $1 billion annually.

Another cost to be assessed is the development of alternate energy sources. Since the 1973 oil embargo, taxpayers have poured tens of billions of dollars into developing alternate sources. In addition, the state and federal governments poured tens of billions of dollars into energy conservation measures in buildings, which has little or nothing to do with imported oil used to fuel transportation. Conservation and increased energy efficiency are hugely important to any energy policy, but consumers deserve an honest assessment of the conservation impact on the fuel being targeted for conservation. That is, replacing an inefficient natural gas furnace with one of high efficiency is extremely important to the wise use of the natural gas resource, but claiming that replacement cuts the need for imported crude oil is disingenuous.

As we have increasingly turned to imported oil for our transportation needs, we have encouraged the loss of domestic infrastructure and decreased domestic areas available for exploration and production – other consequences to be considered when evaluating the cost of imported oil to the U.S. economy. Additional, unmeasured costs to the economy result from the impact of imports on the U.S. trade deficit.

As noted by authors Donald P. Hodel and Robert Deitz in their book *Crisis in the Oil Patch*, "Our purchases of foreign oil have contributed more to the growth of the trade deficit than any other single commodity. In fact, over the past twenty-plus years we have imported more oil than the net difference between our purchases and sales of automobiles, electronics equipment and other finished goods." [28]

Oil imports for the year 2005 were $182.13 billion, which represents more than 25 percent of the U.S. trade deficit. According to a report by the National Defense Council Foundation (NDCF), the effects of imported oil are much higher than that. The report looked at three different aspects that affected the "hidden" costs of imported oil. First, the United States pays $49.1 billion annually to defend the flow of Persian Gulf oil. Secondly, the NDCF found that the cost of imported oil leads to the loss of 828,400 jobs in the U.S. economy and a loss of $159.9 billion in GNP annually. The report also concludes that there is a loss of $13.4 billion in federal and state revenues each year. [29]

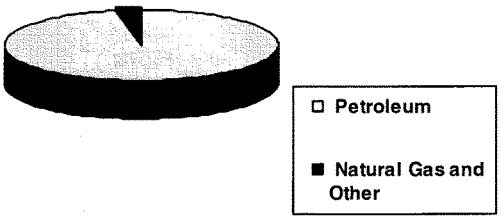
The implications of the massive transfer of private sector wealth from the U.S. to foreign countries have not been fully examined, but should be.

Taken together, these estimates of the true cost and consequences of imported oil will permit the American public to evaluate cost-effective options for encouraging domestic production. Consequently, an on-going public education program and discussion should be developed to fully inform the public regarding the nation's energy circumstances so Americans can make proper consumer choices, and support sound long-term energy policy choices by public officials.

**2. Promote the expansion of research to recover domestic oil and gas resources.**

Oil provides 97 percent of our transportation fuel (Figure 7) .

**Figure 7- Transportation Fuel Shares**




In 2003, the Gulf of Mexico offshore waters contributed 29 percent of the oil produced in the U.S. and 22 percent of domestic natural gas production.

The 1.5 million barrels per day of oil from central and western Gulf of Mexico waters is equivalent to our imports from Saudi Arabia.

The 4.4 Tcf of natural gas produced annually from central and western Gulf waters is enough natural gas to meet more than 80 percent of the electric industry's needs.

According to conservative estimates from Minerals Management Service there are about 288 Tcf of natural gas and 52 billion barrels of oil in the Outer Continental Shelf (OCS) off the lower 48 states:

- This is enough oil to maintain current oil production for 105 years and current natural gas production for 71 years.
- This is enough oil to produce gasoline for 132 million cars and heating oil for 54 million homes for 15 years.
- This is enough oil to replace current imports from the Persian Gulf for 59 years.
- This is enough natural gas to heat 72 million homes for 60 years, OR to supply current industrial and commercial needs for 28 years OR to supply current electricity generating needs for 53 years.

And, that is before the Alaska OCS - with additional resources of 132 Tcf of natural gas and more than 26 billion barrels of oil - is considered.

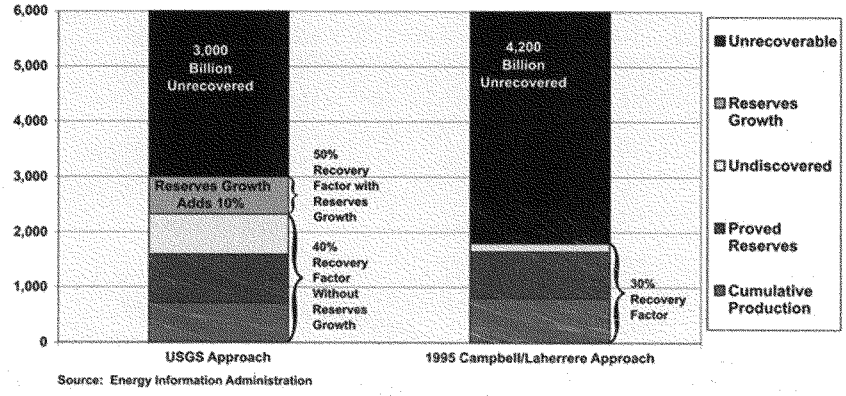
The use of modern technology helps ensure environmental protection. For example, 2005 hurricanes hit 2,900 platforms with 170 mph sustained winds for 5 to 7 hours, yet no appreciable leaks developed.

The advancement of new technologies in the energy sector remains one of the bright spots of the nation's energy future - and perhaps one of the most neglected by policy makers. New technology has been a principal driver of new oil and gas development in the Gulf Coast, the Arctic and across the West. Yet, oil and gas research and development funding at the federal level has been dismal in recent years. Research and development programs should be initiated and properly funded by the states and the federal government, and should offer alluring incentives to the private sector.

This far-reaching recommendation encompasses a number of initiatives designed to ensure the nation's reserves are fully developed. To make informed decisions regarding the nation's energy future, the public must have definitive information on the actual domestic petroleum resource.

For example, there are vast known reserves of oil in the United States. The IOGCC estimates that 351 billion barrels will remain in the ground after conventional recovery technologies have been applied (Figure 8).

**Figure 8 - Different Interpretations of a Hypothetical 6,000 Billion Barrel World Original Oil-in-Place Resource Base**




In addition, there are oil and natural gas reserves located on private and public lands and offshore that have not been analyzed or catalogued. Some of these reserves may exist in environmentally sensitive areas or in difficult-to-access locations that would require extraordinary exploration and production measures or advanced research to develop. Therefore, in addition to identifying the entire oil and gas resource base of the country, research should include estimates of the time required to bring these resources into production.

Defining these resources is only a first step. As an advocate for oil and natural gas research, the IOGCC also strongly supports programs that create technology to improve recovery rates and

lower exploration and production costs. Such research and development (R&D) is an investment in the country's future and its energy security. Technological advance might be the most important factor in ensuring that America's nonrenewable resources are fully developed.

A decade ago, the Task Force on Strategic Energy Research and Development noted, "There is growing evidence of a brewing 'R&D crisis' in the United States – the result of cutbacks and refocusing in private-sector R&D and reductions in federal R&D. Support for research and development is indeed being simultaneously reduced in the private and public sectors. R&D cannot be turned on and off like a water tap. The acquisition and embodiment of new knowledge in new products and services for the economy is a cumulative process that requires continuous effort to sustain. The accumulation of cutbacks in public and private R&D could be setting the stage for a major shortfall and ensuing setbacks in R&D in the United States – characterized by the lack of consistent attention to longer-term needs and problems, a shrinking population of scientists and engineers available to perform high-quality R&D, and a loss of incentive and opportunities for new generations of technologists."[30]

Nothing has changed since that report. In the Fiscal Year 2007 budget, the House Appropriations Committee basically zeroed out natural gas and oil research spending and the Senate Appropriations Committee also slashed R&D spending. While the cyclical nature of petroleum prices is well understood, policy leaders in the White House and Congress have concluded that the current elevated oil price means R&D should be financed by the industry.

A 2006 report commissioned by the IOGCC confirmed the declining trend in oil and gas research and development. "When private R&D is compared to federal expenditures, the outlook is bleaker. Private spending is substantiated but federal spending remains disproportionately small compared to the relative importance of oil and gas to U.S. energy requirements."[31]

A 2006 study published by the IOGCC expressed alarm at the loss of experience and entry-level technical personnel, noting "there is a 5- to 7-year gap between decisions to increase exploration budgets and resulting new oil production, even when experienced technical staff is available. However, few have considered the long-term effects of the 1986 petroleum jobs massacre (in which 500,000 jobs were lost) and how the events of 20 years ago will influence future energy policy and supplies. Any crisis in oil supply causing increases in domestic activity will be constrained by lack of qualified staff."[32]

The federal government could fill a vital leadership role in reversing the trend. The country's network of national laboratories, for example, seems ideally suited for energy research.

In addition, the IOGCC supports a restoration of DOE resources to provide additional research and development funding. The DOE's budget request totals $23.6 billion for Fiscal Year 2007. For fossil energy research and development, DOE is requesting $330 million to be focused on coal research, less than 2 percent of the budget. Currently no portion is allocated for oil and natural gas research. Oil and natural gas research was zeroed out in the Bush Administration's budget recommendation. However, these fuels deliver more than 85 percent of the country's energy.

The DOE's Office of Fossil Energy highlighted the importance of R&D in 1999. "Looking forward, the domestic oil and gas industry will be challenged to continue extending the frontiers of technology. Ongoing advances in E&P productivity are essential if producers are to keep pace with steadily growing demand for oil and gas, both in the United States and worldwide."[33]

The NPC notes "producers are turning to the service sectors to develop new technology for specific applications. Industry consortia have been formed to address critical technology challenges such as deep-water development. While many of these changes improve the efficiency with which research and development dollars are spent, concerns have been widely expressed that basic and long-term research are not being adequately addressed."[34]

Meanwhile, solar and renewable technologies, which provide less than 10 percent of U.S. energy, would receive nearly $1.2 billion. This represents a 2 percent increase in funding.

The IOGCC supports a drastic shift in how available tax dollars are spent. In the early years of the DOE, large and expensive demonstration projects dominated R&D spending. "That early emphasis on demonstration projects, reflecting the turmoil of the late 1970s, was, in retrospect, misplaced."[35]

Despite billions of dollars spent on renewable energy R&D during the period of 1990-2006, there has been little impact by renewables on the nation's total energy consumption pattern (Figure 9). In fact, in 2005, renewables supplied a nearly identical percentage of the nation's total energy consumption as in 2001.

**Figure 9 Comparison of U.S. Department of Energy Research and Development Budget Request (Fiscal Years 2001 and 2006)**

| | FY 2001 | FY 2006 |
|---|---|---|
| Coal and Power Systems | $193 | 330 |
| Electrical Energy systems and Storage | 45 | 3 |
| Fusion Energy | 218 | 296 |
| Natural Gas | 107 | 0 |
| Nuclear Technology | 109 | 90 |
| Oil | 53 | 0 |
| Solar and Renewable Energy Technologies | 457 | 148 |

**Basic and Applied Research and Development (Millions of Dollars)**
*Source: U.S. Department of Energy FY 2007 Budget Request*

According to Hodel and Deitz, "However important alternative sources eventually may be, our best estimate is that we will continue to meet our energy needs with oil and gas for at least the remainder of this and the next generation of Americans, and very possibly, several succeeding ones as well. Without some kind of energy breakthrough or aggressive government mandates, oil and gas appear certain to be our predominant fuels for the next 40 to 100 years."[36]

A broad range of parties assembled by the National Petroleum Council to assess the future of the oil and gas industry expressed "... surprisingly broad agreement ..." on the outlook for the next 25 years, including, "The United States and the world will still be using large amounts of oil and gas in 2020, not significantly different from the more than 60 percent share of world energy consumption these fuels represent today."[37]

The case for redirecting R&D dollars to where they would prove more effective is especially important as government considers budget freezes and cutbacks. Past successes - including three-dimensional seismic, polycrystalline diamond drill bits and horizontal drilling - that have helped lower costs and improve recovery should be built upon.

To ensure that these limited resources are spent wisely, the IOGCC recommends the budgets for energy research and development be considered by the same congressional subcommittees. Current congressional structure requires fossil fuel and renewables research budgets to be evaluated in separate budget bills handled by separate subcommittees of the House and Senate Appropriations Committees. As a result, side-by-side comparisons of expenditures and impacts are difficult, and there is a lack of flexibility in allocating finite resources.

The NPC notes, "In the past three decades, the petroleum business has transformed itself into a high-technology industry ... Looking forward, the domestic oil and gas industry will be challenged to continue extending the frontiers of technology. Ongoing advances in E&P productivity are essential if producers are to keep pace with steadily growing demand for oil and gas, both in the United States and worldwide. Continuing innovation will also be needed to sustain the industry's leadership in the intensely competitive international arena and to retain high-paying oil and gas industry jobs at home."[38]

In addition, the research issues of mature wells and of wells at the end of their productive lives must be addressed with government research. Well-plugging techniques, for example, are little changed in the last 50 years. Some attention needs to be paid to these issues and to assisting states with orphan well plugging and cleanup. An Orphan Well Fund was authorized in The Energy Policy Act of 2005, but has not yet been funded by Congress.

As a final recommendation, R&D activities should be well coordinated at the national level with a "Manhattan Project" type mentality that fully recognizes the urgency of our situation and the potential new technology holds for addressing it.

**3. Re-examine federal and state policies as they relate to oil and natural gas development in consideration of new incentives for exploration and production.**
In recent years, nearly every discussion of the status of the domestic oil exploration and production industry includes the description of the United States as a "mature producing region". As a result, the nation is increasingly dependent on imports from areas with more readily accessible oil."[39]

To assume that foreign oil is more accessible than domestic oil is fundamentally flawed and contrary to ensuring the nation's energy security. This assumption has led to ambivalence about the tens of thousands of small-volume wells in the United States that maximize recovery from known reservoirs. It has lead to ambivalence about developing the nation's offshore resources.

Two recent IOGCC publications, *Mature Regions, Youthful Potential: Oil and Natural Gas Resources in the Appalachian and Illinois Basins* and *Untapped Potential: Offshore Oil and Natural Gas Resources Inaccessible to Leasing*, counter the notion that the United States lacks more natural gas and oil resources.

In addition, onshore and offshore oil and natural gas resources in Alaska should be maximized. Alaska's successful regulatory track record supports the views of the majority of Alaskans that a small part of the Arctic National Wildlife Refuge – with billions of barrels of potential reserves – should be opened to petroleum exploration. In this regard, IOGCC applauds the administration's recent decision to open the North Aleutian basin to oil and gas development. Additionally, the vast majority of Alaskans in and around coastal areas adjacent to the North Aleutian have expressed support for expanded production.[40]

Despite the recent rhetoric by members of the 110th Congress, incentives to develop new resources have been extremely beneficial and cost effective. These include tax credits for the application of enhanced recovery techniques, which can produce up to 20 percent more petroleum. An incentive package for marginal wells in Texas is credited with prolonging production, generating significant tax dollars and recovering natural resources that would otherwise be lost.

Incentives led to commercialization of coal bed methane and other "nonconventional" sources, such as tight gas sands and shale gas, as sources of energy. Special provisions for heavy oil production also have yielded crude that in other circumstances would be abandoned.

The oil and natural gas producing states have attempted to assist the industry in reaching its full potential. The 2005 IOGCC study, *Investments in Energy Security: State Incentives to Maximize Oil and Gas Recovery*, found an array of state programs created to address current issues. States' responses to the needs of the petroleum industry are varied, but the most successful included common elements that ensured simplicity and highly targeted impact.

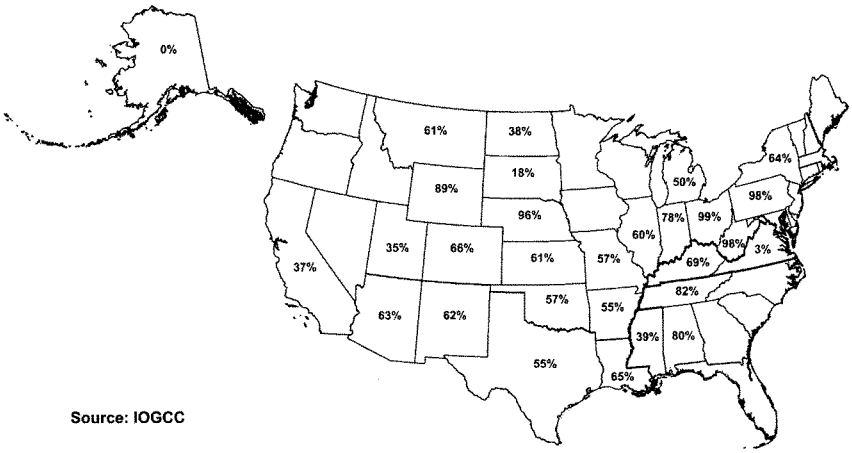
However, the federal government has eliminated many of its incentives for domestic production, and incentives for exploration virtually have disappeared. Accordingly, major oil companies, recognizing that the federal government seems willing to write off domestic resources, are choosing to spend billions of dollars overseas on exploration and production.[41]

Hodel and Deitz say, "The fact remains: public policy today works to the detriment of the domestic oil and gas industry."[42]

During consideration of legislation that became the Tax Reform Act of 1986, many of the incentives for exploration and production that the industry had utilized in its search for new resources were either eliminated or scaled back. Coupled with the collapse of oil prices that year, the loss of these tax incentives has helped to depress activity in the United States so severely that in 1999 the rig count reached it lowest level since the end of World War II. The combination of low prices and lost incentives caused cessation, postponement or cancellation of many enhanced oil recovery projects. With current robust prices, many shut-in wells are being returned to production, but others will never return. The high number of idle wells in some states needs to be addressed.

Other wells have been abandoned instead of plugged because the cost of plugging remained less than the costs of operation. Such marginal wells, producing 10 barrels or less per day, provide 16 percent of U.S. production and form a hedge against even greater dependence upon foreign crude oil imports (Figure 10). In its 2000 study, *Produce or Plug: The Dilemma Over the Nation's Idle Oil and Gas Wells*, the IOGCC reported that 343,030 wells were idle in the United States in 1999.[43]

**Figure 10 - Stripper Oil Wells Proportionate To Total Number of U.S. Oil Wells (2005)**




**Source: IOGCC**

Without action by state and federal regulators - who permitted temporary idling of marginal wells or prolonged plugging deadlines - perhaps thousands more of these stripper wells would have been abandoned. Once abandoned, these wells, their reservoirs, the remaining oil resources they contain, and access they can provide for advanced recovery technologies are, in effect, permanently lost to production or other service. With few exceptions, it is financially impossible to re-drill a three or four barrel a day well and expect to make up its development costs. It is also economically infeasible to re-drill these wells for future enhanced recovery purposes if the entire pool or field is already marginal.

Ironically, this is oil that already has been discovered, and reservoirs that already have been characterized. The known oil resources are enormous, as outlined in *"Mature Region, Youthful Potential: Oil and Natural Gas Resources in the Appalachian and Illinois Basins"*.[44]

A 1995 IOGCC report, *America's Untapped Oil*, estimated the total oil-in-place (known oil reserve) in the United States at 533 billion barrels. Only 182 billion barrels are considered salvageable under existing economic conditions. This leaves about 351 billion barrels as a target for new extraction technologies.

It is estimated that as much as 225 billion barrels are present in discovered and undiscovered oil reserves (enough to supply all U.S. oil needs for decades at the current rate of consumption). In addition, an estimated 1,800 Tcf of natural gas (enough to supply U.S. needs for hundreds of years at current consumption rates) have yet to be produced.

State and federal government counter-cyclical incentives that should be considered for either enactment or revival include:

- Allowing the deduction of no more than 50 percent of a taxpayer's income for certain oil and gas exploration and production expenses;

- An investment tax credit for exploration and development expenditures, stripper well operations, refinery expansion, and enhanced recovery project expenditures;
- Providing certain tax incentives for marginal wells and some limited tax credits for new domestic production;
- Unconventional oil development, such as oil shale, and unconventional natural gas development.
- Research investment;
- Training opportunities for workforce enhancement and urging state employment services to become engaged in job promotion, such as job fairs;
- Reduction in extraction taxes for extremely high-cost wells;
- State economic development departments establishing a relationship with the E&P industry;
- Refinery and common carrier pipeline capacity. Transparency should be provided for pipeline access to maximize competition;
- States providing a property tax holiday of 5-10 years for new refinery and common carrier pipeline capacity;
- State energy education programs for conservation;
- Depletion allowances;
- Strategic Petroleum Reserve.

The states have explored alternatives for maintenance of marginal well operations and have encouraged new or continued enhanced recovery operations. The states also have enacted a variety of E&P incentives, including reductions in severance or income taxes and initiatives that reduce administrative costs of oil and gas operations. Clearly the states also have a necessary role in addressing our nation's energy needs. Collectively, state governments can and should advance policies and programs to assist in new oil and gas E&P, which is in the nation's best interests as well as their own.

In a landmark 1999 study, *Against the Wind: The Economic Impact of Incentives During the Oil Price Collapse*, the IOGCC proved that incentives work to increase production and to generate substantial economic benefits. For an investment of $2.8 billion in reduced tax collections, states generated $75 billion in hydrocarbon production and expenditures to participate in the incentives. States benefited directly from $9 billion in state and local tax and royalty collections.

According to the study, "While it remains impossible to calculate how much of these economic effects are caused by the incentive programs, they still appear to remain 'profitable' for the legislatures investing the money. In a larger sense, the tax revenue stream pales in comparison to the beneficial effects on the economy. The $113.2 billion in economic effects creates $14.8 billion in salaries, which in turn yields 630,000 jobs (meaning years of employment). About one-third of these would be direct jobs in the oil and gas industry, while two-thirds would represent years of employment in other sectors of the state economy."[45]

Additional incentives for finding and developing the nation's reserves are possible as public policy recognizes that "mature" production and the nation's remaining oil producing regions should not be abandoned in favor of foreign sources. Recent reports by the IOGCC, the North American Coastal Alliance, and the Appalachian and Illinois Basin Directors reinforce this need.

Although incentives will prove helpful to preventing the waste of domestic resources, governments have recognized the need to increase the productivity and competitiveness of the gas and oil industry without compromising environmental protection. Regulatory barriers include

uncertainty shared by producers, pipeline owners, marketers, local distribution companies and end users. Market barriers also exist in perceptions toward the physical properties and use of natural gas.

While these barriers are gradually coming down, the processes are slow and uncoordinated. As a result, natural gas may be under-utilized as an appropriate fuel, and imports fill this need.

In response, federal agencies have pledged to "... enhance the efficiency and effectiveness of state and federal regulatory programs and reduce undue burdens on the domestic natural gas and oil industry by improving coordination among regulatory agencies, eliminating redundant or unnecessary regulation and avoiding duplication in state and federal regulatory programs."[46]

More work is needed in this area by the states and federal government. Governments have been slow to maximize the use of information technology in the oil and natural gas E&P area.

As a matter of policy, the IOGCC supports oil and natural gas regulation by the states, where differences in geology, climate and economic factors can be adequately considered. The "one-size-fits-all" nature of federal laws and regulations cannot efficiently deal with diversities in individual states, and actually discourages domestic production.

Examples of costly regulatory burdens include Superfund joint liability provisions, the financial requirements imposed by the Oil Pollution Act of 1990 (OPA 90), the Risk Management Program of the Clean Air Act Amendments and Enhanced Air Monitoring proposed by the Environmental Protection Agency (EPA).[47] In addition, EPA is continuing to look at regulatory expansions into areas already well regulated by the states. EPA has eyed expansion of its regulatory span in such areas as hydraulic fracturing, storm water runoff during the construction of the well site, and air emissions in the E&P sector.

Other areas of concern are Clean Air Act, NEPA, Endangered Species Act, and Clean Water Act. All result in lengthy administrative appeal processes that slow permitting and result in skewed energy policy when these excessive regulatory burdens are adjudicated.

When federal environmental laws are reauthorized, each must contain an analysis of the impact of the law on the nation's energy supply security and on energy consumers.

As an example, the OPA 90 Trust Fund needs to be examined by Congress and reviewed for effectiveness and the mission-focused use of the fund.

The IOGCC also has identified physical barriers to the expanded use of natural gas.[48] Among them are the inadequacy of existing pipelines, the lack of natural gas infrastructure (especially for natural gas vehicles), low capacity electric generation economics, a lack of necessary gas-flow information, lack of storage to meet peak demands and a lack of adequate supply and market pooling points.

The price picture has changed greatly since 2001 when the IOGCC noted, "Because of the fundamental advantages that natural gas enjoys over other sources of energy, in terms of price, environmental attributes and domestic security of supply, natural gas is poised to achieve its rightful role as the nation's dominant fuel. This vision, however, cannot be achieved in the near term if current trends are simply projected into the future. To realize stable deliverable supplies of natural gas, adequate transportation and expanded demand, existing barriers to the use of natural gas must be understood and overcome."[49]

The price of natural gas has moved dramatically during the last decade as this fuel became much more prominent in the U.S. fuel mix for electric power generation.

No discussion of domestic energy security is complete without considering government policy that limits E&P on public properties. While drilling in precious national parks and near beautiful natural treasures is always inappropriate, it makes no sense to allow valuable oil and natural gas reserves to remain untapped based solely on the perception that drilling and production technologies are inherently damaging to the environment. Thanks to proactive state regulatory programs, this is not the case.

Oil spills that capture news headlines are primarily a result of the bulk transportation of oil, not the process of E&P. Foreign oil imports arriving by supertankers represent a far greater risk to the environment than offshore drilling and production – even in environmentally sensitive areas.

Across the board, state and federal polices as outlined above must be re-designed to address our nation's oil and gas needs.

**4. Encourage conservation of fossil fuel resources by the public and efficient production technologies.**

An area in which the efforts of local, state and federal governments have been successful in the past is the encouragement of conservation by the public of fossil fuels. Advances have been made in building heating and cooling efficiency, and individual home use of energy has been made more efficient by utility-sponsored research through the Electric Power Research Institute and the Gas Technology Institute. State governments, utility industry groups and individual utilities have developed extensive programs to assist consumer conservation information.

Continuation of these efforts must be encouraged to avoid complacency on the part of the American public when fossil fuel prices are not affecting usage. Particular vigilance is essential in the conservation of liquid transportation fuels, which account for about 70 percent of the use of petroleum products.

A key to consumer conservation is energy education. For example, the direct conversion of natural gas for home heating, appliances and as a fuel for vehicles is far more efficient than the conversion of gas to electricity.

Consumers should be cognizant of their personal responsibility in energy consumption and ways to be a more responsible user. Consumers' choices of vehicles driven, manner of travel, speed and driving habits, recreational choices, living and work arrangements and personal consumption have an impact upon the nation's energy needs and security. Conservation and efficient use of the energy we have must be part of the solution.

The IOGCC recommends energy education that permits consumers to make choices based on conservation and the wise use of resources.

It also recommends that local governments examine their public transportation systems and ways to curtail individual automobile travel.

The IOGCC should work with the National Association of State Energy Officials (NASEO) to improve state government energy efficiency and continue to urge efficient use of energy at

federal facilities. (e.g. see Western Governors Association (WGA) "Clean and Diversified Energy Initiative" June, 2006).

**5. Manpower Issue**

The nation's domestic petroleum industry labor market currently is so tight that some scheduled exploration and production must be delayed to await the hiring and training of rig crews. The same tight labor situation applies to projects to re-work existing wells, or to undertake enhanced recovery projects.

Enrollment in petroleum-related majors at America's colleges and universities has shrunk for years and is just beginning to pick up again. The University of Oklahoma Mewbourne School of Petroleum Engineering has seen enrollment jump from 98 in 2003 to 224 in 2006. Like other schools, the university has engaged in an aggressive campaign to attract new students by securing corporate grants and establishing scholarships and internship programs.[50] On a national level, the number of bachelor's degrees awarded in petroleum engineering has grown from 260 in 2000 to 322 in 2005, while the number of geology degrees awarded has fallen slightly from nearly 3,500 in 2000 to 3,300 in 2004.[51]

The IOGCC has documented the labor problems and made detailed recommendations for state and federal governments and industry. Some of these recommendations from the IOGCC publication *The Petroleum Pros* have been followed. Others need to be addressed.

Shortages in the professional area include R&D specialists, as well as operational employees. The success of the domestic energy industry will depend on the ability of operating and service companies to attract significant numbers of well-educated and environmentally responsible skilled laborers who can construct and maintain the energy infrastructure needed to deliver low-cost, safe energy to our society.

The federal government is the largest resource owner in the United States and therefore must be actively involved in the solution to this labor problem. The government must commit its infrastructure and financial resources to this challenge to ensure that a long-term focus is brought to bear on the problem. The history of this labor market's huge cyclical employment swings does not condemn it to these swings in the future. This is a natural role for government, and is an urgent policy need that continues to be neglected by the federal leadership.

Such a long-term focus is essential to success because the industry alone is not capable of providing this convergence due to the realities of the modern marketplace. Our nation's leaders must work closely with industry and state governments to provide a regulatory framework that allows access to major reserves and encourages development over future centuries, while carefully protecting the environment.

State governments and agencies have critical roles in managing regional energy resources, providing local and regional regulatory structures, and in providing funding for major universities, secondary education, and vocational programs that will train the petroleum professionals of the future. Since The IOGCC *Petroleum Pro's* recommendations, many states have begun beefing up their technical training programs using state or federal workforce development funds to train lease operators, safety engineers, well service crews and other petroleum field technical skills.[52]

Academia must also continue to provide the educational and research infrastructure and environment that is required to train the large number of geoscientists, engineers and other professionals that are critical to the success of the industry. This role also must include providing continuity between undergraduate and graduate programs, and furnishing outreach courses for students who may not work directly in the industry but must receive a basic, balanced understanding of just how essential energy is to the health and prosperity of our society. The nation needs better consumers of energy products.

Industry must continue to engage fully in this effort. This includes continuing support for university programs such as the development of scholarships, internships and research partnerships. In addition, industry must step forward to give voice to its needs and potentials in securing the nation's energy future.

CONCLUSION

Crucial to the implementation of a national policy for oil and natural gas is the realization that increases in crude oil imports are expected to continue for the foreseeable future. Foreign oil is expected to provide 70 percent of U.S. demand by the end of 2010. The United States is no longer in the enviable position it enjoyed 50 years ago when it produced more than half of the world's oil.

Due to its high percentage of imports, the United States grows increasingly vulnerable to market manipulations by foreign countries that use oil not only as a source of economic wealth, but also as a political weapon. The Middle East has 10 times the known conventional reserves of the United States. As to unconventional reserves, the story is quite different - and that story needs to be communicated to the public and politicians.

The 1973 oil embargo reduced worldwide supplies by about 7 percent of pre-embargo consumption; prices increased dramatically (see Figure 3). A similar shortage that occurred after the Iranian revolution caused prices to triple; the surplus that occurred when OPEC decided to increase its market share in 1985-1986 drove prices back down to near the $12 per barrel level. In 1999, OPEC market manipulation drove the price below $10.

However, the war on terror and booming world demand have driven prices to their current levels. The concentration of production and reserves among Middle East countries again raises the specter of price gyrations and supply disruptions should certain nations choose to use oil as a tool for political gain.

In addition, the United States has committed to a future that relies on increasing the production of domestic natural gas. The many issues identified by the NPC – particularly access to resources and an emphasis on R&D – should provide a focus for policy makers who acknowledge the country's growing dependence on natural gas.

OPEC provides fresh reminders of its ability to manipulate markets. Spiking oil costs in 2006 had federal lawmakers desperately looking for quick fixes. As the price of oil fell in the early fall of 2006, national political attention turned away from the concerns of the summer. When the cyclical pattern of petroleum prices swings upward again, the "quick fixes" will again be trotted out for political fodder.

However, as Ruth Sheldon Knowles noted in her book *America's Energy Famine: Its Cause and Cure*, there are no quick fixes.

"We Americans are so psychologically geared to the idea of doing things quickly in a big way that it hardly seems possible that we cannot have a crash program to get us out of our predicament. In our bewilderment over our dramatically rapid change from an abundance of cheap energy to shortages of expensive energy, we have found it hard to accept the fact that there are no easy, quick answers."[53]

Not one of the proposals this report contains can be expected by itself to provide the stability necessary to maintain domestic production and a growing economy. Nor can one entity – a single state or the Congress – be expected to solve this problem single handedly. A national strategy calls for broad integrated participation. The recommendations within this report could minimize American dependence upon foreign crude oil and products by stressing domestic oil and natural gas exploration, development and conservation. The United States cannot afford to allow its future to be determined by other nations. The health of the economy and the ability for assured national defense cannot be maintained while crude oil prices fluctuate wildly.

The solutions to the real energy shortage, that of liquid transportation fuels, are years away. Renewable energy sources that hold promise will have only a minor impact in satisfying this growing demand.

The petroleum industry remains one of this country's most important, comprising from 3 percent to 5 percent of the economy. In 2004, the industry gave $10.3 billion in economic investment, which is an increase of about 2.5 percent from 2003. In the past five years, the oil and gas industry has invested $98 billion toward emerging energy technologies or 73 percent of the $135 billion spent by all U.S. companies and the federal government. The majority of these investments going to "frontier hydrocarbons" are research on tar and oil sands and heavy oil, making refineries more productive, and turning waste and residue hydrocarbons into more valuable products. The industry's health and the products it delivers are vital to the high quality of life expected by the public.

The federal mandate that deliberately constrains domestic resource development in areas such as the Outer Continental Shelf of California "is poor energy policy which artificially inflates U.S. imports ($56 billion for petroleum in 1994). It is poor government fiscal policy which abandons the stewardship role of maximizing the value of federal lands. It is poor economic and trade policy that discourages capital investments in the United States and the jobs and other benefits they create. It is poor environmental policy insofar as it moves production to areas of the world with less stringent standards of environmental performance."[54]

There is no indication that the federal government will act effectively to address energy issues. For example, the recent increase in gasoline prices fueled "crisis mentality" rhetoric that ranged from the proposed repeal of various taxes on gasoline to selling crude oil from the Strategic Petroleum Reserve to allocating hundreds of millions of dollars more for alternative energy research (aimed at electricity, not vehicle fuels).

The energy future for America is too important to be shaped by purely political gain. The states, acting through the offices of their governors, must participate in a national oil and gas policy based on economic development, maximizing domestic production, increasing access to potential reserves, promoting research and development and prolonging production from marginal wells to be implemented both at the federal and state level.

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# RESOLUTION 06.052

## Oil and Gas Policy Evaluation for Energy Security

WHEREAS, America is blessed with a vast abundance of natural energy resources that have been critical to accommodating substantial population growth and fueling a dynamic economy. Oil and gas resources have been a key component to meeting the nation's energy needs for decades. Much of those resources are located in and developed throughout much of the western United States, but are also located throughout the nation; and,

WHEREAS, notwithstanding our rich domestic energy resource, our nation imports approximately 60 percent of our oil and approximately 3 percent of liquid natural gas from foreign countries. Americans are 5 percent of the world's population and consume 25 percent of the world's oil. Some of the regions from which we import these resources are at times politically unstable, creating unstable supplies, and volatile prices. Additionally, importing foreign oil and gas contributes enormously to our balance of trade deficit, which now exceeds $750 billion annually. Oil and natural gas imports represent approximately one third of the trade deficit; and,

WHEREAS, much of the United States economy and infrastructure is founded upon the use of oil and gas resources. The nation recognizes the need to diversify our energy supply, which will increase stability of the supply and price of our energy resources. Continued use and reliance upon oil and gas as a major part of the American landscape is likely for the coming decade, until new energy resources, technologies, infrastructures and strategies can be employed; and,

WHEREAS, 40 percent of America's energy needs are dedicated toward, or used in the transportation sector, much of which is supplied by crude oil; and,

WHEREAS, in recent years, we have seen a decline in the domestic oil and gas industry. In the downturn of the 1980s nearly 500,000 domestic jobs were lost. Likewise, experienced personnel throughout industry who remain are now approaching retirement age, and the industry is expected to loose nearly 50 percent of the domestic work force within the next decade; and,

WHEREAS, in 2005 hurricanes crippled much of the Gulf Coast drilling capacity and refining capacity, causing record high gasoline prices to exceed $3.00 per gallon; and,

WHEREAS, public reaction to recent gasoline and natural gas price spikes has been mixed, ranging from informed understanding regarding our nation's energy situation, to angry reaction toward the industry calling for investigations of alleged price gouging, to public policy changes that would negatively impact the industry; and,

WHEREAS, 35 states produce oil and gas in the United States, 34 of whom belong to the Interstate Oil and Gas Compact Commission, which is dedicated to the preservation of the state's rights and the development of oil and gas resources in an environmentally sound manner; and,

WHEREAS, many governors of the Western Governors Association (WGA) have served as Chairmen of the IOGCC, forging a relationship between the two organizations; and,

WHEREAS, oil and gas resources remains a topic in need of public policy development by the nation's governors. In recent years, oil prices have exceeded $70 per barrel and gasoline prices now approach or exceed $3.00 per gallon; and,

WHEREAS, although the market has responded to higher prices in some parts of the West, resulting in increased production of domestic resources through the use of new technology and new discoveries, infrastructure constraints limit the transportation and refining of new production. These constraints have resulted in artificially threatening continued new investment and development of new discoveries and also require solutions as part of our nation's energy needs.

NOW THEREFORE BE IT RESOLVED, that the IOGCC believes that a national forum for oil and gas issues, is essential for a well-informed public that understands the nation's current energy situation, potential solutions in the near term and those that will occur in years to come, and to avoid public policy choices that will exacerbate our nation's energy situation by discouraging domestic production;

AND BE IT FURTHER RESOLVED that an inventory of the nation's current needs, trends and policies be conducted to provide for more efficient use of our oil and gas resources, conservation practices of the resources, and policy changes that are necessary to develop and maintain the nations' oil and gas industry that will help provide a stable environment for the development and use of our nation's rich oil and gas resources.

AND BE IT FURTHER RESOLVED, that a joint project should be conducted between the WGA and IOGCC to:

- Conduct several regional forums throughout the West and the nation to hear from and provide information to the public on oil and gas issues.
- Convene a team of experts on oil and gas issues, including conservation and efficiency to provide the governors with recommendations for conservation, and development of the nation's oil and gas resources in an environmentally responsible manner.
- Provide the Governors with policy and other recommendations by December 2006.

The CHAIRMAN. So all time for questions by the select committee has been completed. I will turn to the panel and ask each one of you to give us your best 1 minute to tell us what you think we should know at this time in the history of the United States relationship with oil and other energy sources, and we are going to go in reverse order of our original testimony. So we will begin with you, Ms. Harbert. Your best 1 minute if you would.

Ms. HARBERT. Congratulations on this hearing, we need more deliberate discussion on this very complex issue. It is important to recognize there is no single solution. There is no short-term fix. There is no panacea. So we in partnership with the American people have to address this in a very comprehensive way and a very urgent manner. We need a short-term, medium-term and long-term view on this. We have to remove restrictions on our resources here at home. We have to get serious about investing in our research and development. We have to invest in the next generation of leaders, scientists, engineers, so we can continue to have the intellectual feedstock that we need to sustain our competitiveness over the long term.

We actually have to make available the fiscal resources so that we actually incentivize the investments to be made in this country rather than in other countries. We need to open up ourselves for that investment in innovation in this country that we are not doing. We have to make sure that we have predictability, regulatory predictability, that we have fiscal predictability so the business community can make long-term capital investments in these very complex capital intensive projects in this country.

I am an optimist. We have a lot of venture capital money going into this. We need to sustain that so we can actually win this very, very big challenge.

The CHAIRMAN. Thank you, Ms. Harbert.

Mr. Manuel.

Mr. MANUEL. Well, I will take off on the optimism point. I think I am optimistic as well, but we do urge this Congress to really lead America towards a clean energy future by continuing to push energy efficiency programs, renewable energy, clean energy programs and fuel economy. We think ultimately that is the way the country really needs to go and do so quickly. We didn't learn our lesson from the past, and we continue to think we could drill our way out of the problem. And we just encourage Congress to lead us in the opposite direction that is more sustainable, that is cleaner for our environment, and reverses global warming gas emissions, and puts America to work in the clean energy economy that is good for our environment, and good for the country, and good for the planet.

The CHAIRMAN. Thank you, Mr. Manuel, very much.

Ms. JAFFE. So my 1-minute message is that foreign oil producers and countries whose interests are not the same as the United States are exploiting our lack of political will to gain power at the expense of U.S. national security and our flexibility in international relations.

There are many short-term things we can do. The Senate has addressed some of those things, but when push comes to shove, given the challenges that are facing us both in energy and climate, we

need a serious research and development program in this country both in private industry and in government.

We need to not only think about how we tax corporations to get them to spend more on R&D. We need to think about how we raise public funds to spend more on R&D.

And let me end with an optimistic note. I work with 81 nanotechnologists. They are working on solar energy, they are working on better transmission systems, they are working on wind power. All kinds of very interesting technologies that I agree, had we said we were going to the Moon but only put in $100 million to spend to do that, we would never have got there. And so we need to think about how we are going to come up with the money to do the kind of R&D we need. We have the people and we have the will.

The CHAIRMAN. We thank you very much. And we know you are from Rice University in Houston, and the same way that we want you to say Houston, we have a problem and that was the space program, I think we can say the same thing now about our energy program. We thank you for being here.

Mr. Sieminski.

Mr. SIEMINSKI. Thank you. Just two points, there have been tons of research done and investigations already underway that have shown that the futures markets are not being manipulated. And so what I would suggest as a first recommendation is that we be very careful about taking steps immediately to curtail trading activity when what we really need is to cast light on the so-called dark market. So let's get the information first and then act rather than the other way around.

Second point is I really feel that direct controls on prices or profits are going to give you the wrong answers to the crisis that we are facing now. Unfortunately and painfully, the high prices are actually what is encouraging solar and wind and alternatives in the automobile industry and elsewhere in biofuels, both cellulosic and everything else. So let's bear the pain for a bit and see if we can't let these alternatives come out because of that.

Thank you.

The CHAIRMAN. And Mr. Caruso.

Mr. CARUSO. This is a problem that has been created in some ways by good news, and that is global economic growth has been very strong. We need to sustain that growth by meeting these needs through using energy more efficiently definitely, more economic, environmentally consciously, but also to develop all forms of energy resources. There is no single solution, as a number of our panelists have said. So we need to facilitate investment in all forms of energy and research and development and innovation, as has been mentioned.

This is not a short-term solution. We need to recognize this is a large-scale, long-term solution and it is going to take time.

The CHAIRMAN. Thank you, Mr. Caruso, very much. And we thank each of our witnesses.

This is a very important hearing. It is a very timely hearing, because it really goes to the question of where are we today and what do we have to do in order to avoid the most catastrophic consequences of this huge amount of high priced oil that we are importing from around the world. If we do not have a plan, then

clearly there is going to be an incredible price that our economy is going to have to pay.

So whether we are talking about using the Strategic Petroleum Reserve as a weapon against the speculators, against the manipulators, we have to do that. And President Bush has refused to do that.

Whether it is ensuring that the CFTC, the Commodities Futures Trading Commission, looks in at these dark markets, finds out what is going on with regard to the speculators and with regard to the manipulators, we have to do that. But the Bush administration thus far has kept hands off this very critical part of the story and the impact that it is having upon these price increases.

And going forward long term, we have to have accurate projections, because much of what goes on inside the Federal Government, much of what happens in the private sector is dependent upon the long-term projections of the Bush administration at this time and its Energy Information Administration.

What we are seeing over the last 5 or 6 years is that there has basically been about a $0.50 lag between what the administration says the price of gasoline is going to be and then what it winds up being in year after year. And that it has a tremendous impact not only upon consumers, but upon what the mandates that we would then impose upon especially the automotive industry to increase their fuel economy standards.

We again put 70 percent of all the oil we consume in America into gasoline tanks and we only have 2 percent of the oil in the world. That is our weakness. Now our strength is technology. And that is the weakness of the Middle East, that is their weakness. So if we don't use our technology, based upon what is a realistic assessment of what the long-term price of oil is going to be, then we are ultimately going to be subservient to the geopolitical whims of the Middle East.

By the way, when President Bush went to Saudi Arabia just 3 weeks ago and asked them to produce more oil that we could consume in the United States, that is a pretty sad moment in our history. But what was even sadder is that after the Saudi Arabians said that they would not produce more oil, they then asked us to provide them with nuclear power plants for Saudi Arabia, and Condoleezza Rice and President Bush said yes to that request. Now of all the countries in the world that need nuclear power and all the nuclear equipment and the materials that go with it, Saudi Arabia is the bottom of that list. They have more oil, more gas, more solar, more wind in combination than any other country in the world. And they have a very small population. Why would the Bush administration be agreeing to a deal that will have us sell nuclear power plants into Saudi Arabia, where Iran, Iraq, North Korea and all those nuclear power plants and their dual use purpose for nuclear bomb programs continue to haunt us?

That is a sad state of affairs for us. It is a very sad state of affairs and very dangerous. It will get us even more deeply in trouble in the Middle East, 10 years and 20 years from now. And so it is time for the Bush administration to get more realistic.

The energy administration, the Department of Energy that is, the Bush administration is projecting $2.26 gasoline by 2016, $2.51

for a gallon of gasoline by 2030. It is completely unrealistic. It is off the mark and off the point as every other projection that has been made in this decade, and it as a result will diminish our ability to improve our technologies so that we can tell the Middle East that we don't need their oil any more than we need their sand. And right now we still cannot deliver that message because we are operating in a delusory environment where the Bush administration is not getting real with what is happening.

This is no longer the OPEC people deliberately saying no more oil. It is no longer the Shah of Iran falling. This is now structurally the Indians and the Chinese and others who are going to consume more oil as each year goes by, and we have to change the technologies and our relationship to technology in our country. And because of the Bush administration, the agency responsible for determining how efficient our automobiles have to be in 2015, 2020 and 2030, they are going to be able to set standards at 5, 6, 7 miles per gallon lower than where they should be.

By the way, the legislation which we passed in December, the Democrats in the first year after we came back into power, the increases from 25 to 35 miles per gallon, the fuel economy of the vehicles which we drive by 2020, that backs out the equivalent of all of the oil which we import on a daily basis from the Persian Gulf. That is the difference a change in technology can make. But you have to have realistic data because now the Bush administration's Department of Transportation is going to implement the standards that are put in place pursuant to that law which we passed in December. And so all of this is interrelated, no question about it.

When you are talking about oil, you are talking about transportation, because that is where we put it. This is again very central to the dilemma which we have. The Democrats came back in after being out for 12 years, it is the first thing we did. But the Bush administration had plenty of opportunity in their first 6 years to put those standards on the books. The Republican Congress had every opportunity to improve the fuel economy standards of our vehicles. They never did it.

And so as we go forward, we have to think of this as an opportunity to create a new generation of jobs, a new economy in our country. Green collar jobs, yes, but they are really the blue collar jobs of the past, the blue collar power. Building the wind mill, the solar, the new technologies that will slowly, but surely wean us away from this incredible mess that the Middle East is now and is very likely to become even worse in the years ahead.

We thank all of you for your testimony here today. It is very helpful to us, because it is going to help us to begin to chart a course where we help the American consumer to stop being tipped upside down at the gas pump and having money shaken out of their pockets every single time they refill. Thank you so much.

[Whereupon, at 12:35 p.m., the committee was adjourned.]

**Department of Energy**
Washington, DC 20585

February 9, 2009

The Honorable Edward J. Markey
Chairman
Committee on Energy Independence
and Global Warming
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On June 11, 2008, Guy Caruso, Administrator, Energy Information Administration testified regarding: "The Future of Oil."

Enclosed are the answers to nine questions that were submitted by the Committee to complete the hearing record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, at (202) 586-2031.

Sincerely,

Betty A. Nolan
Senior Advisor
Congressional and Intergovernmental
Affairs

Enclosures

Printed with soy ink on recycled paper

**QUESTIONS FROM REPRESENTATIVE MARKEY**

Q1 Last year's National Petroleum Council report on energy supply and demand included comparison charts of multiple forecasts. EIA's projections for liquids supplies seemed to be closer to the top of the range of projections. Is EIA too optimistic about the growth in liquids supplies?

A1 We do not believe that our projections are unduly optimistic for total liquids supplies. In EIA's latest assessment of world liquids supplies, published in the *International Energy Outlook 2008* (*IEO2008*), total liquids production increases from about 84.3 million barrels per day in 2005 to 112.5 million barrels per day in 2030 on an oil-equivalent basis in the reference case and to 99.3 million barrels per day in the high price case. EIA carefully considered resource availability in all long-term country-level projections, the aggregation of which gives the total world production projection. These projections are physically achievable and can be supported with available resources beyond 2030.

EIA's long-term assessment of world liquids supplies considers four key factors: 1) the growth in world liquids demand; 2) the growth in non-OPEC supply of conventional liquids; 3) OPEC production behavior; and 4) the growth in unconventional liquids supply. In the *IEO2008* reference case, increasing volumes of conventional liquids (crude oil and lease condensate, natural gas plant liquids, and refinery gain) are anticipated from both OPEC and non-OPEC producers. In addition, unconventional supplies (biofuels, oil sands, extra-heavy oil, coal-to-liquids, and gas-to-liquids) are increasingly competitive. In the *IEO2008* reference case, unconventional resources account for nearly 9 percent of total world liquids supplies in 2030.

The reference case assumes that OPEC producers will choose to maintain their market share of world liquids supply, and that OPEC member countries will invest in

incremental production capacity so that their conventional oil production represents approximately 40 percent of total global liquids production throughout the projection period. Increasing volumes of conventional liquids (crude oil and lease condensate, natural gas plant liquids, and refinery gain) from OPEC members contribute 12.4 million barrels per day to the total increase in world liquids production, and conventional liquids supplies from non-OPEC countries add another 8.6 million barrels per day.

World production of unconventional resources, which totaled only 2.5 million barrels per day in 2005, increases to 9.7 million barrels per day in 2030 in the reference case, accounting for 9 percent of total world liquids supply in 2030 on an oil-equivalent basis. Biofuels, including ethanol and biodiesel, will be an increasingly important source of unconventional liquids supplies, largely because of the growth in U.S. and Brazilian biofuels production. In the *IEO2008* reference case, the United States accounts for nearly one-half of the rise in world biofuels production, at 1.2 million barrels per day in 2030.

Q2 What effect would cap and trade legislation have on unconventional crude oil development?

A2 In general, we believe carbon limitation programs would have a disproportionately negative effect on unconventional crude oil supplies because the production processes associated with these fuels are more energy intensive than those associated with conventional oil production. This is especially true of coal-to-liquids, gas-to-liquids, and oil shale production. An important exception is in-situ oil sands production using Toe Heel Air Injection (where a fire is started underground and air is injected to keep it burning so that the heat melts the bitumen), because the carbon dioxide created during the process remains trapped underground. We expect that cap and trade legislation will result in increased use of carbon capture and sequestration (CCS) techniques, including injection into oil-bearing reservoirs. This practice would improve the profitability of enhanced oil recovery (EOR) as the CO2 injected would likely receive a sequestration allowance. This would lead to increased oil production; however, EIA categorizes all oil recovery from conventional oil reservoirs as conventional oil.

Q3 Some analysts have suggested that U.S. action to increase the domestic availability of oil in the short run through releasing supplies from the Strategic Petroleum Reserve, and in the long term, through opening areas currently restricted to oil exploration, would have an effect on the market disproportionate to the actual quantities of oil involved, by demonstrating to producing nations our resolve in lowering prices. Is there any substance to this argument?

A3 Holding all other factors constant, an increase in supply would lower oil prices. In the short run, since supply and demand are not very responsive to price changes, any drop in oil prices would likely be disproportionate to the volume of incremental supplies. However, a number of factors would likely be in play were strategic supplies to be made available, suggesting that the degree and duration of any price decline would be dependent on market conditions at the time.

For example, tight market conditions (like those seen last summer) would likely yield a somewhat larger price response for a Strategic Petroleum Reserve (SPR) release of a given size than is likely in weaker circumstances such as currently exist. Even under tight market conditions, the magnitude of the price decline would likely vary with the size of the release and the degree to which oil-exporting nations reduced their production in response to the SPR withdrawal. Furthermore, the price impact would likely depend on whether or not the oil withdrawn was to be replaced at a later date. If a replacement provision were included in the withdrawal program, any relaxation of market balances resultant from the release would be accompanied by a tightening of oil markets at the time the volumes released from the SPR were replaced. This highlights an important difference between SPR releases and increased production as a means of addressing concerns about tight oil markets.

Additionally, while the initial price impact of a release would likely be immediate because the volume would be made available in a relatively short time frame in a high demand location, nonetheless, the impact might not be sustained. As market fears were deflated, some bounce-back could occur as new factors emerged suggesting renewed supply tightness. That said, were the market to assume further use of the SPR was possible, any bounce-back could be dampened.

While tight oil market conditions existed in June (at the time of the hearing), U.S. and global markets have loosened dramatically since then, as evidenced by the more than decline in oil prices below $80 per barrel as of mid October. As noted, the generally weaker balance between supply and demand today suggests a smaller price impact would likely result from any SPR release in current circumstances, all else being equal. Nevertheless, certain aspects of a release into today's market environment may be worth noting.

Even prior to September's hurricanes, U.S. refiners were not running at capacity, largely due to very weak gasoline demand and to the lack of crude oil available at a price that would justify a higher operating rate given the price at which petroleum products could be sold. Surplus gasoline supply reduced gasoline margins, while, at the same time, diesel margins were high, reflecting unusually strong world demand for distillate fuels. U.S. refiners adjusted their yields away from gasoline toward distillate and produced record distillate volumes through August, in spite of running less crude oil.

In such circumstances, were increased availability of crude oil in the short run to cause crude oil prices to fall more rapidly than product prices, increased margins on gasoline

and distillate could create an incentive for refiners to run more crude oil and/or increase crude inventories. The placement of that additional crude oil at refinery locations could be beneficial over the winter months, especially if low U.S. imports continue to put downward pressure on currently low crude oil stocks.

As in the case of prior SPR releases, putting more crude oil into the United States is putting more crude oil into the world market. Some crude oil imports to the United States could be backed out, but not likely on a one-for-one basis. The United States still would likely use and/or store more crude oil than would otherwise be the case. Furthermore, if lighter, low-sulfur crude oils were backed out of the U.S. market, they would be available for European refiners to produce more distillate, thereby reducing the incentive for diesel exports from the United States, which have been high this year.

Finally as noted, considerable uncertainty exists regarding OPEC's reaction to a release, as well as the market's response to an OPEC reaction. OPEC's response could be determined by the nature of the release program. Generally, large sustained releases would appear more likely to lead to a cut in OPEC production that could counter some of the desired impact of an SPR release. It also is not clear how the market would respond to an OPEC cutback, which would increase surplus crude oil production capacity.

Turning to long-term supply issues, the world oil price impact of opening more areas of the United States to exploration would be determined on the international market based on long term supply and demand elasticities and the size of the increase in U.S. production.

EIA prepared an outer continental shelf (OCS) access case for its *Annual Energy Outlook 2007* (*AEO2007*). The OCS case examined the potential impacts of lifting the Federal restrictions on access to the OCS in the Pacific, the Atlantic, and the eastern Gulf of Mexico. The OCS case assumes that current moratoria to drilling in effect through FY 2008 were not reinstated, and that exploration and development of resources in those areas begins in 2012, which implies that production could not be expected to begin before 2017. Total domestic production of crude oil from 2012 through 2030 in the OCS case is projected to be 1.6 percent higher than in the *AEO2007* reference case and 3 percent higher in 2030 alone, at 5.6 million barrels per day. Because oil prices are determined on the international market, any impact on average wellhead prices is expected to be small.

Q4 Has the relationship between the market price of oil and new exploration, development, and production changed during the past four years of oil price increases?

A4 Exploration, development, and production (E&P) expenditures have increased significantly in the past four years as the price of oil has increased but they have not increased by the same amount as the increase in cash flow from operations. Companies that report on EIA's Financial Reporting System (FRS) survey have shown significant increases in cash flow from operations over the past four years as oil prices moved higher. E&P expenditures tend to follow changes in cash flow from operations, though often with a lag. In 2003 and 2004, E&P expenditures changed very little despite large increases in cash flow. Companies were hesitant to increase investment since they thought the rise in prices may be temporary. In 2005 and 2006, E&P expenditures increased significantly, even surpassing cash flow from operations in 2006. Expenditures in 2006 were higher, in part, due to some major acquisitions that took place that year. In 2007, however, cash flow from operations declined despite the rise in oil prices. Costs, for drilling services in particular, increased more than revenues. Although E&P expenditures in 2007 declined from the 2006 level, they remained considerably higher than in prior years. E&P expenditures have risen substantially in the past four years, but the difference between cash flow from operations and E&P expenditures has increased, with the exception of 2006. Reasons for this may include the speed that cash flow from operations has increased in these years and the time required to scale up operations and contract drilling services. Utilization rates in the drilling services industry have been very high and companies have had problems accessing rigs and personnel.

Q5 Is it likely that a decline in the price of oil could make investments in unconventional crude, coal-to-liquids infeasible in economic terms? If so, how much would the price of oil have to decline to make this happen?

A5 It is possible that a substantial drop in oil prices could make investments in unconventional liquids economically unattractive, since product revenues and operating margins are highly dependant on oil prices. In recent years, soaring construction costs have matched or exceeded oil price increases and cut into potential operating margins (expected product revenues minus production costs). Further, concerns over future greenhouse gas regulations serve to both delay potential projects and put projected operating margins at risk. Break-even oil prices for each unconventional technology are highly site-specific and dependant on such factors as type and quality of feedstock, product yields, tax rates, interest rates, and future environmental compliance costs. Excluding any future environmental compliance costs, oil shale using a conventional mining and retorting process needs an oil price in the $70 to $100 per barrel range to be feasible. A coal-to-liquids plant built without carbon capture and sequestration requires an oil price in the $39 to $75 per barrel range, depending on coal source.

Q6 After observing the futures price of oil on the NYMEX increase by over $17.50 in two days last week, is it likely the estimates of $150 to $200 per barrel oil by some financial institutions will be attained this summer? What would oil priced at those levels mean for the price of gasoline?

A6 At the time crude oil prices fluctuated between roughly $120 and $140 per barrel in June, EIA analysis indicated that $200 per barrel was unlikely to be attained at any point in 2008. While the June short-term forecast projected an average monthly peak price of $136 per barrel, a daily price of $150 was well within the forecast's uncertainty range, and crude oil prices did in fact reach the $145 level in mid July, subsequently falling back below $80 per barrel as of mid October. In explaining the rise in oil prices last summer, EIA pointed to limited spare crude oil production capacity, and continued strong growth in global demand despite high prices. The increase in oil product demand stemmed from non-Organization for Economic Cooperation and Development regions, with especially strong growth in China and India, where price subsidies cushioned consumers from rising prices. On the supply side, non-OPEC additions have been disappointing in recent years, leaving OPEC to cover growing demand, while future growth requires OPEC to increase production capacity, a change from the pattern of the past twenty years. Some analysts also cited the weak dollar and rising perceived geopolitical risks as contributing to rising prices during the early summer months.

Until September's hurricanes, gasoline margins during 2008 were relatively low, so gasoline price increases were relatively less than those seen in past times on a gasoline-price-increase-per-dollar-crude-oil-price increase basis – a point that can be readily seen by contrasting the 2008 gasoline price rise with the diesel price rise over the same summer period. As a result, while wholesale and retail gasoline prices moved to record highs, with the latter peaking at $4.11 per gallon in July, most of the increase can be

attributed to high crude prices. Had gasoline markets reflected the tightness seen in diesel markets last summer, retail gasoline prices would likely have been even higher in July.

Q7 To what extent would the current, and projected, tight oil market conditions be alleviated if emerging markets [sic] countries and oil producing nations refrain from subsidizing consumers' use of fuel?

A7 We believe that subsidies do increase consumer demand for fuels. The extent to which removing subsidies would reduce demand is, difficult to assess. While it is true that consumers who are shielded from the impact of high world oil prices have little incentive to reduce their demand, many of the countries where subsidies exist are also among the world's fastest-growing economies. In general, we would expect demand to be dampened by removing subsidies, but continued strong economic growth would still likely lead to overall increases in demand.

Many nations of the resource-rich Middle East subsidize fuels. In Iran, for example, gasoline prices average $0.42 per gallon, and consumption has increased by an estimated 9 percent per year since 2004. Many of the world's major oil-exporting nations are in the Middle East, and as world oil prices have continued to rise, so too have their per-capita incomes. Strong economic growth coupled with a young and fast-growing population have meant that, as standards of living have improved, demand for personal motorization has increased, and many nations of the region have seen double-digit growth in automobile sales in recent years. With projected world economic growth in the International *Energy Outlook 2008*of about 4.0 percent per year anticipated for the 2005 to 2030 period, growing per capita income would most likely still lead to overall increases in consumer demand despite the removal of subsidies.

The *International Energy Outlook 2008*, projects China and India as the world's fastest-growing economies and account for the largest increase in world liquids demand between 2005 and 2030. Both countries also provide their consumers with subsidized energy

sources and neither is expected to greatly expand their liquids production capabilities over the projection period. It may be increasingly difficult to maintain fuel subsidies if world oil prices remain high in the future. However, with projected GDP growth of 6.4 percent per year in China and 5.8 percent per year in India, overall growth is likely despite the removal of subsidies.

The growth in liquids demand among developing economies that are not growing as strongly as China and India might experience overall decreases in demand for liquid fuels with the removal of subsidies. For instance, Indonesia has been forced to increase fuel prices (by 29 percent in May 2008), but the government still estimates that their subsidies for electricity and other energy could account for as much as one-third of the country's budget in 2009. Retaining this level of support for subsidies is not sustainable in the long-term.

Q8 Have the EIA's projections in the Annual Energy Outlook been altered in any way to take account of the growing suspicion among market analysts that portfolio investment in the oil futures market is driving the increases in the price of oil over the past year? If so, how? If not, why?

A8 EIA's view is that while recent developments in crude oil markets are primarily explained by oil market fundamentals, other factors, including activity in the financial markets for oil derivatives, can have some short-term impact on markets. However, trading in oil derivatives is much less likely to play a significant role in determining long-run prices. While we did incorporate forward prices in the world price assumptions found in the *Annual Energy Outlook 2008* (*AEO2008*), the horizon of the futures market currently ends well before 2020, let alone 2030—the end of the AEO projection period.

Q9 Is the U.S. refinery industry taking appropriate steps to assure that refining capacity will match the proportion of sweet and sour crude that will be available? The spike in diesel fuels has been attributed in part to the inability of some refineries to adjust their production between gasoline and diesel. What can be done to improve refiners' flexibility?

A9 U.S refiners can currently handle more heavy and sour crude oil than refiners in any other region of the world, so they are more than able to deal with the proportion of light sweet crude oil available. Also U.S. refiners are planning to further increase their ability to handle heavy sour crude oils. It should, however, be noted that, as an emergency reserve, light sweet crude oil has added value because it can be processed by most refiners. The global distillate market has been tight and the relative margins for gasoline and diesel reflect the fact that many world refiners cannot readily increase diesel yields. However, U.S. refiners have demonstrated that they can increase distillate refinery yields in the short term and can increase them further, if distillate margins remain significantly higher than gasoline margins in world markets. The U.S. has met domestic diesel demand this year and increased exports to help meet increased demand in other markets. Longer term there are a number of major refinery expansion projects with the goal of large distillate (diesel and jet) production increases.

Dear Mr. Sieminski,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky

Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming
(202)225-4012
Aliya.Brodsky@mail.house.gov

1. How do we make a case to foreign governments to phase out price controls in a market that might be described as "tight" but has yet to be experiencing inadequate supply to meet demand?

Work with the World Bank and NGOs such as the Alliance to Save Energy to point out that most economists believe that market prices result in the most efficient allocation of capital and thus promote the highest level of economic growth and well-being for all citizens.

2. In the face of strong expectations about demand continuing to increase in other parts of the world, how much would demand for oil have to fall in the United States to begin to soften prices, or at least stem their rise?

Any decline in the US or anywhere else cumulatively helps to balance the markets and thus soften prices. It is wrong to assume that taking small steps to add supply or reduce demand do not matter. The US should take those steps that make economic sense regardless of what any other country does.

3. We generally expect when prices rise and it appears that they will remain high, that commodity supplies increase. You suggest that the industry must "work very hard" to maintain current production, much less growing demand. At prices of $120/barrel or more, aren't the funds available to invest in finding new fields and using advanced

recovery technologies for existing fields? Are other factors preventing oil companies from developing new fields and using new technology for current fields?

The biggest problem that the companies have is getting access to the areas that have the greatest resource potential. This is true both in the US (access to federal land in Alaska, the western US, and the outer continental shelf) and globally (with access problems in countries like Mexico, the Middle East, Nigeria, Russia, etc.). The problems are "above ground" in a policy sense, and not "below ground" in terms of reserves or capital availability. The difficulty is matching up the capital the companies have with places they can deploy it.

4. After the oil shocks of the 1970's, the amount of energy consumed to achieve economic growth declined in the United States. Has anyone tried to measure what the level of energy intensities are in Asia and other developing countries?

Yes. DOE/EIA has done that. www.doe.eia.gov

5. Among the forces cited as contributing to high prices for crude at the moment are the value of the dollar, perceptions of demand, and spare production capacity. Which of those factors do you think price is the most sensitive to at the moment?

You have permission to add this to the record.

6. You observe that we keep seeing that "peak production" can be increased and the moment of peak production can be delayed. What are the different assumptions made in you conclusion and by those who are arguing that peak production is upon us?

This is a complicated debate, but the key to it is this:

"Peak Oil" Theory: (1) requires a "final" estimate of the level of ultimately recoverable reserves (URR)... but URR estimates have been rising for over a century and recent evidence suggests they are still rising; and (2) assumes that once half of the world's reserves have been used up, production must fall... but since the URR keeps rising, that point keeps moving ahead in time. Peak oil models do not account for changes in technology, costs, prices, or politics - all of which can have a huge impact on the actual shape of the production curve. Peak oil models assume a symmetric production curve, but much evidence points to production profiles that have "fat tails" to the right. In my view, increases in subsoil knowledge, the spread of technological progress, and the advancement of drilling – along with political decisions and oil price changes – have shown time and again that peak production can be increased and "peak decline" delayed.

7. In your testimony, you state, "Policy decisions corn ethanol as an example of unintended consequences." What do you mean by unintended consequences?

I believe that the sponsors of the massive subsidies for corn ethanol did not intend to set off a upward spiral in global food costs. But devoting more than 1/3 of the US corn crop to ethanol has played a key role in the food price rise. This is an unintended consequence.

October 9, 2008
TO: Select Committee on Energy Independence and Global Warming
FROM: Athan Manuel
RE: Follow up questions to testimony on the Future of Oil

**1. Are the current conditions in the oil market, low excess capacity and high prices, a precursor to the conditions predicted by "Peak Oil" theorist, or are they, rather, the result of strong market fundamentals in conjunction with political and financial conditions?**

There is no consensus on Peak Oil theory. What we do know is the United States contains at best four percent of the world's known oil reserves, and that as a nation we hit our peak years ago.

Devotees of the Peak Oil theory believe we that the world has already reached it, or shortly will. The Association for the Study of Peak Oil and Gas (ASPO) predicted this past January that world supply would peak in 2010. Famed oilman T. Boone Pickens testified on June 17, 2008 that we had already peaked at 85 million barrels a day globally. A 2007 KPMG survey found that 60 percent of oil executives thought that the trend of declining reserves was irreversible, and this survey was before skyrocketing prices.

In general, the optimistic predictions associated with Peak Oil put oil growth plateauing around 2020 (but once again, these predictions avert the conditions associated with peak oil by shifting demand to renewables through investments).

The Sierra Club feels that the most important thing we can do – to combat global warming, protect our beaches and coastal economies, and make peak oil irrelevant – is to reduce our demand for fossil fuels and dramatically increase our use of renewables and other clean energy alternatives.

**2. The structure of the US economy, and much of the value it creates, is based on low cost liquid fuels. How large would the income and wealth effects be of transforming the economy to one based on renewable fuels?**

The United States consumed 20.7 million barrels per day in 2007, 58 percent of which was imported. Oil prices have been highly volatile as of late but at $100 per barrel, that would be around $440 billion dollars leaving our country. At $130 per barrel it would be $570 billion. That's an enormous amount of capital flight that is not going toward developing clean, renewable and domestic sources of energy. Unless we decrease demand, that capital flight is only going to increase as economically recoverable reserves dwindle.

One of two things must be done: 1) begin to replace this liquid fuel with domestic renewable alternatives, thus keeping large amounts of capital within our borders, or; 2) develop a renewable manufacturing base that will not only decrease the amount of capital we send abroad but actually increase our gains by allowing us to export more energy and energy infrastructure.

The Sierra Club thinks this shift would benefit the environment but also reenergize our economy. The externalities our country now faces with climate change are unpredictable, to say the least, and likely to cost us vast amounts of money in the future. The Pew Center estimates anywhere from a low of .6 percent reduction in GDP to a high of 3 percent reduction due to climate change alone. To switch to clean energy now will lessen that burden in the future.

A new green jobs report issued by the U.S. Conference of Mayors says that over the next 3 decades, the 'green jobs' sector will create more than 4 million jobs. The report, "Capturing the Energy Opportunity: Creating a Low-Carbon Economy," was released by the Center for American Progress.

**3. Should the United States encourage other nations to expand their production of oil if we are unwilling to expand our own production through opening area currently unavailable to oil exploration and development?**

No. Climate change is a global challenge that requires global cooperation. At this point, no nation should be expanding their production into areas currently off limits to drilling. The Sierra Club advocates the increased investment in renewables partially to help our economy but partially to set a standard for the world. We cannot properly lead by example, and we cannot be a nation committed to social justice and climate equity, if we advocate for oil exploration overseas. The more we drive down demand for oil domestically and create demand for newer, cleaner sources, the greater that demand will grow globally.

**4. Cuba and China are planning to develop oil resources off the coast of Florida and Brazil has announced major offshore oil discoveries. If the United States continues to restrict drilling offshore, will the offshore activities of other nations create far worse environmental damage than American companies being regulated by American law?**

Regarding Cuba and China, there is absolutely no proof of these plans. This oft-repeated assertion has become an urban myth perpetuated by drilling advocates. Again, we do not think drilling anywhere or everywhere is the answer to America's or our planet's energy problems. Finally, are drilling advocates seriously urging the United States to pursue an energy policy modeled on the ones in place in Communist and totalitarian states such as China and Cuba? The Sierra Club is confident that our nation can innovate our way out of this problem, and solve our short-term and long-term energy challenges with American ingenuity, creativity and hard work.

Climate change is a global challenge that requires global cooperation. At this point, no nation should be expanding their production into areas currently off limits to drilling. Finally, if other nations do allow drilling in new areas, we expect western oil companies to abide by the environmental laws of the nations in which they are incorporated and to also use best practices no matter where they operate.

**5. What measures should the United States and other countries take against China and other emerging nations that exhibit high rates of growth of carbon emissions, oil demand, coal fired electricity generation, and other environmentally costly generating activities?**

The United States cannot legitimately ask another country to reduce its carbon emissions and stop building coal fired power plants until it makes those same changes here. The Sierra Club is confident that our nation can innovate our way out of this problem, and solve our short-term and long-term energy challenges with American ingenuity, creativity and hard work. We should be working to reduce emissions domestically while developing technologies that can be implemented and shared abroad to help developing countries in their own transition. The global transition to clean energy must be one of collaborative diplomacy and technology-transfers, not heavy-handed ultimatums.

**6. How long would the transition to an alternative, renewable energy future take? How much would it cost?**

The transition will involve a rearranging of subsidies and investments but, over the long term, those investments will easily pay for themselves. Google.org, one of the world's most successful companies, recently released an energy roadmap proposal entitled "Clean Energy 2030." This document outlines an

ambitious plan that will move us significantly closer to the necessary carbon dioxide emissions reduction of 80 percent by 2050 in order to combat catastrophic climate change. Over the next 22 years, the proposal lays out a timeline that will allow us to reduce:

- Fossil fuel-based electricity generation by 88 percent
- Vehicle oil consumption by 38 percent
- Dependence on imported oil (currently 10 million barrels per day) by 33 percent
- Electricity-sector CO2 emissions by 95 percent
- Personal vehicle sector CO2 emissions by 38 percent
- US CO2 emissions overall by 48 percent (40 percent from today's CO2 emission level)

A very notable aspect of this plan is how beneficial it will be for the economy. The overall investment up until 2030 will be about $4.4 trillion in 2008 dollars. The savings over that same period, however, will be about $5.4 trillion. This proposal, then, not only helps us move past our dangerous addiction to climate-warming fossil fuels, but it boosts our economy an extra $1 trillion.

The industrial mobilization brought about by World War II made America the economic world power that, for a time, generated half of the economic output of the entire planet. We now face a war against climate change and a war against outmoded and dwindling energy resources. The stakes are higher than they have ever been and we know that the United States has the ability to fight this war with our economic fight and come out victorious.

The Sierra Club is confident that we can innovate our way out of this problem, and solve our nation's short-term and long-term energy challenges with American ingenuity, creativity and hard work.

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Dear Ms. Harbert,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky

Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming
(202)225-4012
Aliya.Brodsky@mail.house.gov

1. **What action do you believe is necessary to ensure an affordable and reliable energy future in the United States?**

I firmly believe that securing America's energy future is one of the most fundamental challenges for the 21st century. Access to affordable and reliable energy is essential for the United States, as well as the global community, to grow our economy and keep us strong at home and abroad.

Energy policy has become more topical recently as energy prices have risen. However, with sporadic exception, a focus on implementing a comprehensive energy policy has largely been treated as a secondary issue in the United States. Both the Executive and Legislative branches of the federal government must institute and implement a long-term energy policy that is durable, predictable, and ensures availability of affordable, reliable, and clean energy. The Institute for 21st Century has recently issued a *Blueprint for Securing America's Energy Future* (Blueprint) which lays out a policy path that if wholly adopted, will do exactly that.

Our Blueprint, and its recommendations, constitutes a comprehensive energy policy that will ensure the United States is on a path to a secure energy future. Specifically, the Blueprint calls for a more concentrated effort on increasing the efficiency of how we produce and consume energy. It increases energy supplies by expanding the use of all sources - traditional, renewable, and alternative alike. It also creates an environment where the power of American ingenuity can be harnessed and efficiently brought to market to ensure diversity of supply as well as competition to benefit consumers. The Blueprint also ensures that the country focuses on deploying technologies that will allow us to produce and consume energy more cleanly. Additionally, we outline how to bolster our energy infrastructure to ensure reliability and capacity to handle the projected increases in demand and new sources of supply. The Blueprint also analyzes the long term impact of not currently having enough qualified professionals and skilled laborers to build, operate, and maintain the energy infrastructure necessary to secure our energy future, and steps we must take to address this critical challenge to our innovation-based economy and our complex energy system. Finally, our Blueprint recognizes that energy policy can not exist in a domestic vacuum. Energy is a global enterprise and U.S. energy policy must ensure we maintain our leadership and competitiveness in the global market.

Too often attempts at formulating energy policy are hampered by parochial interests and exigent circumstances. The ways we produce and consume energy will not change quickly, and any credible attempt at implementing a new bold energy policy will require strong bipartisan leadership and enduring commitment. Efforts to implement policies to the contrary are selling the country short and will not result in meaningful changes necessary to ensure our energy future.

**2. How many barrels of oil-equivalent could be extracted from the OCS using environmentally responsible technology?**

Nearly 85% of the Outer Continental Shelf has been put off limits for exploration and production for almost three decades. The U.S. Minerals Management Service (MMS) estimates that the OCS contains 86 billion barrels of undiscovered recoverable oil. This estimate includes approximately 18 billion barrels of oil that was inaccessible until the expiration of the legislative moratorium September 30, 2008. The 18 billion barrels estimate is widely considered conservative and significantly under-representative of actual amount of recoverable oil. These estimates were done decades ago and technology has advanced significantly since then. With no incentive for exploration, no new estimates have been undertaken.

In 1974 the U.S. Geological Survey estimated the Gulf of Mexico contained 50 trillion cubic feet (tcf) of recoverable natural gas. As of 2005 we have already produced over 160 tcf of natural gas and MMS estimated in 2003 there is another 230 tcf of recoverable natural gas to produce. This proves the point that the more an area is explored, the more legitimate our resource estimate will be.

Now that more of the OCS can be explored using the latest seismic modeling available to industry, it is expected that proven reserves will increase significantly. Moreover, as production begins with environmentally responsible technology available today and over time, technology continues to improve, proven resources will increase even more.

**3. In your view, what can Congress do in the immediate term to alleviate the pressure of record high oil and gas prices?**

Congress should be truthful with the American people and acknowledge that there is very little the federal government can do to alleviate high fuel prices in the "immediate term." Moreover, Congress must also acknowledge that past and current policies of the federal government have acted to contribute to these higher prices.

Instead of attempting to formulate knee-jerk energy policy to impact the near-term status quo, Congress needs to understand the country's energy picture, agree on an energy vision for the future and implement predictable and durable policies that promote investment to get us to that point. The Institute for 21st Century has recently issued a *Blueprint for Securing America's Energy Future* (Blueprint) which defines the situation, outlines a new vision and presents policy recommendations that, if implemented, will put the nation on a path to a more secure energy future.

There are many actions that must be taken now to ensure we do have access to more, and more diverse sources of energy, and that we produce and consume energy more efficiently and cleanly. The Congress has been appropriating less funding for many years in energy R&D than they did following the 1970s oil embargo. It's time to develop the private-public relationships needed to develop technology solutions and get them out into the marketplace.

**4. Since securing energy is a global problem, what responsibility do you think China and India have to significantly invest in research and development, develop and commercialize clean energy technology, and reduce greenhouse gas emissions? Should the U.S. be bearing the brunt of this?**

At roughly $4 billion each, the U.S. and Japan are the largest government supporters of clean energy technology R&D, far surpassing contributions from other governments, including those from the European Union and the large emerging economies, such as China and India. Given the energy challenges that face the globe, it is important that these other countries face up to their responsibilities and increase their expenditures on clean energy R&D. Government spending across the globe on energy R&D has declined significantly since the 1970s. We must recognize, however, that government is not well-suited to pick winners and losers and that ultimately the private sector will lead us to a more secure energy future.

The Energy Institute's *Blueprint for Securing America's Energy Future* proposes increasing energy R&D spending to twice the current level within five years to accelerate the development of a broad suite of technologies—such as carbon capture and storage, next generation nuclear, advanced biofuels, energy efficiency, renewable power—that can provide energy security and contribute to reducing greenhouse gas emissions. We must also encourage other countries to increase their funding for R&D and looking for opportunities to partner, especially in areas of pre-competitive R&D.

We must recognize the aspirations of people everywhere for economic growth, abundant and affordable energy, an improved quality of life, and a clean environment. The International Energy Agency estimates that over 1.5 billion people lack access to modern energy services. Providing these energy services is a priority for many governments around the world to lift people out of poverty.

Significant transitions are occurring and will continue in world energy markets, especially in non-Organization of Economic Cooperation and Development (OECD) countries. This has

changed the structure of energy markets dramatically. By 2030, global energy demand could be as much as 50% higher than in 2005, with the vast majority of this growth—roughly three quarters—coming from developing countries. Developing countries also make up the largest projected source of future global greenhouse gas emissions, especially the large emerging economies such as China and India. More than 80% of the increase in CO2 emissions from energy between 2005 and 2030 expected to come from developing countries. Therefore, to effectively reduce global emissions, any new international arrangement addressing climate change must include active participation from developing countries. In this regard, the Bali Roadmap that emerged from the United Nations Framework Convention on Climate Change talks in Indonesia in 2007 was a welcome development in that developing countries agreed to consider actions that are measurable, reportable, and verifiable.

Nevertheless, the fact is that many countries—both developed and developing—find it difficult to reconcile addressing climate change and meeting increasing energy demand at an acceptable price. We should look to capitalize on significant opportunities to work together with developed and developing countries alike to tackle the common problems of energy security, economic growth, air pollution, and climate change. In particular, voluntary sectoral partnerships should be pursued to enhance the effectiveness of emissions reduction policies and to engage emerging economies on a lower emission path. Innovative financing and free trade in clean energy technologies, goods, and services also should be pursued vigorously, as should joint R&D of promising clean energy technologies. We must be equally clear that international or domestic climate policy should not be used as an excuse to erect barriers to free and open trade, or as a way to gain competitive advantage or redistribute wealth.

**5. What role do you envision nuclear power playing in our energy mix? With no nuclear plants built in 30 years, do you believe this trend will change and that nuclear power will play an increasing role in our energy mix?**

Nuclear energy is a clean, reliable, and affordable source of baseload electricity and must be a greater component of our energy portfolio in the future. The Energy Information Administration projects electricity demand to increase by as much as 30% by 2030. Concerns about climate change have led many policymakers in federal and state government to make electricity production from emission-free sources a higher priority. Nuclear power currently accounts for about 20% of electricity generated in the U.S., and nearly 75% of emission-free sources of electricity. Moreover, the 104 commercial nuclear reactors across the country operate in excess of 90% capacity, 24 hours a day, seven days a week.

If electricity generation is to keep pace with demand, ensuring America's economic competitiveness is not threatened, nuclear power must be expanded. To merely maintain a 20% share of the electricity generated, the U.S. will need to build at least 30 new reactors by 2030. While no new reactor has been licensed for construction in nearly 30 years, conditions are very favorable to see new reactors ordered and built. The current licensing process has not been tested, but the Department of Energy (DOE)'s Nuclear Power 2010 program, a 50-50 public-private cost share, has made industry confident enough to submit 16 combined construction and operating licenses for 25 new reactors to the Nuclear Regulatory Commission.

Nuclear reactors are capital intensive with construction estimates ranging from $6-$8 billion per reactor. The DOE loan guarantee program can significantly reduce the cost of capital and, therefore, reduce the price consumers pay for electricity produced from these new reactors. Enabling the utility to finance construction with a greater share of private debt, which is significantly cheaper than equity, will give industry the certainty needed to make these robust investments. In fact, the loan guarantee program will not require any

appropriations of tax payer dollars, beyond initial funding to initiate the office. This program should be expanded for nuclear power.

While the technology these new reactors employ presents little risk, the regulatory and legal processes do create considerable risks of economically harmful delays in operation. The standby support program authorized in the Energy Policy Act of 2005 effectively creates an insurance against regulatory or legal delays beyond the control of the plant's sponsor. This important tool makes it more likely that a utility board of directors will decide to build a facility that may account for nearly a quarter of its entire balance sheet.

With these important policy and economic tools in place, I do believe that nuclear power will play an increasing role in the coming decades.

**6. What effects do you think proposed climate change legislation will have on American jobs and the U.S. economy?**

There can be no doubt that climate change legislation, if enacted without regard to the readiness of technology to meet purported targets or absent a global approach would be extremely harmful to the U.S. economy and send industries and jobs—and the greenhouse gases that go with them—to other countries not subject to the same restrictions. The Environmental Protection Agency, Energy Information Administration, and many industry and other groups have detailed these economic impacts to our economy.

Since my appearance before the Committee, the U.S. Chamber of Commerce's Institute for 21st Century Energy has issued its *Blueprint for Securing America's Energy Future*, which provides a broad-based approach to ensuring our energy security. Climate change should be part of, but not the primary driver of, a comprehensive energy security plan that emphasizes getting new advanced technologies out into the marketplace—both here and abroad. Solving our energy challenges through diversifying energy supplies to include nuclear, renewables and clean coal, for example, will contribute significantly to emission reductions.

The pursuit of greenhouse gas emissions (GHG) reductions should be integrated into efforts to increase our energy security and sustain economic growth. Meeting our energy security challenge—through greater energy efficiency and conservation, diversification of supply, and application of advanced technologies—can complement efforts to reduce GHG emissions. Nevertheless, we cannot ignore the tensions that do exist between energy security and climate change policies. While fuel switching from coal to natural gas in the power sector can lead to greenhouse gas reductions, for example, it is appropriate to ask what the cost impact would be and what the implications would be for our long-term energy security.

It is also important that we take stock of existing trends in GHG emissions and existing climate policies and regulations. U.S. net total GHG emissions today stand at about 14% above their level in 1990. Over the 1990s, net emissions grew 17 %; but, from 2000 to 2006,

net emissions declined about 3%. Moreover, with the enactment of the Energy Policy Act of 2005, Energy Independence and Security Act of 2007, and the recent extension of tax credits for renewable energy technologies, the climate policy space already has been populated with an array of different tools, programs, and mandates that promise to limit emissions even further into the future.

Moreover, climate policies that get ahead of the technology will not work and will be extremely costly in terms of lost productivity and lost jobs. We believe a doubling of technology R&D will be needed to lower the costs and raise the performance of a broad suite of technology options for a clean and prosperous America.

Balancing these and other issues cannot take place through different, unrelated administrative processes using statutes and authorities, such as the Clean Air Act, Endangered Species Act, National Environmental Policy Act, and Clean Water Act, that were not designed for, and are ill suited to, address the complexities of reducing GHG emissions. The misuse of these statutes compounds rather than alleviates the present ambiguity. Issues of such far-reaching economic impact need to be debated and resolved legislatively by the Congress and the President and in a way that incorporates our desire for abundant and clean energy. Consumers and businesses also need and expect a candid assessment of the costs and benefits of any legislative proposal.

**7. What energy resources will be necessary to meet the energy demands of the 21st century?**

All of them. We need the entire suite of energy sources and technologies if we are to provide the energy necessary to maintain our prosperity and lift billions of people across the globe out of poverty. Here at home we need to increase domestic oil and gas production, increase R&D and incentives for clean coal development and use, expedite the construction of nuclear power plants, invest in alternative fuels and renewable energy, provide a stable regulatory framework needed for energy investments, get serious about energy efficiency; and partner with, rather than penalize, industry. The real measure of our success in meeting growing demand and achieving energy security will not be whether a certain technology has achieved "X" percent of our generating capacity or a certain fuel has achieved a "Y" percent share of the transportation fuels market, but whether we have achieved a degree of energy flexibility characterized by vigorous competition among different technologies and fuels within and among different sectors. Right now, that degree of competition is not there, but with the proper policies, we can drive technology innovation and create a competitive energy marketplace that is good for consumers, good for business, and good for the environment.

**8. Do you believe that there is enough emphasis on investment taking place to develop necessary energy resources and infrastructure taking place today?**

Clearly, the answer is no, and just as clearly, it is the result of policies that prevent investment from going forward.

We have shut out large swaths of the U.S. to oil and gas exploration. Nuclear plants take nearly a decade to get licensed and built. The "on again-off again" nature of the tax credits for R&D and renewables stifles investments and makes planning difficult. Siting and permitting issues have slowed the construction and expansion of power plants, refineries, pipelines, and electricity transmission lines, and organized opposition has resulted in delayed and cancelled projects. As a consequence, our energy security and the resiliency of our entire national energy infrastructure—really a collection of many complex interdependent infrastructures—is at risk.

The energy business is a long lead-time, capital-intensive industry. Growing energy demand compels us to move forward immediately on projects that will take years to finance and complete. Lengthy, excessive, and unnecessary regulatory delays and roadblocks during a project will only increase costs that are ultimately passed on to consumers, prolong the current imbalance of supply and demand, and imperil our economic progress.

Energy infrastructure systems, including both generation and transmission, require massive amounts of new investment in the face of rising difficulty in locating, permitting, and building new infrastructure. Siting and building energy infrastructure projects in the United States is a very complex process with multiple layers of over-lapping jurisdictions. Construction of numerous electricity transmission lines, natural gas terminals, and wind projects has been abandoned as a result of frustration and the inability to get siting approval. It is increasingly clear that the time needed to make a decision to proceed, or to reach a decision not to proceed, with the siting and/or licensing of an energy or infrastructure project

simply takes too long. We need clear and streamlined regulatory and licensing processes to allow industry to make large capital commitments with confidence.

With passage of the Energy Policy Act of 2005 Congress recognized the urgent need to provide mechanisms to foster the siting and construction of crucial new electric transmission lines that have been stymied by inaction and regulatory delays at the state and local level. Section 1221 created a new authority for DOE to designate corridors of high transmission congestion that adversely affect consumers. Sponsors of transmission projects located in these corridors can petition the Federal Energy Regulatory Commission (FERC) to authorize construction in certain circumstances where state consideration of the project has been delayed. This mechanism does not relieve the project's sponsor from obtaining necessary environmental permits.

On October 2, 2007, in accordance with its authority, the Department of Energy (DOE) designated two such corridors as part of this process. Subsequently, several lawsuits have been filed against DOE attempting to overturn these designations even before FERC could consider any applications. These types of dilatory actions must be addressed if we are to see expanded energy infrastructure this country needs to continue its economic growth.

An even more direct mechanism to ensure needed interstate energy facilities can be constructed when needed is FERC's authority in Section 7 of the Natural Gas Act, which gives the FERC authority to approve and site natural gas pipelines. Other energy facilities in interstate commerce—for example, electric transmission facilities and pipelines for carbon sequestration and other purposes—should be able to benefit from similar authority.

The next administration and Congress must redouble efforts to achieve fair administrative and judicial processes that yield decisions, whether affirmative or negative, in a timely manner that also preserves reasonable opportunities for public participation and input.

29 September 2008

Deutsche Bank

# Crude Oil: Downside Risk From Demand

## Commodities Special

- **We believe oil demand is being constrained by rising prices and a deteriorating financial and economic environment.**
- **With global growth forecasts for 2009 slipping toward 3% from a year-ago consensus near 5%, we believe oil markets will remain loose.**
- **We have reduced our global oil demand growth forecast for 2009 to just under 0.5mmb/d while the consensus now stands closer to 0.9mmb/d.**
- **Current non-OPEC supply growth forecasts look for a rise of 0.8mmb/d for 2009 and an additional 0.7mmb/d of OPEC NGLs. We do not significantly disagree with this view.**
- **This suggests that the "call on OPEC" for 2009 could be 1.0mmb/d lower in 2009 than in 2008.**
- **In view of King Abdullah's comments concerning the adverse impacts of high oil prices made during the Riyadh producer/conference in June, we believe that Saudi Arabia will be reluctant to agree to production restraint as long as the global economy is decelerating.**
- **We have cut our 2009 oil price estimate to USD92.50/bbl and believe that crude oil prices will be under maximum downward pressure over the next two quarters.**
- **We stand by our 2010 oil price forecast of USD100/bbl, rising at USD5/year.**

Oil markets are being buffeted by a number of forces that have created unprecedented volatility in prices, including:

- Changing views of global GDP growth
- Shifting strength in the US dollar
- Financial market turbulence
- Gulf of Mexico hurricanes
- Geopolitical tensions.

Fundamentals have been tightened recently by hurricane activity in the US and continuing geopolitical problems in Nigeria, the Caspian region and elsewhere. However, looking into Q4 2008 and 2009 we believe world oil demand growth risks are now skewed to the downside in an environment where world GDP is set to grow by 3% or less. In 1998 and 2001, when world growth fell below 3%, OPEC needed to cut production significantly in an effort to rescue the oil price. With spare capacity lower now and costs of production (as well as OPEC government budgets) higher, we do not expect the same degree of pressure on oil prices in 2008-09 as seen in prior downturns, but we do expect a period of weakness that could drive prices toward USD85/bbl until the global economy regains solid footing.

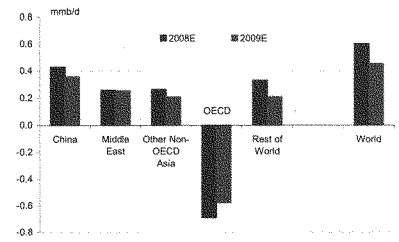
**World demand**

We believe that world oil demand is almost entirely a function of GDP growth at 1:1 ratio, including an annual offset of approximately 2% for technological progress (with this constant term larger during periods of very high prices). Baseline 2009 world GDP estimates from the IMF stood at 4.9% a year ago and were cut to 3.8% in April 2008. New figures from the IMF are due shortly, but we expect that their new estimate for 2009 will be cut again to circa 3%. In April, the IMF said that global GDP growth at or under 2% in 2009 was a very low probability, but the possibility of such an outcome is rising in our view. We believe recessions are underway in both Europe and Japan, and that US growth over next few quarters looks to be very flat at best.

Inflation has now emerged as an issue in both China and India, and downside growth risks are evident in these economies. DB's GDP forecast for China in 2009 has been reduced to 8.9% from a late 2007 estimate of 10%. With oil demand growth in China and the rest of Asia acting as a linchpin to global oil demand prospects, this is important. In the IEA's 2008 estimates, China represents 65% of global oil demand growth (0.45mmb/d out of 0.69mmb/d). In our 2009 forecast, China represents 80% of world oil demand growth (0.36mmb/d out of 0.45mmb/d net).

**IMPORTANT:** All prices are those current at the end of the previous trading session unless otherwise indicated. Prices are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is sourced from Deutsche Bank and subject companies. Deutsche Bank does and seeks to do business with companies covered in its research reports. Thus, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. Independent, third-party research (IR) on certain companies covered by DBSI's research is available to customers of DBSI in the United States at no cost. Customers can access this IR at http://gm.db.com, or call 1-877-208-6300 to request that a copy of the IR be sent to them. DISCLOSURES AND ANALYST CERTIFICATIONS ARE LOCATED IN APPENDIX 1.

**Figure 1: Oil demand growth by region**




*Source: IEA, DB Global Markets Research*

A rough rule of thumb to forecast oil demand growth in China is to multiply GDP growth by 0.6. In view of the importance of the outlook in China, we show individual forecasts for oil products demand in China for the period 2007-09E in Figure 2. We believe that gasoline and gas/diesel fuel consumption are most vulnerable to downward revision. Lower real urban income could result in lower vehicle sales and motor fuels consumption, and greater coal availability could result less demand for middle distillates in the power sector.

We expect total world demand to rise from 86.1mmb/d in 2007 to 86.7mmb/d in 2008 and 87.1mmb/d in 2009. As shown in Figure 1, oil demand growth is slower in 2009 than in 2008 since we expect that GDP growth will be lower and the lagged impacts from higher oil prices in 2007 and 2008 will be felt in 2009.

**Figure 2: China oil demand by products (kb/d)**

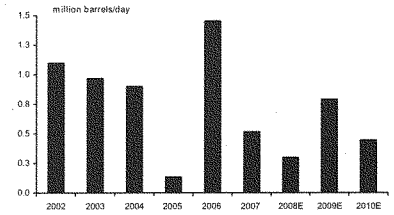
| | 2007 | 2008E | 2009E | Change in 2009 | |
|---|---|---|---|---|---|
| LPG & Ethane | 669 | 640 | 645 | 5 | 1% |
| Naphtha | 812 | 830 | 910 | 80 | 10% |
| Motor Gasoline | 1257 | 1430 | 1500 | 70 | 5% |
| Jet & Kerosene | 280 | 300 | 320 | 20 | 7% |
| Gas/Diesel Oil | 2576 | 2890 | 3040 | 150 | 5% |
| Residual Fuel Oil | 744 | 630 | 640 | 10 | 2% |
| Other Products | 1204 | 1250 | 1275 | 25 | 2% |
| Total Products | **7542** | **7970** | **8330** | **360** | **5%** |

*Source: IEA, DB Global Markets Research*

**Non-OPEC oil supply**

Non-OPEC supply growth has had a disappointing year in 2008 so far, with project delays in new fields and production declines in older fields, now compounded by hurricane problems in the US Gulf of Mexico (GOM). We expect 0.8mmb/d of non-OPEC growth in 2009, close to the average growth over 2002-08. The rise in 2009 comes from the US, Canada, Brazil, and the Caspian region. We expect partially offsetting declines in the North Sea, Mexico, and Russia. The increase in non-OPEC growth in 2009 shown in Figure 3 likely will be subject to the same delays that have resulted in disappointing production growth over the past two years, but even in dire circumstances, growth exceeding 0.5mmb/d is likely in our view.

**Figure 3: Non-OPEC supply growth**



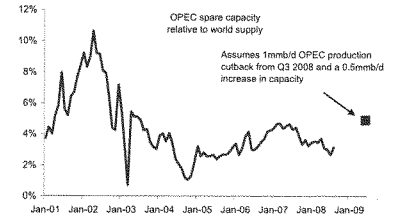

*Source: IEA, DB Global Markets Research*

With OPEC natural gas liquids (NGL) growth expected by the IEA, DOE and OPEC Secretariat to average more than 0.7mmb/d, the total liquids supply outside of OPEC's quotas is significantly greater than total demand. We now believe that OPEC's crude oil market share in 2009 will be under some pressure.

**OPEC spare capacity**

Spare oil production capacity is almost solely held within OPEC. The IEA estimates that OPEC's effective spare capacity (excluding Iraq, Indonesia, Nigeria and Venezuela, which face ongoing security, operational or investment issues) has now slipped below 2mmb/d. Both the IEA and US DOE/EIA see OPEC crude capacity increasing by the end of 2008 and into 2009, especially in Saudi Arabia with streaming of the delayed AFK (Khursaniyah) project. We project a mid-2009 spare capacity estimate of circa 5% of global supply, compared to approximately 3% in 3Q 2008. We estimate that about 1 percentage point of the 3-5% spare capacity figures for 2007-2009 are in Nigeria (0.6mmb/d) and Venezuela (0.25mmb/d) and thus are not directly comparable to earlier data in Figure 4.

**Figure 4: OPEC spare capacity**

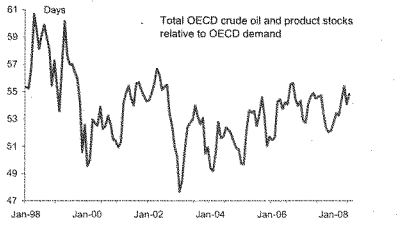



*Source: IEA, DB Global Markets Research*

**OECD inventories**

The IEA reported that OECD industry stocks rose by 47mmb in July to 2646mmb, and said that a "large, unseasonal crude build from a revised June base and weaker demand leave end-July OECD cover at 54.5 days." The IEA observes that higher OEC end-June stocks now imply a 380kb/d OECD stockbuild in 2Q 2008 against their 'flat' estimate from last month. In our supply/demand model, this pushes forward demand cover up to 55 days in 2009 from our prior 54 days estimate and suggests that fundamentals are loosening somewhat from our prior view.

**Figure 5: OECD inventories days cover**

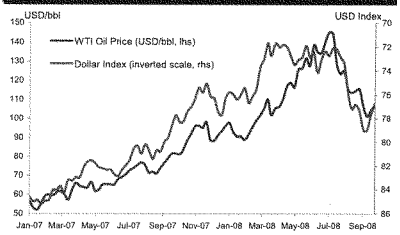



*Source: DB Global Markets Research*

**US dollar**

Our FX Research team believes that the positive effect on the US dollar of the financial sector rescue packages announced recently is tending to fade. We believe the US dollar is unlikely to strengthen much beyond (lower than) 1.40 against the euro in the absence of a significant shift in interest rate and/or portfolio flows in favour of the US dollar. Over the last two years, shifts in the US dollar have also coincided inversely with oil prices, Figure 6. Oil was trading rich relative to the US dollar in early September, but with the dollar weakness over the last two weeks, the relationship appears to be near fair value. Although we believe the causality runs from higher oil prices to the US dollar, we believe it would be foolhardy to ignore the potential effects the US dollar could have on oil prices. A dollar/euro rate of 1.40 (equivalent to a dollar index rate near 80) points to USD90/bbl oil, while and index near 77 (dollar/euro at 1.47) suggests USD105/bbl oil.

**Figure 6: Oil prices vs. USD index**




*Source: Bloomberg, DB Global Markets Research*

**Oil price outlook**

The tug of war in the oil markets on how to best think about long-term oil prices continues. One view is that "marginal cost of supply" should dominate, and we see this price being driven by changing cost and access issues; for now it might be near USD75-100/barrel. The other view is that prices are rising toward the level required to destroy demand, or to get it to slow dramatically. We have now learned through a real test that prices in the USD125-150/barrel range are sufficient to invoke changes in demand behavior.

In Figure 7 we have attempted to show the key factors that we think will influence oil price formation over the next five years. This list is not all-inclusive, but illustrates what we see as the major pressure points. We have left off Geopolitics – which we believe is adding upward pressure in all time frames. In summary, we believe that the short-term outlook is being driven by decelerating global GDP, but the longer term is being driven by rising costs and difficulties in accessing conventional oil liquids resources.

**Figure 7: Gauging oil price impacts**

| Variable | Q4 2008 | 2009 | Five Years |
|---|---|---|---|
| Inventory levels | Up | Down | Neutral |
| Global GDP growth | Down | Down | Up |
| USD | Up | Neutral | Down |
| US gas switichability | Neutral | Down | Up |
| Oil use efficiency | Down | Down | Down |
| Refining capacity | Down | Down | Up |
| Industry costs | Up | Up | Down |
| Financial uncertainty | Up | Down | Neutral |
| Global inflation | Up | Up | Neutral |
| OPEC spare capacity | Down | Neutral | Up |

*Source: DB Global Markets Research*

Our oil and gas price forecasts shown in Figure 8 are lower for 2009 but unchanged for 2010. Our short term view is based on the potential for the slow growth/recession environment in the OECD to slip over into Asia and other parts of the world. Our long-term forecast reflects the continuing lags being seen in global supply/demand elasticities, and the persistent escalation in finding and development costs. Furthermore, we believe that as marginal supply growth increasingly comes from non-OECD countries (with the largest remaining resources), there will be greater difficulty in achieving non-OECD production growth.

**Figure 8: Deutsche Bank oil/gas price deck**

| | WTI (USD/bbl) | Brent (USD/bbl) | US Gas (USD/mmBtu) |
|---|---|---|---|
| **2007** | **72.36** | **72.66** | **7.12** |
| Q1 2008 | 97.74 | 96.19 | 8.72 |
| Q2 2008 | 123.61 | 122.60 | 11.42 |
| Q3 2008E | 119.00 | 118.00 | 9.00 |
| Q4 2008E | 85.00 | 85.00 | 8.50 |
| **2008E** | **106.34** | **105.45** | **9.40** |
| Q1 2009E | 85.00 | 85.00 | 8.50 |
| Q2 2009E | 90.00 | 90.00 | 9.00 |
| Q3 2009E | 95.00 | 95.00 | 9.50 |
| Q4 2009E | 100.00 | 100.00 | 10.00 |
| **2009E** | **92.50** | **92.50** | **9.25** |
| **2010E** | **100.00** | **100.00** | **10.00** |
| **2011E** | 105.00 | 105.00 | 10.50 |
| **2012E** | 110.00 | 110.00 | 11.00 |
| **2013E** | 115.00 | 115.00 | 11.50 |
| **2014E** | 120.00 | 120.00 | 12.00 |
| **2015E** | 125.00 | 125.00 | 12.50 |

*Source: DB Global Markets Research*

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## Figure 9: World Oil Supply & Demand

| | 2007 | 2008E | 2009E | 2010E | 2011E | 2012E | 2013E | 2014E | 2015E | Annual Avg Rate % 00>05 | 05>10 | 10>15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CONSUMPTION** | | | | | | | | | | | | |
| United States | 20.7 | 20.0 | 19.7 | 19.8 | 19.8 | 19.9 | 20.0 | 20.0 | 20.1 | 1.1 | -1.0 | 0.3 |
| OECD Europe | 15.3 | 15.2 | 15.2 | 15.1 | 15.1 | 15.0 | 15.0 | 15.0 | 15.0 | 0.6 | -0.8 | -0.1 |
| Japan | 5.0 | 5.0 | 4.9 | 5.0 | 4.9 | 4.9 | 4.8 | 4.8 | 4.7 | -1.0 | -1.4 | -1.0 |
| Other OECD | 8.2 | 8.2 | 8.1 | 8.3 | 8.4 | 8.5 | 8.5 | 8.6 | 8.7 | 1.3 | 0.7 | 0.8 |
| **Total OECD** | **49.2** | **48.5** | **47.9** | **48.1** | **48.2** | **48.3** | **48.3** | **48.4** | **48.4** | **0.8** | **-0.7** | **0.1** |
| **USSR (former)** | **4.1** | **4.2** | **4.2** | **4.1** | **4.2** | **4.3** | **4.4** | **4.4** | **4.5** | **1.2** | **1.1** | **2.0** |
| Non-OECD Europe | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 2.9 | 1.5 | 2.1 |
| China | 7.5 | 8.0 | 8.3 | 8.7 | 9.1 | 9.5 | 9.9 | 10.4 | 10.8 | 8.0 | 5.4 | 4.5 |
| Other Asia | 9.3 | 9.5 | 9.7 | 9.7 | 9.9 | 10.2 | 10.5 | 10.7 | 11.0 | 3.3 | 2.1 | 2.5 |
| Latin America | 5.6 | 5.8 | 5.9 | 6.1 | 6.2 | 6.3 | 6.5 | 6.6 | 6.7 | 1.1 | 3.5 | 2.0 |
| Middle East | 6.5 | 6.8 | 7.0 | 7.3 | 7.5 | 7.7 | 7.9 | 8.1 | 8.3 | 3.4 | 4.1 | 2.6 |
| Africa | 3.1 | 3.1 | 3.2 | 3.2 | 3.3 | 3.4 | 3.5 | 3.5 | 3.6 | 3.5 | 1.9 | 2.3 |
| **Other Non-OECD** | **32.8** | **34.0** | **35.0** | **35.9** | **36.9** | **37.9** | **39.0** | **40.2** | **41.4** | **3.9** | **3.5** | **2.9** |
| **TOTAL CONSUMPTION** | **86.1** | **86.7** | **87.1** | **88.1** | **89.3** | **90.5** | **91.7** | **93.0** | **94.3** | **1.8** | **1.0** | **1.4** |
| **SUPPLY** | | | | | | | | | | | | |
| United States | 7.5 | 7.6 | 7.9 | 7.9 | 7.8 | 7.7 | 7.6 | 7.5 | 7.4 | -1.8 | 1.4 | -1.5 |
| OECD Europe | 5.0 | 4.7 | 4.3 | 4.3 | 4.1 | 3.9 | 3.7 | 3.5 | 3.4 | -3.8 | -5.1 | -4.8 |
| Other OECD | 7.5 | 7.2 | 7.4 | 7.2 | 7.4 | 7.8 | 8.1 | 8.4 | 8.7 | 1.0 | -0.4 | 3.6 |
| **Total OECD** | **19.9** | **19.5** | **19.6** | **19.5** | **19.4** | **19.5** | **19.5** | **19.4** | **19.4** | **-1.4** | **-0.9** | **-0.1** |
| **USSR (former)** | **12.8** | **13.0** | **13.2** | **13.6** | **14.0** | **14.4** | **14.4** | **14.6** | **14.7** | **8.3** | **3.0** | **1.5** |
| Non-OECD Europe | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | -2.3 | -3.5 | 0.0 |
| China | 3.8 | 3.8 | 3.9 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 3.6 | 2.2 | 0.7 | -0.5 |
| Other Asia | 3.7 | 3.7 | 3.7 | 3.5 | 3.4 | 3.3 | 3.1 | 3.0 | 2.9 | 3.0 | 5.6 | -3.5 |
| Latin America | 3.9 | 4.1 | 4.2 | 4.4 | 4.5 | 4.5 | 4.4 | 4.4 | 4.3 | 2.6 | 3.2 | -0.7 |
| Middle East | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | -3.3 | -2.4 | -3.3 |
| Africa | 2.6 | 2.6 | 2.6 | 2.8 | 2.7 | 2.7 | 2.6 | 2.5 | 2.5 | 3.7 | 2.7 | -2.4 |
| **Other Non-OECD** | **15.6** | **15.9** | **16.1** | **16.3** | **16.1** | **15.9** | **15.5** | **15.2** | **14.9** | **1.8** | **2.3** | **-1.8** |
| Processing Gains | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.7 | 2.9 | 1.5 |
| Other Biofuels | 0.3 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | | 43.1 | 5.0 |
| **Total Non-OPEC** | **50.8** | **51.1** | **51.8** | **52.3** | **52.4** | **52.7** | **52.5** | **52.3** | **52.2** | **1.7** | **1.4** | **0.0** |
| OECD Stock Withdraw | 0.3 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.2 | | | |
| OPEC NGLs | 4.6 | 5.1 | 5.7 | 5.9 | 6.1 | 6.4 | 6.6 | 6.9 | 7.0 | **7.7** | **5.6** | **3.5** |
| Other and Balance | 0.1 | -0.5 | -0.2 | -0.4 | -0.4 | -0.4 | -0.4 | | 0.0 | | | |
| **OPEC CRUDE OIL** | **30.3** | **31.1** | **30.0** | **30.4** | **31.3** | **31.9** | **33.1** | **33.9** | **35.4** | **1.6** | **-0.7** | **3.0** |
| ***Memo Items:*** | | | | | | | | | | | | |
| FSU exports | 8.6 | 8.8 | 9.0 | 9.5 | 9.8 | 10.1 | 10.1 | 10.2 | 10.1 | | | |
| US imports | 13.0 | 12.2 | 11.6 | 11.7 | 11.8 | 12.0 | 12.2 | 12.3 | 12.5 | | | |
| Europe imports | 10.3 | 10.6 | 10.9 | 10.8 | 11.0 | 11.1 | 11.3 | 11.5 | 11.6 | | | |
| China imports | 3.8 | 4.1 | 4.4 | 5.0 | 5.4 | 5.8 | 6.3 | 6.7 | 7.2 | | | |
| **Demand Outside FSU** | **81.9** | **82.5** | **82.9** | **84.0** | **85.1** | **86.2** | **87.4** | **88.5** | **89.8** | **1.9** | **1.0** | **1.3** |
| Y/Y % Change | 1.1 | 0.7 | 0.5 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | | | |
| **Non-OPEC Sup. Ex-FSU** | **38.0** | **38.1** | **38.6** | **38.7** | **38.4** | **38.4** | **38.1** | **37.7** | **37.5** | **0.0** | **0.9** | **-0.6** |
| Y/Y % Change | 0.0 | 0.2 | 1.4 | 0.1 | -0.7 | 0.0 | -0.9 | -0.9 | -0.6 | | | |
| Brent (1st Month) $/bbl | 72.66 | 105.45 | 92.50 | 100.00 | 105.00 | 110.00 | 115.00 | 120.00 | 125.00 | 14.2 | 12.6 | 4.6 |
| WTI (1st Month) $/bbl | 72.36 | 106.34 | 92.50 | 100.00 | 105.00 | 110.00 | 115.00 | 120.00 | 125.00 | 13.4 | 12.0 | 4.6 |
| US Imported (RAC) $/bbl | 66.66 | 100.45 | 87.50 | 95.00 | 100.00 | 105.00 | 110.00 | 115.00 | 120.00 | 12.0 | 14.2 | 4.8 |

US oil growth could be even lower as efficiency rises

Mexico and Korea growing above OECD average

China's growth slower in 2010-15 but is still the fastest global rate

Decline rate gets worse in 2010-15 copmared to the prior five years

North Sea output continues to decline

Negative impact of investment slowdown

Overall non-OECD growth situation deteriorates after 2010

Non-OPEC production could peak sometime before 2015 unless NIMBY restrictions are lifted

Call on OPEC production grows rapidly after 2010

This gap suggest increasing reliance on OPEC

WTI forecast at $100 in 2010 and then climbs by $5/year

*Source: OPEC Secretariat, International Energy Agency, US DOE/EIA, DB Global Markets Research*

# Appendix 1

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# Existing Conservation and Alternative Technology Gains Far Outweigh Arctic National Wildlife Refuge Potential: Oil Imports Have Declined Significantly Since 2005

A Report to the Alaska Wilderness League

By

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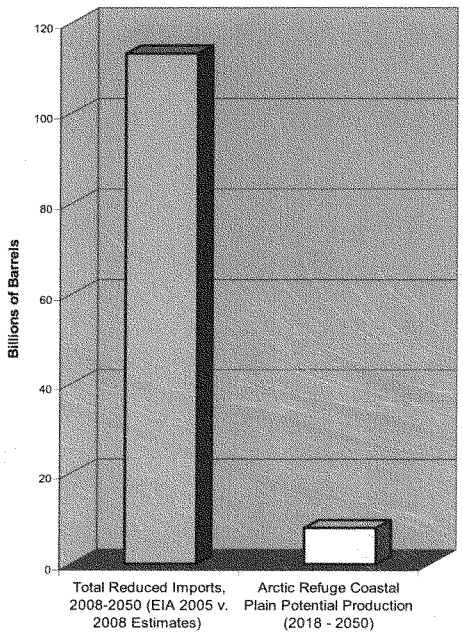
June 4, 2008

**Barrels Gained through Conservation and Alternative Technology Since 2005 v. Arctic Refuge Production Potential, 2008-2050**
**(Estimates derived from EIA and USGS Reports)**




Total Reduced Imports, 2008-2050 (EIA 2005 v. 2008 Estimates)

Arctic Refuge Coastal Plain Potential Production (2018 - 2050)

**Notes:**

The tall blue bar at the left represents the dramatic reduction to this nation's estimated import requirement between now and 2050 achieved in the last three years. This estimate is based on EIA's 2008 projections through 2030, compared to the agency's 2005 estimates. The 113 billion barrel total -- more than 36% of the total import requirement three years ago -- is made up of reduced consumption (94.3 billion barrels) and increased domestic production, excluding the Arctic Refuge (18.7 billion barrels).

Arctic Refuge production is estimated at 7.9 billion barrels, or approximately 3/4 of the estimated mean technically recoverable volume of undiscovered oil this region is thought to hold.

***Executive Summary***

## Existing Conservation and Alternative Technology Gains Far Outweigh Arctic National Wildlife Refuge Potential: Oil Imports Have Declined Significantly Since 2005

The U.S. Energy Information Administration (EIA) May 2008 update report on the petroleum potential of the Arctic National Wildlife Refuge Coastal Plain region concludes that:

- Based on the USGS mean resources estimate, EIA reports that leasing and development on the Arctic Refuge Coastal Plain region would result in production of approximately 2.6 billion barrels of oil between 2018 and 2030.
- Production from the Arctic Refuge Coastal Plain region would peak in 2027 at approximately 780,000 barrels per day (0.78 million bpd) and would average approximately 657,000 bpd (0.657 million bpd) between 2018 and 2030.
- During the decade between 2021 and 2030, Arctic Refuge production would reduce prices at the gas pump by approximately $0.032 (3.2 cents) per gallon. At peak, the gas pump reduction would be less than $0.04 (four cents) per gallon, based on a $0.78 per barrel reduction in the price of crude oil (all figures in 2008 dollars).
- Due to geologic and logistical constraints, EIA has not increased its estimate of Arctic Refuge production potential through 2030 since its last review in 2004, despite high oil prices.
- If Congress authorized leasing on the Arctic Refuge Coastal Plain, first production would not occur until ten years later.

Drilling advocates, perhaps mistaking wishful thinking for reality, frequently overlook significant data that do not support their views, such as the mean

estimates of Arctic Refuge protection potential published by USGS and EIA. In the resulting confusion, it is easy to lose sight of important new developments that have bearing on the proposal to seek oil on the Arctic Refuge Coastal Plain. Salient facts and projections discussed in this report include the following:

- For the first time in the last quarter-century, since 2005 net petroleum imports have exhibited a decreasing trend.
- In recent years, reductions in petroleum consumption and early implementation of alternative technologies have led to reductions in projected future imports that dwarf the production potential of the Arctic Refuge.
- When national trends reported by EIA are extended out to the year 2050, this nation is on track to achieve a reduction in imports of more than 100 billion barrels of oil through conservation and alternative technologies. By comparison, potential production from the Arctic Refuge Coastal Plain region during the same period is estimated to be less than 10 billion barrels of oil.

These data and developments make a strong case for aggressive pursuit of conservation and alternative technology measures. The demonstrated and potential future import reductions attributable to these measures strongly support the proposition that the proposal to seek oil on the Coastal Plain of the Arctic National Wildlife Refuge should be dismissed as a misguided distraction from the urgent energy tasks at hand.

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# Existing Conservation and Alternative Technology Gains Far Outweigh Arctic National Wildlife Refuge Potential: Oil Imports Have Declined Significantly Since 2005

## I. Introduction: Game Plan for This Report

This report reviews the long-standing debate over the proposal to drill for oil on the Coastal Plain of the Arctic National Wildlife Refuge from an energy perspective. Section II summarizes the salient points in the new report on oil potential of the Arctic National Wildlife Refuge Coastal Plain region, released by the U.S. Energy Information Administration (EIA) May 22, 2008. Section III reviews current national petroleum production, consumption and import levels, while Section IV places potential Arctic Refuge production in the broader national energy context. The six figures in Sections III and IV present important summary information regarding the current and future national energy picture and estimated potential oil production from the Arctic Refuge Coastal Plain region. These data provide focus on the striking reductions to import requirements that are already being realized, which dwarf the comparatively small role that development of the Arctic Refuge can be expected to play in addressing the nation's energy problems. Section V concludes with discussion of some of the implications of continued debate over Arctic Refuge petroleum development.

## II. EIA's May 2008 Report on the Arctic Refuge

The EIA's May 2008 *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge* concludes that under its mean resources case,[1] seven

[1] To deal with the inherent uncertainty of estimates of Arctic Refuge petroleum potential, EIA follows the U.S. Geological Survey (USGS) in presenting its results in terms of three exploration outcomes or cases: high resource (5 percent probability), mean (average or expected results) and low resource (95 percent probability). The USGS mean resource course assumes discovery of 10.4 billion barrels of technically recoverable oil, compared to 16.0 billion barrels in the high resource case and 5.7 billion barrels in the low resources case. USGS estimates that there is only a 1 in 20 chance that the high resource case volume will be discovered. (EIA, *The Effects of the Alaska Oil and Natural Gas Provisions of H.R.4 and S.1766 on U.S. Energy Markets*, February 2002 [Report No. SR-OIAF/2002-02], p.7. See also: USGS, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998,*

fields would produce approximately 2.6 billion barrels of oil between 2018 and 2030, peaking at 0.78 million bpd and averaging approximately 0.657 bpd during this 13-year period. Under this scenario, EIA estimates these seven fields would produce an additional 1.6 billion barrels of oil after 2030.[2]

According to the EIA, at peak production the Arctic Refuge development would reduce the price of a barrel of oil by approximately $0.78 per barrel, with a resulting reduction to average gasoline prices of less than $0.04 (four cents) per gallon. Between 2021 and 2030, the gas pump effect would average $0.032 (3.2 cents) per gallon. EIA notes that this relatively small effect on gasoline prices could easily be countermanded by OPEC production cuts.[3]

The EIA estimates of Arctic Refuge region production through 2030 and the economic effects of this endeavor were developed by applying the mean estimate of technically recoverable oil, derived from a three-year study of the region's petroleum potential by the U.S. Geological Survey (USGS), to the EIA's own National Energy Modeling System reference case.[4] EIA's 2008 report was prepared in response to a request from Alaska Senator Ted Stevens (R-Alaska) that the agency update its previous estimates of Arctic Refuge production potential to reflect "recent developments, particularly with regard to the price of

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*Including Economic Analysis*, USGS Fact Sheet FS-028-01, April 2001 [http://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.pdf].)

[2] EIA, *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, May 2008 (Report No. SR/OIAF/2008-03), pp. 5, 8 (http://www.eia.doe.gov/oiaf/servicerpt/anwr/index.html).
EIA's estimated Arctic Refuge mean resources case scenario production profile between first production in 2018 and 2030 is calculated by subtracting Alaska reference case annual production totals (without Arctic Refuge development) from the corresponding Alaska totals under the Arctic Refuge development mean resources case in Table 11 of the EIA reference and Arctic Refuge mean resource case scenarios (posted on line with the May 2008 report ).

[3] Mean resources case per-barrel price effect for 2025 are summarized in *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 11 (converted to 2008 dollars using GDP deflator); gasoline price effects were calculated from Table 12 of the EIA reference case (without Arctic Refuge development) and Arctic Refuge mean resource case scenarios .

[4] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, pp. 4-5; U.S. Geological Survey, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge 1002 Area, Alaska*, Open File Report 98-34, 1999 (2-vol. CD; summarized in *Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis*).

oil."[5] Despite the increase in oil prices since 2004, EIA's current estimate of production from the Arctic Refuge region is similar to that of its previous report, issued in 2004.[6]

The most significant new element in EIA's 2008 report is a discussion of the logistical and geological reasons why EIA does not expect that recent increases in current and forecast oil prices will increase Arctic Refuge region production estimates or accelerate production prior to 2030, compared to the agency's prior estimates.[7] In discussing the time between the decision to explore on the North Slope and first production, EIA reports:

> The assumption that ANWR oil production would begin 10 years after legislation approves the Federal oil and natural gas leasing in the 1002 area is based on the following 8-to-12 year timeline:
>
> - 2 to 3 years to obtain leases, including the development of a U.S. Bureau of Land Management (BLM) leasing program, which includes approval of an Environmental Impact Statement, the collection and analysis of seismic data, and the auction and award of leases.
> - 2 to 3 years to drill a single exploratory well. . . . Typically, Alaska North Slope exploration wells take two full winter seasons to reach the desired depth.
> - 1 to 2 years to develop a production development plan and obtain BLM approval for that plan, if a commercial oil reservoir is discovered. . . .
> - 3 to 4 years to construct the feeder pipelines; to fabricate oil separation and treatment plants, and transport them up from the lower-48 States to the North Slope by ocean barge; construct drilling pads; drill to depth; and complete the wells.[8]

The report also identifies additional factors that might slow development, such as seasonal weather limitations on the North Slope that constrict time available

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[5] Letter from Senator Ted Stevens to Guy Caruso, Administrator, EIA, Dec. 6, 2007.

[6] In fact, although the total mean scenario production figure is essentially unchanged at 2.6 billion barrels, in the 2008 report EIA has changed its production profile, reducing its 2004 peak production estimate of 876,000 bpd to 780,000 bpd. (*Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 8 and *Analysis of Oil and Gas Production in the Arctic National Wildlife Refuge*, March 2004 [Report No. SR/OIAF/2004-04], p. 7).

[7] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 3 ("Timing of First Production") and pp. 6-8 ("Current Oil Market conditions").

[8] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge* p. 3.

annually for exploration and development activities. For example, there are winter time windows for collecting seismic data and drilling wells (3 to 4 months annually) and summer time windows for barging heavy infrastructure equipment to remote well site (2 to 3 months annually). The report notes that between discovery and production, two outlier North Slope developments (Alpine and Badami) took six and eight years, respectively. EIA notes that its estimated time lines do not include delays that might result from legal challenges.[9]

EIA's production estimates for the Arctic Refuge region are based on geological findings, not economic conditions. Again following the approach of the USGS study team, the new EIA analysis assumes that the largest fields will be developed first, and that new fields that might be discovered beneath the Arctic Refuge Coastal Plain will be brought on-line every other year. According to the EIA report:

> The decision to use a 2-year time lag in bringing ANWR fields into production is driven by four factors. First, there is the large expected size of the ANWR fields, which complicates the logistical problems associated with their development. Second, there is considerable investment infrastructure required both to begin production in these fields and to link these fields to the TransAlaska Pipeline System (TAPS). Third, there is competition in investment and drilling resources from other domestic and foreign projects, which potentially limits the resources available for ANWR development. Finally, increasing the rate of ANWR development might also require an expansion of TAPS throughput capacity.[10]

Under this scenario, the seventh field slated for development would start producing in 2030.[11]

In light of these considerations, EIA concludes that even though current and long-term oil prices have risen dramatically since 2004, it does not follow that this development would lead to increase production from the Arctic Refuge region prior to 2030:

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[9] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, pp. 3-4.

[10] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 4.

[11] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 5.

> Considered in isolation, higher prices alone might raise an expectation of higher ultimate recovery from whatever oil resource exists in place. . . . However. . . .the main impact . . . on the amount of oil actually recovered from ANWR is likely to occur after 2030, the current time horizon for EIA analyses.[12]

Post-2030 prospects for the Arctic Refuge Coastal Plain will be discussed in Section IV. But the immediate task is to consider EIA's assessment of the current national energy picture.

## III. The National Energy Context: Surprising Trends

Review of national trends in petroleum production, consumption and import levels, based on EIA data, spotlights two surprising and significant trends regarding oil imports that are frequently overlooked in current discussions of energy policy. The first is historical fact. Since 2005 this nation's petroleum usage and petroleum net import levels have been declining, reversing the trend of increasing consumption and increasing use of foreign oil that had prevailed for more than two decades.[13] As shown in Figure 1, between 1985 and 2005 net imports increased in 17 years and declined in four. Overall, since 1985, U.S. petroleum imports have increased by an average of about five percent per year. At the start of this period, total consumption averaged about 15 million bpd, of which net imports comprised about 4.2 million. By 2005, total domestic consumption topped 20 million bpd and imports exceeded 12 million. While the increase in imports over this period is a dominant aspect of this figure, in the last four years this trend appears to have broken. Since 2005, total consumption has leveled off and actually declined slightly, while net imports have also declined, from a high of 12.5 million bpd in 2005 to a current level of approximately 11.5

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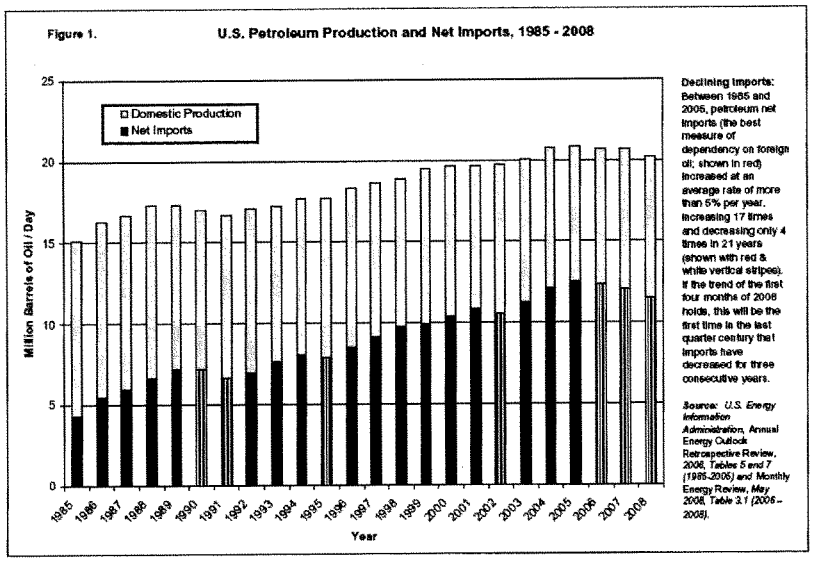
[12] *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge*, p. 6.

[13] Because the U.S. is both an importer and exporter of petroleum and petroleum products, EIA advises that net imports, rather than total imports, is the best measure of dependence on foreign oil. See: C. William Skinner, "Measuring Dependence on Imported Oil," *Monthly Energy Review* (U.S. Energy Information Administration), August 1995. (". . . [T]he most appropriate measure of this country's actual dependence on foreign oil is one based on the *net requirement for imports*, or total imports minus exports, rather than on total imports alone.")

million bpd in 2008.[14] Moreover, if the rest of 2008 follows the trend established during the first four months of the year, 2008 will mark the first time in the last quarter-century that net imports have declined for three years in a row.




When one examines EIA forecast figures, it becomes apparent that the recent historical trend of decreasing net imports is even more pronounced. To understand the significance of the trend in future imports, consider the EIA data for the year 2025, shown in Figure 2. This figure combines EIA historical import

[14] EIA reports that for the first four months of 2008 net imports averaged slightly less than 11.5 million bpd, comprising approximately 57% of total domestic supply. (U.S. Energy Information Administration, *Monthly Energy Review*, May 2008, p. 39 [Table 3.1, Petroleum Overview].)

Drilling advocates often overstate import levels and confuse the picture by using gross imports, without subtracting product exports, which total nearly one million bpd, from the gross import total. For example, on May 1, 2008, U.S. Senator Ted Stevens, speaking on the Senate floor, said, "Mr. President, we import more than 12.5 million barrels a day of petroleum – over 60 percent of our energy needs. As a matter of fact, I think it's higher than that now in the last two or three days." Three weeks later, Senator Stevens told his colleagues, "we import today 67 percent of our oil." (Senator Ted Stevens, "Senator Stevens Highlights Inconsistencies in Anti-Drilling Stance" and "Senator Stevens Calls for Oil and Gas Development in Alaska" [press releases on Senate floor statements], May 1 and May 23, 2008.)

**Figure 2.** **Oil Prices and U.S. Net Imports (Volume and % of Total Supply), Selected Years (Based on EIA data)**

| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2010 | 2020 | 2025 | 2030 | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | /- - - - - - - - - - - - - - - - - Actual - - - - - - - - - - - - - - - - - / | | | | | | | | /- - - - - - - - - - - - - - - - Forecast - - - - - - - - - - - - - - - - / | | | | |
| AEO 2002 | | | | | | | | | | | -- | -- | *Annual Energy Outlook 2002,* |
| Net Imports | | | | | | | | | 14.27 | 16.66 | | | Table A11, Petroleum Supply and |
| Total Supply | | | | | | | | | 23.16 | 26.61 | | | Disposition Balance, p. 150. |
| % Imports | | | | | | | | | 61.61% | 62.61% | | | |
| AEO 2003 / *Price in 2025 ** | | | | | | | | | | | $31.63 /bbl. | -- | *Annual Energy Outlook 2003,* |
| Net Imports (billion bbls.) | | | | | | | | | 13.76 | 17.72 | 19.79 | | Table A11, Petroleum Supply and |
| Total Supply " | | | | | | | | | 22.97 | 27.11 | 29.17 | | Disposition Balance, p. 150. |
| % Imports | 55% | | | | | | | | 59.90% | 65.36% | 67.84% | | |
| AEO 2004 / *Price in 2025 ** | | | | | | | | | | | $31.54 /bbl. | -- | *Annual Energy Outlook 2004,* |
| Net Imports (billion bbls.) | | | | | | | | | 13.16 | 17.44 | 19.69 | | Table A11, Petroleum Supply and |
| Total Supply " | | | | | | | | | 22.69 | 26.41 | 28.30 | | Disposition Balance, p. 150. |
| % Imports | | 54% | | | | | | | 58.00% | 66.04% | 69.58% | | |
| AEO 2005 / *Price in 2025 ** | | | | | | | | | | | $40.01 /bbl. | -- | *Annual Energy Outlook 2005,* |
| Net Imports (billion bbls.) | | | | | | | | | 13.37 | 17.11 | 19.11 | | Table A11, Petroleum Supply and |
| Total Supply | | | | | | | | | 22.98 | 26.32 | 27.93 | | Disposition Balance, p. 157. |
| % Imports | | | 56% | | | | | | 58.18% | 65.01% | 68.42% | | |
| AEO 2006 / *Price in 2025 ** | | | | | | | | | | | $56.60 /bbl. | | *Annual Energy Outlook 2006,* |
| Net imports (billion bbls.) | | | | | | | | | 12.33 | 14.42 | 15.68 | 17.24 | Table A11, Petroleum Supply and |
| Total Supply " | | | | | | | | | 22.21 | 24.87 | 26.12 | 27.65 | Disposition Balance, p. 152. |
| % Imports | | | | 58% | | | | | 55.52% | 57.98% | 60.03% | 62.35% | |
| AEO 2007 / *Price in 2025 ** | | | | | | | | | | | $57.46 /bbl. | | *Annual Energy Outlook 2007,* |
| Net Imports (billion bbls.) | | | | | | | | | 11.79 | 13.56 | 14.87 | 16.37 | Table A11, Liquid Fuels Supply and |
| Total Supply " | | | | | | | | | 21.49 | 23.94 | 25.22 | 26.84 | Disposition Balance, p. 156. |
| % Imports | | | | | 61% | | | | 54.86% | 56.64% | 58.96% | 60.99% | |
| AEO 2008 / *Price in 2025 ** | | | | | | | | | | | $67.50 /bbl. | | *Annual Energy Outlook 2008* |
| Net Imports (billion bbls.) | | | | | | | | | 11.39 | 11.36 | 11.53 | 12.41 | (early release [revised]), |
| Total Supply " | | | | | | | | | 21.02 | 22.04 | 22.34 | 22.86 | Table A11, Liquid Fuels Supply and |
| % Imports | | | | | | 60% | | | 54.19% | 51.54% | 51.61% | 54.29% | Disposition Balance, p. 23. |
| Monthly Energy Review, May 2008 | | | | | | | 58% | 57% | | | | | *Monthly Energy Review*, May 2008, p. 39 (Table 3.1, Petroleum Overview) |

* $ / barrel price in 2025 given in real (2008) dollars, adjusted for inflation using Gross Domestic Product deflator. (For an example of this calculation, see Figure 4 , fn. 1.)

*Research Associates, Ester, Alaska (May 2008)*

data (shown in the left portion of table) with forecast data for selected years (on right-hand side of table). Looking forward, EIA projections anticipate significant price-induced reductions to future petroleum consumption, as well as smaller increases in domestic production due to the implementation of alternative technologies.

As shown in Figure 2, in 2003, actual net imports were reported (two years later) at approximately 56% of total petroleum supply; at that time, EIA anticipated that by 2025 the net import level would climb to nearly 68% .In 2004, the long-standing trend of increasing net imports shown in Figure 1 was still evident, with net imports at 58% of total petroleum supply and anticipated net imports for 2025 rising to nearly 70%. But in 2005, the net import forecast for 2025 leveled off. And then, over the next three years the EIA's net import forecast for 2025 began to decline sharply. The 2008 *Annual Energy Outlook* reference (base case) scenario anticipates that by 2025 U.S. petroleum imports will drop to approximately 52% of total domestic consumption, down from the 70% import level EIA had anticipated just four years ago.[15]

Transportation fuels play an important role in the change in imports over time. Because a major portion of this nation's petroleum consumption goes to vehicle fuel, the enactment of CAFÉ (corporate automotive fuel efficiency) standards last December contributes significantly to reduced petroleum consumption. But the new CAFÉ standards were only put into effect through 2022. With those standards no longer on the books between 2022 and 2030, EIA's 2008 reference case shows that petroleum imports, generally declining between now and 2021, begin to increase again.[16]

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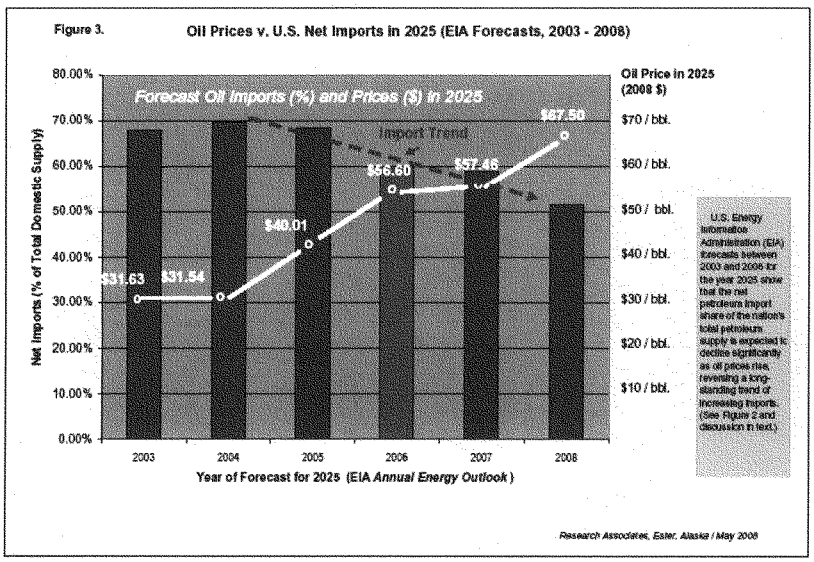
[15] The dramatic decline in future imports is shown in charts that EIA officials typically releases with the informal analysis of its *Annual Energy Outlook*. Four EIA charts issued since 2004 that demonstrate this trend are attached as Appendix 1.

[16] See: John J. Conti (Director, Office of Integrated Analysis and Forecasting, EIA), "Annual Energy Olutlook 2008: EISA2007 and Other Major Impacts" (presentation to the 2008 Energy Conference, Washington, DC), Slides 10 and 11, April 7-8, 2008.

Figure 3 isolates key EIA forecast data from 2025 to display the relationship between increasing oil prices and declining imports. The lesson of this figure is clear: Oil prices play a key role in reducing petroleum consumption.




## IV. The National Energy Context: Barrels Saved v. Barrels Produced

In this section, the spotlight shifts from price, domestic production and import trends already in motion to the likely future effects of forecast reductions in petroleum imports. These baseline import reductions effects are then compared to the much smaller potential impacts of the undiscovered oil that is thought to lie beneath the Coastal Plain of the Arctic Refuge.

As discussed in Section II of this report, EIA estimates that through 2030 the Arctic Refuge region can produce approximately 2.6 billion barrels of the

USGS mean estimate of 10.4 billion barrels of oil ultimately recoverable from the region. While the EIA's assessment must be taken seriously, to assess the implications of potential Arctic Refuge development, policy makers may find it useful to look past the 2030 termination date of the EIA's national energy model.[17] The analysis presented here assesses domestic energy and Arctic Refuge region developments in the years subsequent to the termination date of the EIA model by extending the results of EIA's energy model through the year 2050. To extend the horizon on Arctic Refuge development, for purposes of this analysis the Arctic Refuge province between 2018 and 2050 is assumed to conform, in general terms, to the production profile established at the Prudhoe Bay complex during its first three decades of operation. This approach yields an estimate of approximately 7.9 billion barrels produced from the Arctic Refuge region between 2018 and 2050.[18]

To compare the production estimate for the Arctic Refuge Coastal plain region and the likely outcomes of the energy programs presently underway, played out over the same time horizon, national figures from the EIA reference case are extended using straight-line projections of the rates of change that EIA has calculated for domestic consumption and domestic production.[19] The resulting gap between these two figures is the revised import requirement.

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[17] While it is reasonable to assume that at high oil prices most (if not all) of the technically recoverable oil that might lie beneath the Coastal Plain would eventually be produced, an earlier EIA report estimated that it might take as long as 65 years to achieve this goal. (EIA, *Potential Oil Production from the Coastal Plain of the Arctic National Wildlife Refuge: Updated Assessment*, May 2000 [Report No. SR/O&G/2000-02], Table 3 and Figure 3).Although EIA does not repeat this statement in its recent report, EIA does state that high prices could result in increased Arctic Refuge production after 2030 (see Section I, above).

[18] During its first 30 years of operation, the Prudhoe Bay complex has produced approximately three-quarters of the estimated recoverable reserves from the North Slope's Prudhoe Bay complex (The annual rates of production for fields in the Prudhoe Bay complex between 1977 and 2006 are reported in "Table III.3. Oil Production, Historic," *Division of Oil and Gas 2007 Report*, pp. 3-4 - 3-7). For purposes of this analysis, the production profile for the Prudhoe Bay complex has been applied to the mean technical volume of Arctic Refuge potential production through the 29th year; for the final four years of this period, a field decline rate of 6% per year was assumed. (This calculating procedure was employed because production from the Prudhoe Bay complex during its 30th year [2006] was reduced by British Petroleum's oil spill and corrosion problems at the Prudhoe Bay field itself.)

[19] This analysis uses the projected rates of change EIA has estimated would prevail during the third decade of this century.

When developments on the national energy scene and in the Arctic Refuge are compared on an apples-to-apples basis, the results presented in Figure 4 (below) and depicted graphically in Figure 5 show that the net energy gains resulting from conservation and alternative technologies are likely to far outweigh the limited production potential of the Arctic Refuge.

**Figure 4.**

**Reductions to U.S. Oil Imports since 2005 v. Potential Production From the Arctic National Wildlife Refuge Coastal Plain 2008-2050 (Table)**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | / - - - - - - - - - - - - - - - - - - - - Billion Barrels | | | - - - - - - - - - - - - - - - - - - - - - - - - / |
| **Case** | **Avg. Price, Of Oil, 2025** *(2008 $/Bbl.)* | **Domestic Production** *(excluding Arctic Refuge)* | **Potential Arctic Refuge Region Production** *(2018 – 2050)* | **Total Domestic Consumption** | **Import Requirement** *(With [without] Arctic Refuge)* |
| ***AEO 2008* (Reference Case [updated early release])** | **$67.50** | **160.8** | **7.9** | **358.4** | **189.7** ***[197.6]*** |
| ***AEO 2005* (Current Futures Case)** | **$40.01** | **142.1** | **7.9** | **452.8** | **302.8** ***[310.7]*** |
| **Change 2008 v. 2005** | **$18.26** | **18.7** | **0.0** | **(94.3)** | **(113.1)** ***[113.1]*** |
| % Change (2008 v. 2005) | +67.7% | +13.2% | (0.0%) | (20.8%) | (37.2%) *[36.4%]* |

***Sources:***

Col. (1): From U.S. Energy Information Administration, *Annual Energy Outlook 2005* and *Annual Energy Outlook 2008* (updated early release, Mar. 4, 2008), Table A1 (prices adjusted to 2008 $ using Gross Domestic Product deflator [$64.49*121.86 / 116.43 = $67.50]).

Col. (2), (4): From: *Annual Energy Outlook 2005* and *Annual Energy Outlook 2008* (early release), Table 11 (projections from 2031-2050 projected by author, based on EIA average of annual rate of change for 2021-2030 and 2026-2030).

Col. (3): Estimated from: U.S. Geological Survey, *Arctic National Wildlife Refuge, 1002 Area, Petroleum Assessment, 1998, Including Economic Analysis* (fact sheet summarizing U.S. Open File Report 98-34 [CD], updated in 2001), Table 1. For purposes of this analysis, the production profile for the Prudhoe Bay complex has been applied to the mean technical volume of Arctic Refuge potential production through the 29th year; for the final four years of this period, a field decline rate of 6% per year was assumed. This figure optimistically assumes that 3/4 of the total mean undiscovered technically recoverable volume of oil from the Arctic Refuge can be produced between 2008 and 2050, beginning in 2018. (See discussion in text.).

Col. (5): With Arctic Refuge = Col. (4) - (Col. [2] + Col. [3]); without Arctic Refuge (shown in brackets) = Col. (4) - Col. (2).

Figure 5, on the following page, puts the estimated aggregate numbers for U.S. oil consumption between the present and 2050 (shown in Figure 4), into calendar-year perspective.[20] The chart in Figure 5 is read as follows: Reading from the bottom up, for any calendar year (shown on the horizontal axis), total domestic petroleum consumption consists of the following components:

**Domestic Production**

- Net domestic production, as estimated in 2005 (excluding alternative technologies and production from the Arctic Refuge Coastal Plain
- Increased domestic production from alternative sources (2008 estimate v. 2005)
- Arctic Refuge Coastal Plain region (2005 and 2008)

Net Imports (as estimated in 2008)

- Reduction in imports due to lower consumption (the red line rising to right at top represents total consumption as estimated in 2005; the black line at top of estimated imports in 2008 represents total petroleum consumption as estimated in 2008)

The blue areas of Figure 5 represent estimated barrels of oil that, under EIA's 2005 forecast through 2030, would have had to be imported for domestic consumption between the present and 2050 – barrels that were no longer needed by 2008. Put otherwise: the blue portions represent barrels saved through conservation and alternative technologies.

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[20] It should be noted that long-range forecasts always come with caveats about the future; this one is no exception. Despite the uncertainties inherent in long-range projections, this analysis was conservatively designed with the best available inputs to provide a reasonable framework for assessing policy options. The analysis presented here can be regarded as conservatively calculated for the following reasons:

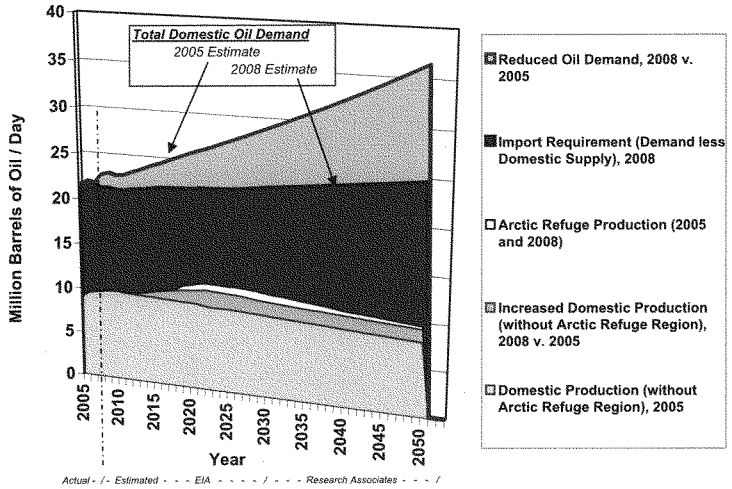
(a) The EIA projections through 2030 reflect only conservation and alternative technology measures already in place; the enactment of further measures (for example, extension of CAFÉ standards beyond their present expiration date of 2022) would yield energy savings additional to those EIA has calculated between 2022 and 2030.

(b) The extension of EIA projections 2050 does not assume new technological developments or policies that might be expected to achieve additional energy savings between 2031 and 2050.

(c) For purposes of this comparison, it is assumed that the USGS mean estimate of technically recoverable oil from the Arctic Refuge Coastal Plain region – 10.4 billion barrels of oil – can be developed and produced at a pace comparable to that achieved from the Prudhoe Bay complex. Since Arctic Refuge field sizes and total province volumes are expected to be significantly smaller than the corresponding numbers from the Prudhoe Bay complex, the Arctic Refuge will not benefit from the economies of scale realized in Prudhoe Bay complex development. For this reason, the Arctic Refuge complex estimate used for purposes of this analysis – 7.9 billion barrels – is an inherently optimistic assumption. (For further discussion, see footnote 18 and notes to Figure 4, col. 3, and Figure 5.)

Figure 5.

## Reductions to U.S. Oil Imports since 2005 v. Potential Production from the Arctic National Wildlife Refuge Coastal Region




***Reductions to U.S. oil import requirements since 2005 (shown in blue above), outweigh the production potential of the Arctic National Wildlife Refuge (shown in white) by more than ten to one. In other words, for every barrel of oil that might (or might not) be discovered and produced from the Arctic Refuge between now and 2050 (with production starting in 2018 at the earliest), over the last three years conservation due to high oil prices and the development of alternative energy technologies have already combined to reduced the nation's long-term petroleum import requirement by more than ten times the total amount of oil anticipated to lie beneath the Arctic Refuge Coastal Plain.***

***These gains, which are already in motion, have been realized without the benefit of a national energy policy and will reduce the need for imports between now and 2050 by more than 100 billion barrels of oil. By comparison, during the same period under the aggressive development scenario shown here the Arctic Refuge would produce less than 8 billion barrels of oil (approximately three-quarters of the mean technically recoverable volume of undiscovered oil, 10.4 billion barrels, thought to lie beneath the Coastal Plain).***

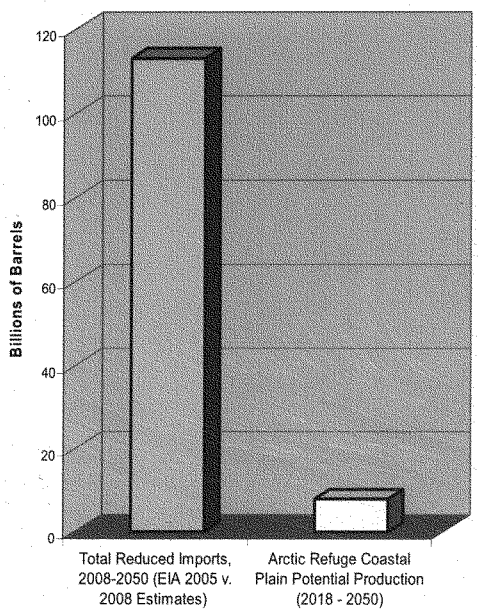
*(Domestic production and import requirement projections through 2050 based on U.S. Energy Information Administration [EIA] data through 2030; Arctic Refuge production estimate by Research Associates, based on U.S. Geological Survey data. [See Figure 4.])*

*Research Associates, Ester, Alaska / May 2008*

Figure 6 graphically depicts a key comparison that emerges from the analysis presented in Figures 4 and 5. Between now and 2050 this nation appears to be on track to achieve a reduction in imports of more than 100 billion barrels through conservation and alternative technologies. This figure dwarfs potential production from the Arctic Refuge Coastal Plain region during the same period by a factor of more than 10 to one.

Figure 6.

**Barrels Gained through Conservation and Alternative Technology Since 2005 v. Arctic Refuge Production Potential, 2008-2050**
**(Estimates based on EIA and USGS Reports)**




Total Reduced Imports, 2008-2050 (EIA 2005 v. 2008 Estimates)

Arctic Refuge Coastal Plain Potential Production (2018 - 2050)

**Notes:**

The tall blue bar at the left represents the dramatic reduction to this nation's estimated import requirement between now and 2050 achieved in the last three years. This estimate is based on EIA's 2008 projections through 2030, compared to the agency's 2005 estimates. The 113 billion barrel total -- more than 36% of the total import requirement three years ago -- is made up of reduced consumption (94.3 billion barrels) and increased domestic production, excluding the Arctic Refuge (18.7 billion barrels).

Arctic Refuge production is estimated at 7.9 billion barrels, or approximately 3/4 of the estimated mean technically recoverable volume of undiscovered oil this region is thought to hold.

*See Figure 4 for data and sources.*

*(Research Associates, Ester, Alaska / May 2008)*

**V. Conclusions**

The EIA's May 2008 update report on the petroleum potential of the Arctic National Wildlife Refuge Coastal Plain region concludes that:

- Based on the USGS mean (expected) resources case estimate of the size of fields likely to be discovered in the Arctic Refuge Coastal Plain region, EIA restimates that leasing and development on the Arctic Refuge Coastal Plain region would result in production of approximately 2.6 billion barrels of oil between 2018 and 2030.
- Production from the Arctic Refuge Coastal Plain region would peak in 2027 at approximately 780,000 barrels per day (0.78 million bpd) and would average approximately 657,000 bpd (0.657 million bpd) between 2018 and 2030.
- During the decade between 2021 and 2030, Arctic Refuge production would reduce prices at the gas pump by approximately $0.032 (3.2 cents) per gallon. At peak, the gas pump reduction would be less than $0.04 (four cents) per gallon, based on a $0.78 per barrel reduction in the price of crude oil (all figures in 2008 dollars).
- Due to geologic and logistical constraints, EIA has not increased its estimate of Arctic Refuge production potential through 2030 since its last review in 2004, despite high oil prices.
- If Congress authorized leasing on the Arctic Refuge Coastal Plain, first production would not occur until 10 years later.

The most significant addition to EIA's 2008 report is the discussion of the factors that constrain the prospects for development on the remote Arctic Refuge Coastal Plain through 2030, the final year covered by the agency's National Energy Modeling System. In its assessment of Arctic Refuge production potential, a three-year study completed in 1998, the U.S. Geological Survey concluded that a super-giant field like Prudhoe Bay was unlikely to be discovered

on the Arctic Refuge Coastal Plain, but that the region holds a number of smaller fields whose combined mean technically recoverable volumes would total 10.4 billion barrels.[21] As noted in Section II above, with Arctic Refuge development requiring development of multiple fields, EIA estimates that logistical constraints will necessitate a two-year delay between first production at one remote field on the Arctic Refuge Coastal Plain and initiation of production at the next field.

The EIA's conclusions must have been a disappointment to Alaska Senator Stevens, who had asked EIA to update its previous report to reflect the effects of recent high oil prices. At least twice in May 2008, Senator Stevens told his colleagues that the Arctic Refuge will produce more than one million barrels of oil per day.[22] But under the EIA's mean (expected) production profile, Arctic Refuge production falls far short of 1.0 million bpd, peaking at 0.78 million bpd and averaging approximately 0.657 bpd between 2018 and 2030 (see Section II).

Drilling advocates, perhaps mistaking wishful thinking for reality, frequently overlook significant data that do not support their views, such as the mean estimates of Arctic Refuge protection potential published by USGS and EIA. In the resulting confusion, it is easy to lose sight of important new developments that have bearing on the proposal to seek oil on the Arctic Refuge Coastal Plain. Salient facts and projections discussed in the preceding sections include the following:

- For the first time in the last quarter-century, since 2005 net petroleum imports have exhibited a decreasing trend.
- In recent years, reductions in petroleum consumption and early implementation of alternative technologies have led to reductions in

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[21] Emil D. Attanasi and John H. Schuenemeyer, *Frontier Areas and Resource Assessment: The Case of the 1002 Area of the Alaska North Slope*, USGS Open-File Report 02-119, March 2002, p. 10.

[22] "Senator Stevens Highlights Inconsistencies in Anti-Drilling Stance" and "Senator Stevens Calls for Oil and Gas Development in Alaska." Also on May 1, Congressman Don Young told his colleagues that the Arctic Refuge could provide the nation with one million barrels of oil per day for 30 years. (Congressman Don Young, "Dear Colleague," May 1, 2008.)

projected future imports that dwarf the production potential of the Arctic Refuge.

- When national trends reported by EIA are extended out to the year 2050, this nation is on track to achieve a reduction in imports of more than 100 billion barrels of oil through conservation and alternative technologies. By comparison, potential production from the Arctic Refuge Coastal Plain region during the same period during the same period is estimated to be less than 10 billion barrels of oil.

The developments summarized in this report augur well for an extraordinary reduction in the volume of oil this nation will need to import in coming decades. These data make a strong case for continuing aggressive pursuit of the net energy gains from conservation and alternative technologies that are necessary to address current energy problems. Compared to the limited amount of oil the Arctic Refuge might produce over the same period, these measures appear to be on track to reduce future demand for petroleum imports more than ten fold.

This analysis is not intended to minimize the severity of the energy crisis with which this nation must deal; indeed, there is general agreement today that this nation is paying an extremely high price for past failures to avert the problems we now face.[23] At the same time, as the United States continues to develop fundamental solutions to the energy problems that confront the nation and the world, the information presented in this report strongly supports the proposition that the proposal to drill for oil on the Arctic Refuge Coastal Plain should be dismissed as a misguided distraction from the urgent tasks at hand.

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[23] While drilling advocates persist in looking backwards to claim rhetorically that authorizing drilling in the Arctic Refuge a decade ago might have resulted in significant alleviation of today's energy problems, the analysis presented here suggests that a much greater contribution to resolution of current energy problems might have been made by adherence to the national energy policies promulgated during the 1970s by Presidents Nixon and Carter that were later rolled back. At this time such retrospective analysis is a luxury we cannot afford; this report looks forward, limiting examination of past data to the task of understanding where we are today, how we got to this point and where we go from here.

# Appendix

U.S. Energy Information Administration Charts
Show Declining Imports Trend

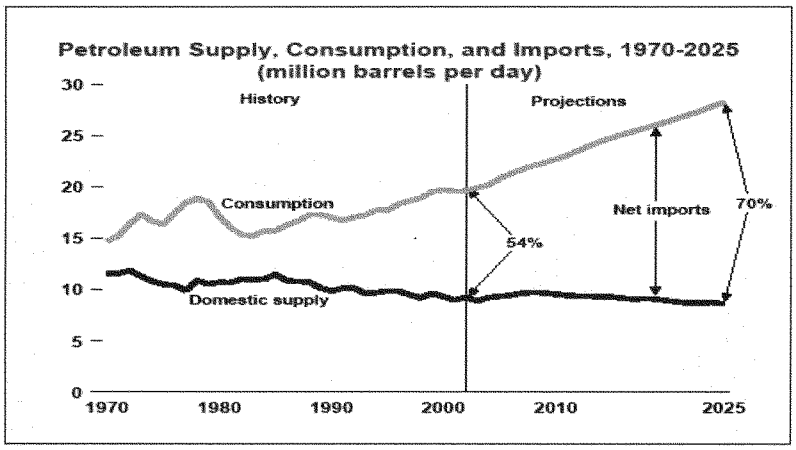
Sheet 1. 2004 and 2006

Sheet 2. 2007 and 2008

Appendix 1 (Sheet 1)

## EIA Net Import Import Projections, 2004 - 2008

**2004:**




**From: U.S. EIA, *Overview of the Annual Energy Outlook 2007*, March 23, 2004.**

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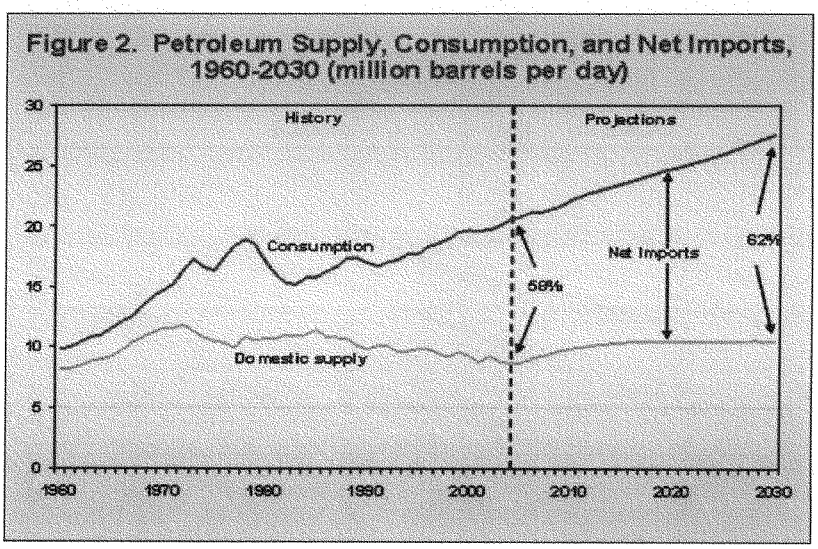
**2006:**

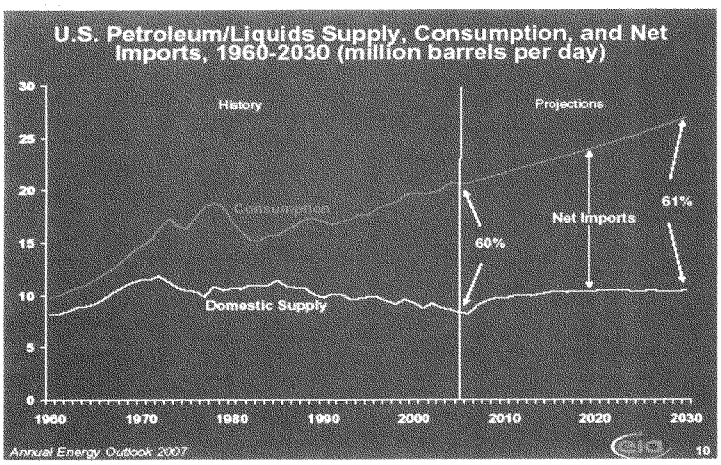



**From, U.S. EIA, "*Annual Energy Outlook 2006* (Administrator's Presentation)," December 2005.**

Appendix 1 (Sheet 2)

## EIA Net Import Import Projections, 2004 - 2008

**2007:**




**From U.S. EIA, *Annual Energy Outlook 2007*, Advanced Release presentation (posted Dec. 5, 2006).**

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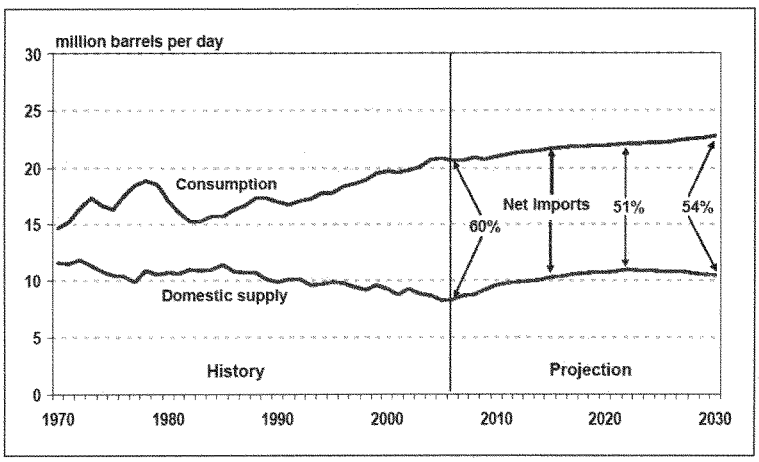
**2008: IMPORT SHARE OF NET LIQUIDS USE DECLINES FROM ITS CURRENT LEVEL.**




**The EIA's 2008 projection of future oil imports was presented as Figure 9 in EIA Administrator Guy Caruso's March 4, 2008 testimony to the U.S. Senate Energy and Natural Resources Committee,**

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