THE EFFECTS OF MIDDLE EAST EVENTS ON U.S. ENERGY MARKETS

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND POWER

OF THE

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SUBMITTED MATERIAL

THE EFFECTS OF MIDDLE EAST EVENTS ON U.S. ENERGY MARKETS

THURSDAY, FEBRUARY 10, 2011

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

The subcommittee met, pursuant to call, at 9:38 a.m., in room 2123 of the Rayburn House Office Building, Hon. Ed Whitfield (chairman of the subcommittee) presiding.

Members present: Representatives Whitfield, Sullivan, Shimkus, Walden, Terry, Burgess, Scalise, McMorris Rodgers, Olson, McKinley, Gardner, Pompeo, Griffith, Barton, Upton (ex officio), Rush, Inslee, Markey, Green, Capps, and Waxman (ex officio).

Staff present: Garrett Golding, Professional Staff; Maryam Brown, Chief Counsel, Energy and Power; Carly McWilliams, Legislative Clerk; Elizabeth Lowell, Research Analyst; Cory Hicks, Policy Coordinator, Energy and Power; Aaron Cutler, Deputy Policy Director; Phil Barnett, Democratic Staff Director; Greg Dotson, Democratic Chief Counsel, Subcommittee on Energy and Power; Jeff Baran, Democratic Counsel; Alison Cassady, Democratic Professional Staff Member; and Caitlin Haberman, Democratic Policy Analyst.

OPENING STATEMENT OF HON. ED WHITFIELD, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF KENTUCKY

Mr. WHITFIELD. Good morning and welcome, and I am very sorry we are 8 minutes late but we do appreciate this panel being with us this morning. We look forward to your testimony as we have this hearing on the effects of Middle East events on U.S. energy markets.

We convene today's hearing to have a discussion on recent developments in the Middle East and North Africa and their effect on world energy markets. Violent protests and political uncertainty in Egypt 2 weeks ago caused a sudden spike in oil prices that, over the past few days, has gradually subsided. The price increase was driven by investor fears over the possible shutdown of the Suez Canal and Su-Med Pipeline, which transport up to 3 million barrels of oil per day.

These events provide a catalyst for deeper examination of the economic and geopolitical factors that contribute to the pricing of oil and its impact on the United States. Events in the Middle East also demonstrate a number of facts. One, oil is a globally traded

commodity, the price of which is influenced by basic laws of supply and demand; two, political events can play a major role in influencing the price of oil; and three, half the world's oil is produced in OPEC member states and Russia. Some of these nations are politically and economically unstable, and in a tightening market, unreliable sources of oil will prove increasingly detrimental to price stability and international security. It also certainly reinforces the issue of the importance of Canada and our relationship with Canada as it relates to energy.

With these facts in mind, we should turn our attention to the current state of international energy markets. We have a booming demand in China, which greatly outpaces that of the OECD countries. We have seen in 2008 how OPEC spare capacity can reach dangerously low levels during periods of high global demand. We have new frontiers of oil production ranging from the Arctic to enhanced recovery technologies here in the United States. Additionally, we have restricted vast supplies here in North America by government action, or, in many cases, government inaction.

Now, how do all of these factors relate to domestic energy policy? For starters, there are numerous steps we can take to protect ourselves from price and supply shocks. The National Petroleum Council estimates we have upwards of 40 billion barrels of oil locked away in the eastern Gulf of Mexico, Atlantic and Pacific Coasts, on- and offshore Alaska, that are currently off-limits for production. These 40 billion barrels are double the proven reserves in the United States today. These resources could easily double our domestic production capacity and replace our imports from the Middle East. This is the quickest and most efficient way of reducing dependence on foreign sources and ensuring environmental safety. Any barrel we do not produce here in the United States or Canada will have to be produced in a remarkably less safe, less regulated, and more environmentally damaging manner in Nigeria, Venezuela, Angola and other states where environmental quality is a depressingly low priority. Essentially, failing to produce domestic energy guarantees environmental harm elsewhere in the world. Events in Tunisia, Egypt, Jordan, Algeria and Yemen show how uncertain and dangerous this world is. Furthermore, these developments show how the price of oil can bend to the will of protesters thousands of miles away from our shores. How we react and adapt to this inconvenient reality is a test of political leadership that will play a major role in the economic and national security of America, and that is why we are so appreciative of all of you being here and we look forward to your testimony.

[The prepared statement of Mr. Whitfield follows:]

PREPARED STATEMENT OF HON. ED WHITFIELD

• We convene today's hearing to have a discussion on recent developments in the Middle East and North Africa and their effect on world energy markets. Violent protests and political uncertainty in Egypt two weeks ago caused a sudden spike in oil prices that, over the past few days, has gradually subsided. The price increase was driven by investor fears over the possible shutdown of the Suez Canal and Su-Med Pipeline, which transport up to 3 million barrels of oil per day.

• These events provide a catalyst for deeper examination of the economic and geopolitical factors that contribute to the pricing of oil. Events in the Middle East also demonstrate a number of facts:o One: Oil is a globally-traded commodity, the price

of which is influenced by basic laws of supply and demand. o Two: Political events can play a major role in influencing the price of oil. o Three: Half the world's oil is produced in OPEC member states and Russia. Some of these nations are politically and economically unstable. In a tightening market, unreliable sources of oil will prove increasingly detrimental to price stability and international security.

• With these facts in mind, we should turn our attention to the current state of international energy markets. o We have booming demand in China which greatly outpaces that of OECD countries. o We have seen, in 2008, how OPEC spare capacity can reach dangerously low levels during periods of high global demand. We have new frontiers of oil production ranging from the Arctic to enhanced recovery technologies here in the U.S. Additionally, we have restricted vast supplies here in North America by government action, or, in many cases, government inaction.o Now how do all of these factors relate to domestic energy policy? For starters, there are numerous steps we can take to protect ourselves from price and supply shocks.o The National Petroleum Council estimates we have upwards of 40 billion barrels of oil locked away in the Eastern Gulf of Mexico, Atlantic and Pacific Coasts, on- and offshore Alaska, that are currently off-limits for production. These 40 billion barrels are double the proven reserves of the U.S. today. o These resources could easily double our domestic production capacity and replace our imports from the Middle East. This is the quickest and most efficient way of reducing dependence on foreign sources and ensuring environmental safety.o Any barrel we do not produce here in the U.S. or Canada will have to be produced in a remarkably less safe, less regulated, and more environmentally damaging manner in Nigeria, Venezuela, Angola, and other states where environmental quality is a depressingly low priority. Essentially, failing to produce domestic energy guarantees environmental harm elsewhere in the world.o Events in Tunisia, Egypt, Jordan, Algeria, and Yemen show how uncertain and dangerous this world is. Furthermore, these developments show how the price of oil can bend to the will of protesters thousands of miles away from our shores. How we react and adapt to this inconvenient reality is a test of political leadership that will play a major role in the economic and national security of this nation.

Mr. WHITFIELD. With that I will recognize the gentleman from Illinois for his opening statement.

OPENING STATEMENT OF HON. BOBBY RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. RUSH. I want to thank you, Mr. Chairman, and I want to thank all the witnesses for their presence here today, and I want to thank you for holding today's hearing to highlight our Nation's growing need to address our energy security and to improve our energy independence.

Energy supply and demand are key components to the American economy. They all affect all dimensions of our lives from driving to work, feeding our families to heating and cooling our homes. Notwithstanding energy's fundamental important, the markets and exchanges on which are energy sources are traded remains extremely volatile and unpredictable. I think I can safely say that a consistent theme we will be hearing throughout this morning is that it is in America's best strategic and economic interests to become less and less dependent on foreign oil, gas and other fossil fuels in as short a time frame as possible.

The Obama Administration understands this perfectly well, which is why it has set the ambitious goals of, one, putting 1 million electric automobiles on America's streets and highways and into America's families' garages and parking lots by 2012; two, unleashing a clean energy revolution to double the supply of renewable energy by the end of 2012; three, doubling America's exports by the end of 2015; and four, dramatically decreasing American dependence on traditional fossil fuels so that by 2035 approximately

80 percent of America's electricity is sourced by renewables. That is also why the Obama Administration is putting our country on a prudent course to disrupt our existing paradigms and business models which yield insufficient energy reliability and efficiency, disastrous environmental consequences and lackluster competitiveness in international trade. Rather, the new paradigm focuses on making substantial public investments and designing incentives to encourage major private investments as well as leveraging speedier deployments of advanced electric and smart grid technologies and networks.

In past sessions of Congress, we have set policies aimed at achieving this. We have lowered dependency on volatile world oil markets by reducing our appetite for oil and gas. Under Congress's direction and the stewardship of the Department of Energy and the Environmental Protection Agency, the EPA, we have made sufficient and significant progress towards improving our Nation's energy efficiency. But our dependency as individuals, families and businesses on imported energy sources is still far too great.

Allow me to commend you, Mr. Chairman, for calling this timely hearing, especially as we are in the midst of winter with record-breaking low temperatures and snowfalls in many parts of the country, including my own city and State, while at the same time our lagging economy imposes added pressures on America's budgets, especially those of the unemployed and the working poor.

I must say that regardless of the policy choices that have been made by this Administration or this Congress, our low-income families must always be offered and given needed assistance to cook and heat their homes in winter. I have been a staunch supporter and advocate for the crusade and led by the effort in Congress to fully fund LIHEAP at $5.1 million in fiscal year 2010 and to increase access and eligibility for low-income families, the elderly and seniors all over the country. However, I am very disappointed and disturbed that the Administration in proposing its fiscal year 2012 budget plans to reduce LIHEAP by roughly $3.1 million. This would amount to a steep cut in funding from $5.1 million at which the program had been funded for the past 2 years. That is just unacceptable to me and to others.

Today's hearing should not be used, Mr. Chairman, to criticize EPA's permitting process to build refineries or to sanction more domestic drilling. In case you have forgotten, let me remind you that EPA's mission, as it name indicates, is to protect the American environment and the country that we inherit.

Mr. Chairman, I want to thank you so much. My time is concluded and I yield back whatever balance of time that I have.

Mr. WHITFIELD. Thank you, Mr. Rush. And at this time I recognize our chairman emeritus, Mr. Barton of Texas, for 5 minutes.

Mr. BARTON. I am only going to use 1 minute, Mr. Chairman.

Yesterday we had a hearing on a domestic issue, the Environmental Protection Agency and its effort to regulate the U.S. economy through regulating greenhouse gases. It is a very important issue domestically. Today we are focusing internationally, the situation in the Middle East, specifically in Egypt, its impact on energy markets. I think it is safe to say that in a global economy, unrest in the Middle East with the Suez Canal and the political situation

not just in Egypt but in a number of the Islamic countries, should give the United States pause. I think it points out the fact quite plainly that we need to develop our domestic energy resources.

I was heartened to hear President Obama in his State of the Union talk about natural gas and clean energy. We don't have a lack of energy resources in this country, Mr. Chairman. We do have a lot of political consensus on how and infrastructure to develop this. Hopefully, this hearing will build the case that it is time to move forward domestically. I notice we have a former member, Mr. John. I am sure he is going to talk about the situation in the Gulf of Mexico and the de facto moratorium on new exploration there.

So with that, I appreciate the hearing and I would like to yield to the gentleman from Illinois, Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Mr. Chairman, I am an Obama skeptic when it comes to energy security. We have the resources available in North American energy supplies to be energy independent when we talk about North American.

It is great to see my friend Chris John here. He will talk about the "permatorium," and when the economy starts recovering and gas prices reach $4, $4.50, $5 a gallon, we are going to ask why does this Administration continue to delay, obstruct oil and gas exploration in the Gulf. And then—and I am very pleased to see Mr. Mar here on the Canadian oil stand. This Administration pending with the State Department permission to obviously bring the oil down to continental United States. In his testimony in appendix A, it talks about jobs. Yesterday was about jobs. There is no bigger job creator in the State of Illinois right now than this pipeline and the direction straight to the Wood River Refinery, which is right outside my district, a $2 billion pipeline, $2 billion expansion of refinery, the jobs. Of course, another great Illinois company, Caterpillar, is being used extensively up there. We are talking again the increase in jobs between 2009 to 2025 of 26,000 jobs.

Folks, that has been my message consistently over the past 5 years about high-paying, good jobs in the fossil fuel industry that the past Congresses and this Administration continue to want to destroy. And so as we look and have this testimony, we are talking about the threat of constrained crude oil based upon the geopolitical world. This would not be as much of a dangerous situation if we accessed our resources in the Gulf, if we accessed our resources with our Canadian friends, allies, and if we don't do this pipeline, that pipeline could go west and guess where? To China. Which is part of our debate yesterday, whether we want to create jobs in China or whether we want to create jobs in the United States.

I am very excited about this hearing. I appreciate all the panelists in attendance and I yield back my time.

Mr. WHITFIELD. Thank you. At this time I recognize Mr. Waxman of California, the ranking member.

OPENING STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

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

The recent events in Egypt have once again exposed our dependence on foreign oil. Although Egypt isn't a major producer of oil, the Suez Canal and the Suez-Mediterranean pipeline are crucial shipping links for global oil and gas markets. Instability there has increased oil prices around the world.

For years, decades, really, the Energy Information Administration projected that U.S. oil consumption would grow year after year, and it did. By 2005, nearly 60 percent of U.S. fuels were imported. Sixty percent is imported. And the future looked bleak: higher oil consumption and more imports far into the future.

The solution offered by the Bush Administration was to drill out way out of the problem, and I know we are going to hear this proposed solution again today. We will hear that increased domestic production is the answer. But more U.S. production is never going to be enough to appreciably reduce global oil prices or U.S. imports of foreign oil. We use 25 percent of the world's oil but we only have 2 percent of the world's oil reserves. So we can double it and we could even triple it, and it is simply not going to affect global oil prices much. The key to making progress is to focus on how much oil we use. Reducing our share of global oil consumption from 25 percent can have a real impact both on global oil prices and on imports.

The new motor vehicle standards promulgated by the Obama Administration are exhibit A for benefits of greater efficiency. In 2009, the Administration brokered an agreement to provide the auto industry with coordinated fuel economy and greenhouse gas emissions standards for model years 2012 through 2016. This effort was supported by the auto industry, the States and environmental advocacy groups.

The carbon pollution tailpipe standards have had a remarkable impact. This national program is projected to save 1.8 billion barrels of oil. The Administration estimates that the standard yields net savings to consumers of roughly $130 to $180 per year and $3,000 over the life of the vehicle.

Most remarkable is the impact of these standards on U.S. oil imports and consumption. As this chart shows on the screen, the Energy Information Administration now projects that we will be importing less oil in the future than we did in 2007, reversing decades of increasing reliance on foreign oil. And in a fundamental and historic shift, overall U.S. consumption of oil is predicted to stop growing.

As the second chart shows, by requiring improvements in how efficiently we use oil, the Administration has reversed a dangerous trend. The Administration wants to build on this success with stronger standards after model year 2016. And it is also working on standards for trucks and other commercial vehicles. These standards could save even more money at the pump while further reducing our dependence on foreign oil.

Incredibly, the new Republican majority in Congress is opposed to these efforts. Chairman Upton and Senator Inhofe have proposed legislation to block EPA from setting new motor vehicle standards. This subcommittee held a hearing on this bill yesterday. We need more energy independence, not less. We need more savings for consumers at the pump, not fewer.

We need to use oil more efficiently so that we can import less of it, but the Upton-Inhofe bill would take us in exactly the wrong direction. It would block one policy that has proven that it works. The Upton-Inhofe bill is great for oil companies like Koch Industries, which spent millions of dollars electing Republicans. But it is a public health, economic and national security disaster for all the rest of us.

As we learn more today about the challenges of being dependent on oil from the Middle East, I hope all members will consider what is at stake. We are finally heading in the right direction. It would be a costly mistake to halt our progress. Yield back.

Mr. WHITFIELD. Thank you.

At this time we are going to ask our panel to give their opening statements, and we have with us this morning Mr. Richard Newell, who is Administrator of the Energy Information Administration. We have Mr. Gary Mar, Minister-Counselor from the province of Alberta. We have Mr. Adam Sieminski, Chief Energy Economist, Deutsche Bank. We have Mr. Hofmeister, who is President of Citizens for Affordable Energy. We have Mr. Chris Busch, Director of Policy and Program, Apollo Alliance. And our former colleague, Mr. Chris John, President of Louisiana Mid-Continent Oil and Gas Association.

So Dr. Newell, I will call upon you to begin with the opening statements. You are recognized for 5 minutes.

STATEMENTS OF RICHARD G. NEWELL, PH.D., ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION; GARY MAR, MINISTER-COUNSELOR, PROVINCE OF ALBERTA; ADAM SIEMINSKI, CHIEF ENERGY ECONOMIST, DEUTSCHE BANK AG; JOHN HOFMEISTER, FOUNDER AND CEO, CITIZENS FOR AFFORDABLE ENERGY; CHRISTOPHER BUSCH, PH.D., DIRECTOR OF POLICY AND PROGRAM, APOLLO ALLIANCE; AND CHRIS JOHN, PRESIDENT, LOUISIANA MID-CONTINENT OIL AND GAS ASSOCIATION

STATEMENT OF RICHARD NEWELL

Mr. NEWELL. Mr. Chairman, I appreciate the opportunity to appear before you today.

The Energy Information Administration is the statistical and analytical agency within the Department of Energy. EIA does not promote or take positions on policy issues and has independence with respect to the information and analysis we provide. Therefore, our views should not be construed as representing those of the Department of Energy or other federal agencies.

Given Egypt's small role in the global supply-demand balance for both oil and natural gas, the primary issue for global energy markets is driven by two other concerns. First, there is the concern that unrest could spread to countries with a larger role in supplying world oil markets. There is no doubt that the Middle East and North Africa are a major source of oil supply and other petroleum liquids, supplying about 28 percent of global liquids consumption. At the same time, there is about 5 percent spare crude oil production capacity and roughly 10 percent spare international oil shipping capacity available to the market, and the amount of spare

refining capacity is about 5 percent higher now than it was in 2007. There is therefore more flexibility in the global oil system than a few years ago.

Second, EIA has looked at a concern more directly related to Egypt involving the possibility of disruption of the Suez Canal or Sumed pipeline, which together carry about 3 million barrels a day of oil. The canal and pipeline continue to operate normally, and for reasons outlined in my written testimony, we would expect the direct effect of any closures to be manageable, although there would be undoubtedly an adjustment period.

Focusing next on the short-term outlook for oil, EIA expects a continued tightening of world oil markets over the next 2 years. World oil consumption grows by an annual average of 1.5 million barrels per day in 2011 and again in 2012 in our outlook while supply growth from non-OPEC countries averages about .3 million barrels per day this year and remains flat in 2012. Consequently, we expect the market to rely on increased OPEC members' production of crude oil and other liquids and some drawdown in inventories to meet world oil demand growth.

With tighter world oil market, EIA expects the price of West Texas intermediate crude oil, the key U.S. pricing benchmark, to average about $93 per barrel in 2011 and $98 per barrel in 2012. EIA expects the retail price of regular gasoline will average $3.15 per gallon this year and $3.30 per gallon in 2012. However, oil and in turn gasoline price forecasts are subject to a great deal of uncertainty. For example, the market value of futures and options contracts is telling us that there is close to a one in three chance that the price of oil could be above $110 per barrel at the end of the year.

I will now turn to the longer-term projections for oil and other liquids from EIA's annual energy outlook. The reference case, which we released in December, represents an energy future through 2035 that assumes continuance of current market and technology trends, consumer behavior and current laws and regulations. It does not include the effects of potential future policies that have not yet become law but the reference case represents a baseline that is a useful jumping-off point for assessing alternatives.

Reference case crude oil prices continue to rise in our long-term outlook as a growing global economy underpins oil demand growth that is more rapid than supply growth from non-OPEC producers. By 2035, the average real price of crude oil in the reference case is $125 per barrel in 2009 dollars, although we examine a wide range of oil price scenarios.

Total U.S. consumption of oil and other liquid fuels grows from about 19 million barrels per day in 2009 to 22 million barrels per day by 2025. This modest growth in the reference case reflects increasing fuel prices and implementation of finalized standards and statutory mandates that drive the fuel economy of light-duty vehicles up to 35 miles per gallon by 2020. Virtually all of the increase in U.S. liquids consumption is met by biofuels use driven by the federal renewable fuel standard along with increases in natural gas liquids. We expect domestic oil production increases to come from onshore enhanced oil recovery projects and shale oil plays.

As a result of this increased domestic production and modest consumption growth, we expect U.S. dependence on imported liquid fuels to continue to decline. After reaching a high of 60 percent in 2005, the imported petroleum share of total liquid fuel use fell to 52 percent in 2009 and continues to decline in our projections to 42 percent by 2035.

In addition to preparing the baseline projections I have reviewed this morning, our full annual energy outlook to be released this spring will include a large number of sensitivity cases that examine the impact of different market technology and policy assumptions.

Mr. Chairman and members of the committee, this concludes my testimony. I look forward to any questions you may have.

[The prepared statement of Mr. Newell follows:]

STATEMENT OF RICHARD NEWELL

ADMINISTRATOR

ENERGY INFORMATION ADMINISTRATION

U.S. DEPARTMENT OF ENERGY

before the

COMMITTEE ON ENERGY AND COMMERCE

SUBCOMMITTEE ON ENERGY AND POWER

U.S. HOUSE OF REPRESENTATIVES

February 10, 2011

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to appear before you today to address the subject of this hearing, the effects of Middle East events on U.S. energy markets.

The Energy Information Administration (EIA) is the statistical and analytical agency within the U.S. Department of Energy. EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment. EIA is the Nation's premier source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views expressed in our reports, therefore, should not be construed as representing those of the Department of Energy or other federal agencies.

My testimony today focuses on several areas directly relevant to the hearing topic, including EIA's evaluation of the potential energy challenges posed by the situation in Egypt, our short-term and long-term outlooks for energy markets—especially petroleum, the role of the Middle East and North Africa in the global oil supply picture, the importance of choke points in the world oil transit system (see Figure 1), the role of spare production and refining capacity in the world oil market, and current features of the North American market for natural gas.

EIA's assessment of the potential implications of the situation in Egypt for energy markets

Egypt is a small net importer of crude oil, and a modest exporter of natural gas to regional markets via pipeline and as liquefied natural gas. Egypt's 2009 oil production was 680,000 barrels per day (bbl/d), or less than 1 percent of global supply of oil and other liquids, and its 2009 gas production was 2.4 trillion cubic feet, or about 2 percent of global gas production. Given Egypt's small role in the global supply-demand balance for both oil and natural gas, the primary issue for global energy markets surrounding the situation in the country is driven by two other concerns: (1) the possible spiral of unrest and (2) disruption of oil and gas transit through the Suez Canal and the SUMED pipeline.

First, there is a concern that unrest could spread to countries with a larger role in supplying world energy markets. It is not clear to what extent current oil prices, and the prices of futures and options contracts, which are discussed below, already reflect such concerns.

There is no doubt that the Middle East and North Africa are a major supply source of crude oil and other petroleum liquids to the world market. Crude oil and non-crude petroleum liquids produced in the Middle East and North Africa, which represent about 28 percent of estimated global liquids consumption of 86.6 million bbl/d in 2010, are extremely important to today's world market. In 2010, EIA estimates that 6 OPEC member countries in the Middle East (Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates) produced 20 million barrels per day (bbl/d) of crude oil, while 2 OPEC member countries in North Africa (Algeria and Libya) produced an additional 3 million bbl/d of crude oil. There is also some additional production by non-OPEC member states in both regions. OPEC members in the Middle East and North Africa also supply an important share of OPEC's non-crude petroleum liquids production,

which EIA estimates at 5.4 million bbl/d in 2010. Many analysts, including EIA, expect Middle East producers to supply a growing amount of oil to world markets in coming years.

Surplus oil production capacity, and the availability of refining capacity that can make use of the oil that would come from those sources, are important to world oil markets because they can act as a cushion in the event of any disruption in oil markets. EIA currently reports that there is about 4.7 million bbl/d of surplus capacity, with almost 80 percent of this in one country, Saudi Arabia. Most of the rest is located in other Persian Gulf countries including Kuwait, the United Arab Emirates, and Qatar. In this respect, the world oil market is much better situated to handle a disruption than it was in 2007 and early 2008, when the level of spare production capacity was extremely low. Unless a disruption were to directly affect the supply of oil from countries that maintain significant surplus capacity, the availability of that capacity could significantly cushion hypothetical disruptions affecting other important regional suppliers.

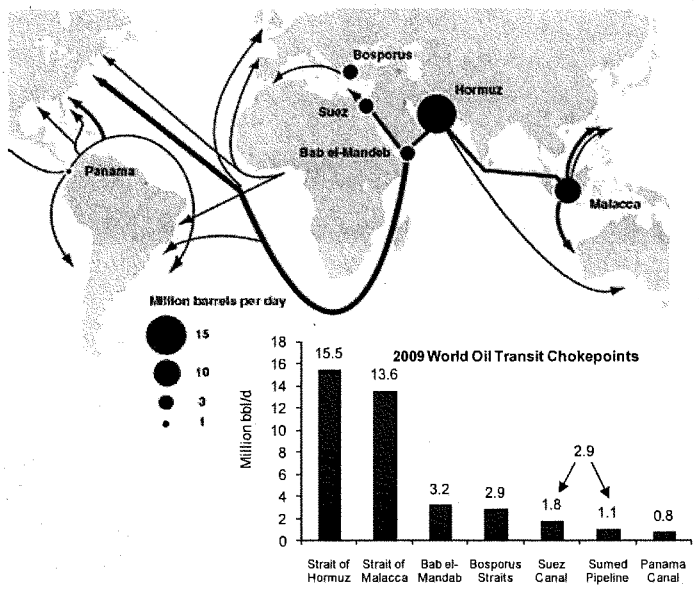
However, there is a wide range of views among analysts regarding the actual level of spare capacity. The disparity is the result of varying assessments of both actual production levels and available production capacity, and reflects a lack of transparency in global oil markets that has not been fully resolved by transparency efforts such as the Joint Oil Data Initiative (JODI). If surplus capacity were actually below EIA's published estimate, the impacts of any potential disruption on oil prices and economic output could be higher in magnitude.

In addition to tracking the level of surplus production capacity, EIA also pays close attention to refining capacity in order to better understand market dynamics. Total world refining crude oil distillation capacity as of January 1, 2011 was 88.3 million bbl/d, according to the Oil and Gas Journal. Based on reported crude oil production in 2010, the average world refinery utilization rate was about 81 percent. In 2007, when total world liquid fuels consumption was close to the level it was in 2010, the average world refining capacity utilization rate was about 86 percent.

Second, EIA took an in-depth look at a concern more directly related to Egypt involving the possibility of disruption of the Suez Canal and/or the Sumed (Suez-Mediterranean) pipeline. EIA estimates that roughly 3.1 million bbl/d (January-November 2010 average, 2.9 million bbl/d in 2009) of crude oil and oil products transit the Suez Canal or the Sumed pipeline, representing about 6 percent of total daily global waterborne oil movements. About 20-25 percent of global liquefied natural gas (LNG) shipments also pass through the canal, and several European countries are heavily dependent on those shipments. Information available to EIA as of February 8, when this written testimony was finalized, suggests that the canal and oil pipeline are both operating normally.

However, a gas pipeline in Egypt's Sinai Peninsula exploded on February 5. Jordan relies on Egyptian gas to generate around 80% of its electricity. Israel receives about 40 percent of its natural gas imports from Egypt, and 15 percent of Israeli electricity generation is met by this natural gas. Reports suggest the gas pipeline may remain shut down for about a week. While we are not aware of any reports of any current disruptions to canal or oil pipeline activity, we recognize that policymakers may want to understand the possible implications for energy markets of a disruption of these routes.

Figure 1: Major Oil Transit Chokepoints



Source: EIA (data estimates based on APEX tanker data); GAO (map)

For reasons outlined below, however, we would expect the direct effects of any such closures to be manageable, although there would undoubtedly be an adjustment period.

- Full diversion of all Suez Canal/Sumed flows around Africa is an extreme worst-case scenario, since it is likely that some crude or product streams would be redirected to reduce the need for such movements if the canal and the pipeline are disrupted.
- Even assuming a scenario where all 3.1 million barrels of crude and product that flow through the Suez Canal and Sumed daily (January-November 2010 data) were diverted around Africa, the increase in tanker requirements traffic would be modest in the context of current global oil shipment flows. Oil diverted around Africa could require an extra 6000 miles and 12 days of transit, with the actual values depending upon the exact destination.
- Our contacts in the tanker community suggest that the tanker market remains relatively relaxed. About 45 million bbl/d of waterborne oil shipments are moving

daily with a spare capacity margin of roughly 10 percent or 4 to 5 million barrels per day.

- Even if tanker rates were to increase significantly in a disruption scenario involving closure of the Suez Canal/Sumed transport route, which is again contrary to the indications above, tanker costs represent a very small component of overall delivered crude costs. For example, tanker costs from the Persian Gulf to the Gulf of Mexico generally fall within the range of $1 to $2 per barrel, so even a major increase in tanker rates would have little impact on delivered oil prices.

Impacts of the Egypt situation on U.S. energy markets

In considering the impact of recent developments on U.S. energy markets, it is important to recognize that the degree of global market integration differs across fuels. Oil is traded in a market that is fully global, so that impacts on U.S. markets would closely correspond to global market impacts. In this regard the actual source of imported oil to the U.S. does not really matter. After adjustment for quality differences, the prices of oil streams from different sources and regions are highly correlated.

The situation is somewhat different with respect to natural gas, because relatively higher transportation costs for intercontinental shipments of liquefied natural gas, and the recent rapid growth in U.S. production of shale gas, have allowed natural gas prices in North America to diverge significantly from natural gas prices in other world regions. Although small amounts of LNG continue to be imported, they do not play a large role in determining U.S. natural gas prices.

Recent oil market trends and the short-term energy outlook

At any point in time, the prices of crude oil and related futures and options derivatives reflect an aggregation of all information judged to be relevant by market participants. The situation in Egypt is certainly one important factor recently influencing prices, but there is no clear way to determine the share of recent price movement that is directly attributable to it. Some key observations concerning recent price movements follow.

West Texas Intermediate (WTI) crude prices have moved in a relatively narrow band over the past month with no strong directional trend. The daily closing price of the WTI March delivery contract ($86.94 per barrel on February 8) has generally moved in the range of $87 to $92 per barrel over the past month. The daily closing price for the Brent March delivery contract ($99.92 per barrel on February 8) has shown a clearer trend, rising about $6 per barrel over the course of the past month. The gap between Brent and WTI prices widened significantly in late January, and remains large by historical standards.

In EIA's view, recent Brent price movements are more representative of trends across broader crude oil prices that would drive gasoline prices than are recent WTI price movements. WTI prices are currently heavily influenced by storage capacity and the supply/demand balance at

Cushing, OK, the delivery point for the WTI futures contract traded on the New York Mercantile Exchange.

The short-term energy outlook

EIA's latest monthly *Short-Term Energy Outlook,* released on February 8, forecasts a continued tightening of world oil markets over the next 2 years. World crude oil and liquid fuels consumption grew by an estimated 2.4 million bbl/d in 2010, to 86.7 million bbl/d, the second largest annual increase in at least 30 years. This growth more than offset the losses of the previous two years and surpassed the 2007 level of 86.3 million bbl/d reached prior to the economic downturn. World oil consumption grows by an annual average of 1.5 million barrels per day through 2012 while the growth in supply from countries that are not members of the Organization of the Petroleum Exporting Countries (OPEC) averages about 0.3 million barrels per day this year and remains flat in 2012. Consequently, EIA expects the market will rely on both inventories and significant increases in the production of crude oil and non-crude liquids in OPEC member countries to meet world demand growth.

While on-shore commercial oil inventories in the Organization for Economic Cooperation and Development (OECD) countries remained high last year, floating oil storage fell sharply in 2010, and EIA expects that OECD oil inventories will decline over the forecast period to a level close to the middle of the previous 5-year range by the end of 2012. EIA expects that OPEC members' crude oil production will continue to rise over the next 2 years to accommodate increasing world oil consumption, especially with non-OPEC supplies expected to show limited growth. Projected OPEC crude oil production increases by 0.4 and 1.2 million barrels per day in 2011 and 2012, respectively.

Because of the projected tightening in world oil markets EIA expects the price of West Texas Intermediate (WTI) crude oil to average about $93 per barrel in 2011, $14 higher than the average price last year. For 2012, EIA expects WTI prices to continue to rise, with a forecast average price of $98 per barrel. Energy price forecasts are, however, uncertain. Based on futures and options prices, the probability that the monthly average price of WTI crude oil will exceed $100 per barrel in December 2011 is about 44 percent. Conversely, the probability that the monthly average December 2011 WTI price will fall below $85 per barrel is about 32 percent.

EIA expects regular-grade motor gasoline retail prices to average $3.15 per gallon this year, 37 cents per gallon higher than last year and $3.30 per gallon in 2012, with prices forecast to average about 5 cents per gallon higher in each year during the April through September peak driving season. There is regional variation in the forecast, with average expected prices on the West Coast about 25 cents per gallon above the national average during the April through September period. There is also significant uncertainty surrounding the forecast, with the current market prices of futures and options contracts for gasoline suggesting a 35 percent probability that the national average retail price for regular gasoline could exceed $3.50 per gallon during summer 2011 and about a 10 percent probability that it could exceed $4.00 per gallon. Rising

crude oil prices are the primary reason for higher retail prices, but higher refining margins are also expected to contribute.

The projected Henry Hub natural gas spot price averages $4.16 per million Btu for 2011, $0.22 per million Btu lower than the 2010 average. EIA expects the natural gas market to tighten in 2012, with the Henry Hub spot price increasing to an average $4.58 per million Btu.

The long-term outlook for oil and other liquids

International Energy Outlook. Before focusing on our U.S. Annual Energy Outlook, I want to briefly discuss some highlights of our *International Energy Outlook 2010* (*IEO2010*), which was issued last May. The *IEO2011* will be issued this spring. Although the *Annual Energy Outlook* focuses on our latest thoughts about domestic energy markets, it is useful to place this within a global context given the interconnectedness of U.S. energy markets and the broader global economy.

The United States accounted for one-fifth of the world's energy consumption in 2007, but this share is likely to decline over the next two decades. Global energy consumption will grow about 50 percent over the next 25 years, with most of the growth occurring outside of developed countries, in places like China, India, and the Middle East. Energy demand in non-OECD countries is expected to grow over 80 percent from 2007 levels, and by 2035 China will account for almost 25 percent of total world energy consumption. Renewables are the fastest-growing source of world energy supply, but under current market and technology trends fossil fuels are still expected to meet more than three-fourths of total energy needs in 2035, assuming current policies are unchanged.

Total global liquid fuels consumption projected for 2035 is 110.8 million barrels per day, which is 29 percent or 24.7 million barrels per day higher than the 2007 level of 86.1 million barrels per day. Conventional oil supplies from OPEC member countries contribute 11.0 million barrels per day to the total increase in world liquid fuels production from 2007 to 2035, and conventional supplies from non-OPEC countries add another 4.8 million barrels per day. World production of unconventional resources (including biofuels, oil sands, extra-heavy oil, coal-to-liquids, and gas-to-liquids), which totaled 3.4 million barrels per day in 2007, increases fourfold to 13.5 million barrels per day in 2035.

Natural gas consumption increases 44 percent globally over the projection period. Tight gas, shale gas, and coalbed methane supplies increase substantially in the *IEO2010* Reference case—especially from the United States, but also from Canada and China.

Annual Energy Outlook. Turning to the *Annual Energy Outlook 2011* (*AEO2011*), the Reference case was released in December 2010 and is intended to represent an energy future through 2035 based on given market, technological and demographic trends; current laws and regulations; and consumer behavior. EIA recognizes that projections of energy markets are highly uncertain and subject to geopolitical disruptions, technological breakthroughs, and other unforeseeable events. In addition, long-term trends in technology development, demographics,

economic growth, and energy resources may evolve along a different path than represented in the projections. The complete *AEO2011*, which EIA will release this spring, will include a large number of alternative cases intended to examine these uncertainties.

World oil prices declined sharply in the second half of 2008 from their peak in mid-July of that year. Real prices trended upward throughout 2009, and through November 2010 they remained generally in a range between $70 and $85 per barrel before climbing above $90 per barrel. Prices continue to rise gradually in the Reference case, as the world economy recovers and global demand grows more rapidly than liquids supplies from producers outside OPEC. In 2035, the average real price of crude oil in the Reference case is $125 per barrel in 2009 dollars.

The *Annual Energy Outlook 2011* (*AEO2011*) Reference case assumes that limitations on access to energy resources in resource-rich countries restrain the growth of non-OPEC conventional liquids production between 2009 and 2035, and that OPEC targets a relatively constant market share of total world liquids production. The degree to which non-OPEC and non-OECD countries restrict access to potentially productive resources contributes to world oil price uncertainty. Other factors causing uncertainty include OPEC investment decisions, which will affect future world oil prices and the economic viability of unconventional liquids. A wide range of price scenarios (from $50 per barrel to $200 dollars per barrel in 2035, in 2009 dollars) and discussion of the significant uncertainty surrounding future world oil prices will be included in the complete *AEO2011* publication.

Total U.S. consumption of liquid fuels, including both fossil liquids and biofuels, grows from 18.8 million barrels per day in 2009 to 22.0 million barrels per day in 2035 in the *AEO2011* Reference case. The transportation sector dominates the demand for liquid fuels and its share (as measured by energy content) grows only slightly, from 72 percent of total liquids consumption in 2009 to 74 percent in 2035. The *AEO2011* assumes the adoption of fuel economy standards for light-duty vehicles for model year 2011, as well as joint fuel economy and greenhouse gas emissions standards set forth by the Environmental Protection Agency (EPA) and the Natoinal Highway Traffic Safety Administration (NHTSA) for model years 2012 through 2016. The fuel economy standards increase further through model year 2020 to meet the statutory requirements of the Energy Independence and Security Act of 2007.

The Reference case does not assume any further changes in fuel economy standards. Some ideas for further standards are discussed in the September 2010 EPA/NHTSA Notice of Upcoming Joint Rulemaking to Establish 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy (CAFE) Standards. Nor does it include the proposed fuel economy standards for heavy-duty vehicles provided in *The Proposed Rule for Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles*, published by the EPA and NHTSA in November 2010. Enactment of further binding standards would lower the projection for liquid fuels use.

Biofuels account for most of the growth in liquid fuels consumption, increasing by 1.8 million barrels per day from 2009 to 2035. The biofuel portion of 2035 liquid fuels consumption is 3.9 quadrillion Btu in *AEO2011*, about the same as in *AEO2010*. Although the situation is uncertain, EIA's present view of the projected rates of technology development and market penetration of cellulosic biofuel technologies suggests that available quantities of cellulosic biofuels will be

insufficient to meet the renewable fuels standard (RFS) targets for cellulosic biofuels legislated in EISA2007 before 2022, triggering both waivers and a modification of applicable volumes, as provided in Section 211(o) of the Clean Air Act as amended in EISA2007.

U.S. dependence on imported liquid fuels, measured as a share of total U.S. liquid fuel use, reached 60 percent in 2005 and 2006 before falling to 52 percent in 2009. The liquids import share continues to decline over the projection period, to 42 percent in 2035.

In the *AEO2011* Reference case, U.S. domestic crude oil production increases from 5.4 million barrels per day in 2009 to 5.7 million barrels per day in 2035. Production increases are expected from onshore enhanced oil recovery (EOR) projects, shale oil plays, and deepwater drilling in the Gulf of Mexico. Cumulatively, oil production in the lower 48 States in the *AEO2011* Reference case is approximately the same as in the *AEO2010* Reference case, but the pattern differs in that more onshore and less offshore oil is produced in *AEO2011*.

Onshore oil production is higher in *AEO2011* as a result of an increase in EOR, as well as increased shale oil production, for which the resource estimate has been increased relative to *AEO2010*. In *AEO2011*, EOR accounts for 33 percent of cumulative onshore oil production. The bulk of the EOR production uses CO2. For CO2 EOR oil production, naturally produced CO2 or man-made CO2 captured from sources such as natural gas plants and power plants is injected into a reservoir to allow the oil to flow more easily to the well bore.

Offshore oil production in *AEO2011* is lower than in *AEO2010* throughout most of the projection period because of expected delays in near-term projects, in part as a result of drilling moratoria and associated regulatory changes, and in part due to the change in lease sales expected in the Pacific and Atlantic outer continental shelf (OCS), as well as increased uncertainty about future investment in offshore production.

As with natural gas, the application of horizontal drilling together with hydrofracturing techniques have allowed significant increases in the development of shale oil resources (oil resident in shale rock). With *AEO2011* incorporating five key shale oil plays (as opposed to two in *AEO2010*), oil production rises significantly in areas of the country where shale oil is being produced, including the Rocky Mountains (primarily from the Bakken shale), the Gulf Coast (primarily from the Eagle Ford and Austin Chalk plays), the Southwest (primarily from the Avalon play), and California (primarily from the Lower Monterey and Santos plays).

Conclusion

As I noted at the outset, while EIA does not take policy positions, its data, analyses, and projections are meant to assist policymakers in their deliberations and the private sector in making informed decisions. In addition to preparing the baseline projections that I have reviewed this morning, our full Annual Energy Outlook to be published this spring will include a large number of sensitivity cases that examine the impact of different market, technology, and policy assumptions. This concludes my testimony, Mr. Chairman and members of the Committee. I would be happy to answer any questions you may have.

Mr. WHITFIELD. Thank you, Dr. Newell.

At this time I will call on Mr. Mar for his 5-minute opening statement.

STATEMENT OF GARY MAR

Mr. MAR. Thank you, Mr. Chairman.

For the record, Mr. Chairman, my name is Gary Mar, Minister-Counselor here in Washington, D.C., and I represent the government of Alberta, a province of Canada. I thank you very much for the opportunity to be here today. As a former elected official in the province of Alberta, I have had ministerial responsibilities in areas including health and environment, and I, like you, have had the privilege of debating difficult issues and making tough decisions on behalf of the people who elected me over a period of 14 years.

The issue before you here today is that of energy and where and how you will obtain that energy, particularly oil, and I believe that my home province, Alberta, has and will continue to have a very important role in providing the United States with an alternative to foreign oil supplies, and I hope that nobody here takes offense with Alberta not really considering itself to be a foreign supplier.

Now, if I can leave you with three things to take away from my presentation on Alberta oil, they are: number one, security of supply; number two, economic benefits; and number three responsible development. This is a combination of attributes that is not readily associated with many of the other countries in the world that the United States gets is oil from.

For the past 5 years, Canada has and continues to be the largest supplier of imported oil to the United States. In 2009, Canada supplied 23 percent of America's oil imports, more than double the imports that come from Saudi Arabia and more than four times the imported oil that comes from Iraq. The lion's share of Canada's exports comes from Alberta's oil sands. If you look at Alberta in isolation, we provide 17 percent of your total crude oil imports, and that is in volume 1.5 million barrels of oil per day that comes to you from Alberta in a transportation system that doesn't move called a pipeline. This number will grow, and the question perhaps for you is, how much will it grow by.

The province of Alberta has the distinction of being the largest OECD jurisdiction capable of substantially increasing oil production to meet future demand. In fact, it is forecast that by the year 2019 Alberta will be producing 3.3 million barrels of oil per day compared to current production of 2 million barrels. That represents security of supply. Moreover, our oil comes from a politically stable and democratic neighbor and is sent to the United States via pipeline so it is not affected by political unrest or other disruptions, a point that was supported very recently by a released report of the United States Department of Energy.

Alberta oil also far exceeds any other foreign source of oil and economic return that it brings to the United States, and Hon. Shimkus's example of Caterpillar is but one example. I was at Caterpillar's offices in East Peoria yesterday. The largest collection and concentration of Caterpillar trucks in the world is around the area of Fort McMurray, is what I was advised by the people from Caterpillar.

For every dollar that the United States spends on Canadian products, you get 91 cents in return from the products that we turn around and buy from you. The United States is our largest trading partner by far. There are currently estimated, and this is a very conservative estimate, at the very least more than 900 U.S.-based businesses that are suppliers for Canadian oil sands and related pipeline projects. Mr. Chairman, your State is home to three of those companies. The vice chairman's home state is home to 36 of them. In addition, over the next 4 years America will gain 343,000 new jobs as a result of oil sands development.

Major U.S. companies like ConocoPhillips, Exxon, Devon and Marathon have oil sands operations in the province of Alberta. These companies all have firsthand understanding of the stringent rules in place to ensure that energy is developed responsibly in our province and with the highest degree of care and concern for the environment. In 2007, the province of Alberta was the first jurisdiction in North America to regulate large industrial greenhouse gas emitters. Alberta has a price on carbon. To date, we have collected $187 million as a result of this carbon tax. This money is set apart from our general operating fund as a government. It is wholly dedicated to developing clean energy projects. Thus far, $71 million has been invested into 16 different clean energy projects.

In addition to this, the government of Alberta has also committed $2 billion to commercial-scale carbon capture and storage projects to help reduce greenhouse gas emissions. This is $2 billion from a province whose population is only 3½ million people. It is a significant contribution on a per capita basis.

At the start of my remarks, I talked about being a former elected official in Alberta, and now I have the pleasure of working here in Washington and I spent much of my time talking to our American friends about how Alberta can help meet your energy demands. I want you to feel confident that when the people who elect you go to a gas station to fill up on their way to soccer practice or a baseball game that they are using a product that came from a friend, a friend with similar goals, with similar values. As the President said last week, our countries are woven together perhaps like no other two countries in the world. We match up more than probably any country on earth, and I agree with that statement emphatically.

So Mr. Chairman, Alberta oil can provide America with security of supply. It does help create jobs and grows our economies, and most importantly, it does both of these responsibly, ensuring that the environment is a top priority, and I look forward to working with the United States to develop sustainable solutions as we continue to advance our clean energy technologies. I thank you for the invitation to be here.

[The prepared statement of Mr. Mar follows:]

WRITTEN STATEMENT

HEARING ON THE EFFECTS OF MIDDLE EAST EVENTS ON U.S. ENERGY MARKETS

GARY MAR, ALBERTA REPRESENTATIVE IN WASHINGTON, D.C.

FEBRUARY 10, 2011

CANADIAN OIL SANDS AND U.S. ENERGY SUPPLY

SUMMARY OF MAJOR POINTS

- Growing oil production in the Western Canadian province of Alberta provides a key alternative to U.S. oil imports from less secure and reliable sources.
- Most of this production growth will come from the ongoing development of oil sands resources. This development offers benefits to the U.S. beyond energy and national security, including economic growth, jobs, and socially and environmentally responsible energy production.
- Canada is already the largest supplier of oil to the U.S., accounting for almost one-quarter of U.S. imports, and expanded production from Alberta's oil sands offers the potential for this proportion to increase.
- Americans companies are not only major investors in the oil sands, but many U.S. businesses throughout the country benefit from supplying goods and services required for ongoing oil sands operations and expansion.
- Alberta's oil sands industry is one of the most regulated in the world, with strict legislation and standards to protect our air, land, water, and wildlife and manage greenhouse gas (GHG) emissions.

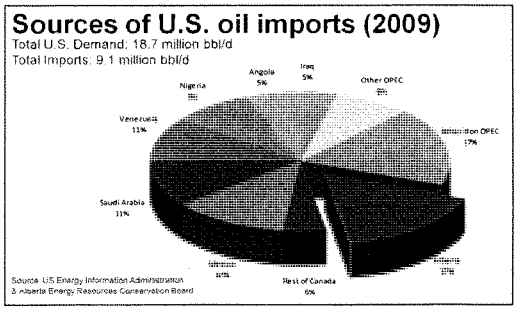
OIL SANDS OVERVIEW

The western Canadian province of Alberta is home to the largest proven oil reserve in the world open to international investment and not controlled by a state-run oil company. The bulk of this 171 billion barrel reserve is comprised of oil sands, a viscous form of oil that, over time, has combined with sand and water. About 20 per cent of the resource is close enough to the surface to allow it to be mined in a manner similar to many coal, iron ore, copper and diamond mine operations. Images of mining operations tend to dominate perceptions of oil sands production, so it is important to note that over 80 per cent of the resource, and about 45 per cent of current production, lies deep below the surface, and can only be recovered through underground production methods, including drilling operations that, although technologically advanced, are not unlike traditional oil production.

Alberta's oil sands have placed Canada in a unique position in the industrialized world: an open and transparent democracy with First World environmental and social standards also capable of substantially increasing oil production to meet future domestic, North American and international demand. It is forecast that by 2019 Alberta will be producing 3.3 million barrels of oil per day, about 70 per cent more than current levels.

ENERGY SECURITY BENEFITS

Alberta is now the largest global supplier of oil to the U.S. With the recent declines in U.S. oil demand, and increased oil sands production, oil from Alberta is now displacing



imports from overseas sources, many of which are less secure, friendly, or socially and environmentally responsible.

In examining the growing significance of Alberta oil sands production to U.S. energy security, the Council on Foreign Relations found that:

> *The prospect of sourcing oil from a stable, friendly, nearby country is naturally appealing to U.S. policymakers.*[1] *...world oil markets would also gain from shifting to supply chains that are less vulnerable to terrorism.*[2]

The Council on Foreign Relations went on to say:

> *Revenues from oil sales can empower adversaries in two ways. They can finance spending on hostile activities. More subtly but perhaps more dangerously, they can also lessen the value to states of participating responsibly in the international economic system, blunting the tools of economic statecraft on which the United States and its allies often depend.*[3]

The U.S. Department of Energy recently commissioned a study to examine the impacts of increased pipeline capacity, most notably the Keystone XL proposal, on U.S. crude supply. The report found that, while increased pipeline capacity will have little impact on U.S. oil

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[1] Council on Foreign Relations "The Canadian Oil Sands: Energy Security vs. Climate Change". Page 15 www.cfr.org/canada/canadian-oil-sands/p19345
[2] Ibid. Page 23.
[3] Ibid. Page 16.

consumption, with sufficient pipeline capacity and the projected increase in Alberta production, oil sands have the potential to:

> *...curb dependency on crude oils from other sources notably the Middle East and Africa.*[4]

The study also noted that transportation projects bringing Canadian crude to the U.S. have the added benefit of enabling U.S. domestic energy production, security and employment. Referring specifically to the Keystone XL proposal, the study reported that:

> *The project could also potentially (a) enable Bakken crudes in North Dakota and Montana to be linked in to KXL and taken to Cushing and the Gulf Coast and (b) enable U.S. crudes in the Cushing area to be taken into the line and transported to the Gulf Coast*[5]

OIL SANDS IMPACT ON U.S. ECONOMY AND JOBS

Canada and the U.S. have the world's largest two-way trading relationship. Over half of Canada's imports come from the U.S. In terms of the bottom line, for every American dollar spent on products from Canada, including oil, 91 cents is returned to the American economy. When the same metrics are applied to trading relationships with some other major sources of U.S. crude oil imports, returns are much lower: Saudi Arabia is 49 cents, and Venezuela is 33 cents.

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[4] "EnSys Keystone XL Assessment Prepared for US Department of Energy". Page 117. www.keystonepipeline-xl.state.gov/clientsite/keystonexl.nsf/AssmtDrftAccpt.pdf?OpenFileResource

[5] Ibid. Page 116.

Oil sands is "technology oil" and its development makes extensive use of U.S. products, technologies and expertise, creating a significant number of jobs throughout the U.S. A recent study by the Canadian Energy Research Institute (CERI) estimated that over the next 15 years, the development of Alberta's oil sands **will boost U.S. GDP by an average of $31 billion per year, creating over 624,000 jobs in the U.S., just over half of which will be created in the next four years.**[6] The study described the economic and employment benefits to each U.S. state, a breakdown of which can be found on Page 10.

With such strong direct benefits to the U.S. economy, it is not difficult to find local examples of supply chain connections throughout the U.S. The Canadian Association of Petroleum Producers (CAPP) has just surveyed its members and identified almost one-thousand U.S. companies that supplied parts, equipment, software and engineering and other technical services for oil sands and related pipeline projects between 2008 and 2010. A summary of the survey results can be found on Page 11. This survey is still a work in progress and so far identifies only a portion of all the U.S companies maintaining or building their businesses by partnering with us in the ongoing operation and expansion of the oil sands.

ENVIRONMENTALLY RESPONSIBLE

Not only can oil sands help to deliver energy and national security, jobs and economic growth for North America, they are and will continue to be developed responsibly. As with all major industrial development, including all forms of energy production, there are challenges associated with producing from the Alberta oil sands. Most of the challenges relate to ensuring continued environmental protection while increasing production. Alberta's

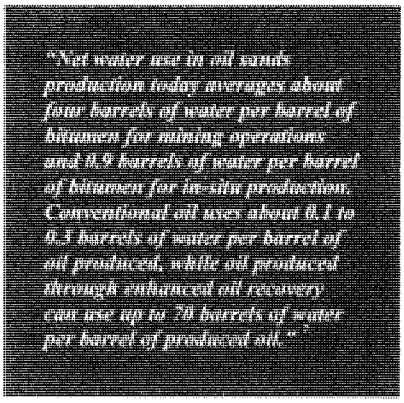
[6] Canadian Energy Research Institute, "The Impact of the Canadian Oil Sands Development on the United States' Economy", October 2009. http://www.api.org/Newsroom/upload/CERI_Study.pdf

oil sands industry is one of the most regulated in the world, with strict legislation and standards to protect our air, land, water, and wildlife and manage GHG emissions. That said, we recognize more can and will need be done to address continued growth. Alberta is currently consulting on a cumulative effects approach to managing environmental outcomes. Under this approach, in addition to environmental performance conditions placed on each project as a part of approvals, all parties will have to work on an ongoing basis to manage the total impact of human activity in the region.

Below are just a few examples of the regulations and policy frameworks currently in place.

WATER USE

The Athabasca River, which flows through Alberta's primary oil sands region, is one of the most protected waterways in North America and the Athabasca River Water Management Framework sets mandatory limits on withdrawals in order to maintain flows at or near natural conditions.[7] All existing and approved oil sands projects may withdraw no more than three per cent of the average annual flow of the Athabasca River and also require that most of the water used is recycled. Current use is less than one per cent of average annual flow. To protect local habitats, the framework puts a weekly cap



[7] "Growth in the Canadian Oil Sands: Finding the New Balance" IHS-CERA, 2009. Page III-7. http://www2.cera.com/cos_form/

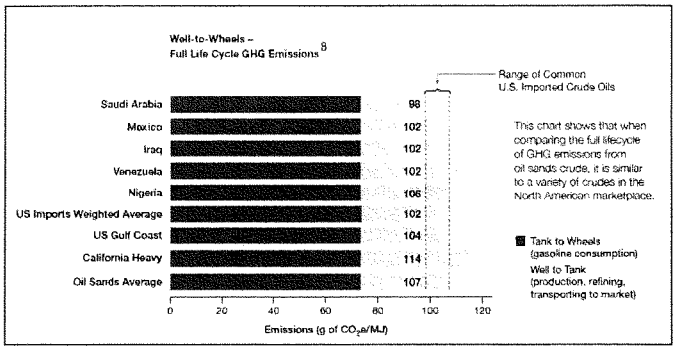
on the amount of water companies can withdraw according to the fluctuating flow of the river.

WATER QUALITY

Alberta has monitored water quality in the oil sands region since the early 1970s. Today, water monitoring has expanded to include government staff who monitor, approve and ensure compliance of projects, as well as consultants and multi-stakeholder groups that continuously assess water quality to ensure there is no adverse effect on the environment.

GREENHOUSE GAS EMISSIONS

Greenhouse gas emissions from oil sands production account for 15 per cent of Alberta's total emissions, 5 per cent of Canadian emissions, and less than 0.1 per cent of global emissions. Ongoing efforts have resulted in oil sands per barrel greenhouse gas emissions declining by an average of 39 per cent between 1990 and 2008. On a lifecycle, or wells-to-wheels basis, GHG emissions from oil sands derived fuels are, in fact, similar to a variety of crudes in the North American marketplace.[8] Alberta is the only jurisdiction in North America with mandatory GHG reduction targets for large emitters across all sectors, including the oil



[8] Jacobs Consultancy and Life Cycle Associates, Life Cycle Assessment Comparison for North American and Imported Crudes, July 2009. http://www.albertainnovates.ca/media/15753/life%20cycle%20analysis%20jacobs%20final%20report.pdf

sands. Our program includes a $15/tonne price on carbon, a regulated offset market, and a dedicated clean energy technology fund financed by compliance payments. Alberta, a province with a population of 3.6 million people, is also investing $2 billion in commercial scale carbon capture and storage (CCS).

LAND RECLAMATION

By law, industry must reclaim all lands to a state similar to that which existed prior to development. Of the 232 square miles that have been disturbed by oil sands mining operations, nearly 26 square miles have either been permanently reclaimed or are undergoing active reclamation. 7.5 million tree seedlings have already been planted.

PUBLIC HEALTH

The health of all Albertans potentially affected by any industrial development is the paramount concern of the government of Alberta. The largely aboriginal community of Fort Chipewyan in particular has expressed concerns regarding rare cancers and cancer rates in their community. Alberta takes these concerns very seriously and is currently pursuing follow-up community health studies. It is important to note that no study has found a statistically significant increase in cancer rates in the community and research has not identified any link between heath in this isolated northern community and oil sands development. The Royal Society of Canada, and independent group of some of Canada's most well respected scientists, very recently reviewed the issue and found:

9

There is currently no credible evidence of environmental contaminant exposures from oil sands reaching Fort Chipewyan at levels expected to cause elevated human cancer rates[9]

CONCLUSION

- Development of the oil sands has enabled Alberta, an open and transparent democracy, to become the number one supplier of oil to the U.S. The capacity for significantly increased production can further enhance U.S. security by reducing imports from less secure and reliable sources.
- In addition to energy and national security benefits, oil sands development will contribute to renewed U.S. prosperity in terms of GDP growth and job creation.
- Alberta is committed to growing production from the oil sands production in a socially and environmentally responsible manner. The oil sands industry is already one of most regulated in the world, with strict legislation and standards to protect our air, land, water, and wildlife, and future development will follow the same course. In doing so, we are very open to working with the U.S. on reducing the environmental impact of all energy production and consumption.

[9] Royal Society of Canada Expert Panel Report "Environmental and Heath Impacts of Canada's Oil Sands Industry. December 2010.
http://www.rsc.ca/documents/expert/RSC%20report%20complete%20secured%209Mb.pdf

APPENDIX A – ECONOMIC BENEFITS BY STATE

IMPACT OF ALBERTA OIL SANDS DEVELOPMENT ON U.S. STATE ECONOMIES (2009-2025)				
	Increase in Industry Output per Year ($ Millions)	Increase in GDP per Year ($ Millions)	Increase in Jobs* 2011-2015	Increase in Jobs* 2009-2025
Alabama	$ 736	$ 348	5,200	9,100
Alaska	$ 156	$ 82	900	1,700
Arizona	$ 1,100	$ 584	6,500	12,200
Arkansas	$ 427	$ 201	3,200	5,600
California	$ 8,545	$ 4,287	43,200	77,900
Colorado	$ 1,015	$ 542	6,000	11,200
Connecticut	$ 928	$ 498	4,000	7,400
Delaware	$ 277	$ 157	1,000	1,900
District of Columbia	$ 270	$ 162	1,200	2,200
Florida	$ 2,906	$ 1,663	20,300	37,700
Georgia	$ 1,641	$ 863	10,500	19,200
Hawaii	$ 211	$ 124	1,400	2,600
Idaho	$ 255	$ 122	1,900	3,300
Illinois	$ 2,769	$ 1,445	14,600	26,500
Indiana	$ 1,295	$ 569	7,600	13,200
Iowa	$ 629	$ 289	3,900	6,900
Kansas	$ 525	$ 249	3,200	5,800
Kentucky	$ 730	$ 336	4,800	8,500
Louisiana	$ 1,246	$ 471	4,800	8,800
Maine	$ 187	$ 98	1,700	2,900
Maryland	$ 966	$ 543	5,700	10,800
Massachusetts	$ 1,615	$ 844	7,700	14,200
Michigan	$ 1,821	$ 872	10,600	18,900
Minnesota	$ 1,181	$ 588	6,800	12,200
Mississippi	$ 399	$ 182	2,900	5,100
Missouri	$ 979	$ 496	6,800	12,300
Montana	$ 140	$ 75	1,200	2,200
Nebraska	$ 344	$ 171	2,300	4,100
Nevada	$ 548	$ 312	3,200	6,300
New Hampshire	$ 255	$ 133	1,600	2,900
New Jersey	$ 1,925	$ 1,063	9,300	17,300
New Mexico	$ 347	$ 164	2,000	3,800
New York	$ 4,687	$ 2,708	19,400	36,300
North Carolina	$ 1,883	$ 883	10,300	18,400
North Dakota	$ 126	$ 61	800	1,500
Ohio	$ 2,154	$ 1,031	13,200	23,500
Oklahoma	$ 602	$ 290	4,000	7,300
Oregon	$ 1,053	$ 436	4,700	8,200
Pennsylvania	$ 2,285	$ 1,170	13,800	24,900
Rhode Island	$ 184	$ 101	1,100	2,000
South Carolina	$ 642	$ 314	4,700	8,500
South Dakota	$ 154	$ 79	1,000	1,800
Tennessee	$ 1,118	$ 544	7,000	12,800
Texas	$ 5,475	$ 2,577	27,300	50,200
Utah	$ 475	$ 242	3,100	5,800
Vermont	$ 113	$ 55	800	1,400
Virginia	$ 1,513	$ 815	8,400	15,700
Washington	$ 1,300	$ 668	7,300	13,200
West Virginia	$ 252	$ 129	1,700	3,200
Wisconsin	$ 1,126	$ 523	7,200	12,600

Wyoming	$ 159	$ 83	800	1,600
US Total	**$ 61,669**	**$ 31,242**	**342,600**	**624,100**

Source: Canadian Energy Research Institute: "The Impact of the Canadian Oil Sands Development on the United States' Economy", October 2009

*Person-Years of Employment

APPENDIX B – OIL SANDS SUPPLER SURVEY RESULTS BY STATE

Number of Firms Supplying the Canadian Oil Sands

State	# Suppliers	State	# Suppliers	State	# Suppliers
Alabama	9	Massachusetts	38	Ohio	39
Arkansas	2	Maryland	7	Oklahoma	36
Arizona	8	Maine	1	Oregon	16
California	71	Michigan	21	Pennsylvania	67
Colorado	28	Minnesota	38	Rhode Island	3
Connecticut	17	Missouri	19	South Carolina	10
Delaware	4	Mississippi	3	South Dakota	2
Florida	29	Montana	5	Tennessee	8
Georgia	26	North Carolina	14	Texas	170
Iowa	6	North Dakota	4	Utah	10
Idaho	3	Nebraska	5	Virginia	12
Illinois	69	New	3	Vermont	2
Indiana	10	New Jersey	28	Washington	20
Kansas	7	New Mexico	2	Wisconsin	34
Kentucky	3	Nevada	2	West Virginia	2
Louisiana	11	New York	39	Wyoming	1

Source: The Canadian Association of Petroleum Producers, survey of members, partial listing as of January 2011

Preliminary U.S. Total: 964

Mr. WHITFIELD. Thank you.
Mr. Sieminski, you are recognized for 5 minutes.

STATEMENT OF ADAM SIEMINSKI

Mr. SIEMINSKI. Thank you, Mr. Chairman and other members of the committee. I thought that what I might do to most valuably use your time today is to just try to give you an overview of what is going on in the global oil markets and how I see things developing over the next few years. Let me just go through a few major points here.

Oil prices started rising in early 2009. It has raised a lot of concerns that we have moved from $40 to nearly $100 a barrel. You just heard Dr. Newell talk about gasoline prices up 15 percent this year. We might hit $3.30 a gallon next year. That certainly has issues for consumers. The OPEC Secretariat interestingly makes an awful lot of statements about fundamentals not being responsible for the increase in oil prices, and I would like to talk about that a little bit.

In my view, oil demand is driven mainly by economic activity. Last year most of the economic forecasters were saying the global economy grew by 5 percent, probably up another 4 percent again this year. Those are pretty big numbers. The average over the last 30 years for global GDP growth is about 3.3 percent, so 5 percent and 4 percent GDP growth is pretty stunning.

Speaking of stunning, the International Energy Agency just this morning said that oil demand grew 2.8 million barrels a day last year. That is a fundamental. That 2.8 million barrels a day far exceeds the million and a half barrels a day that the EIA is forecasting for this year, and it is a huge factor, I think, in the marketplace. A lot of this growth is coming in the emerging market countries. It is not the United States and Europe and Japan as it was traditionally. That is an important issue.

Now, the good news for consumers around the world is that non-OPEC supplies are growing pretty strongly. It is 600,000 barrels a day of growth this year. Last year, the number was probably close to a million barrels a day. It is not just places like Canada that you just heard about. China, Brazil, the former Soviet Union and Colombia. Interestingly, the State of North Dakota is seeing a huge increase in oil production coming from the Bakken formation, and if we could do more of that, more of the Gulf of Mexico that you talked about and so on, I think that would really help.

The demand is growing faster than non-OPEC supplies, so what that means is, OPEC's market share is rising and without further investments in capacity in OPEC countries, OPEC's spare capacity is going to decline. Now, we also know that inventories have been coming down on a global basis. We can measure them best in the OECD countries. They were as high as 63 days of forward demand cover. We are now down to about 59 days. My forecasts say that by the end of next year, we will probably be down to 54 days, which is still in the middle of the normal range, not low but the trend is down. Now, this is really important. Most of the oil price forecasting models use OPEC's spare capacity and inventories as the main drivers, so now what I have just said is that OPEC's spare capacity is likely to shrink and inventories are also coming down.

That implies strength in global oil prices and it is something that I think we need to be cognizant of.

Over the last 4 years, financial factors have been very important in driving oil prices. First it was the dollar exchange range against the euro and other currencies that seemed to be important. Since March of 2009 when oil prices have gone up, there has been almost a lockstep move with the S&P 500 equity index. So what is going on is, is that everybody is so happy we are not having a depression that stock markets are going up and lifting commodities in general including crude oil. I think we are now moving into the area where it is going to be fundamentals more than financial factors. Just like the ad that by my calculations oil prices aren't too far in the United States from what equilibrium levels would be if you looked at it against things like incomes and share of income.

OK. Now, problems in the oil markets, low elasticity of supply and demand. It is an economic phrase. Let me translate that. It takes a long time to plan supply projects and efficiency projects. Mr. Waxman's comments about auto fuel efficiency—it takes a long time to turn the fleet over. It takes a long time to do a development project in the Gulf of Mexico or in the oil sands in Canada. That means that the chances are good that you are going to have sharp movements in oil prices if something else happens in the markets.

Let me just sum up this by saying that as you introduced the hearing today, you said that what we are really trying to get at was events in the Middle East and North Africa and what it meant for the oil markets. The EIA has really good numbers on that, and Dr. Newell talked about them. Clearly the Middle East falls into this geo political category. One of the things that I think you have to be very, very aware of that it is not just things that are happening today that matter is setting oil prices and influencing the oil markets, it is expectations about the future, and if we expect that demand is going to continue to grow strongly, if we expect that supply might be constrained, if we expect that there are going to be tensions in the Middle East, that is going to tend to push prices up. That is a fundamental. It is not a speculative kind of activity.

And with that I will close. Thank you very much.

[The prepared statement of Mr. Sieminski follows:]

Prepared Testimony: The Effects of Middle East Events on US Energy Markets

Outlook for the Global Oil Markets

February 10, 2011

Statement of Adam E. Sieminski, Chief Energy Economist for Deutsche Bank, before the US House of Representatives Committee on Energy and Commerce, Subcommittee on Energy and Power. The opinions expressed in this testimony are those of the author and do not necessarily reflect the views of Deutsche Bank AG or its subsidiaries.

- The continuing rise in oil prices off the lows in early 2009 has raised concerns. The International Energy Agency (IEA) has expressed concern about economic "trouble ahead" from surging oil prices. The Energy Information Administration predicts that US gasoline prices will jump about 15% (37 cents) in 2011 to average $3.15 per gallon, with a further rise to $3.30 per gallon in 2012. The OPEC Secretariat says that fundamentals alone do not explain the rise in oil prices.

- Global oil demand tends to be driven primarily by economic activity. World GDP growth forecasts for 2011 and 2012 are being revised up by most of the major economic forecasters. After 4.5-5.0% worldwide GDP growth in 2010, the typical global GDP forecast for 2011 is now coming in at circa 4% - a slowdown from 2010, but still strong against the long-term historical average (1980-2010) of 3.3%.

- The IEA estimates global oil demand grew 2.7mmb/d last year and expects a 1.4-1.5mmb/d increment in 2011. In my view, demand is more likely to grow a bit faster than the IEA's estimate, rather than slower. Most of the demand growth is coming from the non-OECD (emerging markets) region of the world.

- Non-OPEC supply estimates have been increasing as well. The IEA forecasts non-OPEC output will rise by about 0.6mmb/d in 2011, following a 1.1mmb/d increment in 2010. The IEA says "higher prices are encouraging investment and helping to sustain supply growth" and we agree with this view. Growth prospects are favorable in China, Brazil, the FSU, and Colombia, for example. Global biofuels output is rising. US production should hold relatively steady in 2011, assisted by the very interesting development of oil resources in North Dakota's Bakken formation.

- OPEC natural gas liquids (NGL) production is expected to be up sharply again in 2011 after strong growth in 2010. The consensus points to growth of about 0.6mmb/d this year. Most forecasts for the total "call on OPEC crude oil" suggest modest growth in OPEC's market share in 2011. Our numbers show stronger growth in 2012 and a continuing trend up in 2013-15. Depending on the timing of new production capacity projects in Iraq, OPEC spare capacity appears likely to shrink over the next five years.

- OECD total oil stocks appear to be on a down-trend that would take forward demand cover from 59 days now (relatively high) to 54 days (closer to the historical mid-range) by the end of 2012. Many oil price forecasting models use OPEC spare capacity and OECD inventories as key drivers. Lower inventories and lower spare capacity are associated with higher oil prices.

- Over the past few years, oil prices have moved in concert with financial factors such as exchange rates and equity indices. Evidence that index investing can impact prices is accumulating, but "speculation" continues to offer significantly less explanation for price movements than traditional "fundamentals" (supply, demand, inventories, etc.). By our calculations, oil prices are close to historic "equilibrium" levels.

- Oil prices also react to expectations about the future. This can play just as important a role in price formation as current conditions in the markets. Projections of future supply / demand balances, inventories, weather, logistics, and geopolitics can drive sentiment. Low elasticity of supply and demand for oil can lead to steep price movements.

- Events in the Middle East fall into this "geopolitical" category. As EIA data show, closure of the Suez Canal or the SuMed Pipeline in Egypt would constitute a significant event in the oil markets. Furthermore, some market participants worry that tensions in Tunisia and Egypt could spill over into countries with greater oil production profiles. A quick release of global Strategic Petroleum Reserves would help stem the fear that such a development could create in the markets.

Figure 1: Comparison of 2011 forecast assumptions

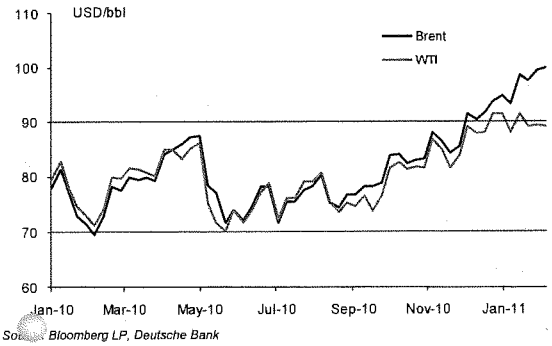
2011 vs. 2010 (mmb/d)	Demand Growth	Non-OPEC Supply Growth	OPEC NGLs	Call on OPEC Crude	World GDP Growth 2010	World GDP Growth 2011
US DOE/ EIA	1.44	0.31	0.73	0.46	4.8%	4.4%
Int'l Energy Agency	1.41	0.59	0.55	0.40	5.0%	4.4%
OPEC Secretariat	1.23	0.41	0.46	0.35	4.5%	3.9%
Deutsche Bank	1.69	0.73	0.58	0.40	4.8%	4.1%
Average	**1.44**	**0.51**	**0.58**	**0.40**	**4.8%**	**4.2%**
Big 3 Agency Avg	**1.36**	**0.44**	**0.58**	**0.40**	**4.8%**	**4.2%**

Note: EIA GDP estimates adjusted upward by 0.5% to reflect fx to ppp

Source: US DOE/EIA, IEA, OPEC, Deutsche Bank

A few months ago it appeared that relative stability in global oil supply and forecasts for 2011 may have been responsible for the much-discussed USD70-90/bbl oil trading range. In our view, market sentiment surrounding the validity of this range has been shattered by a rising concern about how rapidly OPEC spare capacity could erode in the 2012-2015 timeframe. The influence of financial factors such as correlations to the S&P 500 index and the dollar/euro rate that have been important drivers, may be giving way to more traditional fundamentals that are tightening. Brent front month futures prices have pierced through the USD90/bbl top of the range, although interestingly, WTI still looks relatively range-bound.

Figure 2: Comparison of Brent and WTI oil prices



Source: Bloomberg LP, Deutsche Bank

Figure 3: Global GDP growth forecasts

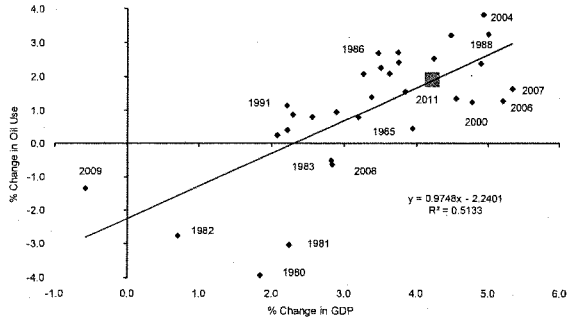
y-o-y % change	2008	2009	2010E	2011E	2012E
US	0.2	-3.2	2.9	3.8	3.9
Euro Area	0.0	-2.6	1.7	1.2	1.4
Japan	-1.2	-5.2	4.2	0.8	1.9
Other OECD	1.0	-2.3	3.5	3.5	3.8
OECD	**0.1%**	**-3.1%**	**2.6%**	**2.4%**	**2.7%**
China	9.6	9.1	10.0	8.7	8.4
Other Asia (1)	5.4	4.3	8.6	6.3	6.8
Latin America	4.3	-1.7	6.0	4.3	4.0
Other Non-OECD (2)	3.6	-4.5	4.5	4.2	4.5
Non-OECD	**6.0%**	**2.5%**	**7.5%**	**6.2%**	**6.3%**
World	**2.8%**	**-0.6%**	**4.8%**	**4.1%**	**4.3%**

(1) Non-OECD Asia ex-China, (2) E. Europe, Mid-East, Africa, Frmr.Sov.Un.

Source: IMF, Deutsche Bank

Global output is forecast by the IMF to expand by 4.4% in 2011 and 4.5% in 2012 after growing by some 5.0% in 2010. According to the IMF, this reflects stronger-than-expected activity in the second half of 2010 as well as new policy initiatives in the US. The IMF is quick to point out that downside risks to the recovery remain elevated. The two biggest potential problems are sovereign debt and financial troubles in the euro area, along with overheating pressures and external rebalancing needs in key EM economies. Deutsche Bank forecasts for world and regional economic growth in 2011-12 are slightly more conservative than the IMF.

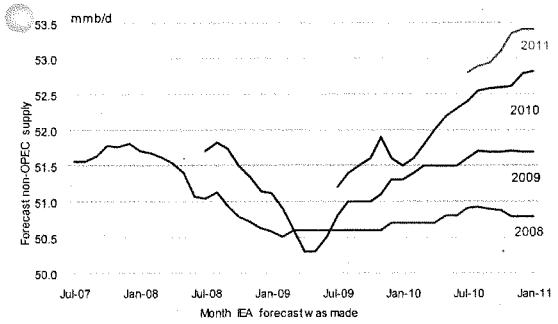
Figure 4: Global GDP growth vs global oil demand growth (1980-2010)



Source: IMF, IEA, Deutsche Bank

Assuming that the 1980-2010 historical relationship continues, world economic growth of 4.1% should translate into a 1.9% rise in oil demand. On a base of 87.7 mmb/d of demand in 2010, this amounts to circa 1.7 mmb/d of oil demand growth in 2011.

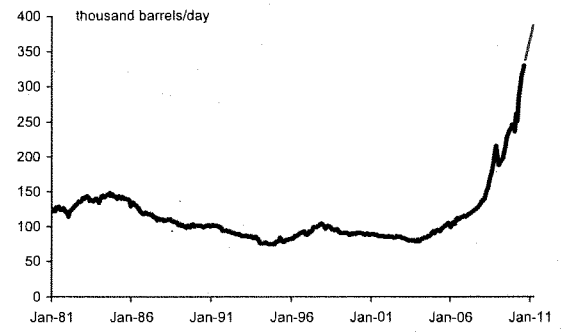
Figure 5: IEA Non-OPEC supply forecast projections



Source: IEA, Deutsche Bank

Since mid-2009, non-OPEC supply estimates have tended to be revised up over time. EIA currently expects a growth of 310kb/d in 2011, followed by a slight decline in 2012. The IEA estimates 0.6mmb/d growth in 2011 following a 1.1mmb/d increment in 2010. The IEA says "higher prices are encouraging investment and helping to sustain supply growth."

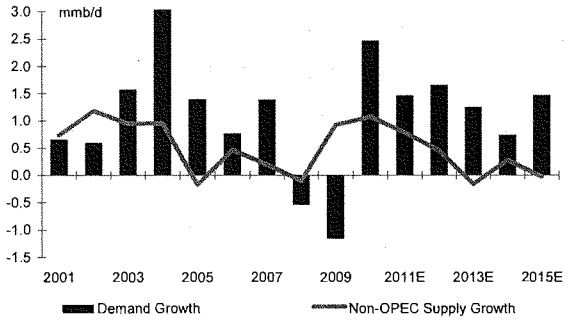
Figure 6: North Dakota oil production



Source: US DOE/EIA, Deutsche Bank

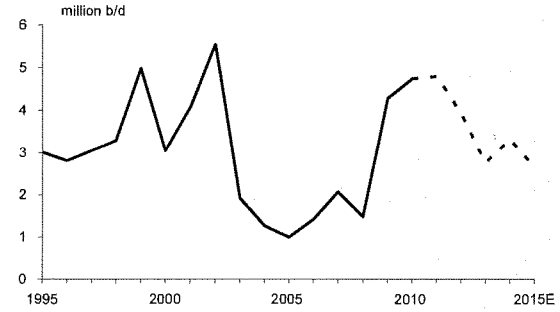
Production in ND languished at 100kb/d for a decade from 1995-2005. Starting around 2006, however, producers in the region began to use multi-stage fracturing of horizontal wells. This allows drillers to stimulate oil flow along numerous "stages" of the well bore and to do so without raising water-cuts significantly. An intensive search for other formations where this technique will work is underway- the Niobrara in Colorado, the Monterey in California, and the Wolfcamp shales in West Texas- and we expect there will be more.

Figure 7: Need for OPEC oil grows over time



Source: IMF, Deutsche Bank

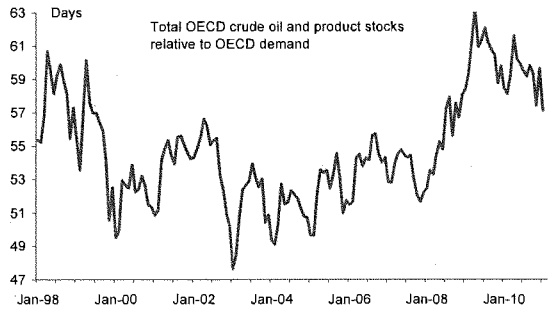
Figure 8: OPEC spare capacity to 2015



Source: US DOE/EIA, Deutsche Bank

We estimate that overall OPEC capacity will average about the same in 2011 as the 4.7-4.8mmb/d estimate from 2010, and then decline as the "call on OPEC" grows faster than capacity additions. We are assuming that Iraq's total capacity will grow from circa 2.5mmb/d in 2010 to circa 4.3mmb/d in 2015. Absent this improvement, spare capacity in OPEC in 2015 could be closer to the 1.0mmb/d low hit in 2005.

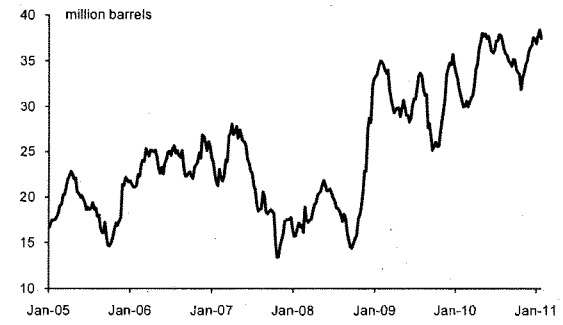
Figure 9: OECD inventory cover of demand



Source: IEA, Deutsche Bank

Most analysts expect that oil inventories will decline over the course of 2011 and 2012 so that by the end of 2012, stocks will be closer to the middle of the normal range. The recent trend is volatile, but seems to be clearly on a general downward course. Our supply/demand model suggests that OECD forward demand cover could be at 54 days by the end of 2012. This is consistent with the US DOE/EIA view.

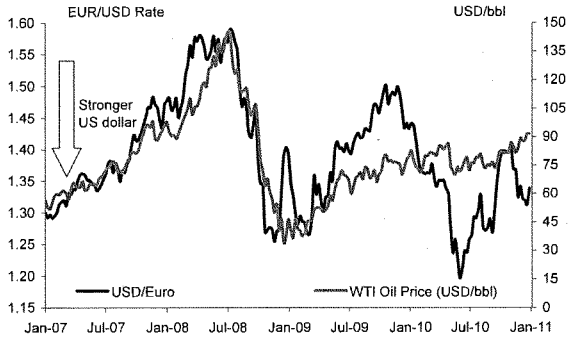
Figure 10: Crude oil stocks at Cushing, Oklahoma



Source: US DOE/EIA, Bloomberg Finance LP, Deutsche Bank

Crude oil stocks in Cushing (the delivery point for the Nymex WIT contract) are very full. Canadian and Bakken crude oil currently has no good transportation options out of Cushing to the US Gulf Coast.

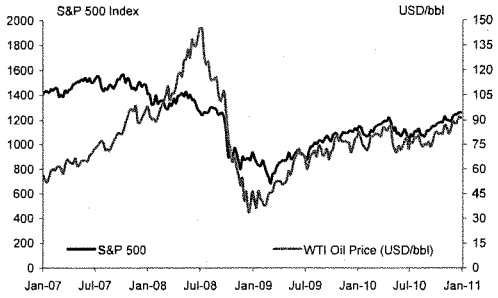
Figure 11: Oil price and the US dollar



Source: Bloomberg Finance LP, Deutsche Bank

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. We believe the relationship between oil prices and the US dollar is highly unstable.

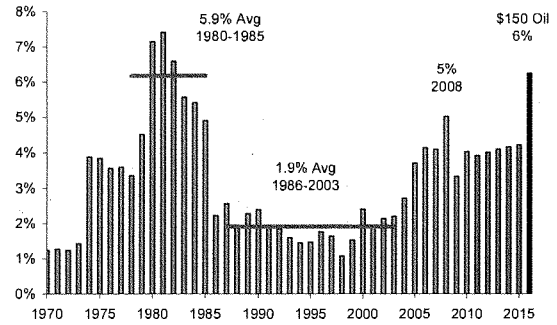
Figure 12: Oil prices and the S&P 500 stock market index



Source: Bloomberg Finance LP, Deutsche Bank

The relationship between the S&P 500 and oil is usually inverse. From July 2008 to the start of March 2009, the two moved in parallel down. From April 2009, the relationship appears to be positively correlated. The 2010 regression implies the S&P500 at 1260 equates to USD90/bbl oil. A rise of 10% from this level of the S&P500 would take oil to USD100/bbl.

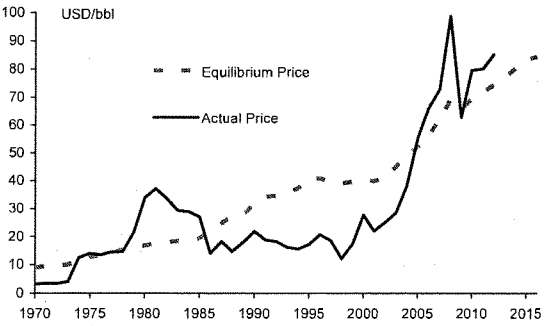
Figure 13: Oil as a percent of global GDP



Source: IMF, IEA, Deutsche Bank

At 5-6% of global GDP, oil absorbs too much of disposable income -- and provides too much incentive for substitutes. At 1-2% of global GDP, oil demand grows rapidly and upstream investment does not. Company cash flow is insufficient to expand. The "sweet-spot" appears to be near 3-4% (not often achieved).

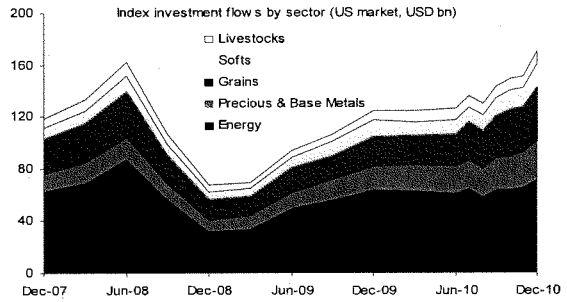
Figure 14: A simple (too simple) model of equilibrium oil prices



Source: IMF, IEA, Deutsche Bank

Oil's average share of global GDP over the period from 1975 to 2010 is 3.3%. A 3.5% sweet spot translates into current WTI price near $70/bbl in 2010, $75 in 2012m and about $85/bbl in 2015. Note that actual prices can remain both above and below this definition of "equilibrium" for long periods of time.

Figure 15: What role is being played by index investors?



Source: CFTC, Deutsche Bank

Grains and precious metals were the engine rooms of commodity price performance in 2010. Oil index flows are picking up, but other commodity sectors grew faster in 2010. Energy flows were up 13%, precious & base metals 65%, grains 83%, softs 32%, and livestock 45%. Evidence that index investing can impact prices is accumulating, but "speculation" continues to offer significantly less explanation for price movements than traditional "fundamentals" (supply, demand, inventories, etc.).

Figure 16: Factors affecting crude oil prices

Source: Talisman Energy, Deutsche Bank

Rig Name	Manager	Operator	Restart or Redeploy?	Layoffs?	
Deep Ocean Ascension	Pride International	BP	To Lybia	??	
Deepwater Nautilus	Transocean	Shell	GOM	No	
Deepwater Pathfinder	Transocean	Eni	GOM	No	
Discoverer Americas	Transocean	Statoil	To Egypt	Took crew	
Discoverer Clear Leader	Transocean	Chevron	GOM	No	
Discoverer Deap Seas	Transocean	Chevron	GOM	No	
Discoverer Enterprise	Transocean	BP	GOM	No	
Discoverer Inspiration	Transocean	Chevron	GOM	No	
Discoverer Spirit	Transocean	Anadarko	GOM	No	
GSF CR Luigs	Transocean	BHP Billiton	GOM	No	
GSF Development Drilling I	Transocean	BHP Billiton	GOM	No	
Marianas	Transocean	Eni	To Nigeria	Crew transferred to other rigs	
ENSCO 8500	ENSCO	Eni/Anadarko	GOM	No	
ENSCO 8501	ENSCO	Nexen/Noble Energy	GOM	No	
ENSCO 8502	ENSCO	Nexen/Marubeni	GOM	No	
Developer	Maersk	StatoilHydro-Woodside	GOM	No	
Amos Runner	Noble	LLOG	GOM	No	
Clyde Boudreaux	Noble	Noble Energy	Still in GOM on standby/suspension rate. Noble Energy will not enter into new contract.	No	
Danny Adkins	Noble	Shell	Still in GOM on standby/suspension rate.	No	
Ocean Confidence	Diamond Offshore	Murphy (Cobalt)	To Congo (then Angola)	Laid off crews and corporate	
Ocean Endeavor	Diamond Offshore	Anadarko	To Egypt	Laid off crews and corporate	
Ocean Saratoga	Diamond Offshore	Taylor Energy	Still working in GOM (Hurricane Rita-damaged well)	No	
Ocean Monarch	Diamond Offshore	Anadarko	Still in GOM on standby; trying to redeploy outside GOM.	No	
West Sirius	Seadrill	BP	Staying in GOM w/ BP	Crew fully employed.	

** ENSCO 8503 arrived in GOM in Decemeber 2010. Currently undergoing acceptance testing. Pending successful testing 8503 will go to French Guiana (Tullow Oil). Est. to be gone for 5 mos; will return to GOM to drill for Cobalt Energy ~May '11.*

** Noble Jim Day entered GOM in September 2010; contract with Marathon refused due to permit restrictions in GOM -- see press release.*

Noble is "back-filling" jobs with existing crews in order to avoid layoffs. I.e., electrician position in Brazil may be filled by GOM worker versus hiring locally.

Noble estimates cost of $3million/day trying to remain hopeful that drilling in GOM will resume.

Mr. WHITFIELD. Thank you, Mr. Sieminski.
Mr. Hofmeister, you are recognized for 5 minutes.

STATEMENT OF JOHN HOFMEISTER

Mr. HOFMEISTER. Thank you, Mr. Chairman, Ranking Member Rush. I am John Hofmeister, the founder and CEO of Citizens for Affordable Energy. When I retired as the president of Shell Oil Company in 2008, I started a foundation to focus on grassroots energy education. In addition, I am privileged to serve as the chairman of the National Urban League, where we have 104 affiliates across U.S. cities where the affordability of energy is a major issue to the people who live in vulnerable circumstances where unemployment in major urban areas exceeds national averages. So I speak with a view that affordability of energy is a critical issue for the United States of America.

Affordability goes directly to the price of crude oil, no question about it. Every consumer in this country uses crude oil in one way or another, and we do face the political uncertainties as evidenced most recently by Egypt and the threat to the Suez Canal and the Sumed pipeline. I am reminded that while this Administration has strangled oil production in the Gulf of Mexico for an unpredictable period, China, according to Professor Wenren Jang at the University of Alberta, is going in exactly the opposite direction. China is planning to build 1.5 million kilometers of highways over the coming decade, and in order to assure a steady crude oil supply to China has loaned the following countries the following amounts of money: Brazil, $10 billion; Kazakhstan, $10 billion; Venezuela, $20 billion; Ghana, $16 billion; the Democratic Republican of Congo, $7 billion; Nigeria, $23 billion; and Russia, $25 billion. China expects crude oil demand of 18 million barrels a day by the end of the decade. They are currently at about nine. Meanwhile, in the United States, today, tomorrow, Saturday, Sunday, Monday, we will consume about 20 million barrels a day, producing only seven domestically.

As long as the United States produces so limited amount of its own supply, we are vulnerable to whatever happens anywhere in the world. The United States forfeited its energy security over a sustained period of decades by prohibiting drilling on 85 percent of the Outer Continental Shelf, by prohibiting drilling on 97 percent of federal land, by standing the way of many infrastructure developments that would otherwise enable enhanced oil production in many parts of old oil fields. It is my view that while people focus on transportation and the use of oil, we should not forget that within that 20-million-barrel-per-day demand, there is an entire petrochemical industry that needs crude oil as feedstock. That petrochemical industry produces the fiber which we use for clothing and other industrial purposes. It produces the pharmaceuticals, the lubricants, the food that we use to eat in this country. We have many more needs for oil than simply transportation purposes. While it is great to have a million new vehicles hybrids and battery cars on the roads by 2015, the 250 million automobiles and tens of millions of trucks, tractors, planes, boats, buses and other transportation vehicles depend upon a daily supply of crude oil.

I would like to use my remaining time to speak about what I think are the concrete actions that could be taken with a plan from this Congress or the Administration or preferably both which would take this country forward to create jobs in an unprecedented number. Example: we know we have the natural resources in the ground to produce far more oil than we do today. I am suggesting that with the billions and billions of barrels that is enough to sustain an increase in domestic production for all of the generations currently alive in this country. We could move daily production from 7 barrels a day to 10 million barrels a day using not a dime of public money, using private investment. The 10-million-barrel-per-day production would create 3 million new jobs, 3 million new jobs over the course of the next decade, which would be a tide to raise all ships because it is not just the drilling workers that would be benefiting from this but it would be the steelmakers, the automakers, the valve makers, the pipe makers, the people who build the homes, the people who set up the retail networks in order to supply these 3 million people with good-paying jobs with good benefits. We currently employ 9.2 million in America in the gas and oil business to produce 7 million barrels a day. Three more million barrels a day and 3 million more jobs is an unprecedented number that no one has talked about since the beginning of the recession in this country, and if we are looking for ideas to improve the economy, I can't think of a better one that is right here at home, jobs which will not be exported.

In addition, we have failed to deal with the need for electricity going forward in material ways, and it is my belief that we could build new power plants, coal as well as nuclear, clean coal, which will in fact create additional jobs on top of that.

Mr. Chairman, I will stop. Thank you.

[The prepared statement of Mr. Hofmeister follows:]

Testimony in the

United States House of Representatives

Committee on Commerce and Energy's

Subcommittee on Energy and Power:

"The Effects of Middle East Events on U.S. Energy Markets"

February 10, 2011

John D. Hofmeister

Founder and Chief Executive

Citizens for Affordable Energy, Inc.

Introduction:

Chairman Whitfield, Ranking Member Rush, distinguished Members of the Subcommittee on Energy and Power, my name is John Hofmeister, Founder and Chief Executive of the not-for-profit education foundation, Citizens for Affordable Energy, registered here in Washington, D.C. Thank you for the opportunity to be present today to share my assessment, perspectives and recommendations on current global instabilities and their impact on crude oil prices, the state of U.S. energy supplies and demand, and prospects, or solutions, to deliver U.S. citizens available, affordable and sustainable energy in the years and decades ahead.

I founded *Citizens for Affordable Energy* following my 2008 retirement as the President of Shell Oil Company for the sole purpose of educating every day, grass roots Americans about energy and environmental challenges and solutions. Following multiple testimonies in both Houses of Congress during the high oil price period of 2006-2008, I determined that energy security for America would more likely come about with an informed electorate selecting its representatives on the basis of clear, well understood factual knowledge of energy and the environment. *Citizens for Affordable Energy* offers its members and followers, in

fact all Americans and Members of Congress, basic, practical and non-partisan energy, technology, environment and infrastructure information at no cost to them.

Additionally I have been privileged to serve as Chair of the Trustee Board of the National Urban League since May 2007. In this role I'm honored to work with my fellow Trustees and the Managerial staff of this century old institution serving the needs of urban Americans in over 100 U.S. cities. The timing of this Subcommittee's meeting, in the face of rising prices for gasoline, is important. Few Americans fully understand the pass through cost inflation that touches virtually every product we buy when crude oil prices rise or high crude prices are sustained. The most vulnerable Americans however feel the impact of such higher prices immediately and are the least able to afford inflated energy prices and the higher prices they pay for everything that energy costs touch, such as food, clothing and housing. Inner city urban Americans, where unemployment rates generally exceed national averages, are among those most vulnerable. Affordable energy is the lifeblood of the American way of life for all citizens, especially the most vulnerable.

Current Dilemma:

Americans once again face the out of pocket costs and anxieties of rapidly rising crude oil prices, which permeate and impact to our detriment the foundations of the

American economy, our lifestyles and national security. At the moment geopolitical uncertainty in the Middle East, once again, increases the political instability that oil production abhors. Companies that spend billions of dollars on long term oil exploration, production and infrastructure to supply the world with its daily demand of some 85 million barrels per day, 20 million in the U.S. alone, worry when its investments are threatened by the unpredictable politics of sovereign nations. Traders who buy and sell daily oil production by the millions of barrels seek to satisfy purchasers of that oil who worry more about the security of supply than the daily price. The anticipation of the consequences of purchasing insecurity creates a psychology among buyers that drives prices up or down, which directly impacts the volatility of prices on world markets. This price volatility plays havoc with national economies, especially those which depend upon predictable imports of global supplies for most or all of their oil consumption.

This brings us right to the point of dramatically increasing U.S. gasoline prices and the negative impacts on both consumers and companies across our country. The U.S. has unnecessarily forfeited its position as the primary direct supplier of the majority of its own oil supplies for domestic consumption. This forfeiture has taken place over the past several decades, especially since the 1980's when both Congressional and Presidential moratoria on the production of offshore oil began limiting access to domestic oil reserves by U.S. oil companies. While the 110th and

111th Congresses held many hearings on the issues of energy and the reasons and implications for high gasoline prices in the 2006-2008 timeframe, no legislative solutions to the proposition for increased domestic supplies were passed into law.

There is only one logical explanation for rapidly rising prices: demand is at or near surpassing supply, aggravated by geopolitical uncertainty. Even before the recent tensions and violence in Tunisia, Egypt and other nations in the Middle East, global crude prices through the Fall of 2010 and Winter of 2011 were on the rise. Increasing demand around the world, especially Asia, and a recovering U.S. economy were already pressuring available supplies. Winter in the northern hemisphere is generally a time of reduced demand for crude oil. However China's surging recovery and U.S. economic improvements, the two largest economies in the world, have raised overall demand back to roughly where it was before the collapse of oil prices in September-December, 2008.

The price has not fully recovered to prior levels for only two reasons: U.S. oil inventories remain robust and OPEC (Organization of Petroleum Exporting Countries) has several million barrels per day of so-called production overhang, i.e. shut-in production capacity. Both factors psychologically impact oil buyers and constrain price volatility somewhat. However this is winter and spring is coming, when demand in both major economies and the rest of the world is likely to further expand, demanding millions more barrels of oil production to sustain

economic growth. Everyone I know expects further price increases this spring and summer when seasonal demand increases. We are completely unprepared for it in the U.S. Cushing, Oklahoma inventories represent at today's record levels just two days of domestic demand. So no one should be comfortable thinking that such inventories provide energy security against rising U.S. demand. In addition OPEC is an international cartel beyond the reach of any sovereign nation's legal jurisdiction. Decisions to increase production to its rated capacity are the prerogative of the nations within the cartel. We have seen in the past that U.S. Presidents, the House Speaker, Cabinet Secretaries and other key U.S. influencers have little or no sway in impacting OPEC production decisions. In the current situation with the obvious hostility shown by the current Administration to the U.S. oil industry over a range of policy matters, it would be foolish to presume that OPEC leaders have any sympathy for the plight of American consumers. When their own government takes an active and decisive position against increased domestic oil production, favoring instead a regulatory regime that arbitrarily shuts down drilling at will and negates future legislatively prescribed Five Year Lease Plans by postponing such rounds, as announced by the Department of the Interior, from 2012 to 2017, Americans should not count on OPEC to rush to the rescue of high prices in America.

The current dilemma America faces with regard to rising crude oil prices is self-made, self-perpetrated and has been a sustained constant over decades, not years. While the U.S. is also the victim of geo-political instability, it further victimizes itself by refusing to produce its own oil. The U.S. previously produced more than 11 million barrels per day of its own domestic resources in the early 1970's and produced 10 million barrels per day well into the 1980's. It currently produces 7 million barrels per day; with the shut-in Gulf of Mexico, I predict it is on its way to 6 million barrels per day of production next year at a time of returning demand and record global consumption, especially driven by Asian growth. It might be visionary to project forward to a clean energy system in 2035 and to promote up to 1 million hybrid and electric cars on America's highways by 2015. But Mr. Chairman and Ranking Member Rush, and distinguished Members, there is a here and now reality where both more of our current energy sources are needed and future sources are needed as well. We live in a "both/and" world, not an "either/or world." Those who pretend that oil is an industry of the past and promote policies to suffocate domestic oil production through refusal to promote enabling regulation condemn their fellow Americans to prices beyond their means and guarantee the continued transfer of American hard earned wealth by additional hundreds of billions of dollars per year to countries from whom we buy imported oil. The risk of the current dilemma is high: we could impose a second recession on ourselves,

despite TARP, the economic stimulus, QE2 and all of the good faith investment taking place across the economy. High oil prices have sunk this nation into recession before; they could do so again.

Domestic Energy Supplies:

Citizens for Affordable Energy promotes the fact that the U.S. has more energy within its borders than our nation will ever, ever need. Whether it is during the current hydrocarbon era in which we find ourselves today or in a post-hydrocarbon era in the future, this nation is geologically and geographically positioned to always have more energy than we can use. We say this with an understanding that there are ten basic sources of energy that we can turn into useful power and fuels: coal, oil, natural gas, nuclear (uranium or thorium), bio-fuels, wind, solar, hydropower, hydrogen and geothermal energy. We utilize energy either as electrons for electrical power or liquid/gaseous fuels for stationary or motive power.

When it comes to the natural hydrocarbon resources in the ground, the Energy Information Agency, or the National Petroleum Councils's 2007 report "Hard Truths: Facing the Hard Truths about Energy" contain as responsible and available an inventory as is currently available. Supplemented by research and university documentation as well as private industry's own knowledge and information, it is

not a stretch to say that our current hydrocarbon availability will serve this nation well into the 22nd century, if we need it. The billions and billions of barrels of crude oil available within the nation and in its offshore geologies from the east to the west coasts, the Alaska coasts, the vast tight natural gas formations in much of the country, the huge Bakken formation, and the prolific and untouched oil shale in the Piceance Basin and surrounding areas of Colorado, Wyoming and Utah, together with enhanced oil recovery of existing or decommissioned oil fields, represent oil and gas resources that if developed would sustain our energy demand, economy and national security well into the future, way beyond the lives of today's generations. Additional billions of tons of coal likewise secure the nation's energy future. Technology and innovation are the hallmarks of modern America. Pure and applied research have and will make advances into new forms of energy production from currently underutilized sources, such as wind, solar, biofuels, hydrogen, tidal power and geothermal energy. They will become commercial and productive in future decades. The future of alternative energy for America is robust and growing. But let's not celebrate or pretend we can rely upon future alternative energy supplies before they arrive. We have decades ahead of us where reliance on traditional coal, oil, natural gas and nuclear power, as well as existing hydropower, are essential to availability, affordability and sustainability of the world's largest energy system. Starving America of availability to its prolific

hydrocarbon base of energy makes no sense. It drives down America's cost competitiveness, weakens the purchasing power of the U.S. dollar, sends billions of U.S. dollars to foreign treasuries, destroys American jobs, frightens Americans who see their disposable income robbed from their wallets, and diminishes our national security and degrees of freedom over international influence. American genius, put to the test, can both develop our hydrocarbon base for our current and future energy needs while at the same time reducing the environmental effects of hydrocarbon production and use. Clean coal through gasification and carbon sequestration is not an oxymoron as critics suggest. Other countries are pursuing it; America can't even have a productive conversation about it. Cleaner fuels and cleaner use of fuels in transportation have been a journey of many successes, with more to come. Natural gas has yet to come into its own in this country because of the historic fear, no longer warranted, of inadequate supplies. Nuclear energy and waste management deserve a renaissance during the next half century.

America and its policymakers have to come to grips, especially with crude oil production in this country, if the U.S. is to maintain its rank as both a superpower and the world's largest economy. The notion that we can import oil at will and save ourselves the risks of producing hydrocarbons at home is at best misguided but more realistically simple nonsense. The world has no obligation to us. We put this great nation at the mercy of a few democratic friends for some of our imports,

but also then rely on autocrats, dictators and even criminals, who would as soon see our nation ruined as prosperous, for the crude oil we must have and the prices we pay to purchase it. We are reminded of this reality most recently due to turmoil in a country with whom we have a multi-decade partnership. We tempt fate daily with our dependence on foreign imports.

Policymakers should take note of recent actions by China to secure its future crude oil supplies in the face of inadequate domestic supplies. In addition to long term supply agreements in oil producing countries in return for building highways, stadiums, schools and universities, China has also loaned the following nations vast billions of dollars to aid their oil and gas production capacities, including the following: Brazil, $10 billion; Kazakhstan, $10 billion; Venezuela, $20 billion; Ghana $16 billion; DR Congo $7 billion, Nigeria $23 billion; and Russia, $25 billion. In the case of Russia, this loan is to assist the conversion of Russia's supplies from 3% of current Chinese requirements to 30%. China is leaving no stone unturned to supporting its energy appetite, regardless of type of energy supply source. China's announcement in February 2010 of a $60 billion supply agreement for coal from Australia is illustrative of the point and indicative that whatever commitment China is making to alternatives, first and foremost it will take care of economic development through the use of whatever energy it needs.

Over the coming decade while the U.S. continues on a path to reduce its oil (and coal) production, based on current policies, such as no new access to offshore leasing through at least 2017; the indeterminate shut-in of the deepwater western Gulf of Mexico; unclear, perhaps impossible to meet regulations, for future deepwater drilling; new mining regulations demanding water quality equal to or better than bottled *Evian* glacial waters; and drilling prohibitions on federal lands, the rest of the world watches in wonder and consternation. Not only does the U.S. refusal to produce more oil cost Americans higher prices at the pump, every nation on earth is negatively impacted by global price increases for oil, prompted not only by geopolitical instability and growing global demand, like everyone else, but by the continuing U.S. dependence on increased imports. Americans go abroad and come back with complaints that no one likes us out there. Is it any wonder when the U.S. demands more crude oil than any other country and refuses to produce its own very adequate supplies? No other nation shut down off-shore drilling after the traumatic, anomalous disaster at the *Macondo* well last April. They need oil. No nation exports its drilling risks like the U.S. They take the risks because they need the oil. No nation has established the type of adversarial relationship between government and hydrocarbon industry as inside the U.S. They work out their differences because they need oil. Continuing on its current path, Mr. Chairman, as I write in my recent book *Why We Hate the Oil Companies: Straight Talk from*

an Energy Insider (Palgrave Macmillan 2010), the U.S. will face inevitable brownouts, blackouts, and liquid fuel shortages within the decade. We cannot extend the 20th century infrastructure indefinitely and we have yet to embark upon the establishment of a rational, coherent 21st century energy infrastructure to replace it. We cannot sustain the path that we are own. We look to you and your colleagues in the Congress to provide leadership in the 21st century to secure available, affordable and sustainable energy for our nation. I'm happy to also share my thoughts on how to do just that.

Future Solutions:

First and foremost, what the U.S. needs most is a coherent, cohesive, practical energy plan for the future. We've never had one. Imagine all the billions of taxpayer dollars that the U.S. has spent on its energy needs and yet it has never spent the money according to a plan. We've made it up as we've gone along. No nation, company, institution or family can operate without a plan. Yet, here we are in the second decade of the 21st century, a nation with no energy plan in a world that competes every day for ever more energy.

Second, the nation's energy plan has to follow a logical and consistent time dimension over decades. Energy time, unlike political time which is calculated in two and four year intervals, extends over decades. Power plants, mines, oil

production, pipelines, refineries, storage sites, wind farms and dams, to name several sources of energy, require decades to plan, permit, engineer, build, operate and decommission. Therefore we need a U.S. energy plan that includes short, medium and long term planning, where short term is measured as now to 10 years out, medium term is 10 to 25 years from now, and long term is 25 to 50 years from now. Such a plan needs to be updated continuously, but not radically changed, short of reverting to where we are today: no plan and constant change in priorities.

Third, there is no question but that from now to as far into the future as any analyst can see over the next decade or two, perhaps three, the U.S. will need 20 million or more barrels of oil, or its equivalent, per day just to get through the day. That's 10,000 gallons per second, by the way. To pretend that oil demand is going to decrease is to defy reality. Increased gasoline mileage efficiency for vehicles, the production of biofuels to displace oil, the displacement of traditional internal combustion engine vehicles with hybrids, electric or hydrogen fuel cell vehicles are multiple decade impact initiatives. Meanwhile the population using current products is increasing, not only in the U.S. but around the world. In other words while we can set in motion initiatives to change the mix of fuels used and the technologies for mobility, it takes at least twenty years, or more, to change just what we're doing today. During these next twenty years we can't pretend we don't need more oil. We must have it or the economy and our lives, as we know them

today, shut down. It's dead wrong to call this an addiction. It is a choice we made as a society over the past 100 years. Because we made such choice we are the world's largest economy with the world's most envied lifestyle, the defender of freedom who won two world wars with our domestic oil. We don't reverse course with ideas or words. It takes action to change the direction we've been taking. Such action warrants a short, medium and long term plan. The 250 million cars and tens of millions of trucks, tens of thousands of aircraft, boats, millions of lawnmowers and tractors, and the entire petro-chemical industry that produces our fuels, lubricants, soaps, chemicals, fibers, make-up and pharmaceuticals all need oil from now until they don't. And no one should think Americans won't buy tens of millions of new products over the coming years and decades that rely on oil as well. We have a hydrocarbon economy now, and it's not going away in our lifetimes. So let's quit pretending we don't need more hydrocarbon development.

Fourth, let's set as a minimum a national objective to produce 10 million barrels per day by the end of this decade. Remember we use 20 million, we're on our way to producing 6 million. Depending on more imports to meet our demand is an economically debilitating and internationally frightening choice. Providing for and enabling increased domestic production at a time of increasing global demand amidst geopolitical instability should be a "no-brainer." Common sense alone says if you have the domestic resources, why depend on foreign sources? Economic

common sense says why invest American dollars to create oil producing jobs in other countries when we need jobs in our own country? But we've been insistent upon not using common sense for far too long. This proposal to commit to 10 million barrels per day realistically only gets us back to half of our domestic demand. This would down from 65% imports, where we were at the end of 2009, but it comes nowhere near to where we were at the time of the first Arab oil embargo of 1973, which was 30% import of supply.

By establishing an objective to produce 10 million barrels per day we also commit to creating as many as 3 million new U.S. jobs within the decade! Currently 9.2 million people work in the nation's oil and gas industry to produce approximately 7 million barrels per day. In creating new jobs this proposal not only means new jobs in the oil and gas fields, onshore and offshore, new jobs for engineers and service company workers, it means so much more. There will be the education jobs to teach skills, math, science, technology to high school graduates in community colleges, four year colleges and universities. Oil and gas workers in the hundreds of thousands need cars, trucks, tools, equipment, clothes, and homes to live in. The expanded infrastructure for gas and oil needs rigs, pipes, valves, trucks, equipment, ships, construction workers, supporting service companies and products from the entire supply chain of materials from iron ore to steel, rubber and plastics, to food and fiber. These workers also need environmental protections

and safeguards because of the risks associated with any hydrocarbon activity and more jobs for the people who can provide it. The industry will need government enablers to provide the permitting and oversight necessary to produce natural resources and to protect our land, water and air as we go about increasing our production by one third. The objective to increase domestic drilling to produce 10 million barrels per day is a rising tide that can lift all ships. The economic value creation will be paid for by private, not taxpayer, investment. The revenues generated both by the economic expansion of wages and salaries, the royalties of increased oil and gas production and the multiplier of goods and services purchased across the spectrum of the supply chain produce new revenues for local, state and federal governments.

Fifth, specific, concrete, measureable plans to develop the supply side of the nation's energy industry across the entire ten sources of energy would enable the same job-creating dynamic as the plan to produce 3 million more barrels of oil per day. We have affordable energy in this country when the supply slightly exceeds the demand. That is the lesson of the 20th century, at least up to the 1980's when we began exporting oil jobs by importing more crude oil than we produced. Utilities across the country have been shelving new power plants by the dozens because of regulatory uncertainty. Coal plants now average almost 40 years in operation. Nuclear plants average over 30 years. Both types of plants have a

natural permitted life-cycle. Rather than extending old plants longer, living with higher risks, increasing inefficiencies and outdated technology, why wouldn't we build new plants with newer technology? Do we want the 20th century energy system to last forever? Well, it won't. So rather than pretend we can extend, why not set in motion the enablers to promote private investment capital to pay for replacing existing old infrastructure with new? More jobs, more value creation and more government revenues are the result.

Sixth, protect our land, water and air with manageable environmental laws and regulations. Mr. Chairman, I've never met the American who argues for dirtier water and air and wasteful land use. To the contrary I know no one who doesn't want better for themselves and their children than what they've experienced. There is no question but that as a nation we have learned lessons in the 20th century regarding environmental protections that we need to apply in the 21st century. The manner by which we go about protecting ourselves has up to now been exceedingly controversial, in part because of the American tendency to do everything at once. We are a society that prioritizes "now." But when it comes to technology, investment and existing infrastructure, we are where we are. We need a practical plan to tackle over the coming years and decades what improvements we need so that government, businesses and operators can adjust to improvements in a way that supports ongoing business and future investments. Again, the nation

should follow a "both/and" approach to environmental improvements, not "either/or." What we knew then is less than what we know now. But getting from then to when, in the future, should be graduated and incremental in the broader interests of jobs, people, and the biosphere.

Finally, Mr. Chairman, the Congress would best serve the energy requirements of the American people if it could enshrine three fundamental concepts in every energy law: energy must be available, affordable and sustainable. The nation's security, economy and lifestyles are precious to every American who has experienced the use of energy during their lives. The nation is the envy of the rest of the world because of all three. We became a great nation because we harnessed the energy we knew and learned as quickly as we could how to do the same with the energy we discovered. That formula works. We don't need to change it. What we need to do instead is to cease politicizing energy into "good" and "bad" energy sources, where we play favoritism with the current "good" energy providers and punish the "bad" energy providers. The electrons in our lights, computers, machines and transmission lines don't know "good" from "bad." They just know they have a job to do and that is to keep our nation running. The fuels in our vehicles don't know where they came from either, except they have a job to do. In the same manner as we enjoy the benefits from all energy, especially knowing that there is more where that came from, we can provide future generations with more

and more. Our domestic energy sources are ample, available and producible, provided, Mr. Chairman, that they are accessible. Thank you again for inviting me to testify. I would be pleased to respond to any questions you or the Members of the Subcommittee might have.

Mr. WHITFIELD. Thank you very much.
Dr. Busch, you are recognized for 5 minutes.

STATEMENT OF CHRISTOPHER BUSCH

Mr. BUSCH. Thank you, Chairman and Ranking Member Rush. Thank you for the invitation to testify today. My name is Chris Busch and I am the Policy and Program Director for the Apollo Alliance. We are a national alliance of labor, business, environmental, and community groups working towards clean energy solutions that also grow the economy and improve American competitiveness.

Every president since Nixon has sought to lessen our dependency on imported oil. Though we have started to turn the corner thanks to policies like the 2010 clean car standards, America still faces this challenge. Nearly 60 percent of U.S. demand is now met by imported oil. The United States accounts for 22 percent of the world's oil consumption but we only possess 1.4 percent of the world's proven reserves. Those numbers are slightly different than Mr. Waxman's but those are according to the EIA's 2009 data. These numbers tell a simple truth. No matter how deep we will, domestic oil supplies cannot solve this problem. We must put in place policies to address the demand side of the problem, and fortunately for America, there are promising transportation policy options that work hand in glove with market incentives to encourage energy savings and innovation. These policies can help consumers save money. They also position American industry to succeed in a fast-growing global market for clean technologies.

Consider the example of the new federal car and light truck fuel economy standards finalized last year. The EPA estimates that the standards will reduce oil demand by 1.8 billion barrels for vehicles sold through 2016, and as Mr. Waxman mentioned, when the standard is fully phased in, the average consumer will save about $3,000 over the life of their vehicle. That is about $150 per vehicle each year.

I would like to talk about some research I did in California with James Fine of the Environmental Defense Fund and Remy Garderet of Energy Independence Now. We calculated the benefits of reduced oil dependency due to AB 32, California's capstone clean energy law. AB 32 reduces California's dependency on imported oil through clean car and clean fuel standards and by providing alternatives to driving. We found that in the year 2020, California will avoid demand equal to 75 million barrels of oil, about an 18 percent decrease, due to AB 32 policies. At the 2009 Department of Energy's midrange price forecast, which was $114.50 per barrel, those were the numbers we were working with when we were doing this research, that reduces California's imported oil bill by about $11 billion.

While shaving $11 billion off the State's import bill is a significant avoided cost, we also estimated the benefits following an oil price shock. We have experienced six significant price shocks in the past 40 years. We all remember oil nearing $150 per barrel in 2008. Oil price shocks have been a reality of world oil markets, and surging demand from China and other countries suggests they will become more common, not less. Our analysis looked at two oil price shocks that cause the price of gasoline and diesel to jump by rough-

ly a dollar or two above a starting point of $3.42 per gallon in the case of gasoline. The diesel jump is more like $2.50, and these were linked to the oil shocks we were looking at. The result of these oil shocks is that AB 32 saves consumers an additional $3 to $7 billion, or about $200 to $500 per household when the savings are distributed over the households projected to exist in 2020 in California.

One of our objectives was to help policymakers understand what is and is not included in the economic analyses they receive and depend upon. Though oil price shocks are a reality, economic studies are not capturing these painful economic effects. Typically energy policy analyses assume smooth prices. National security implications as well as pollution reductions and related public health benefits are also almost never integrated in economic analyses of energy policy. Attacking the demand side of our imported oil dependency is where real progress will be made.

The Apollo Alliance has recently advanced a Clean Transportation Manufacturing Action Plan that I would like to ask be entered into the record. I have it here. The plan calls for increased investment in public transit and railway as well as stronger Buy America provisions and loan assistance to help grow domestic manufacturing jobs. The plan is projected to create 3.7 million jobs over 6 years. These are new jobs in every region of the country and include more than 600,000 manufacturing jobs.

This is part of the Sputnik challenge described by the President. We have the technologies needed to get started, and while the world needs American leadership in advancing the innovation frontier further, the big winner will be the American worker.

Thank you for considering my testimony.

[The prepared statement of Mr. Busch follows:]

Statement of Christopher Busch, Ph.D.

Director of Policy and Program

Apollo Alliance

before the

Energy and Commerce Committee

Subcommittee on Power and Energy

United States House of Representatives

February 10, 2011

Summary points

- The imbalance between U.S. demand for oil and our limited reserves of oil mean that the problem of oil dependency will only be solved through policies that address the demand-side of the problem.

- There are promising transportation policy options that work hand in glove with market incentives to encourage energy savings and innovation, and help position US business to compete in the growing global market for clean technologies.

- Oil price spikes have not been incorporated into most economic assessment of energy policy.

Chairman Whitfield and Ranking Member Rush

Thank you for the invitation to testify today.

My name is Chris Busch, and I am the Policy and Program Director for the Apollo Alliance. We are a national alliance of labor, business, environmental and community groups working toward clean energy solutions that also grow the economy and improve American competitiveness.

Every President since Nixon has sought to lessen our dependency on imported oil. Though we have started to turn the corner thanks to policies like the clean car standards I'll discuss below, America still faces this challenge.

Nearly 60 percent of U.S. demand is now met by imported oil, up from 40 percent in 1990.[1] The U.S. accounts for 22% of the world's oil consumption, but we only possess 1.4% of the world's proven reserves.[2]

These numbers tell a simple truth: no matter how deep we drill, domestic oil supplies cannot solve this problem. We must put in place policies to address the demand side of the problem.

There are promising transportation policy options that work hand in glove with market incentives to encourage energy savings and innovation. These policies can help consumers save money. They also position American industry to succeed in a fast growing global market for clean technologies.

Consider the example of the new federal car and light truck fuel economy standards finalized in 2010. The EPA estimates that the standards will reduce oil demand by 1.8 billion barrels for vehicles sold through 2016.[3] When the standard is fully phased in, the average consumer savings will amount to about $3,000 over the life of the vehicle, roughly 150 dollars per vehicle each year.[4]

James Fine of the Environmental Defense Fund, Remy Garderet of Energy Independence Now, and I calculated the benefits of reduced oil dependency due to AB32 – California's capstone clean energy law. AB 32 reduces California's dependency on imported oil through clean car and clean fuel standards and by providing alternatives to driving.

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[1] *America's Energy Future: Technology and Transformation: Summary Edition. 2009.* Committee on America's Energy Future; National Academy of Sciences; National Academy of Engineering; National Research Council

[2] Department of Energy – Energy Information Administration data. 2009 Total Consumption of Petroleum Products. US 18,771 Thousands Barrels Per Day, world 84,029 Thousands Barrels Per Day. http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5&pid=54&aid=2

[3] http://www.epa.gov/oms/climate/regulations/420f10014.htm

[4] http://www.epa.gov/oms/climate/regulations/420f10014.htm

We found that in the year 2020, California will avoid demand equal to 75 million barrels of oil (an 18% decrease) thanks to AB 32.[5] At the Department of Energy's year 2020 midrange price forecast, $114.50 per barrel in 2020, this would reduce California's bill for imported oil by 11 billion dollars.

While shaving 11 billion dollars off the state's import bill is a significant avoided cost, we also estimated the benefits following an oil price shock.

We have experienced six significant price shocks in the past 40 years. We all remember oil nearing $150 dollars per barrel in 2008. Oil price shocks have been a reality of world oil markets, and surging demand from China and other countries suggests they will become more common, not less.

Our analysis looked at two oil price shock scenarios that cause the price of gasoline and diesel to jump by roughly a dollar or two above a starting point of $3.42 per gallon. The result is that consumers save an additional 3 – 7 billion dollars, or roughly 200 – 500 dollars per household thanks to the smarter energy use inspired by AB 32.

One of our objectives with this research was to help policymakers understand what is and is not included in the economic analyses they receive.

For example, crude oil and gas prices have shot up six times in the last 40 years, but economic studies are not capturing the painful economic effects of energy price spikes.

National security implications as well as pollution reductions and related public health benefits are also almost never integrated in economic analysis of energy policy.

Attacking the demand side of our imported oil dependency is where real progress will be made.

The Apollo Alliance has recently advanced a clean Transportation Manufacturing Action Plan that would help. I have copies of our Plan here, and ask that it be entered into the record. The Plan calls for increased public transit and railway investments as well as stronger Buy America and loan assistance provisions to emphasize domestic manufacturing job growth. The Plan will create 3.7 million jobs over six years. These are new jobs in every region of the country and include more than 600,000 manufacturing jobs.

This is part of rising to the Sputnik challenge described by the President. We have the technologies needed to get started. And while the world needs American leadership in advancing the innovation frontier further, the big winner will be the American worker.

Thank you for considering this testimony.

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[5] Find the full report, *Shockproofing Society,* here:
http://www.resource-solutions.org/pub_pdfs/Shockproofing%20Society.pdf

Mr. WHITFIELD. Thank you.
Mr. John, you are recognized for 5 minutes.

STATEMENT OF CHRIS JOHN

Mr. JOHN. Mr. Chairman, Chairman Whitfield, Ranking Member Rush, thank you very much for inviting me to come and testify in front of this very distinguished body that I was privileged to serve in for 4 years. It seems like an eternity ago. But it is a very important subject matter. I was asked to specifically talk about world and international events and how it affects what goes on domestically in our oil production all over America.

As Chairman of Louisiana Mid-Continent Oil and Gas Association, I represent all of the companies that explore, produce, market, transfer from the ground to the tank is what I like to say, and the fact of the matter is, when we look at energy policy in this country, it cannot be an either/or. The fact of the matter is, we need all drops and all kinds of energy to make America more energy secure. But I think the real factor, the factor that we must keep in focus like a rifle shot as we debate some of these is the energy reality that we have in this country. I think it is very important not to deviate from it because we can talk about assumptions and we can talk about politics and we can look at it from a geographical standpoint. The fact of the matter is that you must be grounded in our conversations about the energy reality in this country, and that is what I would like to spend a little bit of my time on.

The fact of the matter is that 78 percent—the energy reality today, not tomorrow, not yesterday, but today is that 78 percent of our fuel needs, our energy needs is going to come from fossil fuels, 78 percent from fossil fuels. You will have 12 percent from nuclear, you will have 3 percent from hybrid, 1 percent from wind, a half a percent from solar and then it goes down from there. I think that is an important point as we discuss the future of energy policy in this country because even DOE says that 60 percent of our energy needs over the next 25 years is going to come from fossil fuels. There have been experts that obviously have said higher than that, and I believe it is closer to 80 percent for the next 50 years that fossil fuels are going to play a very important part in providing energy security for America.

And why should we care what goes on in different parts of the country? Obviously the incidents in Egypt whether perceived or reality has had an impact on the domestic oil production and the price, and getting a little less attention is what has happened off the coast of Oman where Somali pirates have commandeered a Greek vessel with almost 2 million barrels of crude that is destined to the Gulf of Mexico for refinery and use in our markets today. So it really is important to understand the energy reality and where it comes from, and that is my next point.

Mr. Hofmeister talked about the 20 million barrels. I have used this several times, Mr. Hofmeister, where I said, we used 20 million yesterday, we are using it today, we need it tomorrow, and that is just a fact. That is another energy reality check fact that needs to be looked at. But when you break down the 20 million barrels that we need, 7 million are produced right here domestically and we import 13 billion. Let me peel back the banana just

a little bit more. Where does that 7 million come from? Well, the 7 million comes from basically 53 percent of our oil that we use domestically or that is produced domestically in the United States, 30 percent comes from the Gulf of Mexico, 20 percent comes from Texas and 4 percent comes from Louisiana onshore. So you are looking at 54 percent of our domestic production coming from the Gulf region, the Gulf of Mexico and the region.

But I think more important is to look at where we get the 13 million barrels that we use every day. It comes from countries that obviously do not share a lot of our values. We spend billions of dollars in buying crude oil that could be used right here in America to create jobs. When you look at 23 percent, thank you very much, comes from Canada, our neighbor to the north, 12 percent from Mexico, which are our two largest importers, but then you have 26 percent from OPEC countries, 15 percent from the Persian Gulf area of which 10 percent comes from Saudi Arabia. So I think that is very important to not only understand how much we use domestically but where it comes from domestically and also how much we use and how much we have to import and where that comes from. That in itself provides the answer to the question that this committee is looking for, why should we care about international events. When we are vulnerable to 13 million barrels a day coming from regions all over the world, then you are going to be very vulnerable to price fluctuations like we have seen here of late.

And obviously the future of the Gulf of Mexico was very bright. I could spend another 5 or 50 minutes talking about the Gulf of Mexico and the moratorium and the pursuing "permatorium" that we are dealing with today but the jobs that are created in this industry, I think Mr. Hofmeister is absolutely correct. Only in Louisiana—I can speak parochial a second here because I love Louisiana and I certainly live and work there today—320,000 jobs in Louisiana alone are created by oil and gas, 9.2 million in America, $70 billion in economic driver in the State of Louisiana. This moratorium obviously has been an issue that we have worked on and we are going to continue to work through that. I have gotten a written statement that I submitted that goes on to talk a little bit more about different things but I believe there is more to a barrel of oil than the BTUs, and you have got to look at the economic impact that the oil and gas industry has both on jobs in America and providing our energy security that we must have.

With that, thank you very much.

[The prepared statement of Mr. John follows:]

Chris John, President
Louisiana Mid-Continent Oil and Gas Association
Testimony: U.S. House Subcommittee on Energy and Power
Thursday, February 10. 2011 – 9:30 a.m.
Rayburn House Office Building – Room 2123

Chairman Whitfield, Ranking Member Rush, and members of the Committee, thank you for inviting me to address your committee concerning our nation's current energy picture. I was asked to focus my remarks on how America's energy security is influenced by international events, like those occurring in Egypt, and why we should be concerned. My remarks will focus on the importance of domestic oil production, and especially oil production in the Gulf of Mexico and the Gulf Coast region and its significance to America's energy security.

As the President of the Louisiana Mid-Continent Oil and Gas Association, I represent the companies that explore for, produce, refine, transport, and market crude oil, natural gas and petroleum products in Louisiana and the Gulf of Mexico. For the most part, my comments are based on the most current available data from publicly available sources, including the U.S. Department of Energy's Energy Information Administration (EIA).

Production and Consumption

I believe it is vitally important to focus on the energy reality facing America. Oil and gas resources – fossil fuels - are going to be the backbone of this nation's energy needs for decades to come. The DOE projects that at least 60% of our energy needs will come from oil and gas for the next 25 years. This percentage could easily increase depending on the effectiveness of renewables and other future energy sources. Of the oil that is produced domestically, 29% of

that oil is produced in the Gulf of Mexico – and that's only in the central and western Gulf of Mexico since the Eastern Gulf is off limits to exploration. I will address the issue of access a little later in my comments.

The United States consumes 20 million barrels of oil per day. The U.S. produces roughly 7 million barrels of oil per day – or a little less than 1/3 of what we consume - and the other 13 million barrels we need are ***imported*** from other parts of the world. We do not produce enough oil domestically here in the U.S. to take care of our needs, and anytime there is a threat, or a perceived threat, of an oil supply disruption, the immediate reaction is concern and increased oil prices. At the time of preparing my remarks, the price of Brent Crude was $99.65 per barrel, and it has hovered around $100 in recent weeks.

Before the ***Deepwater Horizon*** incident on April 20, it was projected that Gulf of Mexico oil production would climb to about 2 million barrels of oil per day (2.0 MMBBLs/D) early this decade. This would be a 22% increase from 2010 production (1.64 MMBBLs/D). DOE production estimates for this year, 2011, are 13.5% less than 2010 production (1.42 MMBBLs/D), and for 2012 even less, down 24% from 2010 levels (1.25 MMBBLs/D). The point here is that instead of oil production increasing to help meet our nation's energy needs and moving toward energy security, we are going in the opposite direction and producing even less, making us more dependent and even more vulnerable to events and situations in other parts of the world.

OCS Access

75% of OCS waters in the U.S. are currently off-limits to drilling activity. It has been estimated by the MMS (predecessor to the BOEMRE) that these areas contain 18.17 billion barrels of technically recoverable but undiscovered oil and 77.17 trillion cubic feet of natural gas. Of these areas, the Eastern Gulf of Mexico alone is estimated to contain almost 4 billion barrels of crude oil. These numbers were produced in 2003 and are very preliminary and conservative. The only way to improve the accuracy of the numbers is to do the seismic analysis and drill the wells. Inevitably, these numbers will go up significantly when exploration begins. The point is: we have significant domestic oil and gas resources available to us – but off limits - on the federal OCS.

Refining Capacity in the Gulf Coast Region

Refineries in Gulf Coast states are also vitally important to the nation's overall energy security and are a major component of the U.S. energy supply chain. While refining capacity in the United States is about 17.6 MMBBLs/D, nearly half of that capacity (48%) is located in the Gulf States of Louisiana, Texas, Mississippi, and Alabama. Most of the energy needs of the northeastern and southeastern United States are met by oil produced in the Gulf of Mexico, or imported, and refined in Gulf Coast refineries.

Employment

Jobs are another critically important aspect of Gulf of Mexico oil and gas activity, and the oil and gas industry is critical to America's economy. Not only does it produce the energy that fuels America, but it produces millions of jobs. According to a recent American Petroleum Institute study, our domestic oil and gas industry supports 9.2 million American jobs and adds more than $1 trillion to the national economy. According to a study done for my Louisiana Mid-Continent Oil and Gas Association, there are over 320,000 jobs in Louisiana alone dependent on the oil and gas industry.

Many of the oil and gas industry jobs in Louisiana are dependent on oil and gas activity in the Gulf of Mexico. With the imposition of the deepwater moratoria and resulting permitting delays associated with new BOEMRE regulations, a number of these jobs are at risk. To give you some idea of the impact: It has been estimated that each working deepwater drilling rig employs 230 workers. Furthermore, each working rig has been estimated to employ 920 indirect support workers. Therefore, with 33 deepwater rigs idled since the moratoria, 38,000 jobs have been affected and remain at risk. (Data from Greater New Orleans Inc. study, January 13, 2011) While the industry has kept many of these workers employed awaiting final permit decisions, the final numbers will depend on how many deepwater rigs go back to work and how soon they go back to work.

In closing, I hope that my remarks have highlighted the importance of domestic oil production, and especially oil production in the Gulf of Mexico and the Gulf Coast region and its significance to America's energy security. By increasing domestic oil production, we will enhance America's energy security by insulating the nation's economy from supply and price disruptions. Increasing domestic oil production will also increase jobs and continue to play a pivotal role in driving America's economy.

Remember: Energy security means economic security which provides national security.

Mr. WHITFIELD. Thank you, Mr. John, and thank all of you for your testimony.

Mr. Hofmeister, in your opening statement you talked about the possibility of increasing demand from 7 to 10 million barrels a day, and I think you indicated without any public funds. Would you elaborate on that a little bit about what regions of the country do you think that is possible to do? Where would that happen and tell us a little bit about that.

Mr. HOFMEISTER. If you break down where the oil sits, and while I agree that the narrow definition of reserves as required by the Securities and Exchange Commission suggests the United States has only 2, maybe 3 percent of proven reserves, there are probable reserves and there are resources in ground not counted in that number. So we are looking at more than a trillion barrels of oil in the United States available that could be addressed from an exploration and production. But specifically, East Coast offshore, eastern Gulf of Mexico, western Gulf of Mexico, especially deep water. Off the West Coast there are billions of barrels. Off of the Alaska coast, Bristol Bay, Chukchi Sea, Beaufort Sea, the Bakken formation, enhanced oil recovery from former or existing oil fields and, and most importantly, oil shale in the Piceance Basin of Colorado, which includes Wyoming and Utah. The combination of all of those over the period of a decade or more could take us way beyond 10 million barrels but I realize some people are concerned about the sensitivities so I have only suggested a target of 10 million at this stage. When we get to 10, we could consider more.

Mr. WHITFIELD. But if the proper government policies were in place, do you think that 10 million could be reached relatively quickly?

Mr. HOFMEISTER. If you could consider the capital investment plans of not just the major oil companies but also the major independents and the small oil companies, we are in the hundreds of billions of dollars per year, much of that targeted for outside the United States because that is where they are welcomed. That is where they are wanted. That is where they are creating jobs.

Mr. WHITFIELD. Right.

Mr. HOFMEISTER. Redirecting those billions to the United States because we would in turn welcome them to create American jobs in America would be a reversal of where we have been over a number of decades.

Mr. WHITFIELD. Right. Well, as you well know, this Administration has been totally focused on green energy projects, which are fine and I know billions of dollars or millions of dollar sin the stimulus fund went to green energy projects, but I think most of us agree that this is a long, long, long, long-term solution to our problem.

Mr. John, I know that the moratorium was put in place sometime last spring and then court ruled it was illegal and then a new moratorium was put into place, lawsuits were filed and then Mr. Salazar I think removed that moratorium, but in effect there is a moratorium because no permits have been issued in the Gulf, have they, or has there?

Mr. JOHN. No, that is correct. To my knowledge, as of yesterday, there were no new drilling permits issued in the Gulf of Mexico.

The moratorium was set in place May 27th, and then of course there was a subsequent court battle, which obviously throughout the moratorium and then I think just several, a week or 2 weeks later, the Administration came up with another moratorium, and that in itself, I think, Mr. Chairman, is very troubling. I like to believe, now, maybe this is a little subject, that the process at which this came down has been more harmful than the actual moratorium.

Mr. WHITFIELD. Let me ask you, hasn't the federal judge that is holding that case, hasn't he actually held the Obama Administration in contempt of court?

Mr. JOHN. I am not sure.

Mr. WHITFIELD. I read that yesterday or a couple days ago in the paper that the judge is now holding this Administration in contempt for violating his orders.

Mr. JOHN. Well, it has certainly been in and out of the courts and decisions and all of this time we have 30,000 people at the minimum waiting to go back to work in the Gulf of Mexico.

Mr. WHITFIELD. Well, Mr. Hofmeister's suggestion, which I certainly agree with, he said would create about 3 million more jobs, certainly help make us dependent, create all these jobs as you said.

Now, Dr. Busch, you talked about your Apollo Alliance, and you mention in here public transit rail projects. Are you talking about private expenditures there or are you talking about government expenditures?

Mr. BUSCH. Well, government expenditures but I think there is a role for public-private partnerships and loan guarantees can help leverage.

Mr. WHITFIELD. Well, I think the problem that we have today about any more government expenditures is just the fact of the financial situation we are in, and the great thing about what Mr. Hofmeister is talking about is that we are talking about private dollars here, and that in my view the way we need to go right now. But my time has expired so I will recognize Mr. Rush for 5 minutes.

Mr. RUSH. I certainly want to thank you, Mr. Chairman.

Mr. Hofmeister, I agree with you that the level of investment that China is doing overseas, especially in emerging markets, is alarming. The United States is not doing well in these markets and it seems to me that it is almost akin to us killing our mothers and our fathers and then we complain about being an orphan. And I am a strong believer that the U.S. should invest in emerging markets and not leave all the strategic resources to our competitors' control. And that leads me, I looked at the world transit choke points through which almost half the world's oil productions are moving through. I looked at the map where each of these seven choke points are located, compared it to U.S. imports for major players, especially in the Middle East and from offshore and west African coast, That west African is where China is aggressively investing already, and I realize that none of these imports are going through these choke points. You were with Shell Oil with global operations. Can you tell me which other maritime routes would be used to supply the North American market and how you would characterize those routes? That is the first question.

The second question is, in regards to overseas supply, putting aside our NAFTA partners, Mexico and Canada, how would you characterize the cost efficiencies of those two imports taking into account the quality of the crude transportation costs, the current and projected volume and security of supply?

And my last question, if you answer all these, which of the major overseas exporting countries have favorable and positive policies and attitudes towards the United States, and I just want to make sure, I think the chairman in his opening remarks made note of the fact that he thought that there was some countries, Angola and Nigeria, I think he mentioned specifically, they have a hostile relationship with the United States and I just wanted to correct that. I think they have a very friendly relationship with the United States. So would you speak of choke points and those issues?

Mr. HOFMEISTER. Thank you, Ranking Member. I think with respect to the choke points, the three most serious are the Suez Canal, the Hormuz Straits, which is separating Iran from Yemen—I am sorry—Oman and Iran, and the Straits of Malacca, which is between Malaysia and Indonesia. These choke points carry enormous amounts of crude oil. In fact, a former colleague, Matt Simmons, who passed away this past summer, used to speak of the Straits of Hormuz as, we live one day away from an oil Pearl Harbor. In other words, those Straits of Hormuz transport between 20 and 25 percent of daily consumption of global oil, and were they to be shut in, the world would be in a panic overnight if it were not possible to pass oil.

With respect to your second question, I think the countries such as Venezuela, Nigeria, Angola, in the future, Brazil, also Russia, these are countries which are looking at the U.S. markets quite favorably. They want to be a supplier, but there are issues in each of those countries. The socialistic regime in Venezuela makes a very unpredictable supplier not only to the United States but elsewhere. While Nigeria has an officially favorable outlook on the United States market, as we know, Nigeria is infected by criminal gangs that not only deal with onshore but also now offshore oil. Russia has proven to Europe that it is an unpredictable supplier and we could find ourselves in the same boat.

Mr. WHITFIELD. I recognize the gentleman from Michigan, the chairman of the committee, for 5 minutes, Mr. Upton.

Mr. UPTON. Thank you, Mr. Chairman.

Mr. Mar, not long ago, as I recall, Canada was producing about a million per day from the tar sands, oil sands. Your testimony talks about getting that production up to maybe as much as from 1 million to 3.3 million barrels by 2019. What type of incentives, I mean, how are you getting from 1 to 3.3? What have been the inducements to get there? Quickly.

Mr. MAR. Thank you, sir. First of all, I should talk about the overall size of the resource of the oil that is in place in Alberta in the oil sands. It is roughly 1.7 trillion barrels of oil of which with current technology and prices about 10 percent of it is accessible, so roughly 170 billion barrels. So there is certainly ample room to move up our production to the 3.3 million barrels a day. It is a very realistic target.

In terms of the policies of Alberta, there are policies in place to recognize that the upfront costs of developing oil sands are very, very high. There are no exploratory costs to speak of really because we know exactly where it is, but there are enormous costs upfront in terms of capital investment that is required by private sector investment to do that. The government policy permits those who will invest to pay royalties only after payout from their original investment and so that is really the only incentive that is the strongest incentive that the government puts in place to ensure that there is purchases of land leases to develop oil sands.

Mr. UPTON. What is likely to happen if the United States doesn't permit the Keystone Pipeline to be built?

Mr. MAR. Well, we continue to using existing pipelines——

Mr. UPTON. But what will happen to the bulk of that new production?

Mr. MAR. Well, there has been investment by many companies from around the world, not just American companies who are invested in the oil sands. State-owned enterprises from China have invested themselves in the oil sands. StatoilHydro of Norway has——

Mr. UPTON. So is China proposing to build a pipeline to the west?

Mr. MAR. Well, there currently is a pipeline that goes from Alberta to the West Coast. Small amounts of that oil on the spot market end up going to China on tankers but there is a proposal currently by a private sector company, Endbridge Pipelines, to build a project called the Gateway Pipeline to——

Mr. UPTON. And just quickly, double, triple the capacity? How much capacity ultimately to the west, particularly if Keystone is not built?

Mr. MAR. I actually don't know.

Mr. UPTON. If you could get that for record?

Mr. MAR. I would be happy to.

Mr. UPTON. Mr. Hofmeister, some very troubling numbers in recent months really. As we look at our domestic production from the Gulf, which is basically about a third of our domestic production comes from the Gulf, we have gone from in 2009 1.56 million barrels per day to 2010 1.64, so a little bit of an increase. In this year, we are expecting that to decline to about 1.39 and in 2012 further decline to 1.14 million barrels per day, in essence 420,000 barrels fewer than we got over 2-year span. As I understand it from some discussions in recent weeks, we are actually this year they are predicting that the 1.39 is 250,000 barrels less than they projected even a year ago. Alaska is the same. We have seen these numbers tail off as well, in essence going from .65 million barrels in 2009 to what will be .52 in 2012. Very troubling is this Wall Street Journal piece from last Friday, Shell postpones plan for offshore Alaska drilling. I want to say they had received 34 permits, and the last one, the Environmental Appeals Board pulled the air quality permit.

From your days at Shell before, Shell I think has spent about $3.5 billion on this particular site where they think there is as much as 25 billion barrels down below, tell us a little bit about what would happen if we follow through on what the President indicated in his State of the Union address that we are going to take

away some of the incentives from domestic drilling, particular as you try to get from 7 to 10 million barrels a day.

Mr. HOFMEISTER. Chairman Upton, I have been on the record in many public forums suggesting that by the end of 2012, this country will face $5 gasoline, precisely because of the path that we are on which you describe, and I believe your numbers cited are optimistic. I believe that the decline——

Mr. UPTON. I am a Cubs fan. That is probably why.

Mr. HOFMEISTER. The decline in the Gulf of Mexico I believe will be sharper and deeper than what anyone is currently projecting because the decline rate from existing wells, particularly deep water, fall off naturally very quickly, and the reason we had 34 rigs drilling in the Gulf of Mexico was not so much to increase the rate of production but to sustain the rate of production in the Gulf of Mexico. While there may have been some increase, absent drilling—I mean, we have made a horrible error as a country. The rest of the world did not discontinue offshore drilling.

With respect to the Alaska project you mentioned, I no longer speak officially for my former company, but beginning in 2005 that company began the process of obtaining the permits through 2006, 2007, 2008, 2009. I retired in 2008. The company continues and it has now moved, according to the newspaper report, potentially 2012. Seven years to simply drill two exploratory wells but to see what is there. That is the degree of frustration that American companies experience, and if you notice, no other companies are mentioned in the Alaska, while they have leases, they are not going to spend money when the regulatory regime is so difficult to achieve a single permit which was granted at one time and then rescinded on appeal, so in terms of losing that particular air quality permit. So we have a real strangulation by regulation taking place for domestic production at the current time in this country.

Mr. UPTON. Thank you.

Mr. WHITFIELD. Mr. Inslee, you are recognized for 5 minutes.

Mr. INSLEE. Thank you. I wanted to explore with Dr. Newell whether or not substantially increased opening of federal lands would have an impact on the price of fuel at the pump, and I want to read your agency's evaluation of this issue. It is a study called Impact of Limitations on Access to Oil and Natural Gas Resources in the Federal Outer Continental Shelf. It is a study in 2009. Now, a lot of folks would think if we just open up the spigot off the Outer Continental Shelf and other places, problem solved on prices. I want to read what your agency concluded after looking at it. You concluded: "The average price of imported low-sulfur crude oil in 2030 in 2007 dollars is $1.34 per barrel higher and the average U.S. price of motor gasoline price is 3 cents per gallon higher than in the reference case." Now, as I understand what you are saying, when you looked at this issue and really looked at the economics of this issue, your agency concluded that if we essentially removed all federal restrictions on Outer Continental Shelf drilling. In 2030, after everything had been exploited to the extent the human mind can consider, the price would be 3 cents different in 2030.

Now, that is pretty stunning because a lot of people, particularly on the other side of the aisle, figure we will just solve this cost problem by just opening up the spigot everywhere in the United

States including Yellowstone National Park and the Mall. But your conclusion seems to suggest that there is a negligible, almost infinitesimal difference of we do that in price. Now, my understanding would be the reason for your conclusion is essentially it is a world market for oil, and since we have such a small amount of the world market at 3 percent top of the world market, we are not to affect the cost very much no matter where we drill in the United States, Outer Continental Shelf, Arctic, you name it.

Secondly, there is a phenomenon that every time we increase our drilling OPEC can decrease theirs to maintain the price that they desire because that is where the oil is in the world. Now, are those the primary reasons that you concluded there would be a negligible, if almost infinitesimal, difference of price or are there others that I have not alluded to?

Mr. NEWELL. I think you have captured some of the main factors that would come into play in analyzing that kind of question. In terms of the effect of increased access and production of domestic oil on global oil prices, in addition to the access issue, there is a question about whether or not those fields would be produced, which would depend on the cost of producing, it would depend upon the price of oil that would get in the marketplace. And so access is one piece of it. It would depend on the magnitude of areas that are open to access and the amount of production that would come from that, and then you would have to take that amount of production in the global context in terms of the overall oil supply and demand. In the previous analyses that EIA has done, the magnitude of increased production that tends to be associated with some of these actions is measured in the hundreds of thousands of barrels per day, which is a significant magnitude, but in the global scheme of things, it tends to be significantly less than 1 percent of global oil supply and so therefore in terms of global impacts on price, it tends to be small.

Mr. INSLEE. Quite negligible.

Second question, we look for bipartisanship. We haven't been able to find it on climate change. My Republican colleagues still insist on ignoring the clear scientific consensus about this. But there is a bipartisan consensus about concern for oil supplies, price that our people pay at the pump and national security issues, and I think there is room for bipartisanship by adopting a scenario where we try to maintain a climate that doesn't increase more than 2 degrees, and your colleagues at the International Energy Agency have concluded that if we embrace an effort to limit the amount of carbon dioxide in the atmosphere that would result in a 2-degree increase in world temperature, so if we try to limit it to that increase, we would have a significant reduction in decreasing the cost of oil. They have concluded that if we took action to limit it to 2 degrees, we would essentially drop U.S. imports by 45 percent from 10.4 million barrels in 2009 to 5.7 million barrels in 2035, last seen in the 1980s. They found under the 2-degree scenario, we have a significantly weaker demand with that demand falling briskly thereafter. Oil prices were much lower as a result. If we really do something about climate change by reducing CO_2 emissions and reduced demand for oil, can that help us restrain the price increases of oil?

Mr. NEWELL. We have not specifically evaluated a global scenario like the International Energy Agency has. I mean, we have on different occasions evaluated U.S. energy and climate policies. If there was a significant reduction in global oil demand as a result of some set of policies, that would tend to bring price down, other things equal in the world oil price. There might be a difference, though, between the world oil price and the retail price paid that one would need to take into account, though.

Mr. INSLEE. Just for the record, though——

Mr. WHITFIELD. Mr. Inslee, I let you go over.

One comment I would just make, we have been advocating additional exploration. Certainly one part of that figure is the price but just as important is having the supply to meet the demands of our economy.

I recognize the gentleman from Texas, Mr. Barton, for 5 minutes.

Mr. BARTON. Thank you. I would be happy to yield to my friend from Washington for that question if it is a short one, and if the answer could be relatively short. I don't want to cut him off in midsentence.

Mr. INSLEE. Mr. Barton, I appreciate your continued courtesy. I just want to point out, the study that I referred to suggested that the world oil price would be $90 per barrel in 2035 if we adopted measures to restrain demand consistent with reducing climate change to limit it to 2 degrees. And thank you for your courtesy, Mr. Barton.

Mr. BARTON. Thank you. Of course, I think everyone knows that Mr. Inslee and I don't share the exact same view on climate change, but we do share that we need to discuss views in this committee. That is what it is all about.

Mr. Newell, I know the Energy Information Administration is more of a data collection and reporting agency within the Department of Energy. Do you in your position have any authority to speak on behalf of the Obama Administration or Secretary Chu on policy issues?

Mr. NEWELL. No.

Mr. BARTON. So you are more of a reporting and data collection. And that is fine. That is not pejorative. I was going to ask some policy questions of you, but if you are not authorized to answer, I won't do that.

I will ask you this, though. Do you have any projections within your agency that show a significant reduction in oil demand worldwide?

Mr. NEWELL. The scenario that I discussed earlier, our reference case scenario for domestic liquids consumption, we expect an increase, a modest increase in domestic liquids production. Petroleum consumption in the United States we expect to be——

Mr. BARTON. No, I am talking about worldwide, not just the United States.

Mr. NEWELL. Worldwide, we are projecting under current laws and policies internationally a significant increase in global liquids consumption.

Mr. BARTON. Significant increase?

Mr. NEWELL. Yes.

Mr. BARTON. Is there anybody on the panel that has an alternative view that we can somehow bend the demand curve and send it significantly lower?

Mr. SIEMINSKI. Mr. Barton?

Mr. BARTON. Yes, sir.

Mr. SIEMINSKI. Let me just jump in here. In my forecasts, about the year 2020 overall global demand begins to level off, and I think that that is mainly going to be a function of a better consumption per unit of economic output numbers in the emerging market countries. So we are already seeing the OECD countries' overall demand numbers flattening, probably coming down, and in another 10 years we should begin to see that happening in the emerging market countries.

Mr. BARTON. Well, I would postulate that based on the economy worldwide, if we are able to restart the U.S. economy and the European and the Asian economies and the Chinese economy grow that there is going to be a substantial increase in demand for oil, even with the best efforts on energy conservation and things like that. So that would tell me that for U.S. energy security, we should try to increase U.S. energy production of all sorts—natural gas, oil, clean coal, wind, solar. We should support research into clean coal, CO_2 sequestration if we can see a light at the end of the tunnel on the technology. But we definitely need to, in my opinion, increase our domestic energy resources.

Mr. John, do you have any information if we could really restart exploration in the Gulf, what kind of an increase we could get in production from that, say in the next 2 to 3 years?

Mr. JOHN. Well, in my statement that I submitted, it talks about kind of the production curve of what is in the Gulf and what can be produced in the Gulf, and it shows really somewhat of a decline. However, it is important to understand that you just don't turn the switch on and off. In a deep water project where you have a billion-dollar piece of equipment in a floating drill ship from start to finish, by the time you actually lease the property until you explore, then produce, pipeline and it gets into the market is somewhere in the 2- to 5-year range just depending on a lot of elements. In fact, the deep water Macondo well, the lease sale of that piece of property was in 2008, so that was a 2-year span and they weren't in production. So the lag time is what is very critical because there is going to be a bubble any time you take 30 percent of our domestic production offline, and it has been offline since the 27th of May, there is a bubble. It won't happen tomorrow or the next day but it is coming and it is going to have some sort of impact, a negative impact on the supply.

Mr. BARTON. My time is expired, Mr. Chairman. Thank you very much.

Mr. WHITFIELD. Yes, sir. Mr. Green was next, but I see he is not here. Mr. Markey, you are recognized for 5 minutes.

Mr. MARKEY. I thank the chairman very much.

Yesterday, this subcommittee held a hearing on Republican legislation that will bar EPA from doing anything further to reduce oil use from cars, trucks, planes, boats or any other source. The legislation might even nullify the progress that has already been made at the EPA in reducing demand for oil from cars and trucks and

through the development of homegrown renewable fuels. The Republican bill could result in an increase in our oil dependence of more than 5 million barrels a day by the year 2030, more than we currently import from OPEC. We have heard disturbing rumors that this legislation could be marked or even added to the Continuing Resolution on the House Floor next week, but today, here we are holding a hearing on the effect of Middle East unrest on the oil market as though the Republican legislation that will dramatically increase our dependence on Middle Eastern oil didn't even exist. It reminds me a lot of when Monsignor O'Malley used to go up into the pulpit on Sunday and lecture to the congregation that on Wednesday in the church hall, Father Ganney will lecture on the evils of gambling; on Thursday night in the church hall, bingo. Well, yesterday we are lectured on the evils of the EPA. Today, bingo, Egypt, bingo, Iraq, Iran, Tunisia, bingo, bingo, bingo, bingo.

So let me ask each of you. Let us go down the list and I would like a yes or no on whether or not you feel it is important for us to stop $162 billion a year going to OPEC, going to Middle Eastern countries that are paid for by American consumers at $90 a barrel so that we are not subsidizing religious fanaticism in Saudi Arabia, we are not subsidizing rockets being constructed in Iran that are then used by Hezbollah and Hamas against Israel and against our country. So let me just ask each of you if you believe, number one, that reducing our dependence upon imported oil from the Middle East is important. Dr. Newell, yes or no?

Mr. NEWELL. That would tend to involve a policy position which I am not in a position to answer.

Mr. MARKEY. OK. Mr. Mar, is that important?

Mr. MAR. Sir, as a representative of another government, I am not——

Mr. MARKEY. Mr. Sieminski, is that important? We are talking about Egypt here. It is a hearing on Egypt and its impact on oil prices, and we are talking about the Middle East here, not Canada. We are not talking about Norway. Mr. Sieminski?

Mr. SIEMINSKI. Mr. Markey, I am going to try to answer your question actually but I can't do it in one word. I will try to be brief.

Mr. MARKEY. No, thank you.

Mr. Hofmeister, yes or no, is it important for us to reduce our oil dependence on the Middle East?

Mr. SIEMINSKI. Mr. Markey, my answer to that would be no then if I can only say one word.

Mr. MARKEY. It is not important. OK. Thank you.

Mr. Hofmeister?

Mr. HOFMEISTER. Absolutely critical to reduce dependence on the Middle East.

Mr. MARKEY. Thank you.

Dr. Busch?

Mr. BUSCH. Yes.

Mr. MARKEY. Yes?

Mr. JOHN. I think it is important to increase our domestic production, and if that means reduced from the Middle East, then my answer is yes.

Mr. MARKEY. But should our goal be to reduce dependence upon Middle Eastern oil?

Mr. JOHN. Yes.

Mr. MARKEY. OK. Thank you.

Now, so given that, should we be unilaterally disarming ourselves of any of the weapons, any of the weapons that we have in our arsenal to reduce demand for Middle Eastern oil? Mr. John?

Mr. JOHN. Mr. Markey, you are still on the top of your game.

Mr. MARKEY. And under the 5-minute rule.

Mr. JOHN. Yes. So four corners doesn't work here then. Obviously you bring a very good point. The point is that America and the world consumption of oil is going to increase.

Mr. JOHN. Bottom line—can I say this? I am going to run out of time. Bottom line here is, we can't afford to not improve the fuel economy standards of the vehicles which we drive. That is our number one weapon against the Middle East. That is where we are teaching them a lesson. That is President Kennedy telling Khrushchev we are putting a man on the moon in 10 years and bringing him back, you are not controlling outer space, we are using our technology to dominate you. That is our message to the Middle East. They have 70 percent of the oil reserves in the world, the Middle East. We cannot beat them at that game with only 3 percent of the oil reserves. It is irresponsible to talk about basically tying the hands of the EPA to improve our ability to make ourselves efficient to back out this oil from the Middle East, and next week's vote if we have it will be a historical one.

Mr. WHITFIELD. Mr. Sullivan, you are recognized for 5 minutes.

Mr. SULLIVAN. Thank you, Mr. Chairman, and thank you for having me follow Mr. Markey. It is not something I enjoy very much, and he is very good, by the way, at what he does.

I just want to touch on this again for a little bit. According to the National Petroleum Council, technically recoverable resources in North America currently restricted by law or regulation amount to over 40 billion barrels of oil. The answer to our energy security question is staring us right in the face, but the simple fact is that the Obama Administration is hostile to developing oil and gas, and they have taken a decisive regulatory position against increased domestic oil production, and let us just take a look at this again. On December 1, 2010, the Obama Administration announced a new offshore drilling ban that will keep the eastern Gulf of Mexico and the Atlantic and Pacific coasts off limits to new offshore exploration until 2017, and the Administration just announced that new drilling permits in the Gulf may not happen until June 2011. These actions send terrible signals to the world oil markets and it makes our Nation more vulnerable to oil price swings due to rising demand and political upheaval.

I guess my question would be to Congressman John and Mr. Hofmeister. Congressman John, you referenced that 38,000 jobs are at risk because of the moratorium or "permatorium" in the deep water Gulf. That doesn't mean every job has been lost. Companies are doing what they can to keep workers on the payroll while drilling projects remain in a standstill, and that means companies in many cases are spending millions of dollars a day to keep mass layoffs from occurring, and I have a company in my district that in the Gulf right now, and I met with them not long ago, and they are sitting idle paying like a million dollars a day to service compa-

nies and the rig operators, and they asked me when am I going to get a permit. They said, believe it or not, that the regulators and the bureaucrats don't even return their phone calls. Are you hearing that? And how much longer do you think these companies can last without opening for new drilling, and do you have any indication how much money has been lost by exploration companies since the initial drilling moratorium, and if you could help me, what should I say to these companies? When will they get their permit?

Mr. JOHN. Well, Congressman Sullivan, that is a question that I get every day because I live amongst the people that actually make a living day to day, and it is not just in a pipe company or a wild line company. It is the caterer in the poor boy shop, the caterers and the ice companies and the hardware stores, so I get that question every day. The math is very easy to do. There were 33 drill ships. There are 240 people per drill ship that work, full-time equivalent. If you multiply that out, that is about 38,000 people whose job is at risk today.

Now, let us back that back. Six drilling ships are gone, and those drill ships, as I mentioned earlier, a billion-dollar piece of equipment, you don't just move them one day in an area of the world and move them back 6 months later. They are gone for 3 years to 5 years because that is the contractual obligations that they are insisting on having. Those drill ships are $400,000 a day, a day rate. That is how much they were getting. Some of the companies now negotiated a day rate below 100. How long can they stay? I think we are getting towards the end of that. I think that you see that we have got 27 drill ships that are idled right now kind of waiting to see, but at some point in time, two of which are already in the middle of negotiations, that are going to leave, and when they leave, it is 5 years, and it is about 2,000 jobs per drill ship when you multiply the factor of 4.1 to each job that is created.

Mr. SULLIVAN. Mr. Hofmeister?

Mr. HOFMEISTER. I would suggest that the effects of the shutdown in the Gulf of Mexico will be felt for the next 3 to 5 years from where we are today, even if we started permits in the next 6 months. If you followed the fourth-quarter reports of most of the major oil companies from Chevron and others, they are reporting hundreds of millions of dollars of expenses in maintaining capability for the Gulf of Mexico for which there is no return, so these are absolute out-of-pocket costs. How long they can continue is unknown.

Fortunately, most of the companies have alternative projects where they can reassign people, avoiding layoffs, but the overall reduction in domestic production in the United States will be felt for years into the future.

Mr. SULLIVAN. Thank you, and I yield back the balance of my time. Thank you, Mr. Chairman.

Mr. WHITFIELD. Thank you, Mr. Sullivan.

I recognize the gentleman from Texas, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman, and I thank all of the panel. I want to talk about our susceptibility to any little minor thing that happens because of our dependence on oil. And coming from Texas, I can see it, in fact, all the testimony we have, whether it be from our former colleague or John Hofmeister or anyone else

on the panel, we are susceptible simply because we import so much. And when we have what happened in the Gulf of Mexico for almost the last 10 months, there are very few permits. We fought over shallow water permits as compared to deep water permits, and it is really frustrating with some of our companies actually saying OK, we applied for it, we will try and work it through, and we are hitting the same stone wall that most folks are having. Maybe our energy subcommittee, maybe the oversight committee should invite someone from the Department of Interior. We have some jurisdiction over that, and I know we did last year and we might do that again.

The frustrating thing is, I have a district in Texas and I have five refineries. We need the crude oil even if we don't get it from the Gulf. Even with all the fracking we can do, we get very little oil from the fracking although there is some great things going on in south Texas in the Ford shale but still not enough, so that is why the Canadian pipeline is important because we need that crude oil. I would rather have it from domestic sources but the next place is Canada because we know Venezuela and Mexico's production is decreasing. We can buy everything from Mexico if we want but obviously President Chavez is not our best friend. So that is the issue that I am concerned about, and particularly to my constituents in East Harris County and North Harris County.

Mr. Hofmeister, I have to say, we have known each other for a long time obviously as CEO of Shell and one of my refineries is a Shell facility. We also have a chemical plant. But in your testimony, you said we live in a both-and world and not an either-or. I have supported alternative research for everything on alternatives but it still won't get us where we need to get. We still need oil to fuel our economy.

My questions are really for Administrator Newell, and I think the concern I have, how can—we determine the production from 2010 to 2011. We saw an increase in production actually from 2009 projected but now we are seeing a decrease in production, particularly because of what is happening in the Gulf of Mexico. How would our annual energy outlook differ if the offshore moratorium had not been put in place and if we were not now facing endless permitting delays? Have you been able to quantify that at the EIA?

Mr. NEWELL. We have not specifically looked at what if the moratorium had never happened. There have been implications of that in our short-term and long-term outlook, though. We are forecasting that for this year, 2011, about 250,000 barrels per day lower production offshore and another decline of similar magnitude in 2012, which is in part due to the moratorium, in part due to natural decline at existing fields, so there is an impact there. It is very difficult to isolate one particular factor but that would be a significant piece of that.

Mr. GREEN. Well, it is interesting, because some of the deep water projects actually have the potential for 250,000 barrels a day. Now, we don't see that in shallow water, so that might even be a very conservative estimate on the loss. And remember, every barrel that we don't bring out of the Gulf of Mexico we either bring it in through the Suez Canal or somewhere else and so that is why this hearing is important.

If you haven't quantified about the moratorium and permitting, can you do that or do you need the direction from the Department of Energy or can you do it on your own request?

Mr. NEWELL. No, I mean, we can do that in part. Again, it is difficult to ask the "what if" question because one is looking back and you need to look at particular drilling, and it is something about what would have occurred and what did occur and provide a comparison. As I mentioned, we do in our short-term outlook have about a 250,000-barrel-per-day decline in 2011 and another one in 2012, and a significant part of that would be due to the moratorium but then also the delay in permitting after that. To get it more fine-tuned than that would be a challenge.

Mr. GREEN. Well, I know we have about a 10-month experience now, and again, like the testimony showed, we are not just talking about oil tomorrow or next month, we are talking about 2 to 3 to 5 years from now if those permits continue.

Mr. Chairman, I appreciate your patience. Obviously I have a lot of other questions and I would just like to submit them if we are not going to have a second round.

Mr. WHITFIELD. Thank you.

The gentleman from Illinois, 5 minutes.

Mr. SHIMKUS. Yes. Thank you, Mr. Chairman. Great hearing. I appreciate you all showing.

A couple things, and first directed to Mr. Hofmeister and Mr. Newell, and I don't know, Mr. Newell, if you have been asked, many of us believe we could be energy independent. We all know that we are independent on electricity generation in this country. I talk about energy and the different types of issues, electricity versus transportation fuel issues. Can we—based upon North American energy supplies, North American energy supplies, if we adequately access those, could we be energy independent? Mr. Hofmeister?

Mr. HOFMEISTER. I think it would be very, very difficult to achieve full independence on the path that we are on. We would need to address the transportation industry somehow to——

Mr. SHIMKUS. Well, and that makes a good point, and Mr. Markey left the room, but he keeps saying that in the hearing yesterday that we are going to turn back the clock on fuel economy standards where the legislation drafted yesterday particularly protects those standards. It still allows NHTSA to perform the role in the 2012-2016 car rule. So we also believe that efficiency standards is part of all-of-the-above energy strategy, and if we did that, continued to move on energy security, could we be?

Mr. HOFMEISTER. Well, I think if you look over a 20- to 25-year road map and you substituted the internal combustion engine with other technology——

Mr. SHIMKUS. Well, in the all-of-the-above energy strategy, we also talk about expanding the nuclear portfolio, so then you can have electricity—so I believe they have—Dr. Newell, have you all done an analysis on North America energy and energy independence by accessing available resources?

Mr. NEWELL. We do track North American energy both statistically in terms of what is currently going on in our projections. We have not specifically addressed the question about what actions

could one undertake in order to achieve energy independence. We have not looked at that.

Mr. SHIMKUS. Great. Thank you.

Let me follow up. I want to again highlight that in the legislation yesterday, and my colleague is coming back, I want to make sure he understands up, the big political banner from last year was, read the bill, and I will ask my colleague from Massachusetts, make sure he read the bill because we do not affect the 2012–2016 car rule and truck. We don't do it.

So I need to move to a couple other issues. Mr. Chairman, I would like to ask for unanimous consent that the Cambridge Energy Research Associates article in growth in the Canadian oil sands be placed into the record.

Mr. WHITFIELD. Without objection.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. And also I have an article from AP Energy on North Dakota, and I am going to use these in my comments.

Mr. WHITFIELD. Without objection.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. Mr. Busch, with all due respect, I will invite you to come to my congressional district. Organized labor, where it thrives, thrives in the fossil fuel industry. We are expanding a big refinery. We have several thousand members of organized labor, laborers, iron workers, operating engineers, carpenters, painters, been on site during this economy working in the fossil fuel industry. I would then point to Prairie State generating facility, which is a 1,600-megawatt plant where we have also had thousands, several thousand members of organized labor, the same construction workers expanding and building this new state-of-the-art power plant. I mentioned that in my opening statement with the oil sands and what is in the testimony, I think 23,000 jobs that would then come—23,000 would come on this one project alone for the State of Illinois.

Energy security and jobs, we are focusing on jobs for people to move to destroy and attack the fossil fuel industry when it is a major job creating, low-cost energy. That is what fires up a lot of us.

I want to end with this story which also talks about energy security, and really what we haven't addressed is the vast resources of natural gas in this country. That is a paradigm shift. And look what it has done to North Dakota and jobs. I know Speaker Pelosi once said natural gas is not a fossil fuel but it is, OK? Unemployment in North Dakota has fallen to the lowest level in the Nation at 3.8 percent, less than half of the national rate of 9 percent. The influx of mostly male workers to the region has left local men lamenting the lack of women. Convenience stores are struggling to keep shelves stocked with food. Why? They are accessing this new great resource, natural gas oil shales. I yield back my time.

Mr. WHITFIELD. Thank you.

Ms. Capps, you are recognized for 5 minutes.

Mrs. CAPPS. I am glad that my colleague is still here so that I can say that California, where do have a strong labor movement, rejected the Koch Brothers' attempt to remove all the clean air reg-

ulations that we have in California by voting down Proposition 23 in the last election.

And I just want to address a few questions to you, Dr. Busch, because we also really support the Apollo Alliance as a jobs alliance in California, and I believe that we can look at renewable energy without being disparaging on any other form of energy and say this is a job opportunity for the future. We hear from the majority today that the way to reduce our dependence on foreign oil is to drill our way out of the problem. We know in California but I think we know in our country that that is not true by a long shot. We use so much oil in this country. I think it is actually too precious to waste on energy because of the other products that oil can offer us, lifesaving products. There is no way we could either produce enough to meet our needs domestically. If we had adopted what many of us on this side on the dais and some on the other side as well had called for in the 1990s like efficiency standards for our vehicles, homes and appliances, we may not have found ourselves in the situation we are in today.

Dr. Busch, the Republican Majority also claims that taking action to reduce carbon pollution would be too expensive, but that is not what you found when you looked at the demand side, and that is what I want to ask you about today. You and your colleagues examined the effects of California's clean energy law, which will lead to the adoption of more-efficient vehicles and lower carbon fuels. California's standards will reduce the amount of oil used by cars.

Dr. Busch, what impact on oil demand in imports did California's measures have?

Mr. BUSCH. Well, we actually built on the analysis of the California Air Resources Board, and so using their numbers, we found that AB 32 policies would lead to a reduction of 75 million barrels per year. About an 18 percent reduction is the forecasted reduction.

Mrs. CAPPS. And that is going to save California a little money? About how much?

Mr. BUSCH. At $114.50 per barrel, that is about $11 billion reduction in the import bill.

Mrs. CAPPS. I hope that is being listened to by everyone here today. I think that is not pocket change.

In your study, you examined an additional benefit of the clean cars standards, the protection they offer from oil price shocks. Please tell us about that benefit.

Mr. BUSCH. Right. Well, we didn't actually separate the car standards but the overall sort of protection under the price shock scenarios, and these were increases in gas or diesel of about 25 percent in the lower scenario and 50 percent in the higher scenario, so about a dollar or a little more than $2 increase in the price of gasoline saves consumers about $3 billion to $7 billion more or roughly $200 to $500 if you would spread that over across households.

Mrs. CAPPS. And that is not a partisan estimate, that is a study that is across the board, right?

Mr. BUSCH. Yes.

Mrs. CAPPS. Now, you weren't here yesterday but we had a hearing in our same subcommittee, received, I think, quite compelling testimony from the EPA Administrator and from the American

Public Health Association witness that greenhouse gas emissions do threaten the public's health. Are there additional benefits to the public's health from oil reduction policy? And by that, I want to extrapolate that it is important to save people's health not only for their well-being because healthy people make better working people and can actually help us to grow our economy. Can you please tell us some of the policies that will get us the most bang for the buck in terms of public health being an economic driver?

Mr. BUSCH. Well, I guess broadly speaking in terms of economic drivers, I would point out in California clean jobs have been going about three times faster than jobs overall. In 2008 while overall jobs were shrinking, green jobs grew in California by 5 percent. In 2009, they grew 3 percent while overall jobs grew 1 percent, so again about three times faster. And green manufacturing grew at a 10 percent rate in 2009. And 24 percent of green jobs are manufacturing jobs in California versus 11 percent of the overall employment.

But on the health cost issue, I would say, the broader macroeconomic analyses haven't factored in the benefits to public health in addition to the price spikes in insurance and the national security implications. So, in California the number I have seen, a Cal State Fullerton study, was $28 billion per year in health costs from the burning of fossil fuels in California. We don't burn much coal so most of that would be on the transport side, so the big winners would be cleaning up transportation.

Mrs. CAPPS. Thank you very much.

Mr. WHITFIELD. Yes, ma'am.

Dr. Burgess, you are recognized for 5 minutes.

Dr. BURGESS. And I thank the chairman.

Mr. Hofmeister, I appreciated your thoughtful and well-prepared statement that you provided for us. You mention in there very briefly—and in this committee we had a lengthy hearing in the summer of 2008 when gasoline prices were so high. We had a lengthy hearing on the effects of speculation on driving the cost, and you mentioned that tangentially in your remarks, and while I realize that is not the principal source or the reason for this hearing today, can you expound upon that a little further and do you have any information that you would like for this committee to consider going forward? Because it was an issue in the summer of 2008, I felt, though we never really came to a conclusion as an investigative body in the Oversight Subcommittee on Energy and Commerce, and yet clearly before the worldwide economic downturn occurred, we were on a trajectory where the average person was going to be priced out of the retail gasoline market.

Mr. HOFMEISTER. In my own investigation of the role of speculation, I conclude that it is a minor impact on overall crude oil price for the 2007–2008 period. The real issue that took place—and I testified to this in June of 2008 in my previous role—was the demand for middle distillates, that is, diesel, aviation fuel, heating oil, where there was not enough crude oil barrels in the market to satisfy the demand for those middle distillates drove the price to $147. In any commodity training, there will always be some degree of speculation from orange juice to pork bellies to coffee beans, true also in oil, but based on my own analysis, to get more than, say,

5 percent as speculated price to me is a real stretch and it just is the reality of supply-demand. The supply-demand equation works extremely well across the world and also in this country, and the real issue is the availability of crude oil or the insecurity about obtaining future contracts of crude oil, and that shortage of crude oil is what really drives price.

Dr. BURGESS. And of course, as you correctly point out, the time horizon for new development bears a 7- to 10-year lag between starting a project and actually having a deliverable in the marketplace. So I don't think there is any question, even though supply and demand during that hearing was discounted as a source of the problem. If there is a problem coming 7 years down the road and we don't deal with it today, if the problem today is speculation but there still is going to be a supply-demand inequity in 7 years, it is obviously the producers who need to be making the preparation and doing the investments necessary.

And yet still it was hard to separate out—I know that the head of Southwest Airlines makes money on the fact that he is able to hedge the fuel prices and did that more effectively than any other airline in the country, and in 2008 profited handsomely from that, yet there were other people who were buying large quantities who never intended to take delivery of that product, in fact, had no ability to take delivery, and it did seem that that affected the overall price for the end user. Is there still work to be done on that? I know we are at a time now where I think even it was mentioned by the gentleman next to you that the price of crude does seem to track the stock market. It is a safe place for money to go right now while other things seem not so safe. So is there still a role to play? Does Congress need to pay attention to this as a regulatory body?

Mr. HOFMEISTER. Well, I think in the interest of consumers overall, the answer to your question is yes, I think there is an oversight role that needs to be played because there can be manipulation. I didn't find it in the 2007–2008 period, and many of those who hedged in the summer of 2008 were burned badly later in the year when the price collapsed.

Dr. BURGESS. Yes, we bailed them out, if you will recall.

Mr. HOFMEISTER. But I think from an oversight——

Dr. BURGESS. I voted against that, just for the record, so everyone understands.

Mr. HOFMEISTER. From an oversight standpoint there is always a role in any market for the potential abuse that could exist, and those who don't own the product I think are the most likely to need to be watched over.

Dr. BURGESS. Let me just ask you quickly, because you also referenced some of the shale formation productions going on, and you are the only person on the panel who actually has any experience with production. I agree with you about that. In my area of north Texas in the Barnett shale, it is a big deal, but there is also concern and the general public in the area is not convinced that they are being protected from air quality issues, water quality issues. There is a big fight going on between federal regulators and state regulators back where I live. It seems like there is a lot of responsibility that has to fall on the producers, and I would think that the producers would be more proactive about ensuring that things are

done properly so that they don't lose this very precious resource because of pushback by the general public.

Mr. HOFMEISTER. There is a very serious effort underway by a number of producers to try to arrive at appropriate standards because you are absolutely right. When people operate below standard or do not operate the best practice, best in class, then abuses can take place and people do suffer. So between a number of associations and a number of major companies, there is an effort to agree on what should those standards be and then find a way to get people to comply with such standards.

Mr. WHITFIELD. Mr. Scalise, you are recognized for 5 minutes.

Mr. SCALISE. Thank you, Mr. Chairman. I appreciate you hosting this hearing dealing with the Middle Eastern crisis and especially how it relates to U.S. energy markets.

I want to walk back a little bit and first go through some of the things that got us to the situation we are in in the Gulf of Mexico, which Congressman John did a really good job of outlining. Right after the explosion of the Deepwater Horizon, the President commissioned a team of scientists and commissioned them to go out and come back with a safety report, a report on not only what went wrong as much as how we can improve safety in the Gulf operations, and there was a 30-day safety report that was put together that the Department of Interior issued that was peer reviewed by scientists, and there were some good recommendations on how to improve safety, many things that most of the companies, unlike BP, were already doing. The problem that came out of this was, this was the document that was referenced to create the moratorium, and I want to submit this for the record. I ask unanimous consent that we can submit this report.

Mr. WHITFIELD. Without objection.

[The information appears at the conclusion of the hearing.]

Mr. SCALISE. We later found out that this document was fraudulently doctored by the Obama Administration to suggest that the scientists themselves recommended the moratorium, and I think it is really important for everybody to understand that the moratorium that came out that two courts now have said the Administration doesn't even have the legal authority to administer, that moratorium was based on fraudulent doctoring of this document, and in fact the scientists, a majority of those scientists that were peer reviewing the document that the President himself appointed, that were appointed by the White House, a majority of those scientists said they not only disagreed with the moratorium but they point out how the moratorium reduces safety of drilling operations in the Gulf of Mexico, and they have some very sound reasons why that moratorium reduces safety in the Gulf and why they disagreed with it, even though their name was attached to it. Of course, the Obama Administration later had to apologize to these scientists for that fraudulent doctoring, and that has never really been covered thoroughly enough and I think it is something we do need to pursue, but I want to ask unanimous consent to also include this in the record because I think it is important——

Mr. WHITFIELD. Without objection.

[The information appears at the conclusion of the hearing.]

Mr. SCALISE [continuing]. To establish that the moratorium itself came from fraudulent activities by the Obama Administration, which now has brought us to the point of the "permatorium" as was described where they are not issuing permits in the Gulf today for any drilling activities in the deep water, which dramatically is reducing America's energy security and I think is one of the contributing factors to why we are over 90 approaching $100 a barrel on the price of oil on the spot market.

So I want to ask Congressman John, because you work directly with these companies and you talked a little bit about it in your opening statement, the things that you are seeing on the ground—I know I hear from people every day not just the people who are exploring for energy but all of the service industry people, all of the ancillary. We have gotten reports from the White House alone that 12,000 jobs have already been lost in south Louisiana, not even getting into the rest of the country. In south Louisiana, we lost 12,000 jobs because of the moratorium, now the "permatorium" that is going on, so if you can tell me if you have got any more numbers on how much wider that is approaching because there are so many companies that are just literally holding on by a vine, companies that are small businesses, local American businesses that are about to go under, about to go bankrupt because of the Administration's fraudulent activity.

Mr. JOHN. As far as the direct jobs, and again, there are a lot of number out there, Congressman Scalise, and we try to put our arms around the realistic of what is happening out there, and the math is pretty easy to do. When you look at the jobs that are lost today, there are these six drill ships that are gone. They are gone. And if you multiply those number out, it is right in the 5,000 to 6,000 direct jobs, and then you have to multiply that times four because according to a study that was commissioned by Louisiana Mid-Continent Oil and Gas by Dr. Lawrence Scott, it is a multiplier of four. So, yes, is there some debatableness about the numbers.

Mr. SCALISE. But it is well in the thousands, maybe approaching the tens of thousand?

Mr. JOHN. It is well over 10,000 jobs that have been lost as of today, and G&O Inc. predicted that Woods McKinsey study said that a permanent moratorium or a moratorium that lasts for longer than a year or so and with a total shutdown of the Gulf, it is 175,000 jobs that are——

Mr. SCALISE. I appreciate that. I know we have got a list here of the rigs, as you talked about the 33, and these are very valuable assets, a billion-dollar asset each in many cases, that have already left. I will tell you some of the countries that some of these assets have gone to: Libya, Nigeria, Congo. Two of them have actually gone to Egypt, and it is a sad state of affairs in this country when a major employer thinks that it is better to do business in Egypt than it is in the United States because of the Obama Administration's policies that are leading us to a higher dependence on Middle Eastern oil. Egypt, two of these assets have gone to, and I would like to ask unanimous consent to submit this into the record as well, and I thank you for being here and for what all of you are doing, and I yield back the balance of my time.

Mr. WHITFIELD. Without objection.

[The information was unavailable at the time of printing.]

Mr. WHITFIELD. I might also say that toward the end of the year, we sent a letter to Michael Bromwich asking for some response to questions regarding the moratorium. We never heard anything from him. We are getting ready to recontact him a little more forcefully this time and hopefully we can get some additional answers.

The gentleman from Texas, Mr. Olson, is recognized for 5 minutes.

Mr. OLSON. Thank you, Mr. Chairman. Thank you to the witnesses for coming today to give us your expertise on this critically important matter.

I would like to ask my first question to Mr. Hofmeister. First of all, thank you, sir for your service to the town of Houston, greatly, greatly, greatly appreciate that, and I want to talk about national security and the Middle East. I think you believe as I do that we have to develop all the oil and gas resources that God has given our country. That means the East Coast, the Gulf Coast, the West Coast, Alaska, the public lands, wherever it is, we need to develop that oil. We are very vulnerable geographically particularly, I mean, with these Straits of Hormuz and with the Suez Canal where most of the oil that our country depends upon flows through, and I was in the Navy for 10 years, flew P-3s and did many, many patrols through the Straits of Hormuz, and it is a very, very, very narrow choke point, about 10, 15 miles wide at its widest, and when we flew through there, we had devices on our aircraft that we were being tracked by fire control radar from the Iranians, and I can guarantee you that they are doing that with the tankers that are coming through. I mean, if they want to cause big, big trouble for the world, take out a tanker right there in the middle of the straits and cut off the whole Persian Gulf to traffic.

And so, my point here, we are depending right now—we have got two very unstable nations, Egypt with what is going on there internally and Iran with a leadership who doesn't live on this planet, and I know you predicted $5-a-gallon gasoline by the end of this year. If some of these things happen in the Middle East that I am concerned about, if Iran does something to the Straits of Hormuz or Egypt shuts down the Suez Canal, how would that impact your prediction of $5 per gallon of gasoline?

Mr. HOFMEISTER. The Straits of Hormuz watch about 20 to 25 percent of the world's daily crude oil production move through it, and if the world were to lose that amount of oil because of a shutdown in the Straits, I think that the immediate impact on crude oil prices would be to not just double but even triple the current crude oil price of the panic that would set in in terms of future contracting. There might be a slight delay to see how long it make take to clean up the mess that might be created there but it is such a critical pinch point and there is so much of that oil that goes both east and west that it is not only energy security for the United States, it is energy security for the world's second largest economy, China. And so the consequence would be dramatic. Five dollars would look cheap in terms of a gasoline price in the event of the Straits of Hormuz being shut in.

Mr. OLSON. Thank you for that rather sobering answer.

One question for you, Congressman John. Thank you also for your service. And as you know, we have been talking about it, we have a moratorium, now a "permatorium" in the deep water in the Gulf since April of last year, and I have known of at least five rigs that have gone overseas that my colleague, Mr. Scalise, had mentioned. Amazingly, most of the rigs that I have talked to are taking it on the chin at about $500,000 a day just sitting idle but most of them are still staying here in our country in these waters because they believe we have the best sort of regulatory system, judicial system, and they believe it is less risk to them long term than some of them going overseas. I think the President missed an opportunity during his State of the Union when he could have at least mentioned the oil spill and what he has done to lift the moratorium and make a commitment to get the rigs, the permitting going and get those rigs back out there working, and unfortunately 2 days after the President's speech, we had one more rig announce that they are going to go overseas, and it was one of the Noble Corp's rigs, the Clyde Boudreaux, and they announced that they are going to take their rig—I hope I pronounced that right. I am not from Louisiana. But they were going to take their rig to Brazil, and this is a quote that just sticks out with me about the impact of this moratorium, this "permatorium" on our oil supply. One of the Noble employees was quoted as saying "There is life after the Gulf of Mexico, and that would be Brazil."

Is there a tipping point, Congressman, where somewhere we are going to be hearing not just that there is life after the Gulf of Mexico, life is in Brazil, life is in Sudan, life is in Nigeria, life is in Norway, wherever, life is somewhere else, not American waters, and we are going to lose those American jobs permanently and more depend upon foreign oil?

Mr. JOHN. Well, I guess I can only answer your question as, picture yourself in a boardroom where you may have 4 or 5 or 6 billion dollars in your cap budget for the next 3 or 4 or 5 years, where would you as a board member want to decide to put those kinds of dollars. Is it in the Gulf where today there is an enormous amount of uncertainty today, or is it somewhere else? And that is only way really I can answer that question. I think the fact that seven rigs, six have gone and a brand-new one is leaving, I think is the initial signal of what to come because there is a tipping point, and I think we are very, very close to that point because of the fact that industry and the Bureau of Energy Management have worked together to come up with safety regulations, task force that the industries have put together. The Marine Well Containment Company, a billion-dollar commitment by four companies and more adding today to put a billion dollars into a company for containment. So we have done, I think the industry has done an enormous amount, a good job of all the regulations in doing what is required of them to get back and the goalpost keeps moving, and I think that that is very troubling in a lot of ways, and you only have to look at the amount of money that is being invested out there to give you an idea of where else could it go, and there are a lot of other places that it could go.

Mr. OLSON. Thank you, Congressman.

Mr. Chairman, I ask unanimous consent that the article from the Houston Chronicle about the ship going over to Brazil be placed in the record.

Mr. WHITFIELD. Without objection.

Mr. OLSON. Thank you.

[The information appears at the conclusion of the hearing.]

Mr. WHITFIELD. Mr. McKinley, you are recognized for 5 minutes.

Mr. MCKINLEY. Thank you, Mr. Chairman. I left the private sector, an architectural practice to get back into the political arena, because I had a fundamental belief that our national security and the welfare of our country has been at risk with us not having an energy policy and being independent from foreign oil. I think it is something we have talked about, what this hearing was supposed to be about is the concept of what is happening over in the Middle East. I don't think it is going to end with Egypt. It is going to continue. And I am here, have come to Congress because I want to deal with energy independence. But yet I have come here, now I have come to the realization when I look across the aisle and I hear their remarks and some of the people and the policy.

One thing that we are short of here is naiveté. It is rampant in this community, and I am very concerned about where we are going. This idea of alternate travel, driving—look, West Virginia is a very rural mountainous area. The largest community I have in my district has 35,000 people on it. The idea of high-speed rail and other isn't going to work. What I am looking for here is to find way that we can become energy independent, and that is to mine coal and drill into the Marcellus shale and the oil and gas that we have had in West Virginia. But all I have heard for the last several years has been to stop this dagger in the heart of West Virginia, the cap and trade, fly ash challenges, water discharge, greenhouse gas emissions, the revocation of mine permits. It is as though Congress really doesn't want to have us independent. We know how to do it. I am sure there are panels like this elsewhere that are saying we can do that, we can be energy independent but we are just not.

I want to hear—the discussion we had yesterday, Mr. Hofmeister, you stressed jobs in your opening remarks. I am so frustrated. We have 15 million people out of work in America, union, non-union Americans out of work. I want to try to do something, and mining coal and making us energy independent will get us that direction. My question to you, do you think denying EPA's authority to regulate greenhouse gases is a responsible means to reduce our dependence on foreign oil?

Mr. HOFMEISTER. In my judgment, Congressman, I believe that the Environmental Protection Agency is going way too far, too fast without the means, the mechanisms or the technology available to change the game the way they are trying to change the game.

I visited Pike County, Kentucky, before Christmas just to see what is going on in the coal region of eastern Kentucky, and what I learned from operators in eastern Kentucky is, they haven't had a new mine permit in years because they can't get past EPA regulations on water quality, and the water quality that they are expected to reach has to have Evian bottled water consistency coming down a stream in a natural forest. It doesn't exist in nature, Congressman, and I think there is a reach going on that is job destruc-

tive and that doesn't take into account the fact that over the coming decades I believe the ingenuity and the innovation that is possible in the hydrocarbon world can dramatically clean up the use of hydrocarbons so that we can continue to use natural resources found in this country.

Mr. MCKINLEY. Dr. Newell, can we be energy independent if we mine coal and let us drill? And if so, why aren't we doing it so we can be energy independent?

Mr. NEWELL. Currently, coal goes primarily, almost exclusively, 90 something percent, for electricity generation, the vast, vast majority of which is already domestically produced, so the main issue with regard to fuel imports relates to petroleum. We have currently got about 50 percent of our liquids consumption comes from imported petroleum so there are certainly actions that would tend to affect that. Lower consumption and higher domestic production tend to squeeze out imports but we currently have about 9 million barrels per day. We are projecting that——

Mr. MCKINLEY. My question is, can we be independent if we mine our coal and drill for our gas in America?

Mr. NEWELL. It would be a matter of primarily domestic liquids production that would change the oil import picture, and it would be a significant change from where we currently are.

Mr. MCKINLEY. So the answer is yes?

Mr. WHITFIELD. Do you want to respond to that, Mr. Newell?

Mr. NEWELL. The answer would depend upon the actions that were taken. On current market trends, that is not where things are currently headed.

Mr. WHITFIELD. Mr. Gardner, you are recognized for 5 minutes.

Mr. GARDNER. Thank you, Mr. Chairman. Thank you as well for this timely hearing. I certainly appreciate your efforts to do this today. And thank you to the members of the panel for taking time away from work to be here. I appreciate your time.

Dr. Newell, I will start with you to talk a little bit about some of the testimony. In your testimony, you talked about some of the cost impacts on a per-barrel basis of energy disruption out of the Middle East and some other issues that we face should something continue to disrupt energy supplies in the Middle East. What would the overall, in terms of economic impact, the overall economic impact be should an incident close the Suez Canal to transport, should an incident close some of the choke points that we are talking about here, whether it the Gulf of Aiden, the Red Sea off of Yemen, whether it is the Suez Canal, if those were to close, what would—in real dollars, what would that impact be to our economy?

Mr. NEWELL. The impact would depend upon any price effect of some type of an international disruption. What would tend to happen in terms of oil price increases tends to decrease the amount of household disposable income that can go to other things. It tends to act like an additional cost on production, and if you cost more to have one major input into our national production, it would tend to lead to a decline in GDP. A rough rule of thumb is that every $10-per-barrel increase of the price of oil might shave roughly 0.2 percent off of GDP over the next year. It depends upon the nature of any kind of a price shock that would occur. If it is a supply-side price shock, it would tend to have the kind of effects that I said.

It would also depend whether it is temporary or permanent. A permanent increase is obviously more damaging. If it is an increase that is caused from demand increases like faster global economic growth, it is a less negative impact because along with global economic growth goes increased demand for U.S. products and so that tends to offset any effect. So it depends.

Mr. GARDNER. So is there any way to get a number in terms of if this were to happen, if these two cases were to happen, if there was a disruption, total disruption as a result in the Suez Canal what it would cost? I mean, what would that number be? A billion, 2 billion? I know you said 0.2 shaving off the GDP but what would that number be?

Mr. NEWELL. It really would depend on the specific scenario. So closing different transit points doesn't necessarily take production off of the market, and so if you can reroute that production through other transit points, there may be a short-term impact, but once things adjust, it would tend to bring it back down. It would depend on the magnitude of any kind of a production shortfall. It would depend upon the response of remaining supply sources. So, for example, if one country had a decline in production, there significant spare crude oil production capacity in other countries that could offset it. There is also Strategic Petroleum Reserves that could offset certain impacts. So I am not trying to evade the question but it really depends on a very specific scenario and the responses that one imagines to that scenario.

Mr. GARDNER. Well, thank you.

Mr. Sieminski, just a broader question. Based on our energy policy in the United States today, are we becoming more or less globally competitive in the United States?

Mr. SIEMINSKI. Well, Mr. Gardner, and I think everybody in the room, since I was only one that said no to Congressman Markey's question, I now get a chance to explain. I wish he were here. In fact, when I testified before Mr. Markey a couple years ago, and what I said was, the most troubling thing I find about hearings like this is what seems to an outsider to be an unappreciation for the fact that these solutions are not mutually exclusive, that getting more oil in the Gulf of Mexico or not having a moratorium is not mutually exclusive to fuel efficiency standards for automobiles. I serve on the National Petroleum Council. Several years ago we did a study that was widely well received that basically said there is no single solution to our energy policy problem, that we need to do all those things that make economic sense on the supply side and the demand side in order to move forward, and so let us come back to the Middle East thing.

I keep hearing virtually everybody in this room saying well, we have got to reduce our dependence on Middle Eastern oil. That makes sense if it is good economics and good foreign policy. I am not so sure that it is unless we can produce the oil here less expensively. It would reduce jobs here in this country to say well, we are just not going to import from the Middle East.

Mr. GARDNER. So in 10 seconds, are we more or less competitive as a result of current U.S. energy policy?

Mr. SIEMINSKI. I would say that current U.S. energy policy is probably not doing a whole lot either way——

Mr. GARDNER. So the answer——

Mr. SIEMINSKI [continuing]. To our dependence on the Middle East.

Mr. GARDNER. We are less competitive?

Mr. SIEMINSKI. Are we less competitive? We would be more competitive if we did not exclusive development of domestic resources for what seems to me to be poor policy reasons.

Mr. HOFMEISTER. In my view, we are far less competitive as a Nation by virtue of not producing domestic resources, which I believe are eminently affordable to produce.

Mr. WHITFIELD. Mr. Pompeo, you are recognized for 5 minutes.

Mr. POMPEO. Great. Thank you, Mr. Chairman. Thank you all for being here this morning.

Mr. Hofmeister, you mentioned Matt Simmons early on, and it reminded me, Dr. Newell, in your analysis, there is his theory of peak oil theory. What is the assumption that you all have made? I don't want to get into the complexities but what is the assumption you have made with respect to total capacity and the ability to get at that?

Mr. NEWELL. We are projecting an increase in both U.S. domestic production of crude oil in the next 25 years as well as a significant increase internationally in crude oil, so we at this point in time, for the next 25 years, which is how far our projection goes out, we don't see a peaking of world oil production capacity.

Mr. POMPEO. I appreciate that. And did you also assume—you gave some pricing for the next several decades which you were forecasting for pricing. Did you continue to assume that oil would be priced in dollars, that that commodity would largely be continued to be trading in the U.S. dollar?

Mr. NEWELL. It is not something we explicitly assume. I mean, that is certainly the way that we track it through our model. If that were to change, I don't think that would significantly change the outlook if you priced it some other way.

Mr. POMPEO. I think some of Mr. Sieminski's folks would be very concerned if we decided to price oil in a different way. I know that I certainly would too, so would the folks in Kansas who are producing here. I sit here today. Forty days ago, I was running a company that was a member of KIOGA, the Kansas Independent Oil and Gas Association, and so there are national security implications and cost implications for consumers too in terms of how we price oil in the marketplace.

I don't think anybody has talked this morning either about refining capacity in America, and I think that is important. We focused on getting the crude here. Mr. Hofmeister or Mr. John, could you speak to me too about, we have a huge problem getting refineries built in the United States. We can talk about how long it has been since there has been one. I see that as a huge component when it comes to gasoline prices in addition to the crude oil inputs.

Mr. JOHN. Yes, I would be glad to comment. Actually, in my written testimony, I have a whole paragraph where I did talk about refining capacity, because you really can't talk about crude oil and oil production and how it all fits into the puzzle of energy policy without talking about refinery because a barrel of oil without a refinery is just a barrel of oil. You must be able to boil that oil to

get the value added out of it. And I guess the most alarming part of our refining capacity is, is we haven't built a grassroots from the grass up in almost 30 years. In fact, the opening and the expansion of the Garyville refinery, Marathon Garyville refinery down in Louisiana, was as close as it is going to get to a new refinery in this country. It just hasn't happened for a myriad of reasons. But I think the fact of the location of all the refining capacity in this country should be of some concern. Not only are we vulnerable from the importation of oil from countries that don't share our values but it doesn't take long to look at in 2008 when Hurricane Gustav and Hurricane Ike came through the Gulf of Mexico and the refining capacity from Corpus Christi, Texas, to Pascagoula, Mississippi, is 50 percent of this Nation, and every one of those refineries at some point in time during those 2½ weeks of those two hurricanes were either shut down, cold or warm, and what the implications of that were that the lines up in the Northeast, because all of the refined products, the gasoline that is used in Chattanooga and Atlanta and in Alabama and Mississippi come from the Gulf Coast, and if you remember correctly, there were lines waiting on where is our gasoline. It was because of that. And that just shows the vulnerability that we have had. We need some more refining capacity. However, I think it is important that we must get the crude oil into the pipelines to be able to actually refine and value-add that.

Mr. POMPEO. Mr. Hofmeister, do you care to comment?

Mr. HOFMEISTER. I think that has been well said. There have been a few additions to existing refineries but only in recent years.

Mr. POMPEO. One last question. Mr. Busch, you said, and I think I got this right, you said there were green jobs created while the overall jobs decreased. Do you think those could be related? And here is my point. When you create rules and regulations that cause folks to go try and create these jobs where government regulation would not have permitted them to be before, when federal policy encourages these green jobs, that you do in fact destroy the economy so you see green jobs growing while overall jobs are growing? Do you think those are disconnected thoughts?

Mr. BUSCH. I don't believe they are related, no. I mean, the trend has been continuing for a long period so I don't.

Mr. POMPEO. Thank you. I yield back the balance of my time, Mr. Chairman.

Mr. WHITFIELD. Mr. Griffith, you are recognized for 5 minutes.

Mr. GRIFFITH. Thank you, Mr. Chairman.

Dr. Newell, if you would, I noticed answering one of the earlier questions you were able to project or had at least some idea of what oil production was going to do in the United States. Can you tell me what coal production is going to do in the United States between now and 2025?

Mr. NEWELL. We do have the projections for that. I don't have the specific number in front of me right now. Most of—this depends largely on the outlook coal-based electricity generation. It also depends somewhat on what your starting point is. We have seen during the economic downturn over the last several years and also a significant decline in natural gas prices over the last several years

and there has been a significant decline in the demand for coal for electric power generation. We do——

Mr. GRIFFITH. If I could stop you there and ask you, do you believe that the reason for the significant downturn in demand for coal for electric generation is due to federal regulations on coal and the use of it in the electric generation?

Mr. NEWELL. Not at this point, I actually don't think so. The main factors that have led to a decline in coal over the last several years are the economic downturn, which has an effect on overall electricity generation, and a very significant decline in natural gas prices as well, and so I think that would be the main factor.

Looking forward, obviously regulations would tend to have an impact if they would focus on coal.

Mr. GRIFFITH. How many electric generation facilities have switched from coal to natural gas?

Mr. NEWELL. There has been a—I have an answer to your question here. In 2009, coal production was 1,075 million metric tons, and it goes up to 1,315 million metric tons by the end of our projections, so it increases. Now, largely this is in existing electric power plants, which we project most of those would continue to stay online that are existing laws and regulations. I don't know if I answered the other part of your question, though.

Mr. GRIFFITH. Go ahead.

Mr. NEWELL. I am——

Mr. GRIFFITH. Oh, you want me to rephrase?

Mr. NEWELL. Sorry.

Mr. GRIFFITH. I am going to switch gears on you anyway.

Mr. NEWELL. OK.

Mr. GRIFFITH. I note with some interest that in getting prepared for today, since we are supposed to be focused on Egypt but I don't have much oil in my district, I got a lot of coal and got a lot of natural gas. But I did notice with some interest that apparently we imported 442 short tons, not a lot of coal, from Egypt during the last year, and I am wondering if you can tell me what was special about that coal? It must have been somebody needed something particular. Do you have any clue?

Mr. NEWELL. I really don't but it is something we can find out for you.

Mr. GRIFFITH. If you can get me an answer later? I did not expect you to have that on the tip of your tongue.

If I could shift now to Dr. Busch, you got into a discussion earlier about health, and we have concerns in my area. Electric rates have gone up significantly, and I would have to say since the previous questioner asked you questions about public policy and health concerns, I don't think there is any question that if we regulate the way that the EPA wants to on greenhouse gases it is going to cause even more spikes in electricity or fuel for the people in my district, who already are facing difficulties with median income for the household of about $35,000. Would you not agree that if we have significant increase in the cost of the ability to heat your home with electricity powered by coal or from home heating fuel that we are going to be affecting adversely, particularly during the winter months, the health of the people who are having a hard time af-

fording it right now, affording the energy sources to provide heat in their homes currently?

Mr. BUSCH. Thank you, Mr. Griffith. I would certainly agree that affordable energy to keep a home warm in the winter and cool in the summer, for places that have high heat spikes, that is important to health. I wouldn't have an opinion on whether increases in energy costs would be more detrimental than reductions in pollutants that might be released from electricity generation. I don't know which would be more——

Mr. GRIFFITH. You don't know?

Mr. BUSCH. I don't know.

Mr. GRIFFITH. But it is something that should be considered by agencies of the United States government as they go forward in determining our policies on greenhouse gases, would you not agree?

Mr. BUSCH. I agree it is important to consider all the tradeoffs amongst the options, yes.

Mr. GRIFFITH. I appreciate it.

Thank you, Mr. Chairman. Yield back my 10 seconds.

Mr. WHITFIELD. Thank you very much.

Do any of you have one additional question you would like to ask? Do you have one?

Mr. RUSH. Yes, Mr. Chairman. Thank you for being so kind.

I want to go back to Mr. Hofmeister. Mr. Hofmeister, I am really kind of intrigued by your opening statement, and I am in a district where my constituents probably suffer from environmental ill effects, asthma, all those kinds of illnesses and diseases that might occur. We don't have a lot of oil in my district but we have got high unemployment. That is one of the characteristics of my district. And you mentioned in your opening statement about job creation. Can you elaborate a little bit more on that in terms of what you really mean by job creation? Because that intrigues me.

Mr. HOFMEISTER. Thank you, Ranking Member Rush. If we look at a significant commitment by this country to increasing its domestic oil production, could include gas, could include power plant construction, the number of jobs that would be created through the capital investment made necessary to produce this additional oil would in effect, I believe, raise jobs all over the country, not just in the oil patch. The reason is, the distributed manufacturing system that supplies oil companies includes companies that make equipment in places like Wisconsin, Illinois, Michigan. Many north Great Lakes States are producing the kind of skilled metalworking crafts that are necessary. The steel industry makes pipe. The automotive industry makes the trucks and many other components that go into oil rigs and offshore platforms, and so the equipment manufacturing is a big part of it. In addition, there is a whole services industry that comes with it and there is an education industry that comes with it because somebody's skills would need to be trained in community college systems and in 4-year schools and it would encourage high school students to stay in school to go to community college to et the skills. The average wage we are talking about in the oil and gas industry for semi-skilled workers is in the $60,000 to $80,000 a year range, which is almost double the median wage in the country. And so these high-wage jobs enable peo-

ple to buy many more things and that is why I say it is a tide that lifts all ships.

Mr. RUSH. Thank you, Mr. Chairman. Mr. Chairman, on behalf of the ranking member, Mr. Waxman, I would ask unanimous consent to introduce into the record a report prepared by the NRDC on concerns with tar sands.

Mr. WHITFIELD. Well, I reluctantly won't object to that.

Mr. RUSH. Thank you.

[The information appears at the conclusion of the hearing.]

Mr. WHITFIELD. Thank you.

Mr. Scalise, do you have another question?

Mr. SCALISE. Yes. Thank you, Mr. Chairman, for the opportunity.

Just I guess I will ask the whole panel a yes or no question. With this Administration's current policy of not issuing permits in the Gulf of Mexico for now 10 months, not allowing people to go back to work drilling safely in the Gulf of Mexico, is that 10-month and potentially longer refusal to issue any new permits on deep water drilling, is that going to increase or decrease our country's dependence on foreign oil? I will start with you, Mr. Newell.

Mr. NEWELL. I am going to have to decline to take a policy position on this.

Mr. SCALISE. Or just a judgment. I mean, there was a policy decision made but its impact, how is that policy's impact going to be on our Nation's dependence on foreign oil? Would it increase or decrease? And if you don't want to answer, I respect that.

Mr. NEWELL. OK.

Mr. SCALISE. Mr. Mar?

Mr. MAR. Sir, as a representative of a foreign government, I cannot advise on that matter.

Mr. SIEMINSKI. I think it is a huge mistake to not develop the resources in the Gulf of Mexico, and unnecessary delays in permitting are a mistake. I don't think that carrying that to the next step of your question is particularly important. Whether that does anything to our use of Middle Eastern oil I don't think is really critical.

Just very quickly 10 seconds on this, Saudi Arabia was brought up in this hearing. If it weren't for the fact that Saudi Arabia has 3 or 4 million barrels a day of spare capacity that is available in the marketplace or if it weren't for the fact that we have the Strategic Petroleum Reserve both here and elsewhere around the world, we would be in a lot worse shape with problems in the Suez Canal or anywhere else in the Middle East.

Mr. SCALISE. But there has been no suggestion to tap the Strategic Petroleum Reserve that I have heard. I am not sure if you have heard anything different.

Mr. SIEMINSKI. Well, you would do it if there was a problem.

Mr. SCALISE. Right, but if our demand—maybe you think our demand might be decreasing but if our demand is going to remain the same or increase and yet our actual access to known sources of reserves is shut off by policy, you don't think that would cause an increase in——

Mr. SIEMINSKI. I said that——

Mr. SCALISE [continuing]. The need for it to come from someplace else?

Mr. SIEMINSKI. Well, we might just get more oil from Canada, which——

Mr. SCALISE. Well, that is why I said foreign oil, and I would include Canada in that. I would sure like to completely eliminate our country's dependence on Middle Eastern oil, and I think if we invoked a real smart strategy, we absolutely could eliminate our dependence on Middle Eastern oil. Canada is a good friend and a trading partner but clearly we are still getting, as he pointed out, our 20 percent of our oil from Middle Eastern countries.

Mr. SIEMINSKI. What we want to eliminate our dependence on is uneconomic oil. Whether it comes from the Middle East or somewhere else is not the question.

Mr. SCALISE. Right. But would it increase our decrease based on a shutting off of the supply that we currently know is there?

Mr. SIEMINSKI. Without that domestic oil we are going to need more oil from somewhere, and it could be coming from the Middle East.

Mr. SCALISE. Thank you.

Mr. Hofmeister?

Mr. HOFMEISTER. It is a very serious problem in both the short and the long term, and yes, it would require greater dependence on foreign sources.

Mr. SCALISE. Thank you.

Mr. BUSCH. I don't have a great amount of expertise in this area but I am happy to offer my opinions if you would like.

Mr. SCALISE. Sure.

Mr. BUSCH. It seems—from what I know, it takes a while to get a new well online so I would imagine in the short run it wouldn't make much of a difference but all else equal, it seems obvious to me if we are providing more domestically and we are not changing demand that there would be less dependence on imported oil.

Mr. SCALISE. Thank you. And Mr. John?

Mr. JOHN. I think, Congressman Scalise, from a logical economic standpoint, the answer to your question is absolutely it would make us more dependent on foreign sources. However, with the assumption of 1½ million barrels that come out of the Gulf of Mexico, can we do without that. The question is, can we reduce our demand by a million and a half right now, then the answer to your question would be no. I think I know the answer to that question.

Mr. SCALISE. I haven't seen that demand reduce, and I appreciate it, and I will just end on this final thought. I know there are provisions in current leases that are "use it or lose it" provisions, and as this "permatorium" is going on, the clock is still ticking on those leases so there are many employers out there in the Gulf of Mexico who have leases who want to use it and are not even being allowed to use it by the federal government in a safe way and yet the clock is still ticking even though they are not being allowed to go and extricate those resources, and when you look at what is happening in Egypt and even in other parts, as you pointed out, the supertanker that was hijacked by Somali pirates in the Arabian Sea right off of Oman, there are major threats out there to supply chains. Notwithstanding Canada, but there are major supplies, especially in the Middle East, and increased volatility and yet you have got a policy that shut off those reserves in the Gulf of

Mexico, and with the "use it or lose it" provisions, this is a point that has never really been explored. If that clock keeps ticking and those people aren't allowed to go and explore those resources, if that lease runs out, the government could take those leases back and not leave them out on the open market so you are now even closing off more known resources. There are few areas of the OCS that are currently available to explore. You would actually be pulling back as a policy. The country would be pulling back even more of the very few reserves that are already out there available for exploration, and I don't know if you want to finish on that.

Mr. JOHN. Just a quick comment there, Congressman Scalise. Since 2008, $8 billion has been spent by oil and gas companies leasing in the Gulf of Mexico. The highest and the second highest lease sale in the history of the Gulf of Mexico happened in 2009. So you have got an enormous amount of capital in leasing this 3-by-3 square miles of water for a 5-year period of time, so I think your point is well taken.

Mr. SCALISE. Thank you, and I yield back, Mr. Chairman. I appreciate the opportunity.

Mr. WHITFIELD. Dr. Newell, I just have one question for you. In your levelized cost analysis of electricity, why does the EIA add the equivalent of $15-per-ton carbon tax in the determination of the cost of the new plants?

Mr. NEWELL. Yes. What we do is to reflect existing market behavior of investors and how they are perceiving investment in new coal generation capacity. What we do is, we have a roughly 3 percent additional capital to the capital cost in terms of financing, and this is to reflect behavior that we see in the marketplace in terms of interest on the part of investors in new electricity generation capacity from coal, which has been colored by any number of things including the possibility of future regulations that would affect coal generation, so that is what that is meant to do, to reflect market behavior with regard to coal and coal-intensive technologies.

Mr. WHITFIELD. Thank you all so much. We really appreciate it. Yes, Mr. Mar?

Mr. MAR. Mr. Chairman, may I supplement an answer in response to Congressman Upton's earlier question about pipelines going to the West Coast from Alberta?

Mr. WHITFIELD. Sure.

Mr. MAR. The proposed Gateway pipeline would have the capacity to take 525,000 barrels a day from Alberta to the West Coast. A proposal for oil by rail has the capacity to take an additional 200,000 barrels a day, and the currently existing Kinder Morgan transmountain pipeline has current capacity of 300,000 barrels per day, which would be a total of just over a million barrels a day total. There is currently also a proposal to expand the Kinder Morgan pipeline, so that gives you some sense of the volumes that could be moved to the West Coast.

Mr. WHITFIELD. Well, thank you very much, and once again I appreciate your testimony. We look forward to continuing working with you.

Members will have 10 days to submit additional material, and record will be open for 30 days.

With that, we will conclude this hearing. Thank you.

[Whereupon, at 12:25 p.m., the subcommittee was adjourned.]
[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF HON. FRED UPTON

• Oil and turmoil coexist in several regions, most significantly the Middle East. The unfolding events in Egypt, coming on the heels of similar unrest in Tunisia and other Middle Eastern and North African nations, is of great importance to us for a number of reasons, but today's hearing will focus on the implications for the global oil market.

• Events in that part of the world can disrupt oil production, or in the case of Egypt, jeopardize the transport of that oil to end users. The stronger the global demand for oil, and the smaller the cushion provided by spare capacity, the more likely any actual or threatened disruption of supplies will destabilize markets and elevate prices.

• It's simply a reality that the Middle East will remain volatile. Today it is Egypt, tomorrow it may be Iran or Saudi Arabia. Every few months will bring incidents of minor and sometimes major concern. How to deal with this instability is an ongoing challenge.

• Fortunately, not every oil-producing nation is an unstable or unfriendly one. In fact, America's single greatest source of oil imports is our great ally Canada. Of course, any additional oil production helps keep prices down, but production that comes from a reliable source like Canada also serves as a calming influence on world markets.

• The good news is that Canadian production, and in particular the production from oil sands in Alberta, is on the increase. But we need more pipelines to bring that oil into the U.S. The Keystone Pipeline project would do just that. If allowed, the new pipeline system would have the capacity to carry more than a million barrels of oil per day to refineries in the Midwest and Gulf Coast. It awaits approval by the State Department.

• According to a recent study conducted for the Department of Energy, this project could ″very substantially reduce U.S. dependency on non-Canadian foreign oil, including from the Middle East.″ And construction of the pipeline would create jobs to boot. Unfortunately, a number of environmental organizations are pressuring the administration to say no to a project most of us consider a no-brainer.

• And, as if we needed another reason to revisit our own policy of locking up much of this nation's oil potential, the events in Egypt provided it. Two billion federally-controlled acres, both onshore and offshore, are not open to energy leasing. From the Gulf of Mexico to Alaska, from the Rockies to the Atlantic and Pacific, we are doing to ourselves what OPEC tried to do to us in the 1970s - keep oil off line. Not only would producing this energy lead to greater supplies and lower prices, but it could create hundreds of thousands of well paying oil and gas industry jobs, and generate billions in federal and state revenues.

• Some of these anti-energy policies have been in place for decades, but they have been kicked into high gear during the Obama administration. Within weeks of taking office, his Interior Department cancelled energy leases in the West and shelved a plan to expand offshore drilling and pursue Colorado oil shale. And, in response to the Deepwater Horizon spill last April, the administration has put a lid on issuing drilling permits, preventing shovel-ready exploration from commencing.

• The situation in Alaska is particularly frustrating. It is the state with the greatest untapped potential, both onshore and offshore, as well as strong support amongst a clear majority of its citizens to produce more oil. But at this time, all new exploration activities in the state have been brought to a halt, thanks to the federal government. This includes Shell's long delayed effort to commence exploration in the Beaufort Sea. The company paid $2.2 billion in 2005 for the rights to explore parts of the Beaufort and Chuckchi Seas off Alaska's North slope, but red tape continues to hold up that effort. The company secured 33 of the necessary 34 permits to move forward with exploratory wells, but the Environmental Protection Agency has stalled on that last permit. Because drilling is seasonal there, this means that drilling will be delayed for yet another year.

• Estimates of the amount of oil locked up are just that, estimates. Experience shows that where drilling is allowed, such as in Alaska's Prudhoe Bay, far more oil is produced than initially predicted. The National Petroleum Council's estimate of 40 billion barrels of recoverable oil currently restricted by law is significant in itself, and this figure may only hint at the potential for future domestic production.

• We live in a global economy with a global oil market, and events like those unfolding in Egypt will always have an impact. But with additional imports from Canada, and increased domestic production, that impact would be reduced.

• There is a role for renewable energy and alternative vehicles, but we have to be realistic, and especially realistic about the timeframes involved. Developing technologically and economically viable alternatives capable of taking significant market share away from petroleum derived fuels and internal combustion powered vehicles is a long term project. Put another way, the age of petroleum is going to be with us for a while longer, so we need to take steps to ensure that supplies are as plentiful, reliable, and affordable as possible. How to achieve that is the focus of today's hearing.

PREPARED STATEMENT OF HON. JOHN SULLIVAN

Chairman Whitfield:

Thank you for holding this hearing today examining the impact riots and political upheaval in North Africa and the Middle East are having on global oil markets and U.S. energy security.

Like many Americans, I am concerned with the political unrest in North Africa and the Middle East. From Friday January 28th to Monday January 31st the price of crude oil futures suddenly jumped 6% on the security fears of the Suez Canal which is considered a world oil chokepoint due to the volume of oil traveling through such a narrow route and the Sumed pipeline in Egypt.

These events prove once again that our nation's dependence on OPEC oil is a national and economic security issue. We import 5 million barrels of oil per day from OPEC but yet we continue to restrict domestic oil resources in our country, shooting ourselves in the foot while our nation still suffers from a 9 percent unemployment rate. The U.S. oil and gas industry employs 9.2 million American and that number would surely grow if we committed ourselves to the responsible development of oil and gas on our own shores.

According to the National Petroleum Council, technically recoverable resources in North American currently restricted by law or regulation amount to over 40 billion barrels of oil. The answer to our energy security question is staring us in the face but the simple fact is that the Obama Administration is hostile to developing oil and gas and they have taken a decisive regulatory position against increased domestic oil production Just take a look at their actions.

On December 1, 2010, the Obama Administration announced a new offshore drilling ban that will keep the eastern Gulf of Mexico and Atlantic and Pacific coasts off-limits to new offshore exploration until 2017-and the administration just announced that new drilling permits in the gulf may not happen until June 2011. These actions send terrible signals to the world oil markets and it makes our nation more vulnerable to oil price swings due to rising demand and political upheaval.

With many economists fearing that oil prices will hit 4 dollars a gallon this spring and summer, the time is now to implement policies to produce more oil. I strongly believe that drilling offshore for oil and gas is an essential part of the all of the above comprehensive energy strategy that our nation so badly needs. We must not allow last year's oil spill - as terrible as it was - to derail our ability to continue with production of American made energy by keeping our resources under lock and key while spending hundreds of billions on imported oil every year. We must continue to drill at home!

The simple fact is we live in a hydrocarbon economy and we will be one for long into the future. We have the resources to drill at home and the American people deserve an affordable national energy policy that takes advantage of the fact that we have more energy within our borders than our nation will ever need or want.

I look forward to the testimony of our witnesses and I yield back the balance of my time.

PREPARED STATEMENT OF HON. CORY GARDNER

Mr. Chairman, thank you for holding this hearing today on the effects of Middle East events on U.S. energy markets. I appreciate the opportunity to address our dependence on foreign oil and what steps our government is taking to decrease that dependence.

Both President Obama and Secretary of Energy Steven Chu have recently made statements regarding the need to protect ourselves at home by decreasing our de-

pendency on foreign oil. I applaud this idea and always have. However, I am concerned that the rhetoric simply does not match current policy. Many of the traditional energy alternatives that I imagine each witness will address seem to be off the table, and our future energy dependence and national security are suffering because of it.

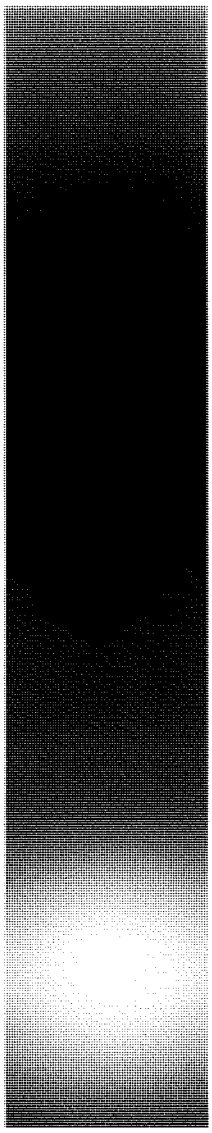
My concern today is that the U.S. does not have a backup for our demand. We are at the mercy of unstable countries like Yemen, and now, potentially Egypt. If their economies fail, or worse, fail and fall into the hands of terrorists, our energy supply fails as well. The US imports over half of what it consumes, so if Egypt collapses and terrorist forces take hold, they may very well decide to restrict access to the Suez Canal, for example. We are then talking about a severe disruption in the oil supply. Rising prices, which we are experiencing today due to the crisis in Egypt, will be the least of our concerns when the wrong people control the energy supply.

Demand for oil and gas is not going away. That being said, I support clean energy and will continue to do so. Exploring clean energy solutions is a necessity. Colorado, for example, has vast amounts of wind and solar energy capabilities. However, when developing and advancing these sources, we must do it in the right way. We simply cannot take expansion of traditional energy off the table, and we cannot limit our options and exclude viable energy sources like nuclear power. I look forward to working with the committee on finding ways to develop an all-of-the-above energy approach.

There are options, Mr. Chairman. There are domestic considerations that must be put back on the table. The National Petroleum Council has stated that recoverable resources in North America, which we are unable to access by law, would create over 40 billion barrels of oil. This is twice the proven reserves we have today, which equal 5 million barrels per day. Opening production by using oil in North America would replace OPEC imports to this country, thus taking a major step in the direction of energy independence.

Further, we must make permitting for environmentally responsible production easier. Developing new oil and gas fields in the Beaufort and Chukchi Seas could result in production of 10 billion barrels of oil and 15 trillion cubic feet of natural gas for the next 50 years. Despite this, the administration has taken away drilling permits that had already been issued on many of these sites.

Mr. Chairman, these are just a few of the ways we can move towards energy independence. There are many more and I look forward to working with you and the committee on advancing them. Thank you. I yield back my time.



The Future of Global Oil Supply

Understanding the Building Blocks

SPECIAL REPORT

CERA

ABOUT THE AUTHOR

PETER M. JACKSON, IHS CERA Senior Director, Oil Industry Activity, is a widely respected authority on oil and gas production and upstream development. He combines expertise with practical experience in some of the world's most important production areas. At IHS CERA he is responsible for global oil capacity outlooks. A major component of his research is examining current trends and challenges in production capacity and reserves distribution as well as forecasting which areas will become a focus for exploration and production (E&P) industry investment over the next ten years. He was principal author of IHS CERA's 2009 Private Report *Pausing for Breath: Liquids Production Capacity to 2030.* Recent research topics tackled by IHS CERA's Oil Supply Team include the changing composition of the barrel, the role of giant fields in future supply, and understanding the drivers of future supply in key producing countries. He has also played a major role in developing IHS CERA's new *E&P Trends Forum.* Dr. Jackson has 22 years of E&P experience with what were Britain's two leading independent oil companies, Britoil and Enterprise Oil, as a geologist and manager. With Enterprise he was President and General Manager of Enterprise Oil's Gulf of Mexico business, where he gained extensive experience with deepwater development. He served as Chief Geologist for Enterprise, responsible for the worldwide view of prospects and development, while Enterprise was the world's largest independent oil company. He also gained extensive knowledge of E&P projects while working in the United Kingdom, Indonesia, and Italy. Dr. Jackson holds a BSc from St. Andrews University and a PhD from Edinburgh University.

We welcome your feedback regarding this IHS CERA report. Please feel free to e-mail us at info@ihscera.com; please reference the title of this report in your message.

For clients with access to **IHSCERA.com,** the following features related to this report may be available online: downloadable data (excel file format); downloadable, full-color graphics; author biographies; and the Adobe PDF version of the complete report.

THE FUTURE OF GLOBAL OIL SUPPLY: UNDERSTANDING THE BUILDING BLOCKS

KEY IMPLICATIONS

The controversy surrounding future oil supply can be divided into two components: a determination of the factors that will drive the much-debated future of oil supply and then, longer term, a consideration of consequences and the actions required when oil supply eventually plateaus. IHS CERA identifies a number of critical observations at the core of this analysis of future supply:

- **Supply evolution through 2030 is not a question of resource availability.**
- **IHS CERA projects growth of productive capacity through 2030, with no peak evident.**
- **There is no unique picture of the course of future of supply: we are dealing with a complex, multicomponent system.**
- **Aboveground drivers—economics, costs, service sector capability, geopolitics, the timing and nature of government decision making, and, centrally of course, investment—are crucial to future supply availability.**
- **Market dynamics will remain highly volatile.**
- **The upstream oil industry faces major challenges in finding new oil and turning discoveries into commercial production.**

—November 2009

CERA

THE FUTURE OF GLOBAL OIL SUPPLY: UNDERSTANDING THE BUILDING BLOCKS

by Peter Jackson, Senior Director, IHS Cambridge Energy Research Associates

CONTEXT: PREDICTING SUPPLY IN A COMPLEX WORLD

Fears about "running out" of oil are recurrent. At their strongest, they coincide with periods of high prices and tight supply-demand balance. The latest such period of "peak oil" concerns became very evident from 2004, when strong oil demand ran up against capacity constraints. In contrast, IHS CERA's reference case for global liquid productive capacity shows growth through 2030 to around 115 million barrels per day (mbd) and finds no evidence of a peak in supply appearing before that time.

Hydrocarbon liquids—crude oil, condensate, extra heavy oil, and natural gas liquids—are a finite resource; but based on recent trends in exploration and appraisal activity, there should be more than an adequate inventory of physical resources available to increase supply to meet anticipated levels of demand in this time frame. Post-2030 supply may well struggle to meet demand, but an undulating plateau rather than a dramatic peak will likely unfold. Moreover, if the "peak demand" now evident in the OECD countries is a precursor of later developments in the emerging markets, world demand itself could eventually move on to a different course.*

In the short term the industry is at another crossroads following the precipitous fall in demand in 2008–09 in response to the onset of the recession. The oil price has roughly halved from its peak of $147 per barrel in July 2008, OPEC has recently cut production, OPEC spare capacity has nearly tripled to 6.4 mbd, and the industry has slowed its pace of expansion. Early in 2009 IHS CERA estimated that as much as 7.5 mbd of new productive capacity could be at risk by 2014 if costs remained high and oil prices hovered just below the cost of the marginal barrel for two years.** Since then the oil price has recovered strongly to around $70–$80 per barrel, and some confidence has returned. Even in these unpredictable times the industry has continued to invest and to build new productive capacity; indeed, Saudi Arabia recently brought onstream the giant Khurais field, which at plateau is expected to produce 1.2 mbd. With sustained investment, a healthy cushion of spare capacity, and slow to moderate post-recession economic growth, supply should not present major problems, at least in terms of availability, in the short term.

Of course looking further ahead, it is important to recognize that oil is a finite resource and that at some stage supply could fail to meet demand on a consistent basis. It is impossible to be precise about the timing of this event, but given the pace at which demand has increased in the past decade a pivot point may well be reached before the middle of this century. Much depends on key factors such as global economic growth, the capability of the upstream industry, costs, government policies on access and taxation, the evolution of renewable and

*See the IHS CERA Private Report *Peak Oil Demand in the Developed World: It's Here.*

**The marginal barrel is the most expensive oil to find and produce globally; currently the oil sands in Canada are regarded as representing the marginal barrel.

alternative energy sources—particularly for transportation—and the effect of climate change issues on policies and regulations concerning the use of fossil fuels. However, there is time to prepare and to make rational decisions to avoid being forced into short-term approaches that may not resolve longer-term problems.

Many studies of future oil supply examine subsurface issues and focus in particular on the scale of the resource while giving limited consideration to technology, economics, and geopolitics.* Though belowground factors are critical, it is aboveground factors that will dictate the ultimate shape of the supply curve.

This IHS CERA Report presents the main points in our current productive capacity outlook to 2030 and discusses the architecture of future conventional and unconventional oil supply. In order to provide a framework, the methodology and foundations of the outlook are reviewed and the results of supporting studies on decline rates and giant fields are included.

In so doing, this report addresses the debate over "peak oil." There is much emotion involved in that debate. In our view much would be gained by lowering the emotional level and instead shifting to a more objective dialogue, based on a comparative view of data, methodology, and analyses. Our hope is that this paper can contribute to such a discussion and exchange. Our further hope is that out of such a dialogue will come a deeper understanding of the world's oil supply in the decades ahead—a question crucial to the world's overall future.

There are many areas of overlap between IHS CERA's view of future oil supply and other outlooks. Oil is a finite resource, and at some stage supply will begin to fall short of meeting demand on a consistent basis if there is no break in the connection between economic growth and oil demand. The basic differences in opinion appear to center on when this will happen and on what happens after the inflection point.** The view that oil supply will plummet after the inflection point and oil will run out, like the gasoline in an automobile, is misleading for the layperson.

IHS CERA believes that this inflection point will herald the beginning of an undulating plateau of supply that will last for perhaps two decades before a long, slow decline sets in (see Figure 3). It represents a transition period when traditional market forces and government policy will be unable to adjust supply to meet growing demand and limits are reached. Of course the path of demand will exert a controlling influence on the future supply curve. Peak demand is an equally important concept that may well be viewed in hindsight, from the perspective of a half century from now, as the main driver of peak supply.

But one further important point: Though a peak of global oil production is not imminent, there are major hurdles aboveground to negotiate.

METHODOLOGY: DEFINING THE YARDSTICKS

Let us begin with the methodology with which we approach these questions.

*See Deffeyes 2005. See the complete citations for all footnotes in the appendix to this report.
**See Campbell 2002; International Energy Agency (IEA) *World Energy Outlook-2008;* and Hirsch et al. 2005.

Productive capacity is defined as the maximum sustainable level at which liquids can be produced and delivered to market. Productive capacity estimates account for routine maintenance, but not for general operational inefficiency, temporary interruptions such as weather or labor strikes, nor for dramatic swings in political and economic factors. For example, a field may have a productive capacity of 140,000 barrels per day (bd) but in reality produce 130,000 bd on average over a year because of unforeseen maintenance issues, regulatory inspections, rig movements, and tie-ins.

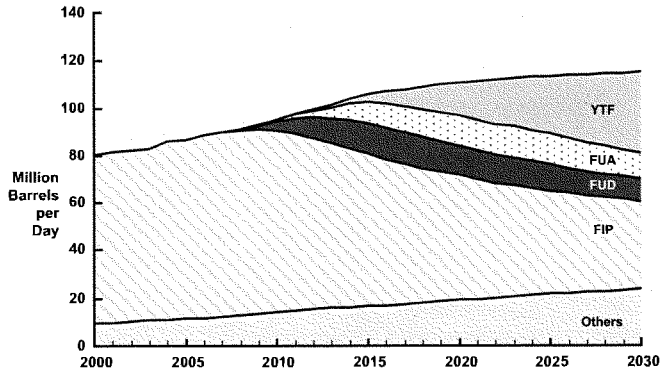
At the core of IHS CERA's methodology is recent production history, which is considered the most reliable data available on which to base a supply projection. We can measure the barrels arriving at the surface over time. Future production trends are extrapolated using a comprehensive framework of decline rates and knowledge of operational plans for individual projects and fields. Remaining reserve data are an important constraint on the future supply profiles but—given the uncertainties in reserves estimation—can be used only as a broad guideline of future supply.

Four key components of supply are included in the outlook (see Figure 1):

- fields in production (FIP)
- fields under development (FUD)
- fields under appraisal (FUA)
- yet-to-find (YTF) resources

Figure 1

Global Liquids Productive Capacity Outlook



Source: IHS Cambridge Energy Research Associates.
90509-3

IHS CERA has fully incorporated the data from the IHS International Field and Well Data database so that there are approximately 24,000 fields and discoveries underpinning the outlook. In addition, we have conducted detailed analysis of field production characteristics, especially decline rates, which have been incorporated at the field and project levels.*

A detailed database of approximately 450 OPEC and non-OPEC FUD provides a clear insight into the immediate plans of the industry to execute new projects ranging individually up to 1.2 mbd at production plateau. YTF resources are estimated by extrapolating historical activity and success rate data and making assumptions about future levels of activity in key countries. We have recently compiled historical exploration data from the IHS International Field and Well Data database on well count, success rate, and discovery sizes for each country, which has improved the YTF analysis.

In this activity-based model we take account of project efficiency, costs, timing, hardware availability, and our detailed oil price outlook. We adopt a holistic portfolio perspective to evaluate global productive capacity. Although it is clear that some giant fields such as Mexico's Canterell are now strongly in decline following a successful secondary production program, and many countries are past their "peak," the sum of the parts as we currently see them show that global productive capacity should be able to grow for at least the next two decades.

WHY SO MUCH VARIATION AMONG PUBLISHED OUTLOOKS?

The long and complex debate about the future of global oil supply is characterized by two overriding characteristics: the very large range of potential outcomes projected and sustained disagreement about "the answer."**

Production volumes are closely related to reserves, rock physics, and investment. Publicly available data tend to be limited and of variable quality. A wide range of methodologies have been applied to the problem, from those encompassing systematic analysis and careful assumptions to less robust techniques such as Hubbert's method, which can provide a good approximation in certain circumstances but fall down especially where government policy constrains production.*** Importantly, Hubbert's approach, developed in the 1950s when technology was stagnating, also fails to account for fluctuations in demand, technology advances, and the discovery of new hydrocarbon plays. Additionally different studies are based on variable views on reserves/resources, field production performance, future exploration, technology, and commercial issues. Few have attempted to incorporate the impact of aboveground factors such as demand and geopolitics.

Some models are based on a very pessimistic view of the future, which is not borne out by scrutiny of recent trends in exploration and production. For example, frequent claims—that "half of global oil reserves have been produced," "global reserves are not being replaced on

*See the IHS CERA Private Reports *Giant Fields: Providing the Foundation for Oil Supply Now and in the Future?* and *Finding the Critical Numbers: What Are the Real Decline Rates for Global Oil Production?*
**See Mills 2008.
***See the IEA World Energy Outlook-2008, Deffeyes op. cit., and Al-Bisharah et. al. 2009.

an annual basis," and "deepwater exploration is essentially exhausted"—are questionable.* The recent discoveries of ten giant oil fields below a thick salt layer in the Santos Basin, Brazil, may have boosted global resources by at least 25 billion barrels. Further assertions that giant oil fields are past their prime simply are not borne out in a recent detailed study of 548 giant oil fields in the IHS CERA Private Report *Giant Fields: Providing the Foundation for Oil Supply Now and in the Future?* This study demonstrates these fields' continuing strong contribution to global supply and that some 76 giant fields, representing 84 billion barrels, remain undeveloped. Fields in general and giant fields in particular still show considerable potential for reserves upgrades, as illustrated in many studies.**

IHS CERA'S 2009 SUPPLY OUTLOOK: "PAUSING FOR BREATH"

In our most recent reference case outlook, global productive capacity is expected to average approximately 92 mbd in 2009 and to rise to 115 mbd by 2030.*** This is a lower rate of growth than we have projected in the past and reflects the reaction of the oil industry to recent changing market forces. This is just one version of many possible outcomes, and we use it in this report to illustrate the architecture of supply and the nature and scale of the problem. This reference case provides a view of the building blocks of future supply in terms of FIP, FUD, FUA, and YTF as well as "Others," the category of unconventional liquids that include extra heavy oil, biofuels, coal-to-liquids/gas-to-liquids, and natural gas liquids. With aggregate decline rates of around 4.5 percent per year, FIP provide a diminishing proportion of the total future capacity. But in terms of the conventional oil asset life cycle, exploration replenishes the appraisal project inventory, which feeds into sanctioned development projects and ultimately producing fields. Figure 1 is a snapshot of a very dynamic system.

This summary does not show evidence of a peak in oil productive capacity before 2030. However, it does emphasize the importance of future exploration and the role of unconventional liquids in generating growth in the future. IHS CERA believes that unconventional liquids already contribute around 14 percent of total global capacity, and we expect this share to grow to 23 percent by 2030. The contribution of exploration is emerging as one of the key uncertainties and is the subject of current IHS CERA research.

This model assumes that

- The oil price stays above the cost of the marginal barrel for most of the period to 2030.
- There are adequate existing and future resources to support these sustained volumes of higher capacity.
- The industry can build the hardware and develop the technical capability to implement investment programs.

*See Leggett 2006.
**See Klett and Gautier 2005.
***See the IHS CERA Private Report *Pausing for Breath, Liquids Production Capacity to 2030.*

WHAT ARE THE CHALLENGES TO PRODUCING A ROBUST OUTLOOK?

Predicting future productive capacity hinges on an in-depth understanding of a complex multicomponent system, which is driven by the interplay of both aboveground and belowground factors. It is not realistic to treat the global oil endowment as if it were simply in a tank being emptied. IHS CERA's experience of evaluating productive capacity over two decades suggests that there are no unique answers, a point reinforced by the wide variety of published outlooks noted above.

As part of our ongoing research program IHS CERA has concentrated on a number of factors that will strongly influence future supply:

- **Data.** The IHS CERA reference case outlook is based largely on the IHS International Field and Well Data, and North American databases, which are arguably the most comprehensive available upstream data sets available. A reliable and comprehensive database is critical to any credible projection—but the complexity of the analysis requires making some significant assumptions. IHS CERA has critically tested many of these assumptions by studying some of the key questions relating to historical exploration trends, resource replacement, and oil field performance. But even a perfect data set would generate a range of possible outcomes in modeling because of the complexity of the problem. The debate about future supply and data has tended to focus on subsurface technical data, especially reserves data. But there is a wide range of sources related to aboveground drivers that is also crucial in assessing country-specific economic data and projections—which drive supply—as well as rig count, yard space, and service sector capability.

- **Reserves.** To date, the analytical core of this debate appears to have hinged on knowledge of field and global reserves.* Oil and gas reserves are defined as the volumes that will be commercially recovered in the future. Hydrocarbons are trapped in reservoirs underground and cannot be physically audited or inspected, so estimates are based on the evaluation of data that provide indirect evidence of the scale of the reserve base. The Society of Petroleum Engineers (SPE) has produced a detailed set of six categories of reserves and contingent resources and three categories of undiscovered prospective resources.** These reserves estimates entail large degrees of uncertainty, and a great deal of experience and judgment are required in performing the calculations.

  Given the complexity of the calculations there are no unique answers at the individual field or global levels, and we still do not know exactly how much has been discovered or what remains to be found, despite any claims to the contrary. Current estimates can only be considered as orders of magnitude. The questionable use of resource estimates is well illustrated by Hubbert's (1982) approach, which suggests that a peak of production occurs when half of the global inventory of supply has been produced. This seems plausible initially, given that some 1.1 trillion barrels of oil has been produced to date and there are apparently some 1.2 trillion barrels remaining to be produced. But that is appearances. What this approach does not make clear is that

*See Mills 2008.
**Ref: SPE website http://www.spe.org/spe-app/spe/index.jsp.

this analysis is based on "proven plus probable conventional reserves" alone, which amounts to 2.3 trillion barrels. It ignores all the remaining categories of conventional and unconventional reserves and resources (including possible, contingent, and prospective reserves), defined by the SPE, which could ultimately contribute at least as much again. IHS CERA estimates that global resources could be approximately 4.8 trillion barrels, including just over 1.1 trillion barrels of cumulative production to date.*

It is clear that we are dealing with a finite resource, but more consistency in reserves reporting and further systematic studies are needed, such as the United States Geological Survey (2000) study of global YTF resources, to improve the quality of the numbers. Remaining reserves data are an important constraint on the future supply analysis—but given the uncertainties this can be used only as a broad guideline. Existing resource estimates have a habit of being increased as fields are upgraded and new plays are established.

- **Decline rates and field performance.** At the core of IHS CERA's productive capacity model is an extrapolation of historical production data into the future. We have completed a study of over 1,000 fields to understand the characteristics of field production through the buildup, plateau, and decline phases. Central to this analysis is an attempt to estimate typical decline rates for a range of field sizes and types in different geological and geographic environments. Information from relatively mature, data-rich areas such as the North Sea and Norway suggested that decline rates were well above an alarming 10 percent on an individual field basis, so it was important to complete this study to develop a more accurate and representative picture around the world.

  In the discussion there often seems to be a confusion between *depletion* and *decline.* All oil fields start to *deplete* the day production begins, but not all fields have production in decline. Oil field production only starts to decline after the plateau period of production has ended. From our 1,000 field study database only 40 percent of production comes from fields in decline, suggesting, perhaps surprisingly, that a significant proportion of all production comes from fields building up or on plateau. This striking point often seems to be lost in the discussion. This study showed that the average decline rate for fields that were actually in the decline phase was 7.5 percent, but this number falls to 6.1 percent when the numbers are production weighted. The numbers were subsequently corroborated by the IEA (2008). Importantly, the global aggregate decline rate of all fields currently in production (which includes fields building up and on plateau) works out to be around 4.5 percent. It is anticipated that aggregate decline rates might increase slowly with time and also that ultimate recovery will continue to increase medium term.

  Giant fields are still the cornerstone of global production. Some 548 giant oil fields contribute 61 percent of the total; and although production from the giants has risen, that proportion has remained steady in recent years. Recent IHS CERA research on giant oil fields shows that collectively the giant fields are not in decline and that some 60 percent of their recoverable oil remains to be produced. The number of giant

*See the IHS CERA Decision Brief *Why the Peak Oil Theory Falls Down: Myths, Legends, and the Future of Oil Resources.*

field discoveries has declined in recent years, but their contribution seems unlikely to plummet in the near term.

- **Costs and capability.** The IHS CERA Upstream Capital Costs Index (UCCI) is a combination of a set of indexes used to monitor the current state of the global upstream cost environment. Set at 100 in 2000, it more than doubled by the end of 2008 (230). This means that oil companies were essentially spending twice as much to undertake the same amount of work as in 2000. By the end of September 2009 the UCCI declined to 202, putting costs back to early 2007 levels; and although oil prices recently fell back to 2004 levels, cost reductions are projected to drop only gradually over the next six months.* Some service sectors, such as the deepwater rig market, will sustain a high pricing structure because of the sustained demand; others, such as jackup rig markets, have softened and may continue to do so.

  One critical factor for future oil output is people. Current upstream sector demographics are such that a large proportion of experienced professionals will retire in the next ten years. The industry has acknowledged this for a number of years and has taken steps to hire and train a new generation of experts, but this may be too little too late. In the current downturn the industry is again in danger of further erosion of its skills base. The service sector in particular is under pressure from operating companies to reduce costs, and this means rationalizations of staff, which will seriously restrict the capability of the service sector in the future.

- **Other aboveground factors.** One key driver of the future supply outlook, rarely considered, is the ability of OPEC countries to control production. In most non-OPEC countries exploitation has progressed without much constraint. This means that for many non-OPEC countries, especially those with modest reserves, production has already peaked. While non-OPEC production capacity still has the potential to grow, it always produces at the limits of its productive capability with limited flexibility. On the other hand, with its vast resource base, much of it undeveloped, OPEC has controlled investment and production, depending on market conditions. Many OPEC countries have specific policies that control the pace of exploitation for future generations. Also many national oil companies have a different approach to oil field exploitation that focuses on optimizing long-term recovery. Extrapolating the impact of current OPEC investment and policy on future supply does not support a short- to medium-term shortage of oil.

Any outlook can present only one potential version of the future. IHS CERA uses a reference case production capacity outlook to generate three scenarios for future production—Asian Phoenix, Break Point, and Global Fissures—that enable an understanding of the range of possible drivers of future supply and describe three feasible outcomes.** Recent oil price volatility has further reinforced the point that the future is highly uncertain and a range of outcomes should be considered.

*See the IHS CERA Special Report *Capital Costs Analysis Forum—Upstream: Second Quarter 2009 Market Update* July 2009.

**See the IHS CERA Multiclient Study *Dawn of a New Age: Global Energy Scenarios for Strategic Decision Making—The Energy Future to 2030.*

THE BIG PICTURE

It would be easy to interpret the following market and oil price events from 2003 through 2008 in isolation to support the belief that a peak in global supply has passed or is imminent:

- oil price spike to $147 per barrel in July 2008
- tight supply-demand balance of around 2.5 mbd through mid-2008
- considerable decline in global production to around 83 mbd

However, these events are linked to an array of political and economic factors, including a global boom, "the rise of the emerging markets," financial market impact, and constraints on "catching-up" in developing new capacity. They do not herald the onset of a peak and at the simplest level illustrate that the market continues to act as the shock absorber of major volatility. Supply continues to respond to prices (conditioned by expectations of future demand), and simultaneously demand responds to prices.

Improved data availability and transparency could help to produce more accurate outlooks for future capacity—but even this will not provide unique, reliable answers. Subsurface data on reserve levels and decline rates are only a part of the story. Some of the major aboveground factors that will continue to affect what actually happens to output are listed below. Both their importance and the range of possible outcomes inherent in them are evident:

- future course of the global economy
- government policies and decisionmaking in resource-holding countries
- balance and impact of the complex web of geopolitics
- future course of oil prices
- course of government policies that focus on controlling demand
- development of renewable energy sources and climate change issues

Many projections, including those based on the methodology of Hubbert, fail to account for the impact of economics, technology, or geopolitics,while others concentrate on conventional oil alone and fail to account for the growing proportion of unconventional oil being developed and produced.* One is struck by the conviction, in each period, that technology has gone "about as far as it can go."

IHS CERA tackled this issue by developing a possible range of outcomes through plausible scenarios for the future of global energy.** Even this comprehensive study—completed in 2006—does not present a unique base case projection, but rather develops the three scenarios noted above—Asian Phoenix, Global Fissures, and Break Point—extending to 2030. Indeed elements of these scenarios have played out during the past three years.

*See Deffeyes 2005 and Bentley et al. 2007.
**See the IHS CERA Multiclient Study *Dawn of a New Age*, op. cit.

The Break Point scenario, developed in 2006, envisaged that oil prices would reach $150 per barrel. It demonstrated the importance of the feedback loops. In this scenario high prices and fear of shortage have a strong price response and policy response. The results include a shift by consumers and automakers, and programs to enhance energy efficiency and accelerate growth of alternative fuels, and oil loses its monopoly on transportation.

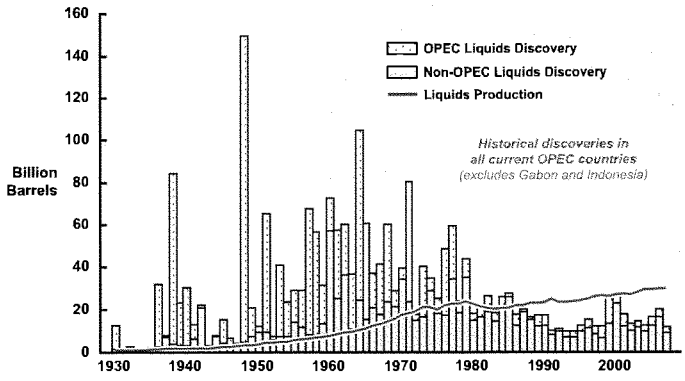
Global Fissures envisions a deep recession. A widespread political backlash against free trade and globalization, combined with global trade and political disputes, lowers economic growth and weakens energy prices. One of the triggers is a hard landing of the US economy, owing to the overhang of debt in housing and other sectors. Global Fissures reflects the current global climate most closely.

Looking ahead, we can see that the upstream industry faces many challenges. There is little doubt that the existing and possible future resource base can support growth in capacity through 2030. There is no shortage of new projects or exploration potential to replenish the hopper. Exploration and field upgrades have tended to replace global production in recent years. Exploration is not yet in terminal decline, and while recently some 12 billion barrels of oil has been discovered annually, the five-year moving average is actually growing (see Figure 2).

The longer-term problem lies not belowground, but in obtaining the investment and resources that the industry will need to grow supply significantly from current levels. Both OPEC and non-OPEC countries have a strong current inventory of some 450 projects under development. The recent fall in oil prices has precipitated a slowdown in the rate at which projects are

Figure 2

World Liquids Resource Discovery and Production, 1930 to 2007



Source: IHS Cambridge Energy Research Associates.
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being sanctioned and developed—but this temporary situation will ease when the global economy starts to recover. The projected medium-term slowdown in the rate of supply growth is a simple function of economics rather than evidence of an imminent peak.

Yet there are a number of trends that cause concern. Non-OPEC growth has been worryingly anemic for five years, driven largely by slowing growth of productive capacity in Russia. Non-OPEC may well struggle to regain the annual growth levels greatly exceeding 500,000 bd that were common before 2004. OPEC countries will be a key element of future growth, but prolonged periods of low oil prices (below $60 per barrel) and abundant spare capacity of around 6.5 mbd might well start to inhibit long-term supply growth. But just over the horizon a period of strong economic growth could quickly reverse this trend.

However, structural changes currently occurring in the service sector in response to falling costs will pose a threat to future supply expansion. After nearly a decade of strong growth in response to increasing demand, some service sector companies are downsizing and restructuring, and this will affect the ability of the service sector to help bring on new supply at an appropriate pace when demand starts to recover.

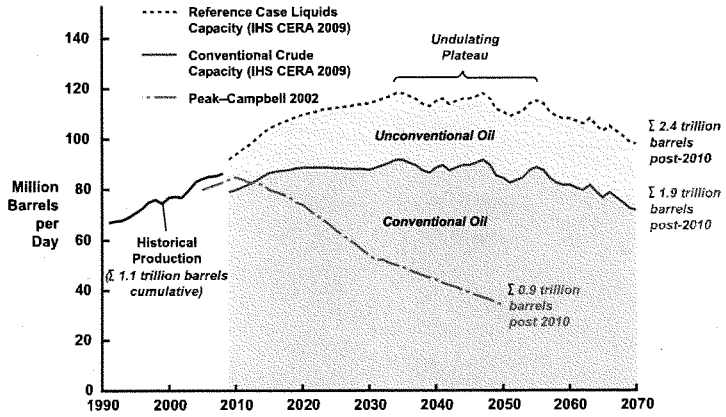
While the current economic situation has driven a reduction in exploration and production investment, it has also coincidentally provided a supply cushion that will take some time to work its way back into the system. Companies continue to build new productive capacity, albeit at a slower rate than one year ago. Collectively this will provide a short-term cushion until the global economy starts to pick up again from 2010 onward. One can well envisage a scenario half a decade or so from now in which a period of strong demand growth again leads to a period of tight supply and higher prices as investment and capacity growth fail to keep up.

But this should not be confused with the inflection point (see Figure 3). Ultimately there will be an inflection point when sustained growth of productive capacity will cease. As already noted, one fundamental difference is the view of when it occurs—is it imminent or two decades or more away? The other difference is on the question of what happens after the inflection point. The idea that oil supply will collapse after the inflection point and that oil will run out of the "tank in the ground" confuses the public. In our view this inflection point will inaugurate a new era—the beginning of an undulating plateau of supply. That, in turn, will last for another two decades or so, before a long, slow decline sets in. Would that be in 2050 or 2060 or even 2070? Whenever, it would take us into still a third era—the start of a transition period when traditional market forces and government policy will be unable to adjust supply to meet growing demand and the real limits are reached.

But much will happen before then that will affect demand—from changes in the automobile engine and the electric battery to changes in demographics and values. That is why the concept of "peak demand" is so important. Ironically, it may come to be viewed in retrospect as the main driver of peak supply. In that case what happens aboveground will have set the tempo for what happens belowground. ■

Figure 3

Undulating Plateau versus Peak Oil—Schematic



Source: Cambridge Energy Research Associates.
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YAHOO! NEWS
Associated Press

New drilling method opens vast oil fields in US

By JONATHAN FAHEY, AP Energy Writer Wed Feb 9, 3:20 pm ET

A new drilling technique is opening up vast fields of previously out-of-reach oil in the western United States, helping reverse a two-decade decline in domestic production of crude.

Companies are investing billions of dollars to get at oil deposits scattered across North Dakota, Colorado, Texas and California. By 2015, oil executives and analysts say, the new fields could yield as much as 2 million barrels of oil a day — more than the entire Gulf of Mexico produces now.

This new drilling is expected to raise U.S. production by at least 20 percent over the next five years. And within 10 years, it could help reduce oil imports by more than half, advancing a goal that has long eluded policymakers.

"That's a significant contribution to energy security," says Ed Morse, head of commodities research at Credit Suisse.

Oil engineers are applying what critics say is an environmentally questionable method developed in recent years to tap natural gas trapped in underground shale. They drill down and horizontally into the rock, then pump water, sand and chemicals into the hole to crack the shale and allow gas to flow up.

Because oil molecules are sticky and larger than gas molecules, engineers thought the process wouldn't work to squeeze oil out fast enough to make it economical. But drillers learned how to increase the number of cracks in the rock and use different chemicals to free up oil at low cost.

"We've completely transformed the natural gas industry, and I wouldn't be surprised if we transform the oil business in the next few years too," says Aubrey McClendon, chief executive of Chesapeake Energy, which is using the technique.

Petroleum engineers first used the method in 2007 to unlock oil from a 25,000-square-mile formation under North Dakota and Montana known as the Bakken. Production there rose 50 percent in just the past year, to 458,000 barrels a day, according to Bentek Energy, an energy analysis firm.

It was first thought that the Bakken was unique. Then drillers tapped oil in a shale formation under South Texas called the Eagle Ford. Drilling permits in the region grew 11-fold last year.

Now newer fields are showing promise, including the Niobrara, which stretches under Wyoming, Colorado, Nebraska and Kansas; the Leonard, in New Mexico and Texas; and the Monterey, in California.

"It's only been fleshed out over the last 12 months just how consequential this can be," says Mark Papa, chief executive of EOG Resources, the company that first used horizontal drilling to tap shale oil. "And there will be several additional plays that will come about in the next 12 to 18 months. We're not done yet."

Environmentalists fear that fluids or wastewater from the process, called hydraulic fracturing, could pollute drinking water supplies. The Environmental Protection Agency is now studying its safety in shale drilling. The agency studied use of the process in shallower drilling operations in 2004 and found that it was safe.

In the Bakken formation, production is rising so fast there is no space in pipelines to bring the oil to market. Instead, it is being transported to refineries by rail and truck. Drilling companies have had to erect camps to house workers.

Unemployment in North Dakota has fallen to the lowest level in the nation, 3.8 percent — less than half the national rate of 9 percent. The influx of mostly male workers to the region has left local men lamenting a lack of women. Convenience stores are struggling to keep shelves stocked with food.

The Bakken and the Eagle Ford are each expected to ultimately produce 4 billion barrels of oil. That would make them the fifth- and sixth-biggest oil fields ever discovered in the United States. The top four are Prudhoe Bay in Alaska, Spraberry Trend in West Texas, the East Texas Oilfield and the Kuparuk Field in Alaska.

The fields are attracting billions of dollars of investment from foreign oil giants like Royal Dutch Shell, BP and Norway's Statoil, and also from the smaller U.S. drillers who developed the new techniques like Chesapeake, EOG Resources and Occidental Petroleum.

Last month China's state-owned oil company CNOOC agreed to pay Chesapeake $570 million for a one-third stake in a drilling project in the Niobrara. This followed a $1 billion deal in October between the two companies on a project in the Eagle Ford.

With oil prices high and natural-gas prices low, profit margins from producing oil from shale are much higher than for gas. Also, drilling for shale oil is not dependent on high oil prices. Papa says this oil is cheaper to tap than the oil in the deep waters of the Gulf of Mexico or in Canada's oil sands.

The country's shale oil resources aren't nearly as big as the country's shale gas resources. Drillers have unlocked decades' worth of natural gas, an abundance of supply that may keep prices low for years. U.S. shale oil on the other hand will only supply one to two percent of world consumption by 2015, not nearly enough to affect prices.

Still, a surge in production last year from the Bakken helped U.S. oil production grow for the second year in a row, after 23 years of decline. This during a year when drilling in the Gulf of Mexico, the nation's biggest oil-producing region, was halted after the BP oil spill.

U.S. oil production climbed steadily through most of the last century and reached a peak of 9.6 million barrels per day in 1970. The decline since was slowed by new production in Alaska in the 1980s and in the Gulf of Mexico more recently. But by 2008, production had fallen to 5 million barrels per day.

Within five years, analysts and executives predict, the newly unlocked fields are expected to produce 1 million to 2 million barrels of oil per day, enough to boost U.S. production 20 percent to 40 percent. The U.S. Energy Information Administration estimates production will grow a more modest 500,000 barrels per day.

By 2020, oil imports could be slashed by as much as 60 percent, according to Credit Suisse's Morse, who is counting on Gulf oil production to rise and on U.S. gasoline demand to fall.

At today's oil prices of roughly $90 per barrel, slashing imports that much would save the U.S. $175 billion a year. Last year, when oil averaged $78 per barrel, the U.S. sent $260 billion overseas for crude, accounting for nearly half the country's $500 billion trade deficit.

"We have redefined how to look for oil and gas," says Rehan Rashid, an analyst at FBR Capital Markets. "The implications are major for the nation."

Associated Press writer James MacPherson contributed reporting from Stanley, N.D.

DEPARTMENT OF THE INTERIOR

INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF

MAY 27, 2010

INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF

EXECUTIVE SUMMARY

Overview

On April 20, 2010, an explosion and fire erupted on an offshore drilling rig in the Gulf of Mexico called the *Deepwater Horizon*, which had just completed an exploratory well 52 miles from shore in 4,992 feet of water. Eleven members of the crew are missing and presumed dead. The remainder of the crew abandoned the rig and was rescued by a nearby supply vessel, the *Damon Bankston.* The fire destroyed the rig, which sank on April 22, 2010. The resulting oil spill has been declared "a spill of national significance" and could become one of the oil industry's gravest disasters. Crude oil continues to flow from a broken pipe on the seafloor, has spread across thousands of square miles, and is damaging local economies, sensitive coastlines and wildlife throughout the Gulf region. On April 30, 2010, the President directed the Secretary of the Interior to conduct a thorough review of this event and to report, within 30 days, on "what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the outer continental shelf." This report responds to the President's directive.

Recommendations

The Secretary recommends a series of steps immediately to improve the safety of offshore oil and gas drilling operations in Federal waters and a moratorium on certain permitting and drilling activities until the safety measures can be implemented and further analyses completed.

The report recommends a number of specific measures designed to ensure sufficient redundancy in the blowout preventers (BOPs), to promote the integrity of the well and enhance well control, and to facilitate a culture of safety through operational and personnel management (see Table ES-1). Recommended actions include prescriptive near-term requirements, longer-term performance-based safety measures, and one or more Department-led working groups to evaluate longer-term safety issues. The recommendations take into account that drilling activities conducted in the deepwater environment create increased risks and challenges.

Key recommendations on BOPs and related safety equipment used on floating drilling operations include:

- *Mandatory inspection of each BOP to be used on floating drilling operations to ensure that the BOP:* meets manufacturer design specifications, taking into account any modifications that have been made; is compatible with the specific drilling equipment on the rig it is to be used on, including that the shear ram is compatible with the drill pipe to be used; has not been compromised or damaged from previous service; is designed to operate at the planned operating depth. Certification of these requirements will be made publicly available.

- *Requirement of new safety features on BOPs and related backup and safety equipment including*: a requirement that BOPs have two sets of blind shear rams spaced at least four feet apart to prevent BOP failure if a drill pipe or drill tool is across on set of rams during an emergency; requirements for emergency back-up control systems; and requirements for remote operating vehicle capabilities. *The Department will develop new surface and subsea testing requirements to verify reliability of these capabilities.*

- *Overhaul of the testing, inspection and reporting requirements for BOP and related backup and safety equipment to ensure proper functioning, including new means of improving transparency and providing public access to the results of inspections and routine reporting.*

Key recommendations on well control systems include:

- *Development of enhanced deepwater well-control procedures.*

- *Verification of a set of new safeguards that must be in place prior to displacement of kill-weight drilling fluid from the wellbore.*

- *New design, installation, testing, operations, and training requirements relating to casing, cement or other elements that comprise an exploratory well.*

- *A comprehensive study of methods for more rapid and effective response to deepwater blowouts.*

Key recommendations on a systems-based approach to safety:

- *Immediate, enhanced enforcement of current regulations through verification within 30 days of compliance with the April 30, 2010, National Safety Alert.*

- *Enhanced requirements to improve organizational and safety management for companies operating offshore drilling rigs.*

- *New rules requiring that offshore operators have in place a comprehensive, systems-based approach to safety and environmental management.*

The Secretary also recommends temporarily halting certain permitting and drilling activities. First, the Secretary recommends a six-month moratorium on permits for new wells being drilled using floating rigs. The moratorium would allow for implementation of the measures proposed in this report and for consideration of the findings from ongoing investigations, including the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

The Secretary further recommends an immediate halt to drilling operations on the 33 permitted wells, not including the relief wells currently being drilled by BP, that are currently being drilled using floating rigs in the Gulf of Mexico. Drilling operations should cease as soon as safely

practicable for a 6-month period.

The recommendations contained in this report have been peer-reviewed by seven experts identified by the National Academy of Engineering. Those experts, who volunteered their time and expertise, are identified in Appendix 1. The Department also consulted with a wide range of experts from government, academia and industry.

Relationship to Ongoing Investigations

This 30-day review has been conducted without the benefit of the findings from the ongoing investigations into the root causes of the explosions and fire on the Deepwater Horizon and the resulting oil spill (collectively "BP Oil Spill") including if there were any violations of existing safety or construction law, gross negligence, or willful misconduct. In the coming months, those investigations will likely suggest refinements to some of this report's recommendations, as well as additional safety measures. Nevertheless, the information currently available points to a number of specific interim recommendations regarding equipment, systems, procedures, and practices needed for safe operation of offshore drilling activities.

Furthermore, because the purpose of this review is to recommend immediate measures to improve the safety of offshore drilling activities, nothing in this report should be used to influence or prejudice any ongoing investigations, or impact any current or future litigation.

Table ES-1. Recommendations for Increased Safety Measures

Recommendations	Key Components (with implementation plan)
Blowout Preventer (BOP) Equipment and Emergency Systems	• Order re-certification of subsea BOP stacks (immediately) • Order BOP equipment compatibility verification (immediately) • Establish formal equipment certification requirements (rulemaking)
New Safety Equipment Requirements and Operating Procedures	• Develop new BOP and remote operated vehicle (ROV) testing requirements (immediately) • Develop new inspection procedures and reporting requirements (immediately) • Develop secondary control system requirements (emergency rulemaking) • Establish new blind shear ram redundancy requirements (emergency rulemaking) • Develop new ROV operating capabilities (rulemaking)
Well-Control Guidelines and Fluid Displacement Procedures	• Establish new fluid displacement procedures (immediately) • Establish new deepwater well-control procedure requirements (emergency rulemaking)
Well Design and Construction – Casing and Cementing	• Establish new casing and cementing design requirements – two independent tested barriers (immediately) • Establish new casing installation procedures (immediately) • Develop formal personnel training requirements for casing and cementing operations (rulemaking) • Develop additional requirements for casing installation (rulemaking) • Enforce tighter primary cementing practices (rulemaking) • Develop additional requirements for evaluation of cement integrity (immediately) • Study Wild-Well intervention techniques and capabilities (immediately)
Increased Enforcement of Existing Safety Regulations and Procedures	• Order compliance verification for existing regulations and April 30, 2010, National Safety Alert (immediately) • Adopt safety case requirements for floating drilling operations on the Outer Continental Shelf (emergency rulemaking) • Adopt final rule to require operators to adopt a robust safety and environmental management system for offshore drilling operations (rulemaking) • Study additional safety training and certification requirements (rulemaking)

CONTENTS

I. INTRODUCTION

On April 20, 2010, the crew of the Transocean drilling rig *Deepwater Horizon* was preparing to temporarily abandon BP's discovery well at the Macondo prospect 52 miles from shore in 4,992 feet of water in the Gulf of Mexico. An explosion and subsequent fire on the rig caused 11 fatalities and several injuries. The rig sank two days later, resulting in an uncontrolled release of oil that has been declared a spill of national significance. The Nation faces a potentially massive and unprecedented environmental disaster, which has already resulted in the tragic loss of life and personal injuries as well as significant harm to wildlife, coastal ecosystems, and other natural resources. The disaster is commanding the Department of the Interior's resources as we work to ensure that the spill is stopped and the well permanently plugged; that our natural resources along the Gulf Coast are protected and restored; and that we get to the bottom of what happened and hold those responsible accountable.

On April 30, 2010, the President ordered the Secretary of the Interior to evaluate what, if any, additional precautions and technologies should be required to improve the safety of oil and gas exploration and production operations on the Outer Continental Shelf (OCS). In addition to this review of the OCS regulatory structure, the President recently created the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. The President established the National Commission to examine the relevant facts and circumstances concerning the root causes of the BP Oil Spill, to develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling, and to submit a final public report to him with its findings and options for consideration within six months of the date of the Commission's first meeting.

In addition, the Departments of the Interior and Homeland Security are undertaking a joint investigation into the causes of the BP Oil Spill, including holding public hearings, calling witnesses, and taking any other steps necessary to determine the cause of the spill. Several committees in Congress have held and will continue to hold hearings on the events associated with the BP Oil Spill. Respecting the ongoing investigations, this report does not speculate as to the possible causes of the BP Oil Spill. This report is intended to identify an initial set of safety measures that can and will be implemented as soon as practicable to improve the safety of offshore oil and gas development.

To provide context for the safety recommendations, this report presents a history of OCS production, spills, and blowouts, a review of the existing U.S. regulatory and enforcement structure, a survey of other countries' regulatory approaches, and a summary of existing Minerals Management Service (MMS)-sponsored studies on technologies that could reduce the risk of blowouts.

In compiling the recommendations presented in this report, the Department has drawn from expertise within the Federal Government, academia, professional engineers, industry, and other governments' regulatory programs. In particular, seven members of the National Academy of Engineering peer reviewed the recommendations in this report. The Department received ideas from the Department of Energy National Laboratories on ways to improve offshore safety. Appendix 1 lists expert consultations for this report.

This report examines all aspects of drilling operations, including equipment, procedures, personnel management, and inspections and verification in an effort to identify safety and environmental protection measures that would reduce the risk of a catastrophic event. (A brief primer on offshore drilling technology and systems is included in Appendix 2). In particular, this report examines several issues highlighted by the BP Oil Spill regarding operational and personnel safety while conducting drilling operations in deepwater environments.

While technological progress has enabled the pursuit of deeper oil and gas deposits in deeper water, the risks associated with operating in water depths in excess of 1,000 feet are significantly more complex than in shallow water. This report describes safety and environmental issues involved in offshore drilling, including the unique challenges associated with drilling operations in deepwater.

The recommendations address well-control and well abandonment operations; specific requirements for devices, such as blowout preventers (BOPs) and their testing; industry practices; worker training; inspection protocol and operator oversight; and the responsibility of the Department for safety and enforcement.

In developing the recommendations contained in this report, the Department has been guided by the principle that feasible measures that materially and undeniably reduce the risk of a loss-of-well-control event should be pursued. Therefore, some recommended measures—particularly those the Department intends to implement immediately—are necessarily prescriptive. At the same time, the Department is examining innovative ways to promote a culture of safety for offshore operations by addressing the human element of operations. The Department is committed to moving to finalize a rulemaking that would require operators to adopt a systems-based approach to safety and environmental management. This rule would require operators to incorporate global best practices regarding environmental and safety management on offshore platforms into their operating plans and procedures. In finalizing this rulemaking, the Department will analyze carefully the current circumstances in the Gulf of Mexico and lessons learned from the ongoing investigation into the causes of the BP Oil Spill.

To realize an improved margin of safety associated with the recommended equipment standards and operating procedures, the report proposes new inspection and verification measures, which the Department will implement. Several of these efforts will also allow the public to access information about the inspection and verification structures, to promote confidence that: (1) the Federal Government undertakes appropriate actions to review, audit, and confirm industry performance; and (2) industry follows the best possible practices and the new set of regulatory requirements.

A comprehensive set of reforms encompassing all aspects of oil and gas development on the OCS simply could not be fully developed in the 30-day timeframe of this report. With respect to some safety measures, the Department will undertake further study—with appropriate input from independent experts, academia, industry, and other stakeholders—to develop new regulations and other appropriate steps to promote drilling safety. These Department-led strike teams will also help to inform the work of the President's new bipartisan National Commission. Finally, this report does not address several important issues associated with the safety of offshore

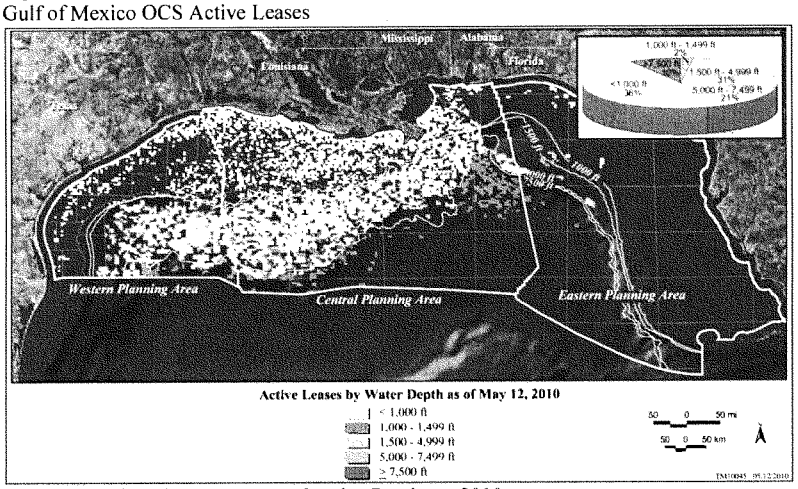
drilling that implicate shared responsibilities with other departments and agencies. For example, the Department will work in close cooperation with the Department of Homeland Security, including the United States Coast Guard, the Environmental Protection Agency, and other agencies to evaluate and improve oil spill response capabilities and industry responsibilities.

II. Offshore Oil and Gas Production

A. Federal OCS Oil and Gas Activities

The Gulf of Mexico provides 97 percent of Federal OCS production. The Gulf of Mexico has nearly 7,000 active leases (see Figure 1), 64 percent of which are in deepwater. The Pacific OCS has 49 active leases off the coast of Southern California, 43 of which are producing. There have been no Pacific OCS lease sales since 1984. Alaska has 675 active leases and production from a single joint State-Federal field. The Atlantic does not have any active leases or production.

Figure 1
Gulf of Mexico OCS Active Leases



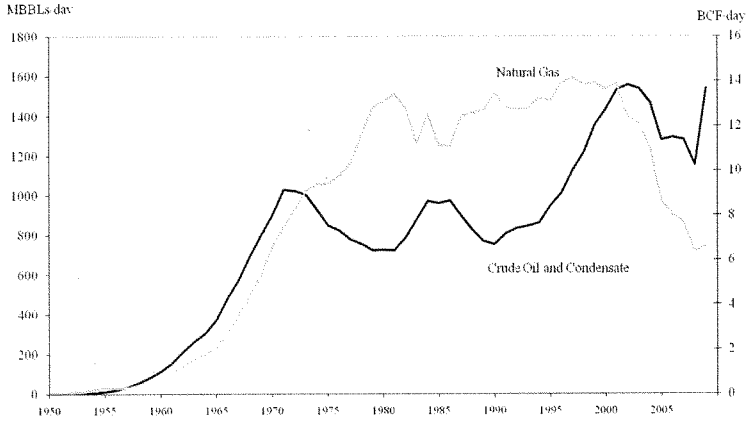
Source: Minerals Management Service Database, 2010.

Since 1947, more than 50,000 wells have been drilled in the Federal Gulf of Mexico, and there are now approximately 3,600 structures in the Gulf. In 2009, production from these structures accounted for 31 percent of total domestic oil production and 11 percent of total domestic, marketed natural gas production. Oil production in 2009 represented the second highest annual production for the Gulf of Mexico OCS (see Figure 2). Minerals Management Service Database, 2010.

Since the first major deepwater leasing boom in 1995 and 1996, a sustained and robust expansion of deepwater drilling activity has occurred, largely enabled by major advances in drilling

technology. In 2001, U.S. deepwater offshore oil production surpassed shallow water offshore oil production for the first time. By 2009, 80 percent of offshore oil production and 45 percent of natural gas production occurred in water depths in excess of 1,000 feet, and industry had drilled nearly 4,000 wells to those depths. In 2007, a record 15 rigs were drilling for oil and gas in water depths of 5,000 feet or more in the Gulf of Mexico. Operators have drilled about 700 wells in water depths of 5,000 feet or greater in the OCS. While fewer wells are drilled in the OCS today, they tend to be more sophisticated with higher per-well production levels than those in the past.

Figure 2
Gulf of Mexico OCS Oil and Gas Production



Source: Minerals Management Service Database, 2010.

Since 1953, the Federal Government has received approximately $200 billion in lease bonuses, fees, and royalty payments from OCS oil and gas operators. Last year, the Federal OCS leasing revenue was $6 billion. The OCS oil and gas industry provides relatively high-paying jobs in drilling and production activities, as well as employment in supporting industries. Offshore operations provide direct employment estimated at 150,000 jobs. Minerals Management Service Database, 2010.

B. OCS Petroleum Spills

Since the 1969 Santa Barbara, California, oil spill, there have been relatively few major oil spills from offshore oil and gas operations in the U.S. and around the world. Yet several notable blowouts have occurred, including one in June 1979, when the Ixtoc I exploratory well located about 50 miles off the Yucatan Peninsula blew out and was not brought under control until March 1980, releasing over three million barrels of oil off the coast of the Mexican state of Campeche. In 2009, the Australian Montara well in the Timor Sea blew out and was not brought under control for more than 10 weeks, releasing oil into the open ocean and forming a thin sheen covering up to 10,000 square miles. Nevertheless, the relatively infrequent occurrence of a major oil spill from an offshore drilling operation has led many to view these operations as safe.

From 1964 to 2009, operators in the Federal OCS produced about 17.5 billion barrels of oil (crude oil and condensate). Over this same time, the total estimated petroleum volume spilled from OCS activities was approximately 532,000 barrels, or 30.3 barrels spilled per million barrels produced. The spill rates from OCS platform and rig activities improved each decade from the 1960s through the 1990s, although the past decade reversed this trend (see Table 1). The oil spilled from OCS rigs and platforms over the past 30 years totaled about 27,000 barrels, illustrating how a catastrophic spill like the current BP Oil Spill can vastly exceed the impacts of typical spills on the OCS.

Table 1
Crude Oil Spills from Platform and Rigs from Federal OCS Activities, 1960-2009

Time Period	OCS Oil Production (Thousand Barrels)	Number of Spills	Barrels Spilled (Thousand Barrels)	Thousand Barrels Produced per Barrel Spilled
1960-1969	1,460,000	13	99	15
1970-1979	3,455,000	32	106	33
1980-1989	3,387,000	38	7	473
1990-1999	4,051,000	15	2	1,592
2000-2009	5,450,000	72	18	296

Note: Only covers spills of 50 barrels or more.

Source: Minerals Management Service Database, 2010.

Blowouts represent a type of loss of well control event that can result in large discharges of oil into the natural environment. Since 1970, the number of blowouts per number of wells drilled has varied significantly from year to year. From 1964 through 1970, a total of approximately 178,000 barrels of oil was spilled on the Federal OCS as a result of blowout events (see Table 2). Of this total, about 13,000 barrels resulted from blowouts related to external forces, such as hurricanes and ship collisions. An additional 30,000 barrels were released when a production fire resulted in the loss of well control of 12 wells on a production platform. The remaining

135,000 barrels that were released during blowouts occurred during drilling, well completion, or workover operations.

Table 2
Blowout Events Exceeding 1,000 Barrels on the Federal Outer Continental Shelf, 1964-2009

Year	Description of Event
1964	Two blowouts associated with a hurricane event that destroyed four platforms. Total of 10,280 barrels crude oil spilled.
1965	One blowout associated with drilling. 1,688 barrels condensate spilled.
1969	One blowout that occurred when a supply vessel collided with a drilling rig during a storm and sheared the wellhead. 2,500 barrels crude oil spilled.
1969	One blowout (Santa Barbara, California) was associated with drilling. 80,000 barrels spilled.
1970	One blowout was caused by a fire in the production area that resulted in the loss of control of 12 wells on the platform. 30,000 barrels crude oil spilled.
1970	One blowout associated with wireline work during workover operations. 53,000 barrels spilled.

Source: Minerals Management Service Database, 2010.

After these blowouts, in the period from 1971 through 2009, a total of approximately 1,800 barrels was spilled on the Federal OCS as a result of blowout events. Of that amount, 425 barrels were blowouts resulting from hurricane damage. An additional 450 barrels occurred at an oil pump during production operations. Since 1956, 15 blowouts resulted in at least one fatality; three of these events occurred after 1986.

While the rate of blowouts per well drilled has not increased, even as more activity has moved into deeper water, the experience with the BP Oil Spill illustrates the significant challenges in containing a blowout in deepwater, as compared to containing a blowout in shallower water.

III. EXISTING WELL CONTROL STUDIES

The Department has conducted research related to offshore oil and gas exploration, development, and production for two purposes: (1) to augment the overall knowledge base in the field, and (2) to identify information supporting new or modified requirements in a regulation or recommended practices. The Department maintains interagency agreements and working arrangements for research with other Federal agencies who share responsibility for regulatory oversight of OCS operations, including the Departments of Commerce, Energy, and Transportation.

Through the Technical Assessment & Research (TA&R) Program, the Department studies the operational safety, technology, and the pollution prevention and spill response capabilities

associated with offshore operations. The TA&R Program serves "to promote new technology and safety through the funding of collective research with industry, academia, and other government agencies and disseminate findings through a variety of public forums." *Minerals Management Service Engineering and Research Branch 2008-2012 Strategic Plan.* This program has funded or co-funded numerous studies investigating the use of well control techniques and equipment, including those associated with drilling fluid of a specified weight and circulation, cement with a specific bond and integrity, casing with a specific design, pressure control safety valves, and BOPs (see Table 3 for a list of well control studies funded by the Department since 1990). These studies have led to offshore drilling safety improvements around the world.

Table 3
TA&R Funded Well Control Research, 1990-2010

Study No.	Title of Study	Completion Date
8	Blowout Prevention Procedures for Deepwater Drilling	1978 to 2003
150	Floating Vessel Blowout Control	December 1991
151	Investigation of Simulated Oil Well Blowout Fires	1989 to 1993
170	Improved Means of Offshore Platform Fire Resistance	1991 and 1994
220	Study of Human Factors in Offshore Operations	1995 to 1997
253	Blowout Preventer Study	December 1996
264	Development of Improved Drill String Safety Valve Design and Specifications	1996 and 1998
319	Reliability of Subsea Blowout Preventer Systems for Deepwater Applications–Phase II	November 1999
382	Experimental Validation of Well Control Procedures in Deepwater	December 2005
383	Performance of Deepwater BOP Equipment During Well Control Events	July 2001
403	Repeatability and Effectiveness of Subsurface-Controlled Safety Valves	March 2003
408	Development of a Blowout Intervention Method and Dynamic Kill Simulated for Blowouts in Ultra-Deepwater	December 2004
431	Evaluation of Secondary Intervention Methods in Well Control	March 2003
440	Development and Assessment of Well Control Procedures for Extended Reach and Multilateral Wells	December 2004
455	Review of Shear Ram Capabilities	December 2004

463	Evaluation of Sheer Ram Capabilities	September 2004
519	Drilling and Completion Gaps for High Temperature and High Pressure In Deep Water	June 2006
540	Risk Assessment of Surface vs. Subsurface BOP's on Mobile Offshore Drilling Units	August 2006
541	Application of Dual Gradient Technology to Top Hole Drilling	November 2006
566	Using Equipment, Particularly BOP and Wellhead Components in Excess of the Rated Working Pressure	October 2006
582	A Probabilistic Approach to Risk Assessment of Managed Pressure Drilling in Offshore Drilling Applications	October 2008
631	Risk Profile of Dual Gradient Drilling	Estimated completion in September 2010
640	Risk Analysis of Using a Surface Blow Out Preventer	April 2010

Note: This report includes hyperlinks to the reports via the study numbers.

Source: Minerals Management Service Database, 2010.

These studies have examined, among other things, blind shear ram capabilities, back-up BOP systems, and drilling and cementing design and operations, which have informed the setting of Department regulations. For example, the 1999 *Reliability of Subsea BOP systems for Deepwater Applications* (study number 319) recommended modifying testing regulations to ensure that the testing of variable pipe rams appropriately account for the diameters of all the sizes of pipe in use in a given drilling project. The Department used this recommendation in revising its 2003 final drilling regulations.

The 2002 *Review of Shear Ram Capabilities* (study number 455) identified issues associated with the cutting power of shear rams, which are intended to cut through drill pipe when the well must be secured in an emergency situation. The Department adopted the report's recommendation that the BOP must be capable of shearing pipe planned for use in current drilling programs under 30 CFR 250.416(e). This regulation requires the submittal of information demonstrating that shear rams on the proposed BOP stack can cut drill pipe under maximum anticipated surface pressure.

The 2004 *Evaluation of Sheer Ram Capabilities* (study number 463) expanded on the analysis in study number 455 through an evaluation of BOP shear rams under the most demanding conditions. In this study, 214 pipe samples were tested against various ram models, and 16 (7.5 percent) were unsuccessful in shearing the pipe below a certain pressure (3,000 pounds per square inch). All 16 of these cases involved a particular combination of shear ram and pipe, which was found unsuitable for actual drilling operations. The results of this study confirmed the regulatory decision to require operators to submit documentation that shows the shear rams are capable of shearing the pipe in the hole under maximum anticipated surface pressures.

The 2003 *Evaluation of Secondary Intervention Methods in Well Control* (study number 431) reviewed the design and capabilities of various secondary BOP intervention systems used in practice. Secondary intervention represents an alternate means to operate BOP functions in the event of total loss of the primary control system or a means to assist personnel during situations involving imminent equipment failure or well-control problems. This study discusses the possible use of acoustic systems in the Gulf of Mexico. According to the report, there remain significant doubts about the ability of an acoustic control system to provide a reliable emergency back-up to the primary control system during an actual well flow event.

IV. Legal Framework, Inspections, and Enforcement

A. Statutory Authority

In 1953, the Congress passed the Outer Continental Shelf Lands Act (OCSLA) that defines the OCS as any submerged land outside state jurisdiction and established Federal jurisdiction over these waters and all resources they contain. The OCSLA also set Federal responsibilities for managing and maintaining the OCS subject to environmental constraints and safety concerns. The legislation authorized the Department to lease areas of the OCS for development and to regulate offshore operations and development. Since then, the OCSLA has been amended to address changing issues, including the 1978 requirement for the Department to develop 5-year leasing program schedules after consideration of environmental, social, and economic effects of natural gas and oil activity on OCS resources, location-specific risks, energy needs, laws, and stakeholder interests. This amendment also requires the Department to seek a balance between potential damage to the environment and coastal areas and potential energy supply. The first 5-year leasing program started in 1980 and the current 5-year plan ends in 2012.

Congress has also enacted laws to promote production in frontier areas like the Gulf of Mexico deepwater. For example, the 1995 Deepwater Royalty Relief Act encouraged oil and gas development in the Gulf of Mexico in water depths greater than 200 meters (656 feet) through royalty relief. Royalty relief incentives were also offered to encourage production from wells drilled for deep natural gas (greater than 15,000 feet or 4,572 meters total depth) on new leases located in shallow waters (less than 200 meters). The Energy Policy Act of 2005 included additional incentives for oil and gas development in offshore areas to stimulate production in deepwater and expanded the OSCLA to include the areas offshore Alaska for royalty suspension.

Oil and gas leasing and operations are subject to environmental reviews under the National Environmental Policy Act (NEPA). On May 14, 2010, Secretary of the Interior Ken Salazar and the Council on Environmental Quality Chair Nancy Sutley announced a full review of NEPA compliance for oil and gas activities on the OCS, and accordingly, NEPA will not be covered in this report.

B. Regulations

Under the OCSLA, the Secretary of the Interior, through the MMS, manages and regulates leasing, exploration, development, and production of resources on the OCS. Current regulations are a combination of prescriptive and performance-based measures.

Prescriptive regulations specify rules or courses of action that must be explicitly followed in order to comply with regulation. A prescriptive approach sets clear rules for industry to follow. Performance-based regulations, in contrast, specify objectives for industry to achieve but allow flexibility in the technology and approaches used to meet these objectives. This approach allows improved technologies and methodologies to be incorporated into industry practices without major revisions to regulations and puts the onus on industry to develop systems for continuous improvement of safety and environmental protection practices. Internationally, many countries (e.g., United Kingdom, Norway, and Australia) are moving toward more performance-based regulations. The Department also incorporates by reference recommended practices and standards from industry associations and technical standard setting groups such as the American National Standards Institute, API standards and recommended practice documents, and National Association of Corrosion Engineers documents. The Department also issues Notice to Lessees (NTLs) to clarify and provide direction on regulatory requirements.

The regulations in 30 CFR 250 govern important drilling operations on the OCS. Subpart D covers all aspects of the drilling operation including permitting, casing requirements, cementing requirements, diverter systems, BOP systems, drilling fluids requirements, equipment testing, and reporting. The minimum requirements for BOPs are stated in detail, including system components, surface and subsea BOP stacks, associated systems and equipment, choke manifolds, kelly valves, drill-string safety valves, maintenance and inspections, pressure tests and additional testing, and recordkeeping. Subpart Q covers decommissioning, which includes temporary abandonment of wells. These regulations are mainly prescriptive in nature, and convey the minimum requirements for safe operations.

While regulations governing OCS exploration, development, and production activities have been largely prescriptive, the Department has been considering more performance-based approaches. For example, the 2002 Subpart O (30 CFR 250.1500) training rule is a performance-based regulation. In addition, the Department has incorporated by reference nearly 100 consensus standards into current offshore operating regulations. In this way, the Department imposes a responsibility on operators to ensure safe operations through compliance with prescribed standards as well as compliance with performance-based, overarching measures. As such, it is the responsibility of operators to meet the requirements of 30 CFR 250.401:

> **What must I do to keep wells under control?** You must take necessary precautions to keep wells under control at all times. You must: (a) Use the best available and safest drilling technology to monitor and evaluate well conditions and to minimize the potential for the well to flow or kick and...(e) Use and maintain equipment and materials necessary to ensure the safety and protection of personnel, equipment, natural resources, and the environment.

Review of Applications for Permit to Drill (APDs)

Upon receipt of an APD, the Department reviews the approval documents for the Exploration or Development Plans for conditions that apply to the APD or the well's proposed location. The Department also assesses whether the applicant has oil spill financial responsibility coverage.

The Department conducts an engineering review of the APD, to check the proposed drilling rig's maximum operating limits for drilling depth and water depth to ensure appropriateness for the proposed well program. The review consists of, but is not limited to, the proposed procedure, well location and directional program, geological and geophysical hazards, subsurface environment for pore pressure and fracture gradient, wellbore design and schematic, design calculations for pressure containment during drilling and completion, cement volumes, and testing pressures for the well control equipment, casing and casing shoe. This review is performed for shallow and deepwater drilling operations, and a hurricane risk assessment is performed during hurricane season. The Department reviews APDs to determine how the proposed operation satisfies the regulations in meeting its objective of safely reaching a targeted depth. This review includes an assessment of:

- well casing setting depths determined by formation strength, predicted formation fluid pressure, drilling mud weight limits, any anticipated subsurface hazards;
- effectiveness of well casing strength for pressure containment at its specified depth;
- effectiveness of cementing the well casing after successfully securing and isolating the hydrocarbon zones or any encountered subsurface hazards; and
- maintaining well control by adjusting drilling mud properties and the use of well control equipment such as diverters and BOPs.

The Department reviews the operator's plans and APDs to verify the use of best available and safest technology (BAST), and inspections verify the use of approved equipment and maintenance thereof.

Upon completing the engineering review, the Department may approve the APD with conditions if warranted, return it to the operator for modifications, or deny it. If the applicant makes changes to the drilling application, the Department must grant approval before the applicant performs its work.

C. Inspections

The Department maintains a comprehensive inspection program to promote the safety of offshore oil and gas operations on the OCS. This program places inspectors offshore on drilling rigs and production platforms to enforce operator compliance with Federal safety and environmental protection requirements. When a drilling rig enters Federal waters to drill a well, Federal inspectors will meet the rig where it is moored to provide training to the rig operators about the Federal regulatory structure. At this time, inspectors will conduct a drilling inspection

of the equipment. It is Departmental policy for inspectors to inspect the rig once on location every 30 days.

For production platforms, it is practice for initial inspections to take place during the fabrication of the platform at a shipyard. Federal inspectors and engineers review the flow diagrams and charts to determine if the specific facility meets regulatory requirements. A complete production inspection of the facility occurs typically about 30 to 45 days after a production platform is installed.

After operations begin, the Department conducts additional announced and unannounced inspections. Inspectors typically give the operator a few days notice for announced inspections. Inspectors also fly to platforms or rigs unannounced, and in such cases, inspectors contact the operator as they approach the facility. These unannounced inspections foster a climate of safe operations, maintain an inspector presence, and allow regulators to focus on operators with a poor performance record. They are also conducted after a critical safety feature has previously been found defective during previous inspections or by operator reporting.

During a drilling inspection an inspector typically conducts the following:

- a general safety walk through of the facility looking for general housekeeping hazards related to slips/trips/falls/railings/open gratings;

- verification of the location of gas detectors/hydrogen sulfide detectors/mud volume detectors;

- verification that the mud trip tank is operational and properly marked (graduated), that appropriate quantities of a mud weighting material are onboard (barite), and that the drilling mud currently in use has been periodically tested and is of the proper density as indicated in the APD (viewing mud logger's report);

- verification that proper well control data relative to the well depth and type of tubulars (drill pipe, casing) in the well is clearly marked and posted on the rig floor and that there are remote BOP and Diverter control panels on the facility;

- verification that equipment is properly grounded and that drill string safety valves with proper wrenches for the diameter of drill pipe or casing currently in the well are located on the drill floor in an open position and within easy access to rig personnel;

- verification that the crown block safety device is installed and operational and that fresh air intakes are properly located on the rig;

- verification that diesel engines have required shut down devices, that breathing air is properly labeled, that engine exhaust is insulated;

- verification that crane load charts on platform rigs have been recorded, that all equipment has proper catch basins/drains/curbs/gutters/drip pans, that the facility is properly marked as to location, that the facility is properly lighted;

- if drilling is being conducted on a production facility, verification that there is an operational Emergency Shut Down device on the rig floor;

- verification of the status/switch position of the BOP pumps that the stand-by pump operates in an automatic fashion, that the accumulator bottles are in service;

- review the BOP tests records;

- checks the Subpart O well control status of contractor and lessee employees;

- checks for certain Potential Incidents of Noncompliance, which allow the inspector to check for general competency related to drilling operations; and

- inspectors may test, randomly or as a result of a safety concern, an offshore employee's competency with various safety devices.

The records check and documentation components of a drilling inspection apply to equipment, procedures, and operations that were conducted prior to the inspector boarding the facility, including but not limited to casing, cement, diverter, and BOP pressure testing results, casing setting depths, cement volumes, proper wait on cement time, formation pressure integrity tests, formation evaluation tests, required well control drills, hydrogen sulfide training certifications, and gas detector and hydrogen sulfide detector calibration records. Furthermore, the inspector confirms that proper paperwork is available in regard to any granted departures approved during the drilling of the well which were not previously approved in the APD.

During 2009, industry drilled a total of 331 wells in the Gulf of Mexico, and the MMS Gulf of Mexico Region conducted the following types and numbers of inspections:

- 561 drilling inspections;

- 3,678 production inspections;

- 268 well workover and well completion inspections;

- 6,804 meter inspections;

- 82 abandonment inspections;

- 4,837 pipelines inspections; and

- 3,342 personal safety inspections, on behalf of the U.S. Coast Guard.

E. Enforcement

The Secretary of the Interior, the Secretary of the Army, and the U.S. Coast Guard have the authority to pursue civil and criminal enforcement actions against persons who violate the OCSLA, the regulations created to implement the OCSLA, and the terms of any lease, license, or permit issued under OCSLA. The Department maintains a National Potential Incident of Noncompliance (PINC) List to help inspectors carry out enforcement actions: it contains a checklist of requirements for specific installations or procedures and prescribed enforcement actions consisting of written warnings, shut-in of a component, including wells, equipment, or pipelines, or shut-in of an entire platform if noncompliance with the National PINC is detected. If the violation does not impose an immediate danger to personnel or equipment, a warning Incident of Noncompliance (INC) is issued. An INC must be corrected within 14 days from the time specified on the INC, and the operator may not continue the activity in question until it has corrected the INC.

The OCSLA (43 U.S.C. § 1334(a)(2)) and regulations at 30 CFR 250.181-188 authorize the Secretary to cancel a lease or permit if, after opportunity and notice for a hearing, it is determined that: (1) continued activity would probably cause serious harm or damage to life, property, the environment, minerals, or national security or defense; (2) the threat of harm or damage will not disappear or decrease to an acceptable extent within a reasonable time; (3) the advantages of cancellation outweigh the advantages of continued activity; and (4) a suspension has been in effect for at least five years or the termination of suspension and lease cancellation are at the request of the lessee.

Regulations appearing in 30 CFR 250.135-136 provide for a disqualification process for operators exhibiting chronic poor compliance. This procedure allows operators to be placed on probation and requires that they submit Performance Improvement Plans. This gives the operator an opportunity to improve their performance. Should it not improve during a specified time, the operator may be disqualified from operating a given facility, including up to any and all facilities. Ultimately, an operator can go through Departmental debarment procedures that would prevent it from transacting any business with the Federal Government.

Under 43 U.S.C. § 1350(b) of the OCSLA, as amended, and regulations appearing at 30 CFR 250.200-206, civil penalties can be assessed for failure to comply with responsibilities under the law, a lease, a license, a permit, or any regulation or order issued pursuant to the Act. In addition to the enforcement actions specified above, civil penalty of up to $35,000 per violation per day may be assessed if: (1) the operator fails to correct the violation in the amount of time specified on the INC; or (2) the violation resulted in a threat of serious, irreparable, or immediate harm or damage to life, property, minerals, or the environment. On a drilling rig, for example, 160 items are checked for potential violations. If significant enough, the violation may call for the particular well component or the entire complex to be shut in. In 2009, drilling operations of 20 facilities were shut-in.

V. Regulatory Authority and Requirements in Other Nations

There have been and continue to be a number of approaches for regulating offshore drilling activity. Some countries have adopted a prescriptive approach directing offshore oil and gas activities through detailed regulations and requirements, while other regulatory bodies have adopted a performance-based approach. Some regulators have adopted a hybrid approach by being prescriptive in areas deemed critical, while also establishing broad performance parameters where they deem industry needs the latitude to meet particular objectives.

There is a major difference among offshore oil and gas regulators in the number of technical standards referenced within their regulations, and the effect of referenced standards. For example, in the United Kingdom, the standards are not compulsory, while in the United States, referenced standards have the same status as regulations. A standard is a formal document that establishes or defines a method or practice; these may also be called recommended practices. Some of the standards developing organizations, referenced in the regulations, include API, American Society of Mechanical Engineers, and American National Standards Institute. The following summarizes the regulatory structures in Norway, the United Kingdom, Australia, and Canada.

Norway

Over the past 40 years, Norway has moved from a prescriptive to a performance-based approach for regulating offshore oil and gas. Like the United States today with joint regulatory oversight of mobile drilling rigs by the Department and the U.S. Coast Guard, Norway originally regulated mobile units through its maritime authority and fixed installations by the Norwegian Petroleum Directorate (NPD).

Over time, the NPD has developed new approaches, including "compliance responsibility" that required companies to verify that their business was run acceptably and in line with the rules. The NPD eliminated the concept of inspection and replaced it with the concept of "supervision." They also replaced the term "approvals" with "consents." Supervision spans audits, verification, investigations, and most significantly, interaction with industry in the form of studies, professional seminars, and the development of regulations. These changes transformed the earlier approvals system that had the effect of the NPD being a virtual guarantor that company activities were acceptable into one centered on the concept of consent.

Since this major change in 1985, the trend has been away from prescription towards a regulatory approach based more on performance and risk management. Also, a series of reforms has resulted in regulations that are aligned with the changes in regulatory approach. Norway's regulatory requirements are general and primarily specify the conditions or functions that must be achieved to be compliant. Within this framework, companies have the freedom to choose practical solutions along with the responsibility to ensure compliance. To avoid misunderstandings about requirements for complying with the regulations, non-binding recommendations and guidelines have also been issued that reference reputable Norwegian and/or international industrial standards for structures, equipment, or procedures. These recommendations and guidelines rely primarily on Det Norske Veritas *Offshore Standards* that

provide technical requirements and acceptance criteria and *Recommended Practices* for proven technology and sound engineering practice.

This approach also means that the regulator must keep abreast of and participate in developing and revising industry standards to ensure that they remain relevant and reflect best practice. Supervision by the regulator involves checking whether the administrative management systems at the companies ensure acceptable operation. This auditing must be conducted by personnel who have special technical and management expertise and experience.

The NPD acknowledges that the requirements for successfully delivering performance-based regulations demands extensive participation from industry, employees, and the regulator in terms of expertise, management and flexibility. To achieve a safe and environmentally responsible offshore work environment, strategic, and operational plans must be drawn up, selected development measures implemented, progress monitored and corrective action taken when problems arise.

The Petroleum Safety Authority Norway (PSA) was established as an independent government regulator in 2004. It took over the safety department of the NPD and continued its role. Its authority was also extended to cover supervision of safety, emergency preparedness, and the working environment for petroleum-related plants and associated pipeline systems on land. Norway is working toward harmonizing their regulations for offshore and land-based petroleum operations under the PSA.

United Kingdom

The UK safety regulation is predominantly performance-based. Indeed, the safety case concept for offshore oil and gas operation began after the 1988 explosion and resulting fire of a North Sea oil production platform called Piper Alpha, which killed 167 men. The subsequent investigation led to the issuance of the Public Inquiry into the Piper Alpha Disaster (the Lord Cullen report) and the reorganization of the UK offshore safety laws from prescriptive to a safety case approach. UK standards describe objectives, and operators can select the methods and equipment used to achieve these objectives and meet their statutory obligations. Complementing the safety case regulations are approved codes of practice and guidance documents.

The UK regulates offshore oil and gas through the Health and Safety Executive (HSE). The core activities of HSE are safety case assessment, verification, inspection, investigation, and enforcement. The approval process for the HSE is case-specific, and each case must be accepted and approved before offshore installation operates. A government inspectorate is in place as an assurance mechanism. The HSE oversight includes over 300 installations including, production platforms, Floating Production Storage and Offloading units, and mobile offshore drilling units. Other legislation is applied offshore on an activity basis. In 1992, the Offshore Installation (Safety Case) Regulations were introduced into the UK sector. These require all fixed and mobile offshore installations operating in UK waters to have a safety case which must be reviewed and approved by the Health and Safety Executive.

Australia

The organization responsible for regulating Australia's oil and gas industry is The National Offshore Petroleum Safety Authority, an independent statutory agency designated under the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. This organization implements a performance-based regulatory approach. The regulator is responsible for providing assurance that the operators address risks identified by a safety case. The organization includes a joint government inspectorate, and requires third party validations for regulatory assurance. Each manned facility is inspected at least once every year. The inspections are planned and usually take several days. The subject of planned inspections includes both control and management of major equipment and occupational health and safety.

The primary features of the Australian regulatory system are:

- Duties of care: Specific categories of persons (operators, employers, etc.) who are involved in offshore petroleum activities at facilities are required to "take all reasonably practicable steps" to protect the health and safety of the facility workforce and of any other persons who may be affected.

- Consultation provisions: Mechanisms are set out that will enable effective consultation between each facility operator, relevant employers, and the workforce regarding occupational health and safety.

- Powers of inspectors: Inspectors are granted powers to enter offshore facilities or other relevant premises, conduct inspections, interview people, seize evidence and otherwise take action to ensure compliance by parties with legal obligations.

- Standards and best practices are based on a safety case approach, similar to that specified in the UK regulatory system.

Canada

The Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) and the Canada Newfoundland & Labrador Offshore Petroleum Board (C-NLOPB) are responsible for the regulation of petroleum activities in the Nova Scotia, Newfoundland, and Labrador offshore areas. Their principle responsibilities include ensuring health and safety for offshore workers, protection of the environment, conservation of offshore petroleum resources, compliance with legislative provisions regarding employment and industrial benefits, issuance of licenses for offshore exploration and development, and resource evaluation. Both boards are independent joint agencies of the Government of Canada and their respective provinces. Each work activity proposed in the offshore area related to exploration, drilling, production, conservation, processing, or transportation of petroleum requires the authorization of the responsible board. Assurance mechanisms include board inspections, audits and investigations programs, and industry self inspections. Operators are required to submit reports detailing the status of their work programs on an ongoing basis, along with other documentation to demonstrate compliance with regulatory requirements. The C-NSOPB oversees one operational natural gas project

comprised of five production platforms and one 26-inch pipeline. The C-NLOPB oversees three oil projects comprised of Floating Production Storage and Offloading units and one integrated drilling/production accommodation installation.

VI. Recommendations for Immediate Action to Improve Offshore Drilling Safety

The BP Oil Spill demonstrates the possibility of a catastrophic event (or multiple catastrophic failures) and, therefore, the need to ensure that oil and gas development on the Outer Continental Shelf can be conducted safely and that another event like the BP Oil Spill never occurs again.

This 30-day review has of necessity been conducted without the results of the ongoing investigations into the precise causes of the event. A series of other investigations will determine those causes in the coming months. Nevertheless, this report makes a set of interim recommendations based upon what is known about the equipment, systems, and practices necessary for safe operation. For example, the BP Oil Spill has underscored that as drilling activity moves increasingly into very deep water environments, it is important to reevaluate whether the best practices for safe drilling operations developed over the years need to be bolstered to account for the unique challenges of drilling in deepwater. In addition, the presumed failure of the BOP points to a need to examine standards specifically related to BOP safety.

With that context in mind, the recommendations are designed to address specific policies, practices, and procedures, which the Department has identified as important for workplace and environmental safety, even before completion of the investigation into the event. Many of the near-term recommendations are prescriptive in nature, reflecting the importance of addressing immediate needs while the Department conducts a more comprehensive examination of the entire regulatory program and determines whether additional performance-based standards are necessary.

Implementation of these recommendations is expected to improve safety of offshore drilling operations. In the coming months, these measures will be refined and supplemented based on recommendations from other reviews and investigations, including from continuing work at the Department as described below, from the Joint Investigation and from the independent bipartisan commission established by the President.

Each recommendation below is accompanied by a brief discussion of the context of the recommendations and an explanation of how it will enhance the safety of future OCS drilling activities. Each is also identified with regard to priority of expected implementation. Certain measures are intended for immediate implementation (within the next 30 days), through issuance of either a NTL, internal Departmental guidance, or in the case of a safety and environmental rule, through publication of the final rulemaking.

Other recommendations will be addressed through emergency rulemaking, where appropriate. It is the intent of the Department to issue expeditiously interim final rules to implement these recommendations. Such rules will become effective immediately upon issuance, but will also be

opened for public review and comment and may be adjusted after comments are received through the appropriate process.

Finally, several recommendations require further study and, therefore, will be addressed through notice and comment rulemaking. The Department will immediately establish strike teams within the Department to further develop these measures. These strike teams will address the highly technical and complex issues raised and will seek input as appropriate from academia, industry, and other technical experts and stakeholders. The teams will present their recommendations for additional environmental protection and safety measures within six months. Recommendations will be implemented as expeditiously as possible through formal rulemaking. The recommendations from these strike teams may also inform the efforts of the President's new bipartisan National Commission.

A primer on offshore drilling technology and systems describes many of the terms used in the below recommendations (see Appendix 2).

The specific recommendations of the Department follow:

I. Blowout Preventer Equipment and Emergency Systems

BOPs and Emergency Systems: BOPs are used to control the release of oil and gas in the event of loss of well control. Current drilling regulations impose specific requirements addressing BOP systems, including requirements for annular preventers and the primary systems that control those preventers, as well as pipe and blind-shear rams.

Although the regulations do not require specific secondary control systems (back-up systems) including subsea BOP safety systems, which are designed to shut-in the wellbore automatically during emergency events the Department only approves permits for which they are secondary control systems. These safety systems include autoshear and deadman systems. Emergency events could include the loss of communication and power between the surface and the BOP stack or an unplanned disconnect of the marine riser from the BOP stack. In addition, all Gulf of Mexico drilling rigs are currently equipped to use a remote operated vehicle (ROV) to provide secondary control of the subsea BOP stack, and most provide other tertiary control systems as well. The ROV intervention capability is limited on some subsea BOP stacks while others have the ability to control multiple functions.

A. Certification of Subsea BOP Stack

Recommendation 1 – Order Immediate Re-certification of All BOP Equipment Used in New Floating Drilling Operations

Prior to spudding any new well from a floating vessel, the operator will be required to obtain a written and signed certification from an independent third party attesting that, on or after the date of this report, a detailed physical inspection and design review of the BOP has been conducted in accordance with the Original Equipment Manufacturer specifications and that: (i) the BOP will operate as originally designed, and (ii) any modifications or upgrades to the BOP stack

conducted after delivery have not compromised the design or operation of the BOP. This certification must be submitted to the Department and made publicly available. Prior to deploying the BOP, the operator must also verify that any modifications or upgrades to the BOP are approved by the Department and that documentation showing that the BOP has been maintained and inspected according to the requirements in 30 CFR 250.446(a) and other applicable standards and is on file with the Department and available for inspection.

Recommendation 2 – Order BOP Equipment Compatibility Verification for Each Floating Vessel and for Each New Well

For each new well, the Department will require, as part of a structured risk management process, the operator to obtain an independent third party verification that:

- The BOP stack is designed for the specific drilling equipment on the rig and for the specific well design including certification that the shear ram is appropriate for the drilling project.
- The BOP stack has not been compromised or damaged from previous service.
- The BOP stack will operate in the water depth in which it will be deployed.

Recommendation 3 – Develop Formal Equipment Certification Requirements

The Department will investigate new certification requirements for BOP equipment and other components of the BOP stack such as control panels, communication pods, accumulator systems, and choke and kill lines. In addition, the Department will develop a system to make BOP certifications publicly available in order to increase transparency and accountability.

B. New Safety Equipment Requirements and Operating Procedures

Recommendation 4 – New Blind Shear Ram Redundancy Requirement

The BOPs used in all floating drilling operations will be required to have two sets of blind shear rams spaced at least four feet apart (to prevent system failure if drill pipe joint or drill tool is across one set of rams during an emergency).

Recommendation 5 –Secondary Control System Requirements and Guidelines

The Department will establish clear requirements for secondary BOP control systems on all subsea BOPs and for systems that address well-control emergencies. These requirements will include:

- ROV intervention capabilities for secondary control of all subsea BOP stacks, including the ability to close all shear and pipe rams, close the choke and kill valves and unlatch the lower marine riser package (LMRP).

- Requirements for an emergency back-up BOP control system, e.g., autoshear, deadman, emergency disconnect system, and/or an acoustic activation system that is powered by a separate and independent accumulator bank with sufficient capacity to open and close one annular-type preventer and all ram-type preventers, including the blind shear ram.

- Guidelines for arming and disarming the secondary BOP control system.

- Requirements for documentation of BOP maintenance and repair (including any modifications to the BOP stack and control systems).

Recommendation 6 –New ROV Operating Capabilities

The Department will develop requirements for ROV operating capabilities including the following:

- Standardized intervention ports for all subsea BOP stacks to ensure compatibility with any available ROV.

- Visible mechanical indicator or redundant telemetry channel for BOP rams to give positive indication of proper functioning (e.g., a position indicator).

- ROV testing requirements, including subsea function testing with external hydraulic supply.

- An ROV interface with dual valves below the lowest ram on the BOP stack to allow well-killing operations.

C. New Testing Guidelines and Inspection Procedures

Recommendation 7 – Develop New Testing Requirements

The Department will develop surface and subsea testing of ROV and BOP stack capabilities. These will include:

- Surface and subsea function and pressure testing requirements to ensure full operability of all functions (emergency disconnect of the LMRP and loss of communication with the surface control pods (e.g., electric and hydraulic power)).

- Third party verification that blind-shear rams will function and are capable of shearing the drill pipe that is in use on the rig.

- ROV performance standards, including surface and subsea function testing of ROV intervention ports and ROV pumps, to ensure that the ROV can close all shear and pipe rams, close the choke and kill valves, and unlatch the LMRP.

- Protocols for function testing autoshear, deadman, emergency disconnect systems, and acoustic activation systems.

- Mandatory inspection and testing of BOP stack if any components are used in an emergency (e.g., use of pipe or casing shear rams or circulating out a well kick). This testing must involve a full pressure test of the BOP after the situation is fully controlled, with the BOP on the wellhead.

Recommendation 8 – Develop New Inspection Procedures and Reporting Requirements

- The Department will evaluate and revise the manner in which it conducts its drilling inspections. Revised drilling inspections will include the witnessing of actual tests of BOP equipment, including the new requirements and guidance that address the surface and subsea testing of ROV and BOP stack capabilities. The Department will also develop methods to increase transparency and public availability of the results of inspections as well as routine reporting. The Department will work with Congress to obtain the necessary resources to implement these recommendations.

- Within 15 days of the date of this report, all operators of floating drilling equipment will report to the Department the following: (i) BOP and well control system configuration; (ii) BOP and well control system test results, including any anomalies in testing or operation of critical BOP components; (iii) BOP and loss of well control events; and (iv) BOP and well control system downtime for the last three years of drilling operations.

- The electronic log from the BOP control system must be transmitted online to a secure location onshore and made available for inspection by the Department.

II. Procedures to Ensure Adequate Physical Barriers and Well Control Systems are in Place to Prevent Oil and Gas from Escaping into the Environment

Minimizing Risk of Uncontrolled Flow: A well creates a conduit for subsurface formations to potentially flow uncontrolled to the surface. There are multiple methods that can be utilized to minimize the risk of the occurrence of uncontrolled flow. Those methods include the installation of rigid physical barriers such as cement plugs or mechanical plugs, well casing design and securing of the casing, and well control equipment. An appropriate well safety program must account for many factors unique to the drill location and dictates the installation of plugs and casing at strategic points to maintain well control and to enable drilling to the desired depth. Current Department regulations require that well-control equipment be in place at all times during the drilling operation to mitigate against failure of a plug or casing. Other, more specific standards may be appropriate to improve physical barriers and well-control systems. Well-control procedures must be revisited for deepwater operations because of the complexity of the equipment design in deepwater and the location of the BOP stack on the seafloor. Enhanced training for rig personnel will complement new well-control requirements.

A. Well-Control Guidelines and Fluid Displacement Procedures

Recommendation 1 – Establish Deepwater Well-Control Procedure Guidelines

As expeditiously as possible, the Department will establish new requirements for deepwater well-control procedures no later than 120 days of the date of this report.

Recommendation 2 – New Fluid Displacement Procedures

Prior to displacement of kill-weight drilling fluid from the wellbore, the operator must independently verify that:

- The BOPs are closed during displacement to underbalanced fluid columns to prevent gas entry into the riser should a seal failure occur during displacement.
- Two independent barriers, including one mechanical barrier, are in place for each flow path (i.e., casing and annulus), except that a single barrier is allowable between the top of the wellhead housing and the top of the BOP.
- If the shoe track (the cement plug and check valves that remain inside the bottom of casing after cementing) is to be used as one of these barriers, it is negatively pressure tested prior to the setting of the subsequent casing barrier. A negative pressure test must also be performed prior to setting the surface plug.
- Negative pressure tests are made to a differential pressure equal to or greater than the anticipated pressure after displacement. Each casing barrier is positively tested to a pressure that exceeds the highest estimated integrity of the casing shoes below the barrier.
- Displacement of the riser and casing to fluid columns that are underbalanced to the formation pressure in the wellbore is conducted in separate operations. In both cases, BOPs must be closed on the drill string and circulation established through the choke line to isolate the riser, which is not a rated barrier. During displacement, volumes in and out must be accurately monitored.
- Drill pipe components positioned in the shear rams during displacement must be capable of being sheared by the blind-shear rams in the BOP stack.

B. Well Design and Construction

1. Requirements for Both Casing and Cementing

Recommendation 3 – New Casing and Cement Design Requirements: Two Independent Tested Barriers

Before spudding any new floating drilling operation, all well casing and cement designs must be certified by a Professional Engineer, who verifies that there will be at least two independent

tested barriers, including one mechanical barrier, across each flow path during well completion and abandonment activities and that the casing design is appropriate for the purpose for which it is intended under reasonably expected wellbore conditions.

Recommendation 4 – Study Formal Personnel Training Requirements for Casing and Cementing Operations

The Department will immediately establish a technical workgroup to evaluate new training and certification requirements for rig personnel specifically related to casing and cementing operations.

2. Casing Requirements

Recommendation 5 – New Casing Installation Procedures

The Department will ensure the requirement of the following BAST practices:

- Casing hanger latching mechanisms or lock down mechanisms must be engaged at the time the casing is installed in the subsea wellhead.
- For the final casing string, the operator must verify the installation of dual mechanical barriers (e.g., dual floats or one float and a mechanical plug) in addition to cement, to prevent flow in the event of a failure in the cement.

Recommendation 6 – Develop Additional Requirements or Guidelines for Casing Installation

The Department will establish specific requirements for the following procedures and practices:

- Positive and negative test procedures and use of test results for evaluation of casing integrity.
- Use of float valves and other mechanical plugs in the final casing string or liner.

3. Cementing Requirements

Recommendation 7 – Enforce Tighter Primary Cementing Practices

- The Department will institute a rulemaking address previously identified gaps in primary cementing practices).
- The Department, with input from independent experts will determine specific cementing requirements.

Recommendation 8 – Develop Additional Requirements or Guidelines for Evaluation of Cement Integrity

The Department will immediately evaluate whether and under what circumstances the use of cement bond logs is feasible and practical and will increase safety.

Discussion of Recommendations 3-8

Recommendations 3-8 are intended to result in better well control. Requiring a Professional Engineer to review and certify the well design will add another level of review to the current well design requirements. The Department's review new training requirements for casing and cementing operations helps focus industry and rig personnel on the importance of proper casing and cementing operations. Additional operational requirements for casing installation and cementing operations will add new assurances that adequate barriers are in place before continuing on to new drilling activities. Incorporation of the new cementing standard will bring all of industry up to state-of-art cementing practices—this means less chance of a well blowout due to a poor cement job.

C. Wild-Well Intervention

Recommendation 9 – Increase Federal Government Wild-Well Intervention Capabilities

Blown out, or "wild" wells, involve the uncontrolled release of crude oil or natural gas from an oil well where pressure control systems have failed. The Federal Government must develop a plan to increase its capabilities for direct wild-well intervention to be better prepared for future emergencies, particularly in deepwater. Development of the plan should consider existing methods to stop a blowout and handle escaping wellbore fluids, including but not limited to coffer dams, highly-capable ROVs, portable hydraulic line hook-ups, and pressure-reading tools, as well as appropriate sources of funding for such capabilities.

Recommendation 10 – Study Innovative Wild-Well Intervention, Response Techniques, and Response Planning

The Department will investigate new methods to stop a blowout and handle escaping wellbore fluids. A technical workgroup will take a fresh look at how to deal with a deepwater blowout. In particular, the workgroup will evaluate new, faster ways of stopping blowouts in deepwater. The technical workgroup will also address operators' responsibility, on a regional or industry-wide basis, to develop and procure a response package for deepwater events, to include diagnostic and measurement equipment, pre-fabricated systems for deepwater oil capture, logistical and communications support, and plans and concepts of operations that can be deployed in the event of an unanticipated blowout, as well as assess and certify potential options (e.g., deepwater dispersant injection).

III. Organizational and Safety Management

A. Increased Enforcement of Existing Safety Regulations and Procedures

Enforcing Existing Regulations: Immediately following the BP Oil Spill, the MMS and the U.S. Coast Guard issued a joint Safety Alert to compel operators and drilling contractors to inspect their drilling equipment (both surface and subsea), review their procedures to ensure the safety of personnel and protection of the environment, and review all emergency shutdown and dynamic positioning procedures. Inspections began immediately to verify that all active deepwater drilling activities complied with these recommendations and all other regulations. Following the completion of the drilling inspections, inspections of all deepwater production facilities began immediately to ensure compliance by those facilities with the regulations. Reconfirmation of adherence to this Safety Alert and all existing regulations will heighten safety awareness.

Recommendation 1 – Compliance Verification for Existing Regulations and April 30, 2010, National Safety Alert

Within 30 days of the date of this report, the Department, in conjunction with the Department of Homeland Security, verify compliance by operators with existing regulations and National Safety Alert (issued April 30, 2010), which issued the following safety recommendations to operators and drilling contractors:

- Examine all well-control equipment (both surface and subsea) currently being used to ensure that it has been properly maintained and is capable of shutting in the well during emergency operations. Ensure that the ROV hot-stabs are function-tested and are capable of actuating the BOP.

- Review all rig drilling/casing/completion practices to ensure that well-control contingencies are not compromised at any point while the BOP is installed on the wellhead.

- Review all emergency shutdown and dynamic positioning procedures that interface with emergency well control operations.

- Inspect lifesaving and firefighting equipment for compliance with Federal requirements.

- Ensure that all crew members are familiar with emergency/firefighting equipment, as well as participate in an abandon ship drill. Operators are reminded that the review of emergency equipment and drills must be conducted after each crew change out.

- Exercise emergency power equipment to ensure proper operation.

- Ensure that all personnel involved in well operations are properly trained and capable of performing their tasks under both normal drilling and emergency well-control operations.

After the 30-day compliance period, the Department will provide a public report on operator verification, including any cases of non-compliance.

B. Organizational Management

Organizational Safety Case Documentation: A safety case is a comprehensive and structured set of safety documentation to ensure the safety of a specific vessel or equipment. This documentation is essentially a body of evidence that provides a basis for determining whether a system is adequately safe for a given application in a given environment. In response to the 1988 Piper Alpha disaster in the UK, the Lord Cullen investigation and report advanced the safety case concept for offshore oil and gas operations.

The use of a formal safety case for drilling operations is an important component in regulating drilling activities in many countries. The International Association of Drilling Contractors (IADC) has developed guidelines that can be applied to any drilling unit regardless of geographic location. The use of these guidelines can assist both the operator and regulatory authorities when evaluating a drilling contractor's safety management program by providing them assurance that the program encompasses a series of best industry practices designed to minimize operating risks. The Department will undertake an evaluation of requiring the application of all or part of these guidelines to OCS oil and gas operations.

Recommendation 2 – The Department Will Adopt Safety Case Requirements for Floating Drilling Operations on the OCS

The Department will assure the adoption of appropriate safety case requirements based on IADC Health, Safety and Environmental Case Guidelines for Mobile Offshore Drilling Units (2009), which will include well construction safety assessment prior to approval of APD. This safety case must establish risk assessment and mitigation processes to manage a drilling contractor's controls related to the health, safety, and environmental aspects of their operations. In addition to the safety case, a separate bridging document will be required to connect the safety case to existing well design and construction documents. Such a proposed Well Construction Interfacing Document will include all of the elements in a conventional bridging document plus alignment of the drilling contractor's management of change (MOC) and risk assessment to the lease operator's MOC and well execution risk assessments. The use of the IADC's Health, Safety, and Environmental Case Guidelines for Mobile Offshore Drilling Units will help operators and drilling contractors demonstrate their ability to operate safely and handle the risks associated with drilling on the OCS.

C. Personnel Accountability Procedures for Operational Safety (Risk, Injury, and Spill Prevention)

Recommendation 3 – Finalize a Rule that Would Require Operators to Develop a Robust Safety and Environmental Management System for Offshore Drilling Operations

Department investigation findings and reports indicate that unsafe offshore drilling operations often result from human error. The Department is proceeding with the rulemaking process to finalize a regulation to require operators on the OCS to adopt a comprehensive, systems-based approach to safety and environmental management that incorporates best practices from around the globe. The Department believes that requiring operators to implement robust and comprehensive safety and environmental management plans could reduce the risk and number of injuries and spills during OCS activities. The Department will finalize a rule that is informed by current operational conditions in the Gulf and the events and related investigation surrounding the BP Oil Spill.

Recommendation 4 – Study Additional Safety Training and Certification Requirements

The Department will immediately establish a workgroup to investigate safety training requirements for floating drilling rig personnel and possible requirements for independent or more frequent certification and testing of personnel and safety systems.

- Establish an oil production safety program or institute similar to U.S. Nuclear Regulatory Commission (NRC) reactor safety program.
- Establish a formalized analytical methodology to assess performance of safety systems in the event of multiple component failure or excursions outside normal environmental ranges.
- Strengthen technical support to the Department and other regulatory authorities, including the resources necessary to obtain independent technical review of regulations and standards.
- Charter a longer-term technical review of BOP equipment and emergency backup system reliability.
- Review and adopt as appropriate best practices from other agencies with similar responsibility for safety regulation of technically complex systems (e.g., Federal Aviation Administration, NRC, Chemical Safety Board, and National Transportation Safety Board).

VII. CONCLUSION

The Department developed these recommendations with input and suggestions from experts from across the field and reviewed by members of the National Academy of Engineering. The

Department has presented new requirements for well design, construction and operation and for the quality and sufficient redundancy of fail-safes, so as to promote better well control and ensure the efficacy of the BOPs. The Secretary of the Interior has directed the Department to develop measures to increase the frequency, thoroughness, and transparency of inspections, such as for testing of BOPs and associated back-up systems. The Secretary has also directed the Department to look at innovative ways of promoting a greater culture of safety through a new rule that would require all rig operators to develop enhanced operational, safety, and environmental management plans, which would include more extensive worker training to enable them to adapt and respond effectively to events when something unexpected happens on a drilling rig.

The Department's approach to implementing these recommendations will follow a continuum from near-term prescriptive regulations, which are required to increase immediately the margin of safety in offshore oil and gas development, to longer-term actions designed to facilitate an environment where the absolute highest standard of performance is demanded of industry. This approach puts the onus on industry to perform safely, with the Government focusing on aggressive verification and enforcement. The majority of the specific recommendations contained in this report fall within the category of near-term prescriptive actions necessary to increase offshore energy production safety immediately.

At the same time, the Secretary has directed a fundamental restructuring of the MMS to bring greater clarity to the roles and responsibilities of the Department while strengthening oversight of the companies that develop energy in our Nation's waters. This restructuring, the latest in a series of reforms to the MMS that the Secretary began in January 2009, will establish:

- Bureau of Ocean Energy Management: A new bureau under the supervision of the Assistant Secretary for Land and Minerals Management that will be responsible for the sustainable development of OCS conventional and renewable energy resources, including resource evaluation, planning, and other activities related to leasing.

- Bureau of Safety and Environmental Enforcement: A bureau under the supervision of the Assistant Secretary for Land and Minerals Management that will be responsible for ensuring comprehensive oversight, safety, and environmental protection in all offshore energy activities.

- Office of Natural Resources Revenue: An office under the supervision of the Assistant Secretary for Policy, Management and Budget that will be responsible for the royalty and revenue management function including the collection and distribution of revenue, auditing and compliance, and asset management.

Another critical part of the ongoing effort to reform the MMS began in September 2009 when the Secretary asked the National Marine Board, an arm of the highly respected National Academy of Sciences, to direct an independent review of MMS's inspection program for offshore facilities. That review is on-going.

The Secretary is committed to implementing the changes recommended in this report at the same time this and other reviews are ongoing and at the same time that the Department undertakes

fundamental change in its OCS oversight. The Secretary established by Secretarial Order 3298 the OCS Safety Oversight Board. The OCS Safety Oversight Board is a high-level team, led by the Assistant Secretary for Land and Minerals Management, the Assistant Secretary for Policy, Management and Budget, and the Inspector General, that reviews and oversees OCS operations to support reasoned and fact-based recommendations for potential improvements.

The success of the Department's longer-term objective of creating a more dynamic and effective regulatory environment for offshore energy production overall is very much the focus of the efforts to restructure the MMS. Specifically, the persons responsible for designing the new Bureau of Safety and Environmental Enforcement have been tasked to create a structure, operational processes, and culture that supports both the longer-term recommendations contained in this report, as well as a continuously evolving set of additional policies and practices that provide the highest assurance of safety in offshore energy operations.

As the Presidential Commission completes its review and as the Department and the U.S. Coast Guard finish the root cause investigation, the Department will know more and will respond accordingly. The measures contained in this report will increase the safety in offshore oil and gas development, but represent only the beginning of the Department's work.

Appendix 1: Expert Consultations

The Department consulted with a wide range of experts in state and Federal governments, academic institutions, and industry and advocacy organizations. In addition, draft recommendations were peer reviewed by seven experts identified by the National Academy of Engineering.

Expert Reviewers of the National Academy of Engineering

- **Bea, Robert** holds a Bachelor of Science in Civil Engineering and a Master of Science in Engineering both from the University of Florida. Dr. Bea has done post-graduate studies at Tulane University, Rice University, Texas A&M University, Bakersfield College, University of Houston, and the Technical and Scientific University of Norway. Dr. Bea received a PhD from the University of Western Australia. He is a registered Professional Civil Engineer (retired) in Louisiana, Texas, Florida, Alaska, Washington, Oregon and California. He is a registered Professional Geotechnical Engineer (retired) in California. He is a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the National Academy of Engineering. Dr. Bea has 55 years of experience in engineering and management of design, construction, maintenance, operation and decommissioning engineered systems, including offshore platforms, pipelines and floating facilities. Dr. Bea has worked for the U.S. Army Corp of Engineers, Shell Oil Company, the Ocean Services Division of Woodward-Clyde Consultants, PMB Engineering – Bechtel Inc., and the University of California at Berkeley where he is currently a professor. In 2009, he was honored by the Offshore Technology Hall of Fame.

- **Brett, Ford** holds a Bachelor of Science in mechanical engineering and physics from Duke University as well as a Master of Science in Engineering from Stanford University and a Masters of Business Administration from Oklahoma State University. Mr. Brett is recognized as a leader in the area of Petroleum Project Management. He has consulted more than 25 countries in the area of petroleum project and process management. Formerly, Mr. Brett worked with Amoco Production Company where he specialized in drilling projects in the Bering Sea, North Slope of Alaska, Gulf of Mexico, offshore Trinidad and Wyoming. In 1996, Mr. Brett was nominated for the National Medal of Technology, the U.S. Government's highest technology award. Mr. Brett has been granted over 25 U.S. patents.

- **Baugh, Benton** holds a Bachelor of Science in Mechanical Engineering from the University of Houston; a Master of Science in Mechanical Engineering and PhD in Mechanical Engineering from Kennedy Western University. Additionally, Dr. Baugh graduated from the Army Machinist School. Dr. Baugh has been employed by Bowen, Camco, Cameron, Vetco, Brown Oil Tools, and Baugh Consulting Engineers. Dr. Baugh is the owner and President of Radoil, Inc., which designs and manufactures oilfield and subsea products. Dr. Baugh has received over 100 U.S. patents for his tool and solution designs, consulting and management. Dr. Baugh has over 50 years of oilfield machine design, manufacturing, management, consulting, and expert witness experience.

- **Chenevert, Martin** holds a Bachelor of Science in Petroleum Engineering from Louisiana State University as well as a Master of Science in Petroleum Engineering and a Doctor of Philosophy in Petroleum Engineering, both from the University of Texas at Austin. Dr. Chenevert has over ten years of industrial experience with Exxon Production Research and Exxon USA and over 30 years of teaching experience from Oklahoma State University, the University of Houston, and the University of Texas. Dr. Chenevert has published over 120 articles on well control, wellbore stability, rock mechanics, drilling fluids, and cementing.

- **Holand, Per** graduated from Norwegian University of Science and Technology in 1982 with a Master of Science in Mechanical Engineering. He has 18 years experience from safety and reliability engineering at SINTEF, prior to joining ExproSoft on May 1, 2001. His main work focus in SINTEF and ExproSoft has been on the reliability of drilling equipment, offshore blowout experience, subsea and well reliability analyses. Dr. Holand carried out numerous subsea BOP reliability studies on behalf of clients in Norway, Brazil, the United States, and Italy. Since 1990 he has been responsible for maintaining the SINTEF Offshore Blowout Database, which serves as the key information in connection with blowout risk analyses in the North Sea area. Dr. Holand holds a PhD (1996) in safety and reliability engineering from the Norwegian University of Science and Technology in Trondheim, Norway. His PhD was later reworked and published as a book at the Gulf Publishing Company in 1997 (Title: Offshore Blowouts, Causes and Control).

- **Juvkam-Wold, Hans** holds a Bachelor of Science, Master of Science, and a Doctor of Science in Mechanical Engineering from the Massachusetts Institute of Technology. His area of expertise is buckling of tubular in horizontal drilling, well control, Arctic and offshore drilling, and dual-gradient drilling in ultra-deep water. Dr. Juvkam-Wold is a Registered Professional Engineer in Texas. Prior to his 24 years of teaching drilling experience at the University of Texas A&M, Dr. Juvkam-Wold has 20 additional years of oil industry experience: Juvkam-Wold has served as a Consultant for the National Institute of Standards & Technology; Frontier and Offshore Technology Co.; Western Irrigation Supply House; Oil & Gas Consultants Inc.; Ocean Drilling Program; Unocal E&P. He has served as the Gulf Mineral Resources Company's Representative on the industry's advisory committee on mine shaft drilling as well as manager of technical services and section supervisor of production engineering. Dr. Juvkam-Wold joined Texas A&M in 1985 with his main area of teaching and research in drilling; he is now a Professor Emeritus of Petroleum Engineering. Dr. Juvkam-Wold holds seven drill-related U.S. patents.

- **Stancell, Arnold** holds a Doctor of Science in Chemical Engineering from the Massachusetts Institute of Technology. Dr. Stancell is the retired Vice president of Mobil Oil, Exploration and Production, and Professor Emeritus, Chemical Engineering, Georgia Tech. Dr. Stancell was awarded nine U.S. patents and was inducted into the National Academy of Engineering and received the AIChE's National Award in Chemical

Engineering Practice. He is a licensed Professional Engineer in New York and Connecticut.

Other Experts Consultations

- **Arnold, Ken** holds a Bachelor of Science in Civil Engineering from Cornell University and a Master of Science in Civil Engineering from Tulane University. Mr. Arnold is currently a registered Professional Engineer in the State of Texas, is a member of the Marine Board of the National Research Council, Society of Petroleum Engineers, the Texas Society of Professional Engineers, was elected to the National Academy of Engineers in 2005 due to his work on offshore safety and is a member of the Academy of Medicine, Engineering and Science of Texas.

- **Danenberger, Elmer "Bud"** holds a Bachelor of Science degree in Petroleum and Natural Gas Engineering and a Master's degree in Environmental Pollution Control, both from Pennsylvania State University. After a 38-year career, Mr. Danenberger retired from the Department of the Interior's offshore oil and gas program in January 2010. During his career, Mr. Danenberger served as a staff engineer in the Gulf of Mexico regional office, Chief of the Technical Advisory Section at the headquarters office of the U.S. Geological Survey, District Supervisor for several MMS offices, and Chief of the Engineering and Operations Division at MMS Headquarters. For the last five years of his tenure at the Department, he served as Chief, Offshore Regulating Programs with responsibilities for safety and pollution prevention research, investigations, regulations and standards, and inspection and enforcement programs.

- **Epstein, Lois** holds a Bachelor of Science in Mechanical Engineering from Massachusetts Institute of Technology and a Master of Science in Mechanical Engineering from Stanford University. Ms. Epstein is currently a licensed engineer in Maryland. Ms. Epstein is a former Senior Engineer, Cook Inlet Keeper. Ms. Epstein is the President of LNE Engineering and Policy, which provides technical and policy consultant to non-profit organizations on oil/gas issues. Ms. Epstein was a public member of the Office of Pipeline Safety Federal Advisory Committee on Hazardous Liquid Pipelines from 1995 through 2007.

- **O'Reilly, David J.** is the retired Chairman and Chief Executive Officer of Chevron Corporation. Mr. O'Reilly is a native of Dublin, Ireland, where he earned his Bachelor's degree in Chemical Engineering from the University College, Dublin. Mr. O'Reilly started as a process engineer with Chevron Research Co in 1968 and after several decades and earning positions of increasing responsibility he was elected Senior Vice President and Chief Operating Officer of Chevron Chemical Company in 1989. Mr. O'Reilly was named Chairman and Chief Executive Office of Chevron Corporation on January 1, 2000, and he held that position until his retirement on December 31, 2009. Mr. O'Reilly is the Vice Chairman of the National Petroleum Council. He is a director of Bechtel Group, Inc., a member of The Business Council, the World Economic Forum's International Business Council, and the American Society of Corporate Executives. He also serves on the San Francisco Symphony Board of Governors.

- **Regg, Jim** holds a Bachelor of Science in Petroleum and Natural Gas Engineering from Pennsylvania State University as well as a Bachelor of Art in Math/Science from Edinboro State University. Mr. Regg worked for the Minerals Management Service Field Operations for almost 20 years where his primary focus was technology assessment. Currently Mr. Regg is a Senior Petroleum Engineer for the Alaska Oil & Gas Conservation Commission where he is responsible for managing the compliance inspection program (including investigations and enforcement); well integrity and regulation development.

- **Ward, E.G. "Skip"** holds a Bachelor of Science in Mechanical Engineering from Lamar University and a Master's and Doctorate in Mechanical Engineering from the University of Houston. Dr. Ward spent 30 years with Shell Oil Co. beginning in Shell Development's E&P Research Division in 1968 as a researcher. From 1981 to 1985, he supervised the Oceanographic Engineering section. From 1985 through 1994, he managed the Offshore Engineering Research Department. In 1994, Dr. Ward became the technology manager of Shell Offshore Inc's Deepwater Division where he was responsible for a group that designed deepwater structures and developed new structural concepts and components for deepwater production systems. Dr. Ward has been a member of the American Petroleum Institute since 1976 and received API's 30+ Years of Service Recognition Award in 2006. Dr. Ward served on the Marine Board of the National Academies for nine years. Dr. Ward is currently the Associate Director of the Texas Engineering Experiment Station's Offshore Technology Research Center.

- **West, Robin** is the current Chairman, Founder, and Chief Executive Officer of PFC Energy where he advises chief executives of leading international oil and gas companies and national oil companies on corporate strategy, portfolio management, acquisitions, divestitures, and investor relations. Before founding PFC Energy in 1984, Mr. West was the Assistant Secretary of Policy, Management and Budget at the Department of the Interior from 1981 through 1983. While there, he conceived of and implemented the Outer Continental Shelf Leasing Schedule and managed the $14 billion per year OCS budget policy. Mr. West also served as the Deputy Assistant Secretary of Defense for International Economic Affairs during the Ford Administration. Mr. West has served on several boards and commissions including a Presidential appointment to the National Advisory Committee on Oceans and Atmosphere in 1977. Mr. West is also a member of the National Petroleum Council; Director of the Magellan Petroleum Corporation; Director of Key Energy Services, Inc and Director of Cheniere Energy. He earned his Bachelor of Arts from the University of North Carolina at Chapel Hill and a Juris Doctorate from Temple University.

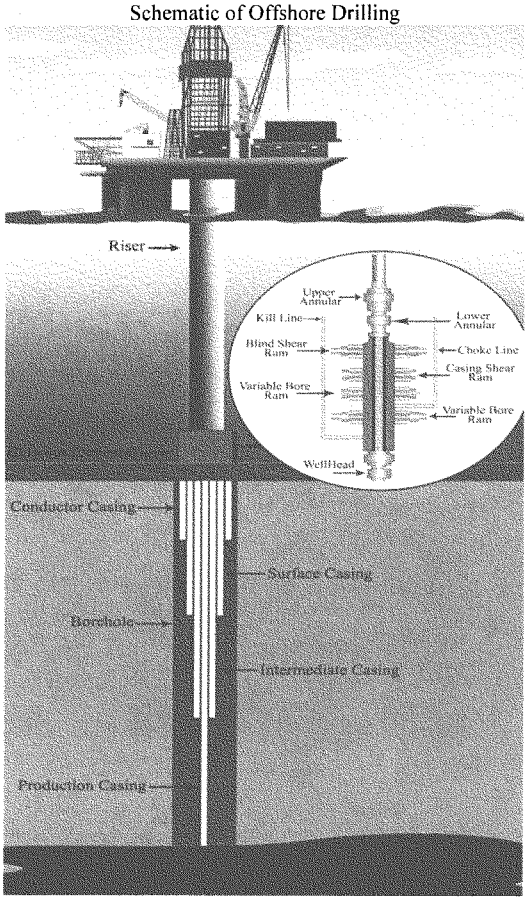
- **Williams, Tom** has been in the energy business for over 28 years. He is currently the Managing Director of Nautilus International LLC. Mr. Williams served as President of Maurer Technology Inc, a leading drilling research and development and engineering technology company. From 1993 through 2000, he was Business Director at Westport Technology Center, a leading upstream oil and gas research company. Mr. Williams held senior executive positions at the Departments of the Interior and Energy during the Bush

Administration from 1989 through 1993. He owned and operated an oil and gas exploration, production and consulting company prior to joining the Department of Energy. Mr. Williams is currently on the Board of Directors of Far East Energy Corporation, a public oil and gas company with operations in China; Board of Directors of Petris Technology, Inc, TerraPlatforms LLC; The Research Partnership to Restore Energy for America; The Contributor Committee Co-Chair of DeepStar Consortium; The Society of Petroleum Engineers; The Independent Petroleum Association of America; The International Association of Drilling Contractors; the American Association of Drilling Engineers. Mr. Williams' Environmentally Friendly Drilling Project was awarded the Environmental Stewardship Award by the Interstate Oil and Gas Compact Commission in May of 2010.

Appendix 2: Brief Primer on Offshore Drilling Technology and Systems

The process for an offshore oil and gas exploratory well begins by positioning a drill rig above the intended leasing tract for exploration (see Figure A1).

Figure A1
Schematic of Offshore Drilling



Source: Minerals Management Service Database, 2010.

The rig lowers drill pipe (also known as a drill string) with a drill bit attached to its end to the seafloor where it commences to drill. The borehole created by the drill is then set with casing. At the seafloor, conductor casing is normally set to stabilize the soft sediments at the top of the borehole to ensure that continued drilling does not precipitate a borehole collapse. Once the conductor is in place, the drill rig lowers to the seafloor a marine riser (a large pipe that surrounds the drill pipe) that connects the conductor casing to the drill rig. As drilling proceeds, a blowout preventer (BOP) is lowered to the seafloor and sits atop the wellhead.

As drilling progresses with depth, additional casings (sections of pipe) that are slightly narrower in diameter than the hole created by the drill bit are inserted into the borehole and bonded into place by "cement." This process ensures that the borehole does not collapse on itself, and it isolates the borehole from any pockets of gas or water in the strata that the borehole passes through. A series of casings of equal diameter that are connected together and run down the borehole is a "string" and a string may be hundreds to thousands of feet long with a threaded connector between each 30-foot segment of casing. Deeper into the borehole, narrower casings are inserted one into the other resulting in strings of casing that are enclosed and cemented into the previous, slightly wider-diameter string of casing. The outermost casing can be up to four feet in diameter with the innermost string of casing less than six inches in diameter in some cases. The initial and final casing diameters, the types of casing, and type of cement used are determined by the profile (depth, temperature, pressure, etc.) of the well being drilled. Once the well is in production, the hydrocarbons will come to the surface through the production casing that is run down through the middle of the narrowest casing string.

During the process of drilling, drill fluid, referred to as "mud," is pumped down the drill pipe through drill bit nozzles. The mud's primary function is maintaining "well control," but it also cools the drill bit and carries the drill cuttings away from the bottom of the borehole and returns to the surface through the space (the annulus) between the drill pipe and the walls of the casing strings. To maintain well control, the pressure created by the weight of the mud in the drill pipe and annulus must be maintained equal to or greater than the pressures encountered in the borehole. Various indicators of well pressure measures allow the mud engineer on the rig to maintain the well bore fluid pressure equal to or slightly greater than the pressures from the deepest formation. This type of pressure balance is called overbalanced.

The pockets of oil, gas, or water that are encountered in porous layers during the drilling process can suddenly push the mud through the annulus with considerable pressure—what is referred to as a "kick." When a kick occurs there are various bypass mechanisms, such as diverters and BOPs, to shunt the pressure away from the well bore (diverter) or prevent the pressure from rising to the ocean surface (BOP), thereby maintaining well control. If a kick overwhelms the control mechanisms, a blowout can occur.

A BOP consists of a series of ram and annular preventers that sits atop the wellhead and connects to one of the outermost casing strings, allowing the narrower casing strings and drill pipe to be lowered down the borehole through the center of the BOP. In the event of significant loss of well control, one or more of the preventers can be activated from the drill rig. The annular preventer is typically the first to be utilized when an influx from a formation is experienced, but is not usually used with pressures above 3,500 pounds per square inch (psi). The pipe (variable

bore) rams are utilized for pressures above 3,500 psi. A pipe ram and/or annular preventer will be closed around the drill pipe shutting off the upward movement of mud and pressure through the annulus between the drill pipe and the casing string. A blind-shear ram can be used to cut through the entire drill pipe and seal the borehole. In the event that activation from the drill rig fails, BOPs may have one or more back-up means for activating the rams. Remote operated vehicles (ROVs) can trigger closure of the rams working at the BOP. Other redundant control systems include "acoustic switch" technology which can activate the BOP with an acoustic signal from the rig through the water. Another device called a "deadman" switch automatically closes rams if the BOP loses connection electronic or hydraulic communication with the drill rig for any reason.

The BOPs are a hydraulically activated device. The hydraulics are supplied by the accumulator system located on the rig through lines that run down the riser and connect to the BOP. The BOP contains control devices called pods which are blue and yellow. The hydraulic fluid is distributed by the pod to the desired components of the BOP. The communication system to the pod may either be a pilot hydraulic system or an electro-hydraulic system. The pilot hydraulic system uses hydraulic pressure to function the pod and the electro-hydraulic system uses electrical signals to communicate with the pod. All commands for the system are sent from the control panel on the rig. The subsea BOP also contains pre-charged bottles that provide hydraulic fluid to activate the BOP's auto shear or deadman devices in the event of disconnects. The BOP is also equipped with an ROV "hot stab" panel that allows the hydraulic line(s) from the accumulator system to be isolated in order for the ROV to "stab" in a separate control line and directly pump into the BOP to function the rams via a pump mounted on the ROV. The panel for the ROV to "stab" into may be capable of activating all rams or only designated ram(s).

Fax to: [redacted]

From: [redacted]

cc. Dr. Robert Bea, Department of Civil and Environmental Engineering, Univeristy of California at Berkeley

Dr. Benton Baugh, President, Radoil, Inc.

Ford Brett, Managing Director, Petroskills

Dr. Martin Chenevert, Senior Lecturer and Director of Drilling Research Program, Department of Petroleum and Geophysical Engineering, University of Texas

Dr. Hans Juvkam-Wold, Professor Emeritus, Petroleum Engineering, Texas A&M University

Dr. E.G. (Skip) Ward, Associate Director, Offshore Technology Research Center, Texas A&M University

Thomas E. Williams, The Environmentally Friendly Drilling Project

A group of those named in the Secretary of Interior's Report, "**INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF**" dated May 27, 2010 are concerned that our names are connected with the moratorium as proposed in the executive summary of that report. There is an implication that we have somehow agreed to or **"peer reviewed"** the main recommendation of that report. **This is not the case.**

As outlined in the attached document, we believe the report itself is very well done and includes some important recommendations which we support. However, the scope of the moratorium on drilling which is in the executive

summary differs in important ways from the recommendation in the draft which we reviewed. We believe the report does not justify the moratorium as written and that the moratorium as changed will not contribute measurably to increased safety and will have immediate and long term economic effects. Indeed an argument can be made that the changes made in the wording are counterproductive to long term safety.

The Secretary should be free to recommend whatever he thinks is correct, but he should not be free to use our names to justify his political decisions.

The Primary Recommendation in the May 27, 2010 report, "INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OUTER CONTINENTAL SHELF" Given by Secretary Salazar to The President Misrepresents our Position

The National Academy of Engineering recommended us as contributors and reviewers of the recent Department of Interior "30 Day Review" of the BP Oil Spill. We were chosen because of our extensive petroleum industry expertise, and independent perspectives. The report states:

"The recommendations contained in this report have been peer-reviewed by seven experts identified by the National Academy of Engineering. Those experts, who volunteered their time and expertise, are identified in Appendix 1. The Department also consulted with a wide range of experts from government, academia and industry."

The BP Macondo blow out was a tragedy for eleven families, and an environmental disaster of worldwide scale. We believe the blowout was caused by a complex and highly improbable chain of human errors coupled with several equipment failures and was preventable. The petroleum industry will learn from this; it can and will do better. We should not be satisfied until there are no deaths and no environmental impacts offshore - ever. However, we must understand that as with any human endeavor there will always be risks.

We broadly agree with the detailed recommendations in the report and compliment the Department of Interior for its efforts. However, we do not agree with the six month blanket moratorium on lfoating drilling. A moratorium was added after the final review and was never agreed to by the contributors.
The draft which we reviewed stated:

"Along with the specific recommendations outlined in the body of the report, Secretary Salazar recommends a 6-month moratorium on permits for new exploratory wells with a depth of 1,000 feet or greater. This will allow time for implementation of the measures outlined in this report, and the

consideration of information and recommendations from the Presidential Commission as well as other investigations into the accident.

"In addition, Secretary Salazar recommends a temporary pause in all current drilling operations for a sufficient length of time to perform additional blowout preventer function and pressure testing and well barrier testing for the existing 33 permitted exploratory wells currently operating in deepwater in the Gulf of Mexico. These immediate testing requirements are described in Appendix 1."

We agree that the report and the history it describes agrees with this conclusion. Unfortunately after the review the conclusion was modified to read:

"The Secretary also recommends temporarily halting certain permitting and drilling activities. First, the Secretary recommends a six-month moratorium on permits for new wells being drilled using floating rigs. The moratorium would allow for implementation of the measures proposed in this report and for consideration of the findings from ongoing investigations, including the bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

"The Secretary further recommends an immediate halt to drilling operations on the 33 permitted wells, not including the relief wells currently being drilled by BP, that are currently being drilled using floating rigs in the Gulf of Mexico. Drilling operations should cease as soon as safely practicable for a 6-month period."

We believe the moratorium as defined in the draft report addresses the issues evident in this case. We understand the need to undertake the limited moratorium and actions described in the draft report to assure the public that something tangible is being done. A blanket moratorium is not the answer. It will not measurably reduce risk further and it will have a lasting impact on the nation's economy which may be greater than that of the oil spill.

The report highlights the safety record of the industry in drilling over 50,000 wells on the US Outer Continental Shelf of which more than 2000 were in over 1000 feet of water and 700 were in greater than 5000 feet of water. We have been using subsea blowout preventers since the mid- 1960s. The

only other major pollution event from offshore drilling was 41 years ago. This was from a shallow water platform in Santa Barbara Channel drilled with a BOP on the surface of the platform.

The safety of offshore workers is much better than that of the average worker in the US, and the amount of oil spilled is significantly less than that of commercial shipping or petroleum tankers. The US offshore industry is vital to our energy needs. It provides 30% of our oil production, is the second largest source of revenue to the US Government ($6 Billion per year), and has a direct employment of 150,000 individuals. The report outlines several steps that can be taken immediately to further decrease risk as well as other steps that should be studied to determine if they can be implemented in a way that would decrease risk even more.

This tragedy had very specific causes. A blanket moratorium will have the indirect effect of harming thousands of workers and further impact state and local economies suffering from the spill. We would in effect be punishing a large swath of people who were and are acting responsibly and are providing a product the nation demands.

A blanket moratorium does not address the specific causes of this tragedy. We do not believe punishing the innocent is the right thing to do. We encourage the Secretary of the Interior to overcome emotion with logic and to define what he means by a "blanket moratorium" in such a way as to be consistent with the body of the report and the interests of the nation.

The foregoing represents our views as individuals and does not represent the views of the National Academy of Engineering or the National Research Council or any of its committees.

Kenneth E. Arnold, PE, NAE

Dr. Robert Bea, Department of Civil and Environmental Engineering, University of California at Berkeley

Dr. Benton Baugh, President, Radoil, Inc.

Ford Brett, Managing Director, Petroskills

Dr. Martin Chenevert, Senior Lecturer and Director of Drilling Research Program, Department of Petroleum and Geophysical Engineering, University of Texas

Dr. Hans Juvkam-Wold, Professor Emeritus, Petroleum Engineering, Texas A&M University

Dr. E.G. (Skip) Ward, Associate Director, Offshore Technology Research Center, Texas A&M University

Thomas E. Williams, The Environmentally Friendly Drilling Project

Rig Name	Manager	Operator	Restart or Redeploy?	Layoffs?	
Deep Ocean Ascension	Pride International	BP	To Lybia	??	
Deepwater Nautilus	Transocean	Shell	GOM	No	
Deepwater Pathfinder	Transocean	Eni	GOM	No	
Discoverer Americas	Transocean	Statoil	To Egypt	Took crew	
Discoverer Clear Leader	Transocean	Chevron	GOM	No	
Discoverer Deap Seas	Transocean	Chevron	GOM	No	
Discoverer Enterprise	Transocean	BP	GOM	No	
Discoverer Inspiration	Transocean	Chevron	GOM	No	
Discoverer Spirit	Transocean	Anadarko	GOM	No	
GSF CR Luigs	Transocean	BHP Billiton	GOM	No	
GSF Development Drilling I	Transocean	BHP Billiton	GOM	No	
Marianas	Transocean	Eni	To Nigeria	Crew transferred to other rigs	
ENSCO 8500	ENSCO	Eni/Anadarko	GOM	No	
ENSCO 8501	ENSCO	Nexen/Noble Energy	GOM	No	
ENSCO 8502	ENSCO	Nexen/Marubeni	GOM	No	
Developer	Maersk	StatoilHydro-Woodside	GOM	No	
Amos Runner	Noble	LLOG	GOM	No	
Clyde Boudreaux	Noble	Noble Energy	Still in GOM on standby/suspension rate. Noble Energy will not enter into new contract.	No	
Danny Adkins	Noble	Shell	Still in GOM on standby/suspension rate.	No	
Ocean Confidence	Diamond Offshore	Murphy (Cobalt)	To Congo (then Angola)	Laid off crews and corporate	
Ocean Endeavor	Diamond Offshore	Anadarko	To Egypt	Laid off crews and corporate	
Ocean Saratoga	Diamond Offshore	Taylor Energy	Still working in GOM (Hurricane Rita-damaged well)	No	
Ocean Monarch	Diamond Offshore	Anadarko	Still in GOM on standby; trying to redeploy outside GOM.	No	
West Sirius	Seadrill	BP	Staying in GOM w/ BP	Crew fully employed.	

** ENSCO 8503 arrived in GOM in Decemeber 2010. Currently undergoing acceptance testing. Pending successful testing 8503 will go to French Guiana (Tullow Oil). Est. to be gone for 5 mos; will return to GOM to drill for Cobalt Energy ~May '11.*

** Noble Jim Day entered GOM in September 2010; contract with Marathon refused due to permit restrictions in GOM -- see press release.*

Noble is "back-filling" jobs with existing crews in order to avoid layoffs. I.e., electrician position in Brazil may be filled by GOM worker versus hiring locally.

Noble estimates cost of $3million/day trying to remain hopeful that drilling in GOM will resume.

chron.com

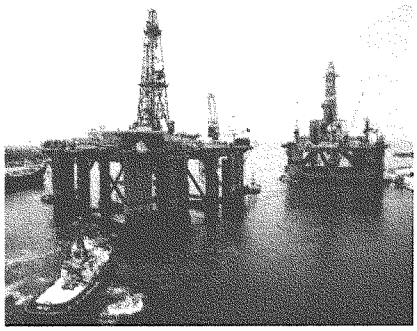
The silence on drilling is troubling

Posted on **February 7, 2011 at 6:41 am** by **Loren Steffy**

Last fall, a researcher for the presidential oil spill commission told me the panel hoped to complete its report on the Deepwater Horizon disaster in time for the president to cite it in his State of the Union speech.

So I was surprised when the president made no mention of the Gulf of Mexico blowout before Congress. He offered no discussion of how drilling would move forward in the Gulf, of what regulations might be changed to prevent a repeat of last year's catastrophe or what America's energy strategy will be in the coming years.

As if on cue, Noble Corp. said two days after the president's speech that it would accept a reduced rate for moving its Clyde Boudreaux rig to Brazilian waters from the Gulf. The current leaseholder chose not to extend its contract because of the lack of new permits issued by the government.



The Noble Frontier driller sits in port in Pascagoula Miss., on Saturday, Aug. 7, 2010. (AP Photo)

Roger Hunt, Noble's senior vice president for marketing and contracts, told analysts that the company "cannot predict when a return to normal might occur or what the new normal might look like" in the Gulf.

Companies like Noble, which saw its fourth-quarter profit fall to $99 million from $446 million because of the drilling moratorium and the subsequent stagnation of new permits, endured the moratorium but has decided it can't wait any longer.

"There is life after the Gulf of Mexico, and that would be in Brazil," Hunt said.

In other words, the Clyde Boudreaux probably won't be the last Noble rig heading south.

While the Gulf remains mired in uncertainty, the rest of the world moves forward. Almost half the new reserves discovered between 2006 and 2009 came from deep-water drilling, according to the energy research firm IHS.

Do the obvious

The administration says it is developing safer drilling rules for the Gulf, yet some obvious steps are being overlooked. Consider the Clyde Boudreaux's destination.

Brazil's state-owned oil company imposes some of the world's strictest drilling standards on companies it hires. Before the Clyde Boudreaux — or any other U.S. rig – can begin drilling, it will have to first demonstrate the effectiveness of its essential safety equipment. For example, the blowout preventer, the device that apparently failed to seal the well under the Deepwater Horizon last April, will have to actually slice through a piece of drill pipe to prove it works.

That isn't the rule in the U.S., but it would be a reasonable measure to adopt – and one that many drilling companies already comply with elsewhere. It's just one example of reasonable regulations that could improve safety and get drilling in the Gulf started again.

Meanwhile, companies operating in other parts of the world are reaping the benefits from the administration's foot-dragging in the Gulf.

Houston-based Hyperdynamics plans to begin drilling off Guinea, in West Africa, before year's end, and it has about eight rigs from which to choose for the project. Company President Ray Leonard told me he doubts he would have so many prospects if it weren't for the Macondo well blowout last April.

Edge in stability gone

Companies used to flock to the Gulf because it offered lucrative potential reserves in a stable political and economic climate. Now, companies are becoming hesitant to put capital at risk here.

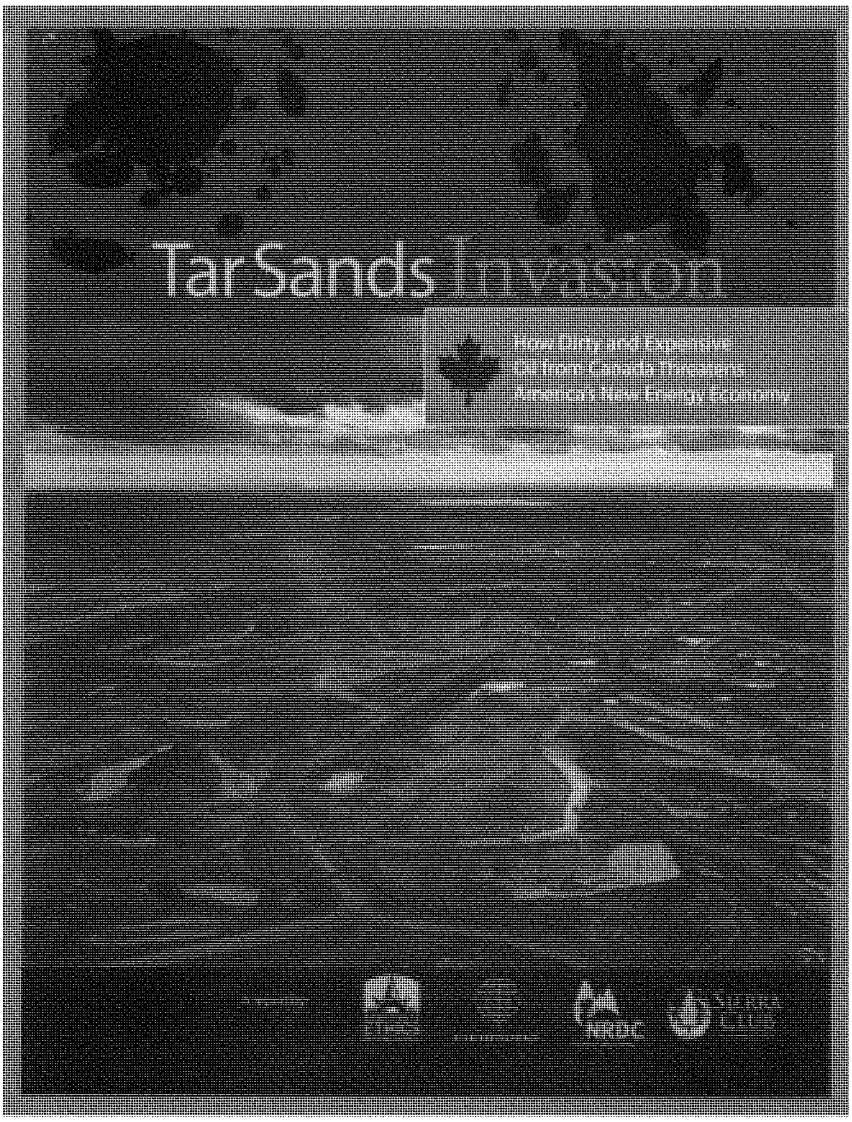
"Suddenly, West Africa is not looking half bad," Leonard said.

While that may benefit his company in the short term, Leonard worries about the long-term implications for the country as global oil demand continues to rise.

"As an American, I'm very discouraged by the whole thing," he said.

We all should be. With untapped deposits of oil becoming harder to find, and viable alternatives decades away from meeting our domestic energy needs, we need to exploit what reserves we have left to bridge the gap.

Instead, in the Gulf, as in the president's speech, the issue is met with stunning silence.


TarSands Invasion

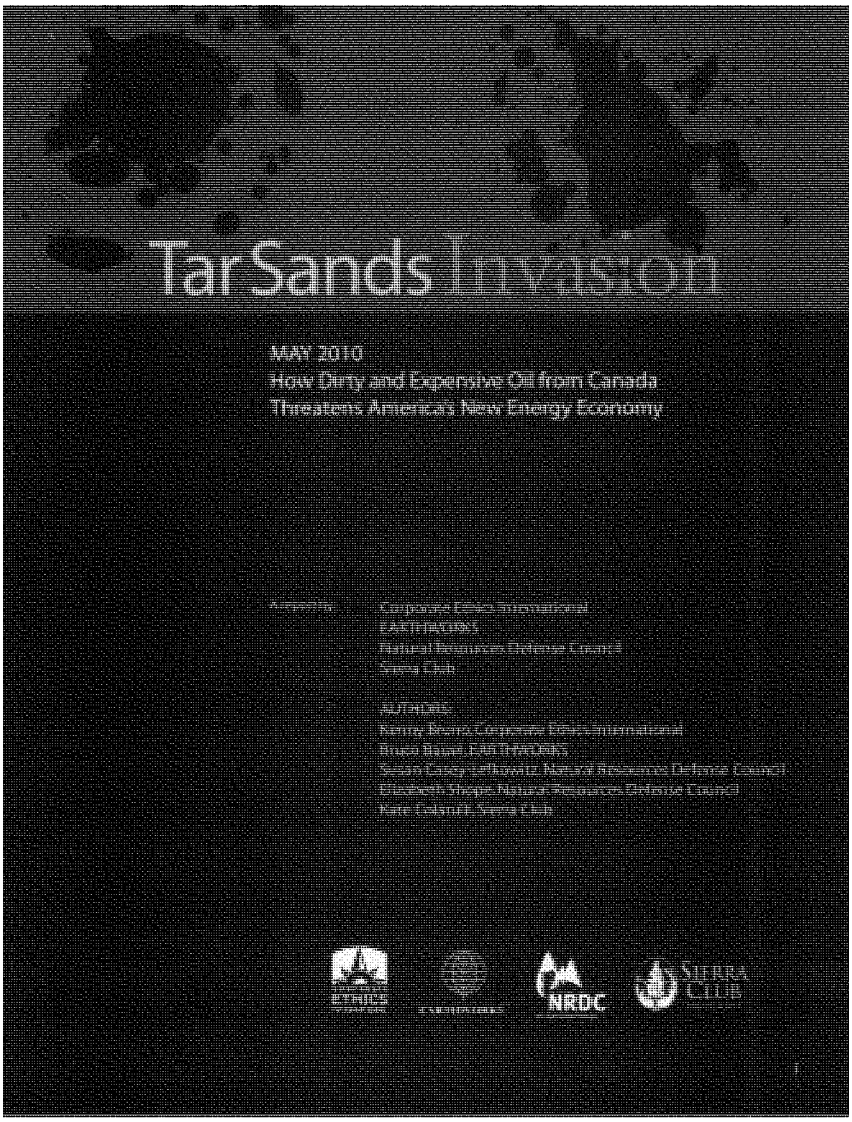
Before

Beneath a green canopy of boreal fen and forest in northern Alberta lies a promise of addiction — tar sands that can be refined into petroleum products like gasoline. This land has already been staked by prospectors.

After, on the cover

The Suncor Millennium mine, an open pit north of Fort McMurray, Alberta, replaces boreal forest with toxic tar sands extraction.

Photos: Peter Essick/National Geographic


Tar Sands Invasion
MAY 2010
How Dirty and Expensive Oil from Canada
Threatens America's New Energy Economy
Corporate Ethics International
EARTHWORKS
Natural Resources Defense Council
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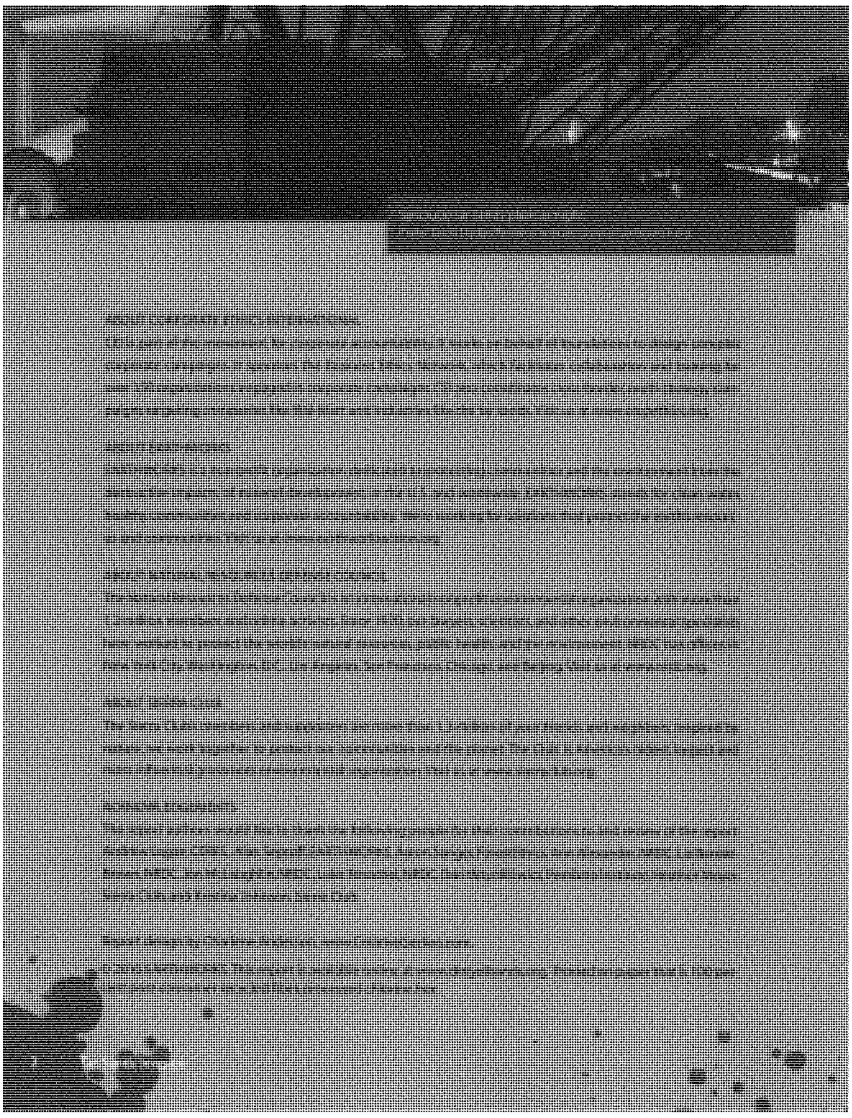

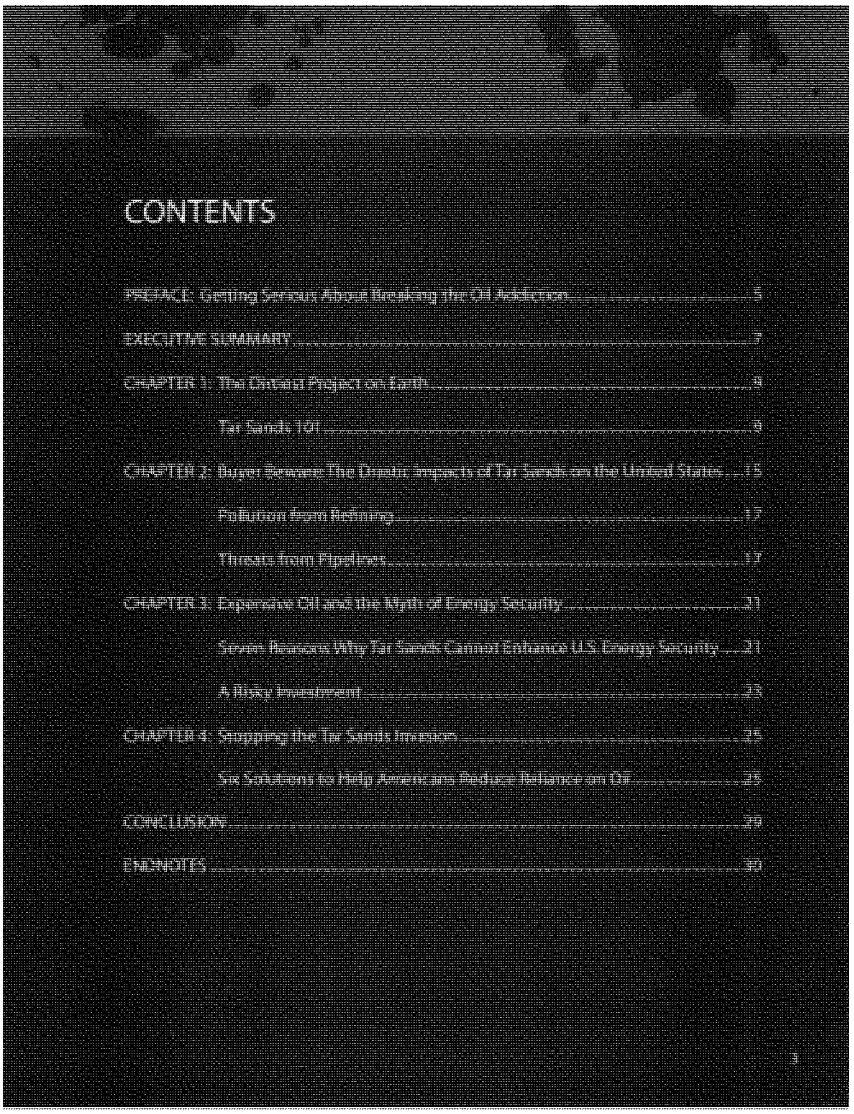

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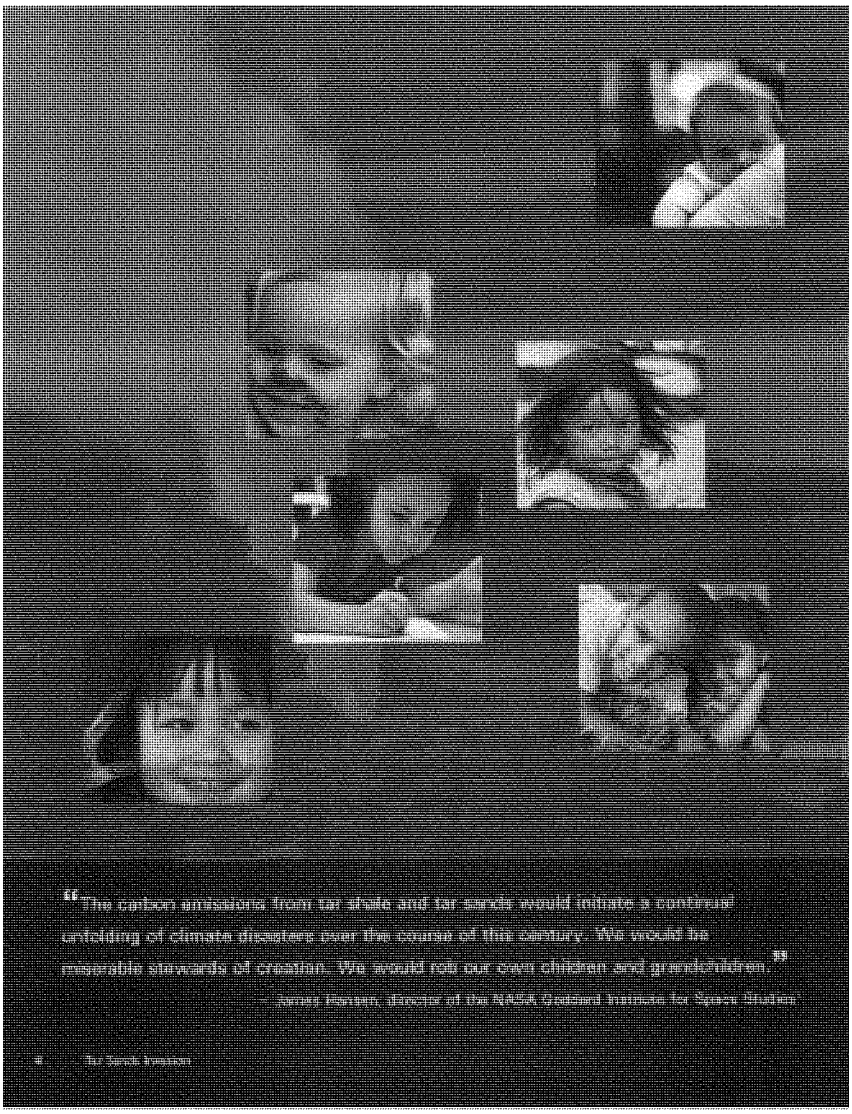

"The carbon emissions from tar shale and tar sands would initiate a continual unfolding of climate disasters over the course of this century. We would be rewarable stewards of creation. We would rob our own children and grandchildren."
— James Hansen, director of the NASA Goddard Institute for Space Studies

Preface

GETTING SERIOUS ABOUT BREAKING THE OIL ADDICTION

Petroleum is a problem. For the sake of oil profits, human rights are violated, ecosystems despoiled, and the planet over-heated. Now, the industry is seeking out ever more remote and high-carbon sources of oil. The largest of those dirty and expensive sources, the bitumen found under the forests of Alberta, Canada, is the subject of this report.

This oil is known traditionally as tar sands – or oil sands (the two terms are synonymous) – and is undergoing a reckless expansion that is arguably the largest and most destructive project on earth.

The good news is that technologies now exist that can transform energy and transportation systems and reduce reliance on oil. It's already happening. Yet, while North America is on the verge of a cleaner, more energy independent future, the oil industry in Canada is planning to triple exports of dirty and expensive tar sands oil to the United States.

Unlike conventional oil, tar sands oil comes from a hydrocarbon called bitumen found under the largest remaining ecosystem: the Boreal Forest. The oil industry strip mines and drills pristine forests and wetlands to get at the bitumen, which lies under the trees and is mixed with sand and clay. The industry then separates the bitumen, thins it down and pipes it out for refining into gasoline and diesel. In the process, giant swaths of forest and bird habitat are lost forever. An area the size of Florida will become a wasteland if tar sands growth goes unchecked; most of this land has already been leased for development.

Oil companies are recklessly expanding this industry, escalating excavation in Canada, and pushing for additional pipeline and refinery capacity in the United States. Hundreds of billions of dollars are quietly being invested in these high-carbon highly polluting projects, despite the fact that they will commit us to decades of continued dependence on dirty and expensive oil.

Map: Alberta Geological Survey

While the tar sands oil development represents a major environmental disaster in Alberta, it also directly threatens U.S. communities. The infrastructure needed for tar sands in the United States requires a network of pipelines and refineries crisscrossing the Northern Plains and Midwest that will affect farmers, ranchers, Native Americans, and the residents of industrial areas. Oil spills, frequent toxic emissions, and other environmental threats to the Great Lakes are all part of the dirty panorama of the tar sands industry.

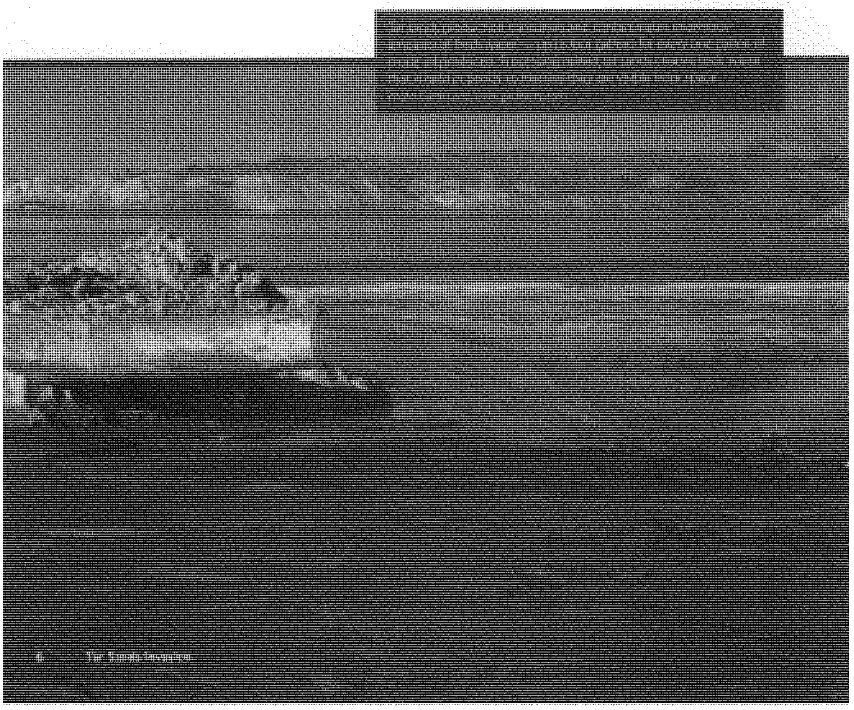
Tar sands are a global disaster as well, because they will all but guarantee the failure of efforts to combat global warming. One of the world's leading climate scientists, James Hansen has written that "[t]he tar sands of Canada constitute one of our planet's greatest threats. They are a double-barreled threat. First, producing oil from tar sands emits two to three times the global warming pollution of conventional oil. But the process also diminishes one of the best carbon reduction tools on the planet – Canada's Boreal Forest."[2]

Tar sands do not enhance energy security simply because they come from a friendly neighbor. Continued reliance on oil empowers all countries that are major oil exporters, including Saudi Arabia and Iran. The best investments in energy security are investments in alternatives to oil. Fortunately, the best investments also clean up the local environment, combat global warming, and create home-grown jobs in energy efficiency and renewable energy.

Most major forecasts agree that demand for oil in the United States has peaked and will soon decline. With efficiency measures and cleaner vehicles such as hybrids and fully electric cars, oil use can drop dramatically in the next decade and all of us will be better for it.[3] Oil will remain, for some time, a part of the fuel mix, but America does not need an expansion of tar sands oil, especially when the environmental and public health cost is so high.

The decline of demand for fossil fuels and the rise of alternative energy has put America on the verge of a tremendously important step toward a new energy economy. Expanding reliance on tar sands oil would represent the proverbial two steps back.

Considering the size and significance of the tar sands project, it is remarkable that most Americans have never heard of it. This report is an introduction to the subject of tar sands and a guide for how to prevent the reckless expansion of a dirty and expensive industry.



Executive Summary

TAR SANDS INVASION:

HOW DIRTY AND EXPENSIVE OIL FROM CANADA THREATENS AMERICA'S NEW ENERGY ECONOMY

The oil industry is currently planning a massive project to export millions of barrels more per day of dirty tar sands oil from Alberta to the United States. Tar sands mining and drilling in Canada's Boreal Forest is the largest and most destructive project on earth. The decline of demand for oil and the rise of alternative energy put North America on the verge of a phenomenally important step forward toward a new energy economy. Expanding reliance on tar sands is unnecessary, undermines our progress, and moves us backward instead of forward.

Tar Sands are Dirty and Expensive

Canadian tar sands deposits are found primarily under Alberta's Boreal Forest and wetlands in an area about the size of Florida.[4] In order to access it, millions of acres of pristine forest and wildlife habitat are strip-mined and drilled, destroying sensitive habitat and disrupting critical terrestrial carbon reservoirs in the peatlands of the Boreal Forest. Because it requires large amounts of energy, production of synthetic crude oil from tar sands is estimated to release at least three times the greenhouse gas emissions per barrel as compared to production of conventional crude oil.[5]

In addition to its high carbon costs, tar sands oil production requires two to five barrels of water for each barrel of bitumen extracted,[6] has already created over 50 square miles of toxic waste ponds,[7] threatens the health of downstream indigenous communities,[8] and is likely to cause the loss of millions of migratory birds that nest in the forests and wetlands of the region.[9]

Tar Sands Oil Has Real Impacts in America

The United States is the main consumer of tar sands oil. 60% of the 1.34 million barrels of tar sands oil being produced daily in Canada are exported to the United States, and oil companies are aiming to expand production to as much as 3.5 million barrels per day (mbd) by 2025.[10]

In America, oil and pipeline companies plan to build an extensive tar sands pipeline and refinery infrastructure that will lock the United States into reliance on this high-carbon fossil fuel for decades. This investment commitment conflicts with tackling global warming and shifting the U.S. transportation sector to cleaner alternatives. Further, pipelines bring a danger of oil spills to America's agricultural heartland, while pollution from refineries would threaten local communities and the Great Lakes. All of these environmental consequences are unnecessary because, due to declining demand and improving energy efficiency, the United States does not need tar sands oil.

Security Lies in Reducing Dependence on Oil

The best climate security policy is to aggressively implement energy efficiency and other measures that reduce oil dependency. These and other measures stand to reduce U.S. demand for oil by four million barrels per day by 2020 and ten million barrels per day by 2030, which would make expansion of tar sands

unnecessary for U.S. fuel needs.[11] Given the climate security risks associated with development of the tar sands and other high-carbon fuels, we should focus on cleaner, low carbon alternatives.

Further, tar sands oil cannot enhance energy security in the United States because it is too expensive and there is not enough of it. Producing tar sands oil will not break the power of OPEC, which controls the world oil market. Tar sands cannot compete in a world of low oil prices; in fact, oil from tar sands is among the most expensive anywhere. Tar sands would not help in the event of an embargo or natural disaster that disrupts supply, because the tar sands industry carries no spare capacity.

Solutions for Stopping the Tar Sands Invasion

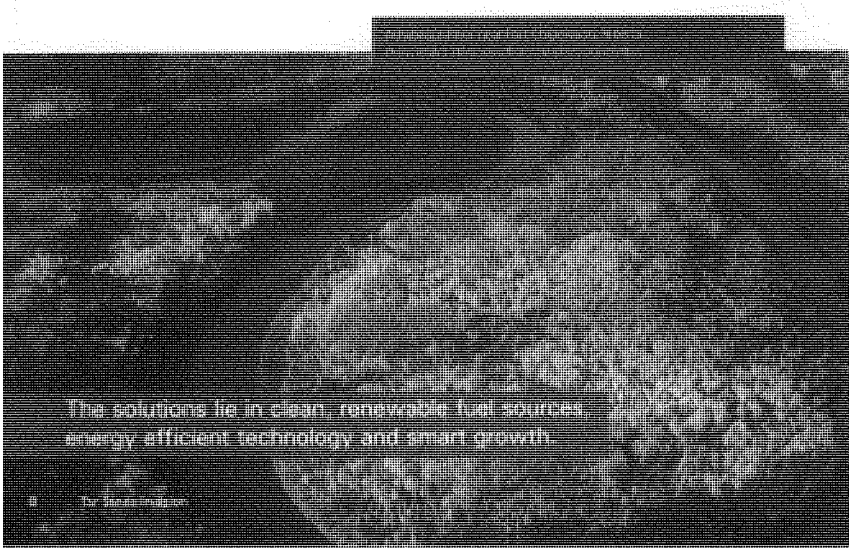
There are serious costs and consequences to the United States in encouraging tar sands oil expansion. Fortunately, there are solutions that policy-makers and business leaders can put in place now.

- Stop expansion of tar sands oil production in Canada.
- Build no more tar sands pipelines and refineries in the United States.
- Continue to reduce demand for oil as a transportation fuel.
- Don't spend taxpayer dollars on buying tar sands oil.
- Eliminate tar sands oil subsidies and financing.
- Adopt corporate policies that say no to tar sands oil.

A Better Way Forward

As the world's largest oil consumer, the United States has choices about its energy future. America currently consumes a quarter of the world's oil supply. We can and must do better.

Surely a nation this innovative and motivated can find a way to maintain mobility, while at the same time acting to halt expansion of expensive and dirty fuels such as tar sands oil that cause global warming and so many other environmental and health impacts. The solutions lie in clean, renewable fuel sources, energy efficient technology and smart growth.

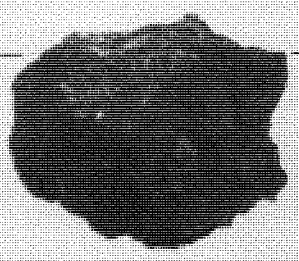


Chapter 1
THE DIRTIEST PROJECT ON EARTH

Most Americans think of Canada as clean and wild. So it comes as a shock to learn that what has been called "the most destructive project on earth" originates in the Canadian province of Alberta.[12] But why is this project so destructive?

- It's huge. The tar sands project is the most costly project on earth. If expansion in the tar sands goes unchecked, it will mean mining and drilling an area the size of Florida.
- The project is wasteful and inefficient. It consumes and contaminates enormous amounts of fresh water – up to four gallons of water for every gallon of crude oil produced. The extraction process requires moving four tons of earth to produce one barrel of oil.[13]
- Tar sands extraction destroys vast swaths of forests and wetlands and the habitat of wildlife such as woodland caribou and millions of migratory birds.
- Processing mined tar sands creates toxic waste that is held in ponds so massive they are visible from space.
- Tar sands operations harm the health of communities that depend on local waters and wildlife, and violate the legal rights of Canadian indigenous peoples.
- Producing a barrel of synthetic crude oil from tar sands emits at least three times the global warming pollution as producing a barrel of conventional oil, causing the tar sands to be the fastest growing source of global warming pollution in Canada.
- If we replace just three million barrels per day of conventional oil with tar sands oil, the increase in greenhouse gas emissions would be equivalent to adding more than 20 million new passenger cars to the road.[14]
- Expanding the tar sands industry will require building an invasive network of pipelines and refineries that will pollute communities across the United States.

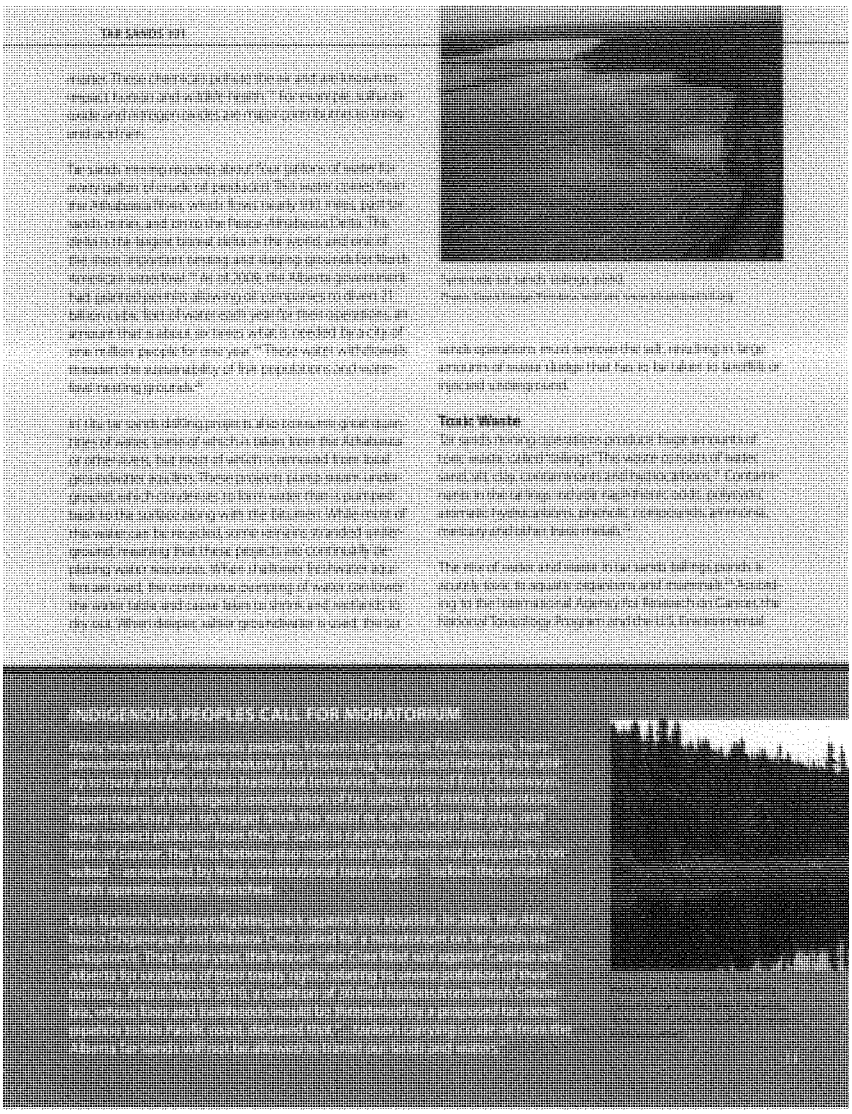
TAR SANDS 101



Open Pit Mining

In Situ Extraction

Air and Water Pollution



Protection Agency, certain polycyclic aromatic hydrocarbons have been classified as definite, probable or possible cancer-causing agents in humans. Because of this toxicity, the tailings waste cannot be released directly back into the Athabasca River, and is instead stored behind holding dams.

These toxic tailings ponds cover nearly 50 square miles, and are increasing in volume at the rate of about 80 Olympic-sized swimming pools each day.[24] These dumps are an environmental threat because they leak into the groundwater, with estimates suggesting that as much as four billion liters of tailings leak each year.[25] The tailings ponds also are a threat to migratory birds. For example, in the spring of 2008, 1,600 migrating ducks were killed when they landed on one of Syncrude's tailings ponds.[26] Independent scientists have estimated that the actual number of waterfowl deaths is far higher.[27]

Ecosystem Destruction: 32 Million Acres

The future 'footprint' of the tar sands operations could eventually cover an area nearly the size of Florida – and oil companies have leased more than half of this land already, lands that are held in public trust by the province of Alberta.

Canada's Boreal Forest is one of the most important forests in the world. It represents one-quarter of the earth's remaining intact forests and makes up 11% of the planet's terrestrial carbon storehouses, not including its tundra and wetlands.[28] Because of its key role in carbon storage, Canada's Boreal region is a life-support system for the planet. But instead of being protected as an irreplaceable resource, it is under siege by these tar sands strip-mining and drilling operations in Alberta.

> "Our ancestors have lived on these lands for thousands of years and the decimation of the land, air, water, vegetation in the past 40 years of tar sands mining is the worst any industrialized country has seen ever. Worst case for our people living downstream is the multitude of rare cancers we are living and dying with while the governments continue to give approvals for further development."
>
> — George J. Poitras, Former Chief of the Mikisew Cree First Nation

The Boreal Forest is a complex ecosystem of forests, wetlands, and lakes that are home to a wide variety of wildlife such as bears, wolves, lynx, and some of the largest populations of woodland caribou left in the world. Thirty percent of North America's songbirds and 40% of its waterfowl rely on critical habitat in the Boreal's lakes and wetlands.

Nearly 2,000 square miles of this forest, spanning numerous watersheds, could ultimately be strip-mined as a result of tar sands oil development.[29] Before strip-mining can begin, the forest must be clear-cut, the wetlands drained, and rivers and streams diverted. By 2008, mining operations had already destroyed more than 200 square miles of the Boreal Forest,[30] and approved operations would strip-mine an additional 360 square miles.[31]

Tar sands sites deemed suitable for in situ drilling span 52,800 square miles – an area nearly 30 times as large as the strip-mineable area. This massive scale of industrial development could push these forests beyond recovery, leading to irreversible ecological damage and loss. Based on tar sands operations over the past three decades, the United Nations Environment Program has identified Alberta's tar sands mines as one of the world's key global "hotspots" of environmental degradation.

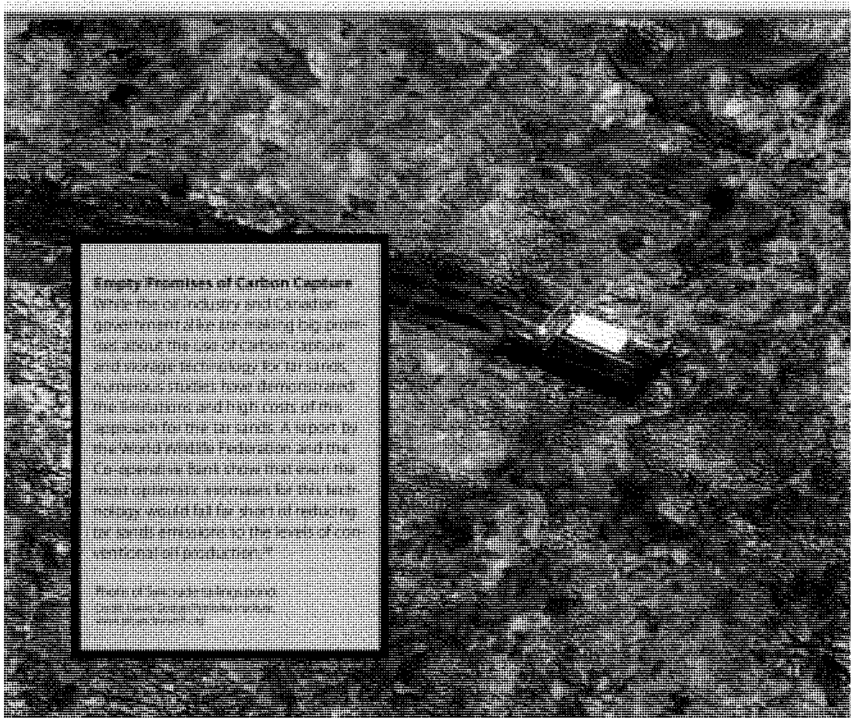
While oil companies are obligated by law to reclaim their tar sands operations, the track record to date and the massive extent of environmental degradation make successful restoration of the Boreal Forest nearly impossible. Less than one percent of the 200 square miles of land disturbed by tar sands mining operations thus far has been certified by the government as reclaimed.[32] The oil industry has claimed that as much as 33 square miles have been reclaimed, but have not shown that this area has met any reclamation standards or guidelines.[33] In addition, the toxic tailings ponds represent an immense long-term reclamation challenge for the industry, as no reclamation approach has been proven to successfully manage this toxic waste.

At best, reclamation of the Boreal Forest from tar sands oil production will be a large-scale experiment that has little hope of re-creating a self-sustaining ecosystem anytime within the next hundred years.

Escalating Carbon Emissions

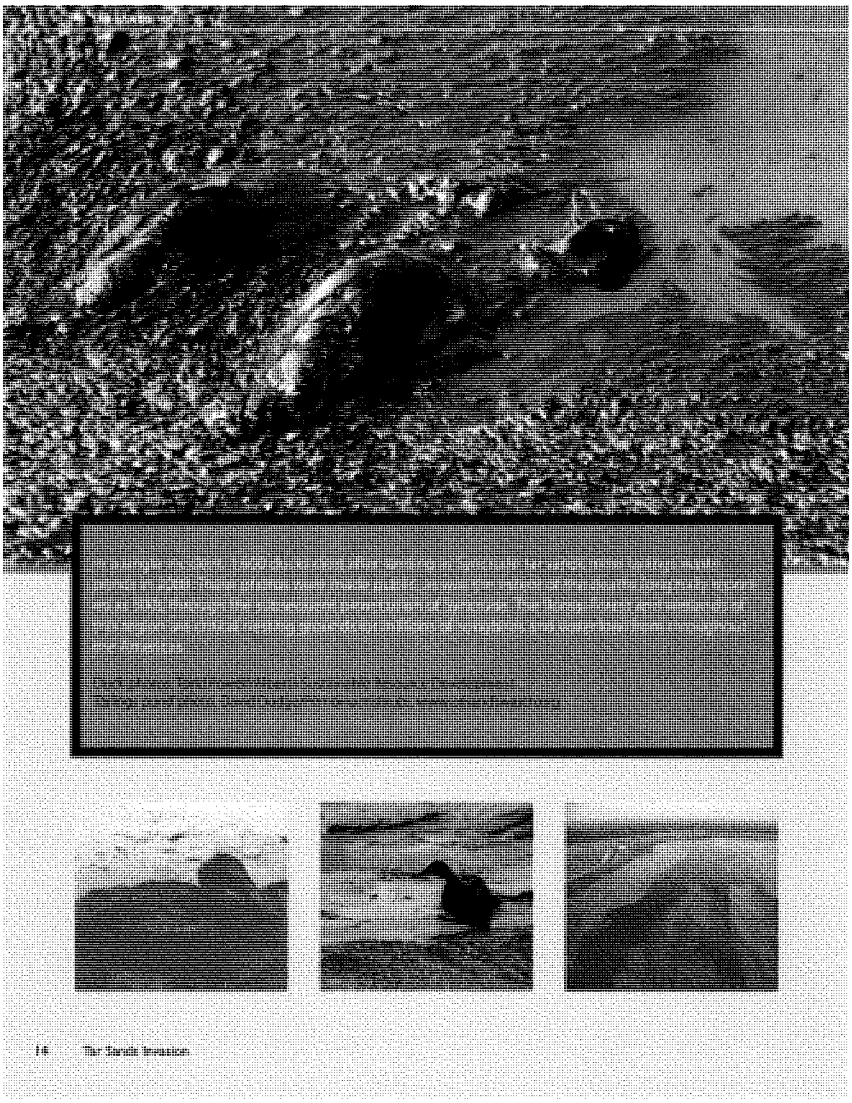
Tar sands oil production is the fastest growing source of global warming pollution in Canada. Tar sands global warming pollution comes from the massive trucks and machines used to extract the bitumen, the natural gas burned to heat the water to wash or melt the bitumen from the sand, and the energy used to upgrade bitumen to synthetic crude oil and to refine the synthetic crude oil to gasoline, diesel and other fuels. Just looking at the extraction and upgrading processes, global warming pollution is at least three times higher per barrel of tar sands synthetic crude oil than for conventional crude oil produced in Canada and the United States. This does not count the likely additional emissions resulting from the soil disturbance and changes in wetlands and groundwater.

In 2002, the Canadian government ratified the Kyoto Protocol on global warming, legally committing Canada to reducing the country's global warming pollution by six percent below 1990 levels by 2012. But the rapid growth of tar sands operations, a powerful oil industry and a sympathetic Canadian government have effectively delayed action and allowed emissions to increase. In fact, Canada's federal government has stood idly by and allowed Canadian global warming pollution to increase to an astonishing 26 percent above 1990 levels. The most recent climate change plan released by the Canadian government abandons its international obligations altogether, and would allow pollution from the tar sands to increase 80 percent by 2020. In addition, regulations that would actually enforce this plan have been repeatedly delayed.



Empty Promises of Carbon Capture

While the oil industry and Canadian government alike are making big promises about the use of carbon capture and storage technology for tar sands, numerous studies have demonstrated the limitations and high costs of this approach for the tar sands. A report by the World Wildlife Federation and the Co-operative Bank show that even the most optimistic estimates for this technology would fall far short of reducing tar sands emissions to the levels of conventional oil production.



Chapter 2

BUYER BEWARE

THE DRASTIC IMPACTS OF TAR SANDS ON THE UNITED STATES

Tar sands oil currently accounts for only about four percent of overall U.S. oil use; however, if industry has its way, that portion is slated to rise to ten or 15 percent. The United States could easily do without tar sands oil, and the proposed rapid expansion of tar sands facilities in the United States threatens communities in several ways:

- Miles of pipelines would crisscross the Northern Plains, Midwest and South, industrializing rural areas and bringing noise, traffic and risks of pollution.
- Dozens of refineries proposed to process dirty tar sands oil will bring toxic emissions and pollute air and water.
- Construction of tar sands pipelines and refineries will lock America into a dirty energy infrastructure and encourage the nation's addiction to oil.
- The higher carbon footprint of tar sands oil will lead to an increase in the U.S. transportation sector emissions – a sector that already accounts for one third of the nation's global warming pollution.

America desperately needs to break its addiction to oil. Importing tar sands oil from Canada continues dependence on oil and leaves the country vulnerable to skyrocketing fuel costs, national security threats, pollution, and environmental destruction.

The U.S. Increasing Addiction to Tar Sands Oil

The tar sands represent around **half** of Canada's total oil production.[40]

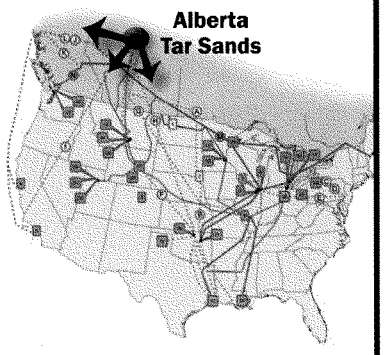
Over **99 percent** of exported Western Canadian Crude goes to the United States.[41]

Approximately **10 percent of U.S. crude** oil is imported from Canada.[42]

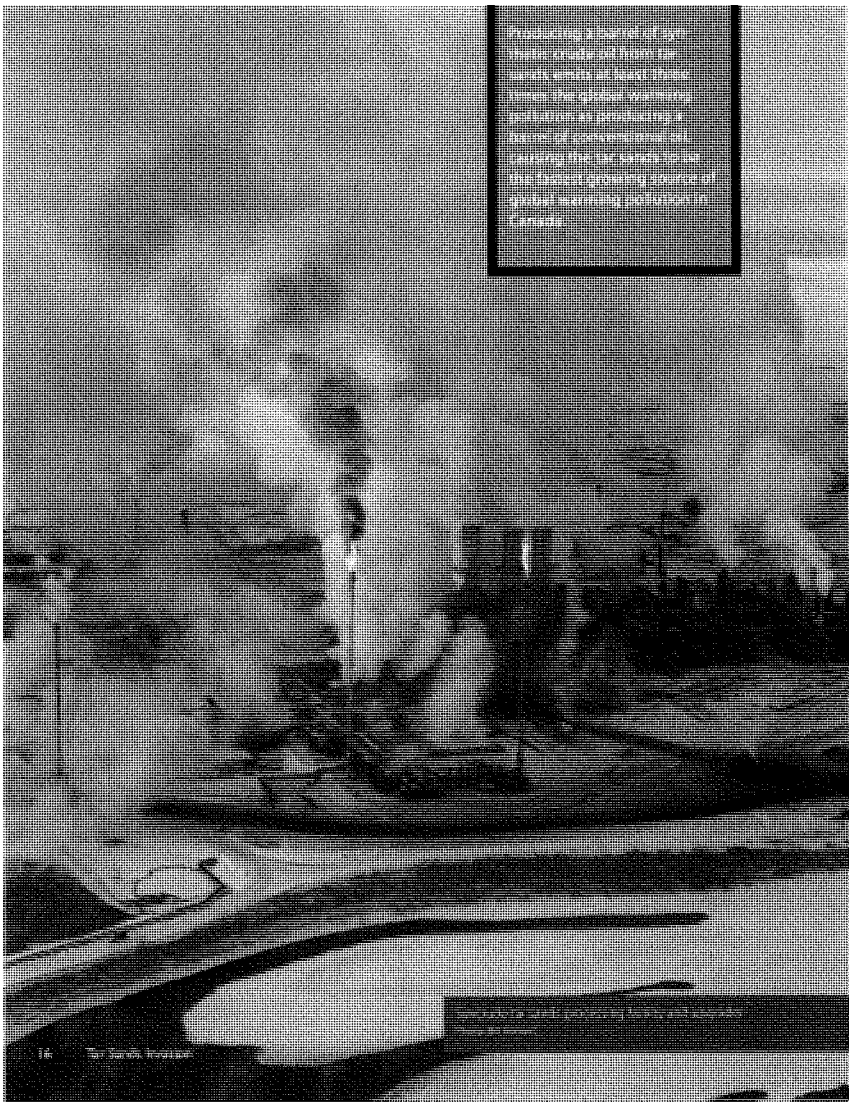
Tar sands are about four percent of total U.S. oil consumption at **800,000 barrels per day** as of 2008.

Alberta's oil exports – over half of which are from the tar sands – reach the United States through a network of more than **10,000 miles of pipeline**.[43]

The proposed Keystone XL pipeline would bring as much as **900,000 barrels** a day to the Gulf Coast.



Map: Proposed and existing pipelines and refineries that would use tar sands oil. Details: http://tarsandsmap.nodirtyenergy.org



POLLUTION FROM REFINING

There are approximately 150 oil refineries in the United States, and many of the communities that host them are already subject to high levels of pollution. Tar sands crude, with its higher concentration of pollutants, will simply make this worse.[44]

Pollutants from refineries include, but are not limited to, air emissions of sulfur dioxide (SO_2), nitrogen oxide (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter, and heavy metals, and discharges of ammonia and other chemicals into water systems.

To date, most of the refining of tar sands oil in the United States has been of limited volumes of synthetic crude oil (SCO). Many oil refineries in the Midwest are being expanded and retrofitted so they can process both additional SCO and raw bitumen from the tar sands. These retrofits—necessary to deal with this heavy, sour crude—essentially involve adding upgraders to the refinery facilities. Bitumen must be upgraded into SCO, and then SCO is refined into gasoline, diesel, jet fuel, and other petroleum products. Bitumen is very heavy and contains many impurities. 'Cracking' the bitumen to make it lighter and removing the contaminants requires large inputs of energy, with carbon dioxide, a key global warming pollutant, being one of the main waste products.

What is so bad about upgrading Canadian tar sands oil? It is "heavy sour" crude that contains more sulfur, nitrogen and metals (including mercury, lead, nickel, and arsenic) than conventional crudes. In fact, bitumen typically contains 2.5 percent more sulfur and four times the nitrogen of conventional crude.[45] These chemical differences result in increased emissions of such pollutants as SO_2, NO_x, VOCs, and metals.

All of these pollutants are harmful to human health. Sulfur dioxide, nitrogen oxide, and particulate matter all make people sick, causing lung and respiratory problems such as bronchitis, asthma, respiratory infections, and decreased lung function. Many metals such as mercury are neurotoxic; and some volatile organic compounds emitted by refineries are carcinogenic.[46] Sulfur dioxide causes acid rain, and volatile organic compounds and nitrogen oxide create smog and haze.

While refineries are supposed to control any significant new pollution generated by their expansions, they often radically underestimate emissions due to faulty and inaccurate estimation tools borrowed from completely different industries, or omit emission sources altogether in their permit application calculations—especially those that are not directly emitted from smokestacks. Emissions from flaring, coking, venting, and "fugitive" sources such as leaky valves tend to be among the most miscalculated.[47]

Simply put, refining tar sands oil requires more energy than conventional oil because of the additional upgrading needed. As a result, the refining process emits higher levels of greenhouse gases. Importing tar sands will add to U.S. emissions.

THREATS FROM PIPELINES: FARMLAND, COMMUNITIES, AND WATER AT RISK

Pipelines transport approximately 800,000 barrels of tar sands bitumen and synthetic crude to the United States per day, mainly to refineries in the Midwest and Rocky Mountain regions. Operating these pipelines and allowing construction of new and expanded tar sands pipelines will present serious environmental risks to the land and water in these areas. The largest of the proposed new pipelines will run around 2000 miles through the heartland of America, in areas populated by farmers, ranchers and Native Americans.[48]

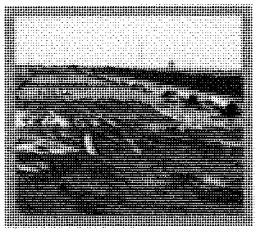
Along their routes, heated soil and spills caused by the pipelines threaten soil quality and productivity. For

A Sample of U.S. Refineries Taking or Moving to Take Tar Sands

Project	Company	Location	Capacity	Status
Wood River	Conoco Phillips	Wood River, IL	70,000 BPD (expansion)	Completed
Whiting Refinery	British Petroleum (BP)	Whiting, IN	240,000 BPD (expansion)	In permitting process
Hyperion Energy Center	Hyperion Resources	Elk Point, SD	400,000 BPD (new)	In permitting process
Marathon	Marathon	Detroit, MI	80,000 BPD (expansion)	In permitting process
Toledo	BP/Husky	Toledo, OH	60,000 BPD (expansion)	In permitting process

example, soil temperatures near the TransCanada Keystone pipeline which runs through the Dakotas, Nebraska, Missouri, Kansas and Oklahoma will be elevated by around 2°F from late December through late August, and by as much as 5°F in early March, when the pipeline is running at its full capacity of 591,000 barrels per day. This may cause a decrease in soil moisture content, which would hurt farmers who use their land for production agriculture.[49]

Underground pipelines, including the crude oil pipelines currently being proposed and built, are not immune to leaks and spills, and in fact, their leaks would go directly into the soil without having to penetrate vegetation and surface layers. Because of the imperfect leak detection mechanism, small leaks can be present for as much as three months and penetrate multiple layers of soil before being detected. Catastrophic leaks or ruptures are detected far more quickly, but even in just a few minutes, can involve thousands of barrels of oil.[50] Since 1973, Enbridge, a pipeline company currently building tar sands oil pipelines in the United States, has been responsible for over four million gallons of hazardous liquids (primarily crude oil) spilled from pipelines; between 2003 and 2008, Enbridge pipeline accidents were responsible for 13 fatalities, 29 injuries and $633 million in property damage.[51]



The Keystone tar sands pipeline being laid across a landowners property. The earthen berm, intended to limit water along the pipeline path, is drowning the property owner's crops.
Photo: Tim Hofer/Dakota Rural Action

In April 2010, an Enbridge tar sands pipeline spilled crude oil into wetlands of north-central Minnesota. The white material is oil-absorbing padding.
Photo: Marty Cobenais/Indigenous Environmental Network

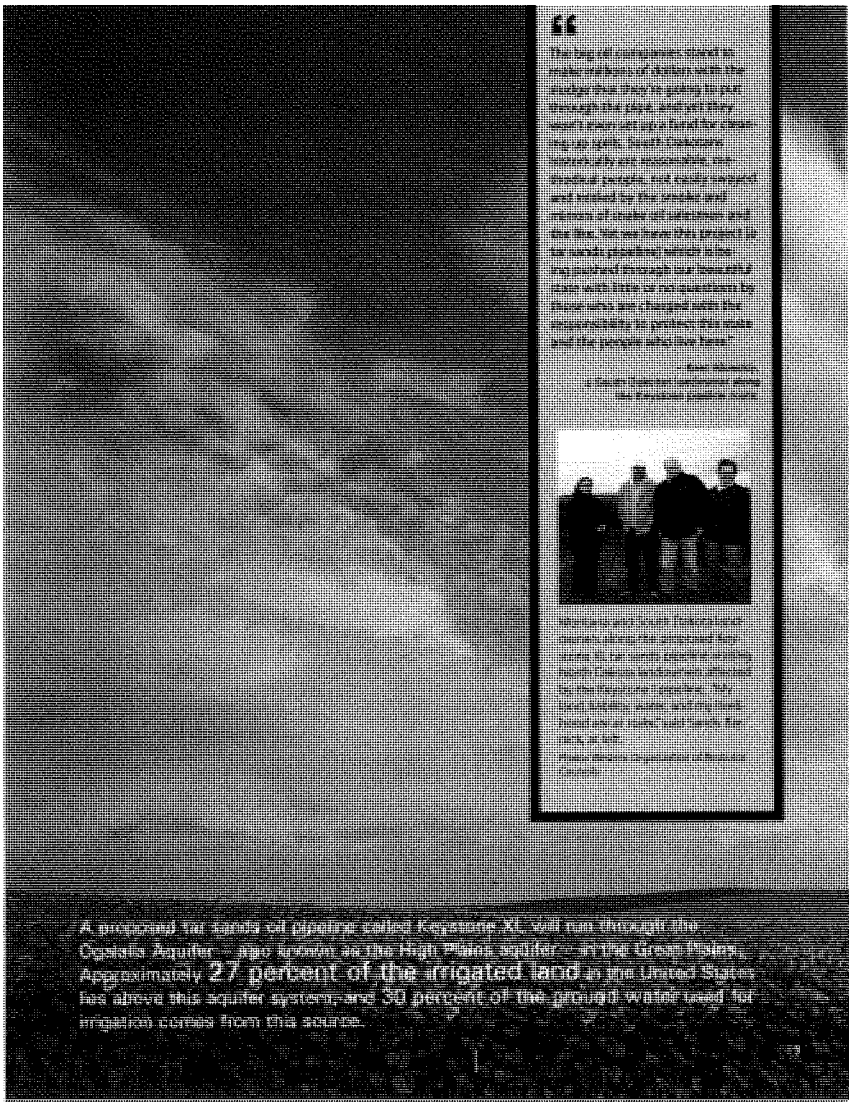
These pipelines often run through shallow aquifers; it is of little help that a pipeline company can detect the leak and shut the pipeline down within the first several hours – the leak will already have infiltrated and contaminated the aquifer. A proposed tar sands oil pipeline called Keystone XL will run through the Ogalalla Aquifer – also known as the High Plains aquifer – in the Great Plains. Approximately 27 percent of the irrigated land in the United States lies above this aquifer system, and 30 percent of the ground water used for irrigation comes from this source. Furthermore, the High Plains aquifer provides drinking water to 82 percent of the people who live within its border.[52]

Pipeline companies want us to imagine that pipelines sit quietly underground, and that oil flows easily through them from Canada to refineries in the Midwest and other parts of the United States, requiring only the help of gravity, and perhaps a small amount of assistance from pumps. The reality is, however, that tar sands pipelines need fossil fuel-consuming pumping stations along their length to keep the heavy oil moving through. If tar sands exports to the United States were to increase to three million barrels per day, as some industry experts have predicted, the carbon dioxide emissions from the pipeline transportation alone would be equivalent to the emissions from over one million passenger cars.[53]

Pipeline Proposals

Pipeline	Company	Impacted States	Capacity BPD	Endpoint	Status
Keystone	TransCanada	IL, OK, ND, SD, NE, KS, MO	590,000	Wood River and Pakota, IL; Cushing OK	Nearing Completion
Alberta Clipper	Enbridge	ND, MN, WI	800,000	Superior, WI	Nearing Completion
Keystone XL	TransCanada	MT, SD, NE, KS, OK, TX	900,000	Nederland, TX	In Permitting Process
Northern Gateway	Enbridge	BC, Alberta	525,000	Kitimat, BC	In Permitting Process

BPD = barrels per day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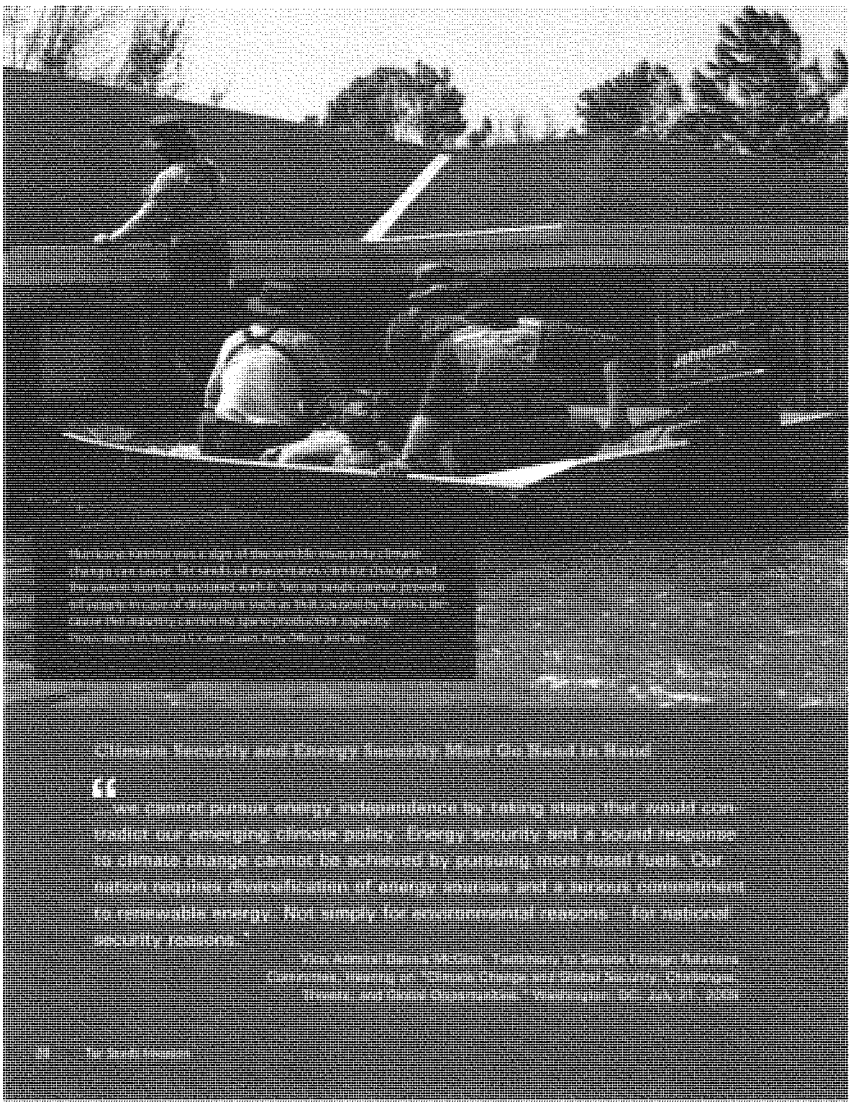
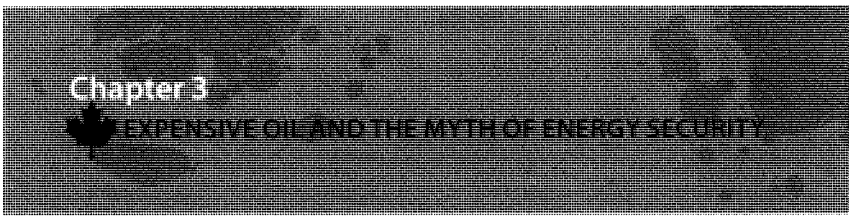




Canadian officials and oil executives claim that tar sands oil is a boon to U.S. energy security because it comes from a neighboring country friendly to the United States.

Scratching the surface of this claim reveals that, in reality, tar sands oil cannot substantially enhance energy security because it is too expensive and there isn't enough of it. In fact, tar sands oil presents a risk to American energy security because it perpetuates oil addiction and requires resources that could be devoted to new, clean energy projects that would create jobs.

SEVEN REASONS WHY TAR SANDS CANNOT ENHANCE U.S. ENERGY SECURITY

1. **Tar sands cannot break the power of OPEC.** The oil cartel, the Organization of the Petroleum Exporting Countries (OPEC), controls the world market for oil, and this will remain true with or without tar sands. The International Energy Agency forecasts show that OPEC's share of the market is set to increase with or without tar sands growth.[54] Even if the United States were to greatly increase its consumption of tar sands oil, it would not change the dynamic of the market or challenge OPEC control.

2. **Tar sands are expensive.** Oil from tar sands is among the most expensive on earth because it requires enormous amounts of energy to extract and extra processes to refine. Tar sands oil is only profitable when gas prices are high. In fact, the industry cannot be profitable in a world of low or volatile prices. If you are putting tar sands in your tank, it's because gas prices are high.

   We cannot drill or mine our way to low gas prices because oil prices are set on the world market. If the United States produces more, OPEC, which controls more than 75% of world's proved oil reserves and 44% of global production, will simply decrease its output commensurately.[55] The total oil supply will remain essentially the same and the price of fuel will continue to increase unless we get off oil.

   Tar sands oil represents a tiny drop in the bucket on the world oil market, and is not worth the costs to forests, water, and human health.

3. **Tar sands cannot help if there is an embargo, climate event or armed conflict that disrupts oil shipments.** Because of huge infrastructure and capital investments, it takes years for tar sands projects to come on-line and the industry carries no spare capacity. During the so-called tar sands boom between 2003 and 2008, tar sands producers spent five years and $50 billion raising tar sands production a mere 350,000 barrels a day.[56] By comparison, Hurricane Katrina knocked out 367,000 barrels a day of production in a single day.[57]

4. **Tar sands are not needed for rising U.S. oil consumption, because (good news!) U.S. oil consumption is not rising.** There is a myth that U.S. oil demand will rise for decades, but the good news is that oil consumption is expected to decline. All major forecasts now agree that U.S. oil demand has peaked and will level off under existing regulations aimed at tackling oil consumption.[58] Moreover, many forecasts have yet to take into account the full transformational potential of hybrids, electric cars, and other efficiency measures such as smart growth planning that could vastly reduce U.S. oil consumption.[59] With policies that encourage this reduction, there will be no need for tar sands oil, and much of the predicted rise in tar sands production will not materialize.

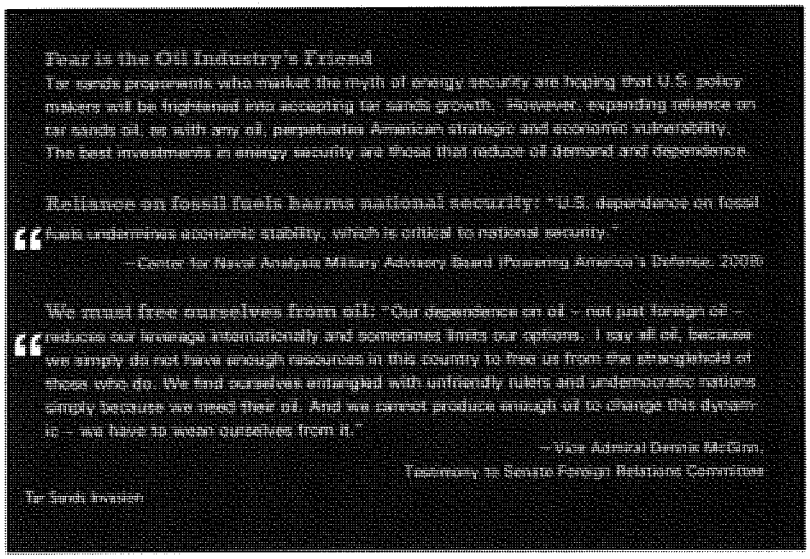
5. **Tar Sands impede the transition to cleaner technologies.** Occasionally, one hears the argument that while tar sands are dirty, our clean energy future is still years away, and we need this oil in the meantime. This argument has several flaws. First, exacerbating oil addiction cannot logically be the way toward breaking that addiction. Second, tar sands infrastructure projects last 30 years or more. That's a long bridge. Third, investing billions in tar sands infrastructure puts cleaner technologies at a disadvantage for decades to come as investors must recoup the enormous sunk costs of that infrastructure.

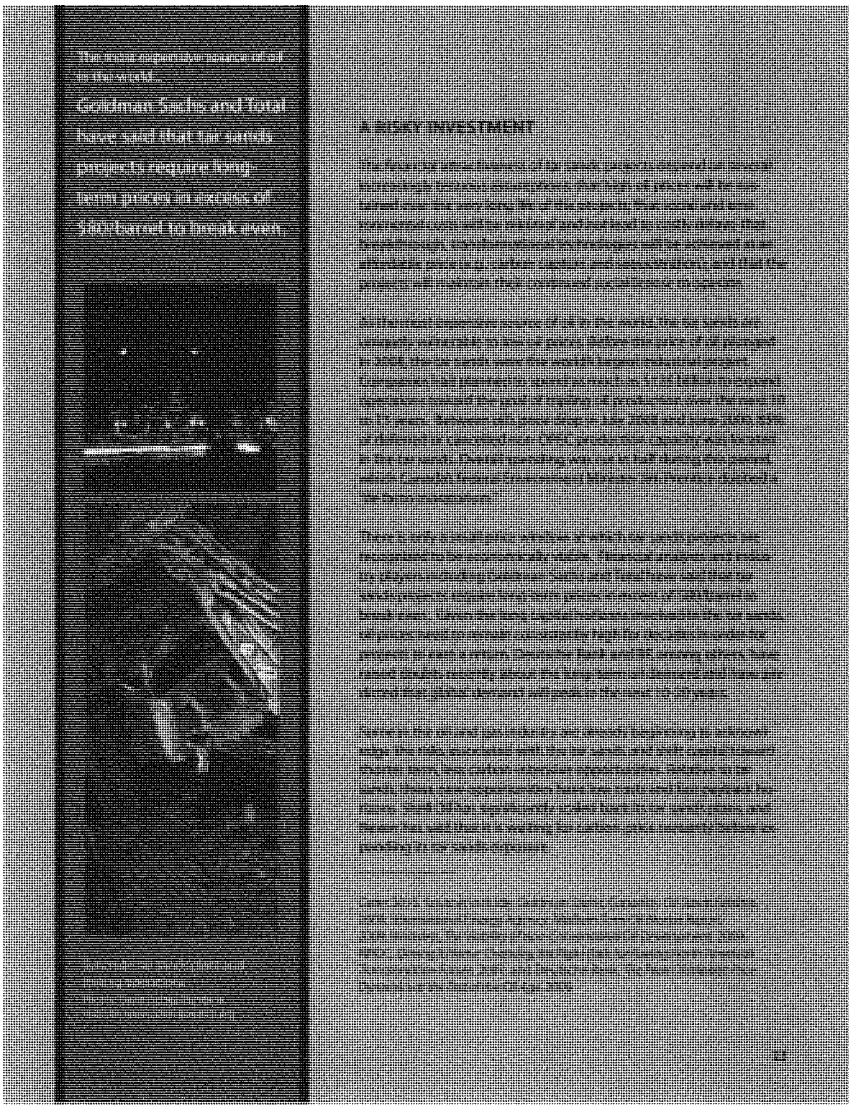
   Efficiency can save more oil than tar sands can provide. Efficiency is the solution to our oil addiction.

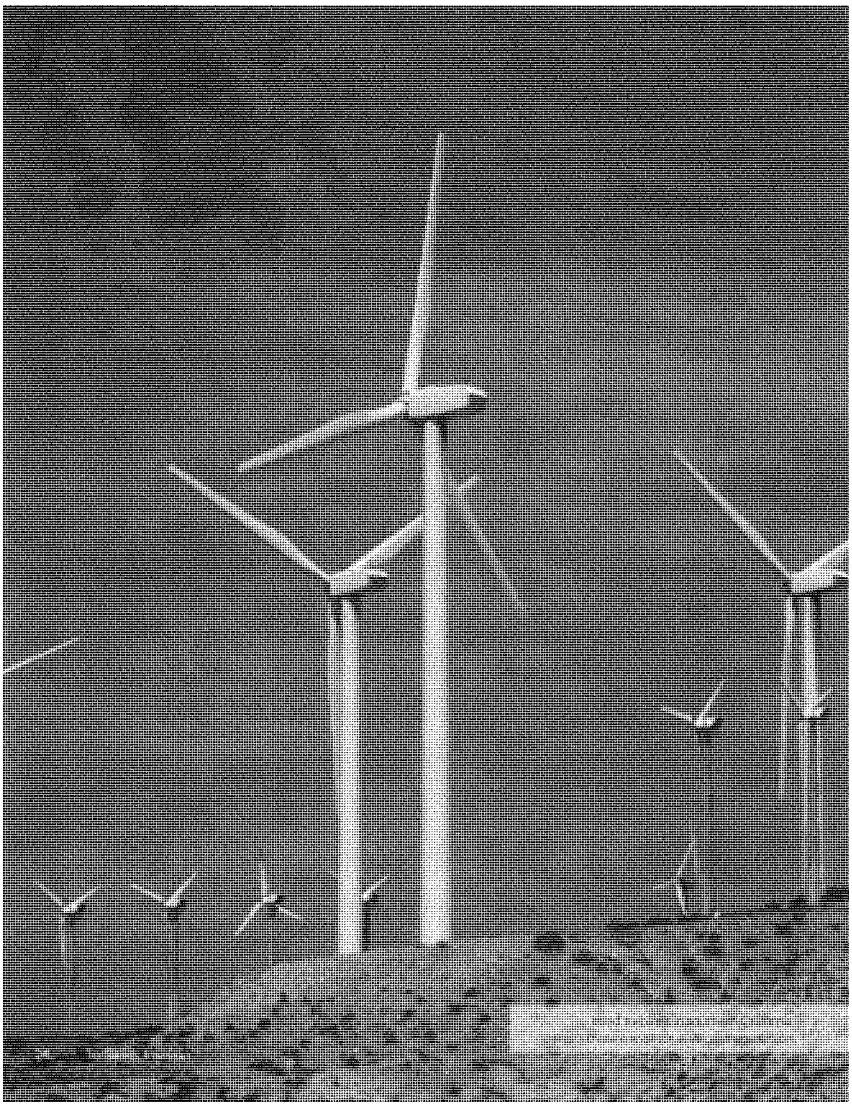
6. **Tar Sands projects in the United States will not hinder Chinese access.** Some Canadian commentators have threatened that if the United States does not buy tar sands oil, then Canada will sell to China. This is an empty threat as there is no current way to get tar sands oil to China. The proposed Gateway pipeline which would take tar sands from Alberta to the west coast of Canada is not certain. Such a pipeline would have to cross dozens of First Nation territories, defy a de facto tanker ban, and overcome the determined resistance of activists in British Columbia and across Canada.

   Further, the industry wants "both/and," not "either/or" and intends to meet both markets with its growth plans. In addition, it is possible that the Keystone XL pipeline may be used to deliver tar sands oil to the international shipping ports on the Gulf Coast as opposed to serving the U.S. market. However, with global demand for oil flattening, it is far from clear that the market will support tar sands growth at this level.[60] U.S. abstinence from tar sands oil will retard the industry's growth. A reduction in U.S. oil demand allows other countries to meet demand without resorting to tar sands oil.

7. **Tar Sands do not prevent the dynamic of "peak oil."** Tar sands growth – even reckless and rapid growth – cannot keep pace with future declines in conventional oil production. The good news is that through transformational technologies such as the electric car, we can make "peak demand" drive lower prices, instead of "peak supply" driving higher ones.







Chapter 4
STOPPING THE TAR SANDS INVASION

At a time when the country is embracing a new, clean energy economy, it doesn't make sense to suggest that America now needs a dirtier, more expensive source of oil – a source that we have made do without for years. It is in the U.S. national interest to stop the expansion of Canada's tar sands oil development as part of efforts to fight global warming through reducing the emissions of the transportation sector. Working together, the government, citizens and private sector can stop the progression of this massive dirty oil project and help keep America on its clean energy path.

There are a number of policy solutions that can help Canada to clean up existing tar sands operations and stop the industry's reckless expansion. Policies and incentives for clean fuels and healthy transportation solutions will reduce U.S. demand for tar sands oil. Although the consequences of destroying the Boreal Forest, one of the world's largest carbon storehouses, are felt by everyone, currently the oil industry is not being held accountable for its actions. They are passing the costs of their mining operations on to our children and our children's children. Policies and decisions that make tar sands oil companies bear the full weight of their environmental impacts will provide incentives to clean up the tar sands oil operations.

Furthermore, a federal government decision that the United States does not need yet another tar sands pipeline slicing through America's agricultural heartland would show that tar sands oil is not the path that Americans choose. Companies that purchase fuel for their transportation needs are already starting to say no to tar sands oil. The following solutions can help America reach its goal of reducing its reliance on oil, including the much dirtier and more expensive oil from the Canadian tar sands.

SIX SOLUTIONS TO HELP AMERICANS REDUCE RELIANCE ON OIL, INCLUDING CANADIAN TAR SANDS

Solution 1: Stop expansion of tar sands oil production in Canada.

The United States should send a clear message to the oil industry and the Canadian government that the environmental and public health cost of tar sands oil production is too high. Existing tar sands oil operations need to be cleaned up, and the oil companies need to bear the full costs of this work. Expansion of tar sands oil production is not environmentally healthy and not economically necessary at a time when we are building a clean energy economy in the United States and Canada.

John Knox

Solution 2: Build no more tar sands pipelines and refineries in the United States.

The United States should not lock itself into an expensive and polluting pipeline and refinery infrastructure. Such an infrastructure will make it even harder to reduce dependence on oil in the long-term.

- The United States should not permit tar sands pipelines that would bring even more tar sands oil from Alberta to the United States.
- The United States should conduct a comprehensive review of whether this expansion of tar sands oil imports into the United States is consistent with the nation's commitments to curb climate change and to build a clean energy economy.
- State and federal government permits for these refineries should be held to the highest standard for water, air and greenhouse gas pollution.

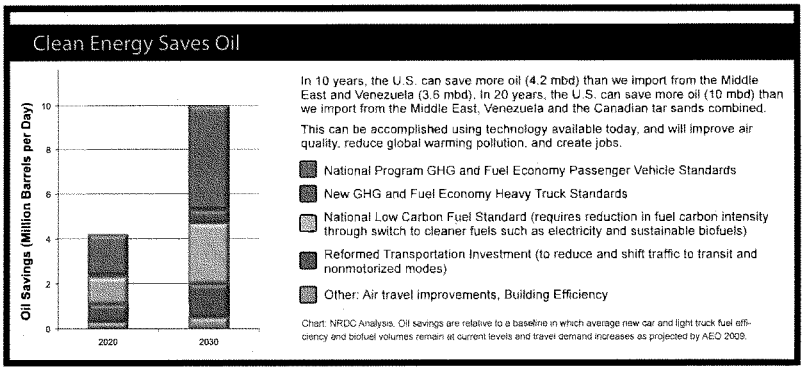
- State and federal governments should not provide financial subsidies for tar sands oil refinery construction.
- Companies and governments as purchasers of fuel should not support expansion of existing upgrading/refining operations in the United States and should oppose construction of new refineries for tar sands oil, such as the proposed new Hyperion refinery in South Dakota.
- The United States should not allow the proposed Alaska natural gas pipeline, meant to bring natural gas to the United States, to be diverted to fuel tar sands extraction in Alberta. Using this natural gas to fuel tar sands oil production would result in increasing rather than decreasing global warming emissions.

Solution 3: Reduce demand for oil as a transportation fuel.

Ninety-five percent of the energy used for U.S. transportation comes from petroleum, and transportation accounts for 71 percent of U.S. consumption of petroleum products – with most of that consumption used for personal transportation.[61] The United States can dramatically cut oil consumption by reinforcing existing reduction programs, such as efficiency standards for vehicles, and through new investments in alternatives to oil. The oil savings achievable with some of these policies are shown in the Clean Energy Saves Oil chart below.

Comprehensive clean energy policies could achieve oil savings of four million barrels per day within ten years. These savings would be realized through a combination of higher efficiency new cars and trucks, maximizing the fuel economy of existing vehicles through technologies such as fuel efficient tires and motor oil, advanced and environmentally sustainable biofuels, smart growth and transit, electric cars, air travel improvements, and energy conservation measures in buildings. From 2010 to 2020, the United States would save approximately $940 billion in oil purchases compared to a business as usual scenario where vehicle efficiency and clean fuel volumes remained at today's levels. These measures to save oil can be achieved through a clean energy policy strategy that combines a cap on carbon emissions, vehicle and fuel greenhouse gas performance standards, and investment in new transportation technologies and infrastructure.

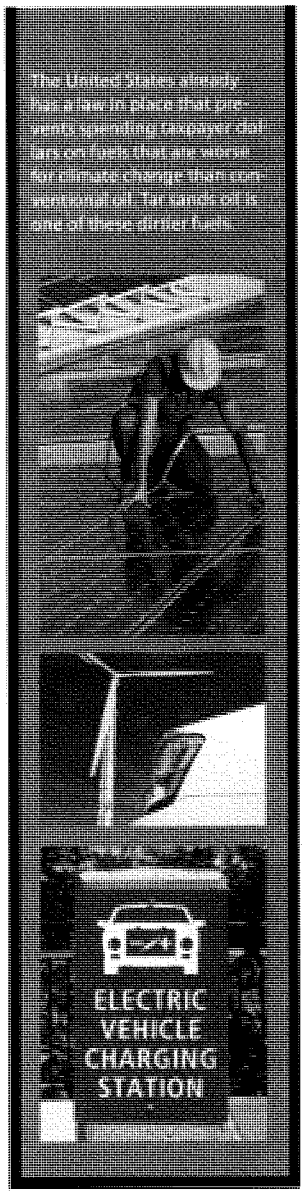
- At the national level, set specific targets for reducing U.S. use of oil within specific timeframes and set out an integrated plan for reaching those goals through a mix of legislative and regulatory actions.
- Increase fuel efficiency standards for vehicles beyond 2016.
- Provide further incentives for electrification of transportation, including rail, public transit, and vehicles.
- Reduce vehicle miles traveled through support for public transportation, rail, land use planning and smart growth initiatives.
- Accelerate oil savings in industrial, aviation and residential building sectors.
- Put in place a national low carbon fuel standard that steadily reduces the carbon intensity of fuels over time, includes full fuel cycle and indirect land use emissions, and distinguishes between conventional and unconventional fossil fuel sources.
- Provide further incentives for production of environmentally sustainable biofuels.
- Provide publicly verifiable tracking of greenhouse gas emissions and tracking of unconventional fuels movement from source to refinery.

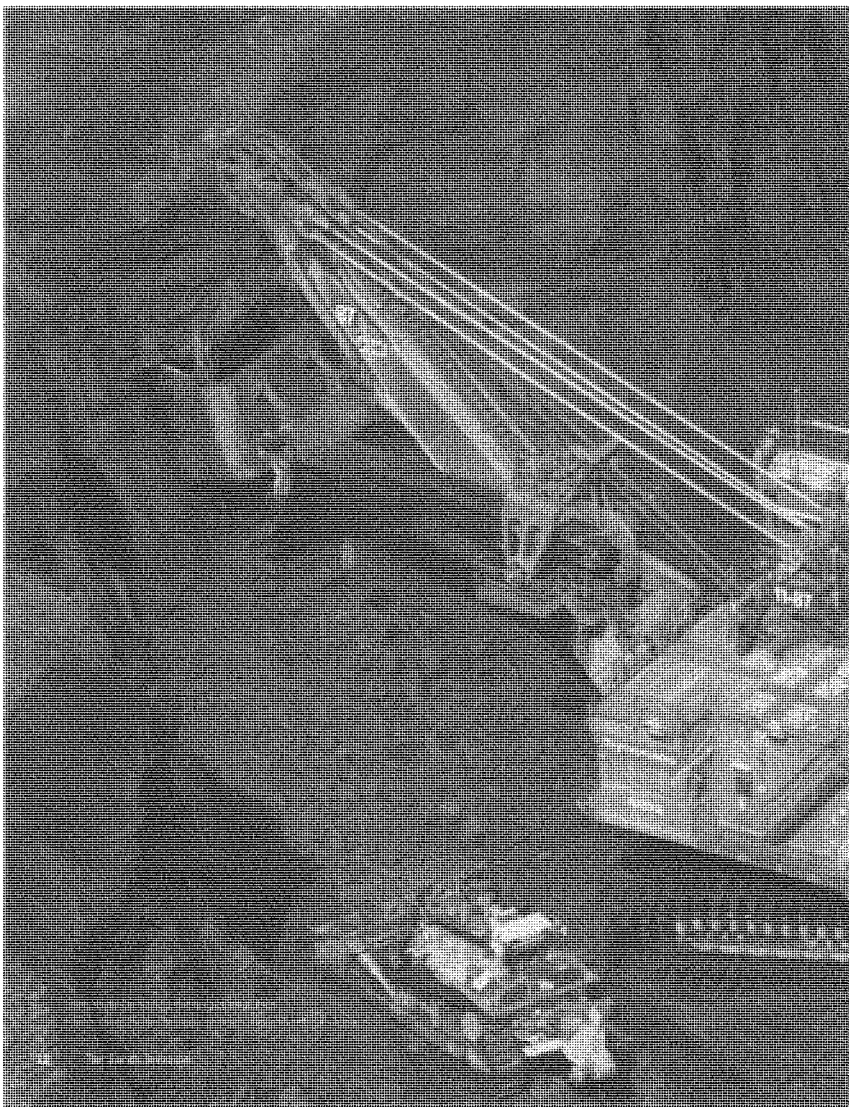


Solution 4: Don't spend taxpayer dollars on tar sands oil.
The United States already has a law in place that prevents spending taxpayer dollars on fuels that are worse for climate change than conventional oil. Tar sands oil is one of these dirtier fuels. Section 526 of the Energy Independence and Security Act of 2007 (EISA) should continue to include tar sands oil. The United States should expand this fuel procurement policy across all federal government agencies so that tar sands oil is included, as was intended by the legislation. Implementation of this section should also consider all upstream tar sands emissions, as omitting them will unfairly disadvantage homegrown, environmentally sustainable transportation solutions.

Solution 5: Eliminate tar sands oil subsidies and financing.
Subsidies and financial incentives that benefit tar sands oil imports have been embedded in broader legislation and policies. In September 2009, President Obama pledged to work with his colleagues at the G20 to phase out fossil fuel subsidies in order to better address the climate challenge.[62] To achieve this commitment, existing tax subsidies should be repealed, including the Internal Revenue Code Section 179C refinery expensing option for tar sands and oil shale. Other subsidy proposals for high-carbon fuels such as tar sands oil have included long term government procurement contracts, grant funding, favorable tax treatment, loans and loan guarantees. Any existing high-carbon fuel subsidies should be eliminated and the United States should refrain from enacting new ones.

Solution 6: Adopt corporate policies that say no to tar sands oil.
The U.S. corporate sector has considerable influence, both with federal and state governments and with suppliers of transportation services and fuels. By adopting low carbon transportation policies and shifting their transportation spending away from suppliers of high-carbon fuels such as those derived from tar sands oil, the corporate sector can help curb the expansion of tar sands oil. For example, in February 2010, Whole Foods Market and Bed, Bath & Beyond both announced that they would encourage their transportation providers to avoid high impact fuels such as those from refineries using tar sands oil and would work to eliminate tar sands fuel from their supply.[63] In addition, the U.S. corporate sector can encourage federal and state governments to take similar actions.





Conclusion

America is a land of innovators. And today the factories of Detroit, the laboratories of Silicon Valley and the next generation of American consumers are ready to invest in and profit from clean technology. Almost every major car maker in the world is coming out with an electric vehicle, and cost benefit analyses show that these vehicles will reduce the cost of fuel. More importantly, these vehicles are the transformational technology that will finally reduce a strategic dependence on oil, thus making the nation more secure.

As simple as this way forward appears, it is being threatened by the powerful interests of the oil lobby and certain arms of the Canadian government. The oil industry does not want to give up the record profits they have enjoyed. In 2008, the oil industry spent [illegible] million just on lobbying the U.S. Congress — not including all of the millions they spent on advertising.[illegible] Recognizing that conventional oil supplies are decreasing, the giants of the oil industry — including Shell, BP, Exxon Mobil, Chevron and ConocoPhillips — have partnered with influential arms of the Canadian government to lobby for increased U.S. use of tar sands oil. They are willing to sacrifice the largest remaining carbon storehouse in the world — our planet's very ability to cope with CO_2 emissions — for the chance to make themselves rich. The tar sands battle is about profit at the expense of climate security.

Over the past several years, tens of thousands of people have come together from all over the world to protest the tar sands. Yet without the support of the Obama Administration and the U.S. Congress, the oil industry will win. While the tar sands oil industry benefits from increasingly expensive gasoline, Canadian and American citizens will be left to deal with a network of pollution and a planet that is increasingly unable to deal with global warming.

This report has outlined the dangers of the tar sands. We call on you, our reader, to consider the costs:

- Tar sands are a global disaster because they will all but guarantee the failure of efforts to combat global warming.
- Tar sands weaken U.S. energy security by continuing our dependence on oil, in this case the dirtiest and most expensive form of oil.
- Tar sands operations violate the legal rights of Indigenous peoples and harm the health of people living in communities downstream from these operations.
- Tar sands directly compete with investments in clean energy and may take away opportunities for America to transition to an independent energy sector.

All forecasts agree that U.S. demand for oil has peaked and will soon decline. With a little help from efficiency measures, hybrids and fully electric cars, oil use can decrease dramatically in the next few years. Oil will remain, for some time, a significant part of the fuel mix, but America does not need an expansion of tar sands oil, especially when the environmental and public health costs are so high.

The United States can maintain mobility while at the same time acting to halt expansion of expensive and dirty fuels that cause global warming and so many other environmental and health impacts. The solutions lie in clean, renewable fuel sources, energy efficient technology and smart growth.

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13 On water use: The Pembina Institute Oil Sands Watch. "Oil Sands 101: Water Use." http://www.oilsandswatch.org/os101/water. On earth moving: Oil Shale & Tar Sands Programmatic EIS Information Center. "About Tar Sands." http://ostseis.anl.gov/guide/tarsands/index.cfm. Note that two of the four tons of earth excavated per barrel are "overburden"—really, Boreal Forest and peatlands—and the other two tons are the soil in which the bitumen is found.

14 NRDC. This is a conservative estimate based on the assumptions that: over its entire lifecycle, tar sands oil causes on average 20g CO_2e/MJ more than conventional oil; there are around 5840 MJ of energy in every barrel of gasoline; and the average passenger car causes a little bit less than 6 metric tons of CO_2e annually.

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[40] Canadian Association of Petroleum Producers. *Crude Oil Forecast, Markets & Pipeline Expansions.* CAPP, 2009. http://www.capp.ca/GetDoc.aspx?DocId=152951. Appendix B.2, p. 34. In 2008, tar sands oil production accounted for 1.306 mbd, or 48%, of Canada's total oil production of 2.718 mbd.

[41] Canadian Association of Petroleum Producers. *Crude Oil Forecast, Markets & Pipeline Expansions.* CAPP, 2009. http://www.capp.ca/GetDoc.aspx?DocId=152951. p. 9. In 2008, Western Canadian Crude exports totaled 1.724 million bpd. Only 8,000 bpd (less than 1%) went to non-US locations.

[42] In 2008, the United States imported 1.941 million bpd of crude oil from Canada: U.S. Energy Information Administration. "Crude Oil and Total Petroleum Imports Top 15 Countries." http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/company_level_imports/current/import.html. The United States used a total of 19.498 million bpd of oil the same year: U.S. Energy Information Administration. "United States Energy Profile." http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=US.

[43] Statistics Canada. "CYB Overview 2008: Energy." http://www41.statcan.ca/2008/1741/ceb1741_000-eng.htm.

[44] Environmental Protection Agency. "Nonattainment Areas Map – Criteria Air Pollutants." http://www.epa.gov/air/data/nonat.html?us~USA~United%20States. For example, Harris County, TX (Houston), Wayne County, MI (Detroit), Cook County, IL (Chicago) and all its neighboring counties, and many of the counties in the Bay Area are nonattainment areas for Ozone (8-hour). These areas are each home to several refineries. For a list of oil refineries in the United States, see: Energy Information Administration. "Refinery Capacity 2009."

[45] Higher sulfur content in tar sands: Gareth R. Crandall. *Prospects for Increased Production – Non-Conventional Oil Market Outlook.* Presentation to: International Energy Agency Conference on Non-Conventional Oil. 2002. http://iea.org/textbase/work/2002/calgary/Crandall.pdf. Higher nitrogen content in tar sands: ADVENT-ENVIRON. *Addendum to "Case-by-Case Antidegradation Analysis."* Prepared for BP Whiting, Indiana, submitted to IDEM November 30, 2006. p. 2. http://www.in.gov/idem/files/clarification_3.pdf.

[46] Dan Woynillowicz. The Pembina Institute. Oil Sands Fever. November 2005. http://pubs.pembina.org/reports/OilSands72.pdf. Accessed November 11, 2009. p. 45.

[47] Minority Staff Special Investigations Division, Committee on Government Reform. *Oil Refineries Fail to Report Millions of Pounds of Harmful Emissions.* Prepared for Henry Waxman. U.S. House of Representatives, 1999.

[48] The Keystone XL pipeline would consist of 1,702 miles of new, 36-inch-diameter pipeline – about 327 miles in Canada and 1375 miles within the United States. U.S. Department of State. "Keystone KL Pipeline Project." http://www.keystonepipeline-xl.state.gov. It would also incorporate the Cushing Extension portion of the Keystone Pipeline – 291 miles of 30-inch diameter pipe. U.S. Department of State. "Keystone Pipeline Project." http://www.keystonepipeline.state.gov.

[49] United States Department of State. *Final Environmental Impact Statement for the Keystone Oil Pipeline Project*. 2008. Section 3.2: Soils and Sediments. http://www.entrix.com/keystone/project/eis/06_Section%203.02%20Soils.pdf.

[50] DNV Consulting. *Frequency-Volume Study of Keystone Pipeline: Report for TransCanada PipeLines Limited*. Report no.: 70015849-2. Rev 1, May 1, 2006. p. 19.

[51] Thomas, Richard. "Alberta-Superior pipeline takes center stage in world climate debate." BusinessNorth Exclusives. October 27, 2009. http://www.businessnorth.com/viewarticle.asp?articleid=3219.

[52] Dennehy, Kevin "High Plains Regional Ground-Water Study: U.S. Geological Survey Fact Sheet FS-091-00." USGS, 2000. http://co.water.usgs.gov/nawqa/hpgw/factsheets/DENNEHYFS1.html.

[53] These CO_2 emissions were calculated with a modified GREET spreadsheet (file GREET1_8c_0.xls)—changing the distance traveled via pipeline. We assumed a pipeline length of 3000 km (1864 miles) from Edmonton to Chicago, which gave us an emissions factor of 0.403 g CO_2 e/mmBtu-km. This is equivalent to 0.00219 kg CO_2e/barrel-km. Thus the transportation emissions to Chicago are 6.58 kg CO_2e/barrel.
Wang, M. et al. GREET 1.8c.0. Argonne National Laboratory, February 2009.
Assuming a future scenario of 3 million bpd (mbd) tar sands exports:
(3,000,000 barrels/day)*(6.58 kg CO_2e/barrel)*(365 days/yr)*(1 metric ton/1000 kg) = 7,205,100 metric tons CO_2e/year
The average passenger car emits 5.8 metric tons of CO_2 annually. (7,205,100 metric tons CO_2e/year) / (5.8 metric tons CO_2/car/year) = 1,242,259 cars.

[54] International Energy Agency. *World Energy Outlook 2009*. Paris, France: OECD/IEA, 2009.

[55] BP. *Statistical Review of World Energy*. BP, 2009. http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/2009_downloads/statistical_review_of_world_energy_full_report_2009.pdf.

[56] Stockman, Lorne and Kenny Bruno. "Comments to the White House regarding the EISA Section 933 Energy Security Report to Congress." December 2009. http://dirtyoilsands.org/files/CommentsToWH_EISA933_CEI_SC_GP.pdf.

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[64] Mulkern, Anne. "LOBBYING: Oil and gas interests set spending record in 2009." *E&E*. February 2, 2010. http://www.eenews.net/Greenwire/2010/02/02/1/.

Faces photos on page 4: Dey Alexander, http://www.flickr.com/photos/dey; Hamed Masoumi, http://www.flickr.com/photos/hamedmasoumi; Andrea Leganza, http://www.flickr.com/photos/neogene.

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Department of Energy
Washington, DC 20585

May 2, 2011

The Honorable Ed Whitfield
Chairman
Subcommittee on Energy and Power
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On February 10, 2011, Richard Newell, Administrator, Energy Information Administration testified before the Subcommittee regarding: "The Effects of Middle East Events on U.S. Energy Markets."

Enclosed is the response to a question that was submitted by Representative Green 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,

Jonathan Levy
Deputy Assistant Secretary
for House Affairs
Congressional and Intergovernmental
Affairs

Enclosures

QUESTION FROM REPRESENTATIVE GENE GREEN

Q. The Department of Energy released a study last week on the Keystone XL pipeline project. The study found that Canadian imports can help to decrease and potentially eliminate imports from the Middle East in the long term. Given this study what do you see as the role Canadian oil sands can play in increasing our country's energy security?

A. In considering the role of Canadian oil sands on U.S. energy security, it is important to recognize that the market for crude oil is global in nature. An impact on any producer or consumer in the global oil market will impact the United States. While Canada can be viewed as a more secure, geographically proximate oil supply source for the United States than many other countries, increasing U.S. imports from one country or region – without changing total U.S. oil consumption – does not change overall U.S. oil import dependence.

EIA's *Annual Energy Outlook 2011* projects that Canada's unconventional liquids production from oil sands will increase by more than 3 million barrels a day between 2010 and 2035 (from 1.9 to 5.2 million barrels per day), while its conventional oil production and oil consumption are projected to be virtually unchanged over this period. Thus, if pipeline infrastructure were added, Canada could easily more than double its net exports to the United States, which in 2010 were more than 2.3 million barrels per day. By 2035, EIA's Reference case—which assumes the continuance of current laws and regulations--projects that U.S. net imports of liquid fuels would be 9.4 million barrels per day. Canada would be in a position to supply approximately half of this amount, in EIA's current outlook.

FRED UPTON, MICHIGAN
CHAIRMAN

HENRY A. WAXMAN, CALIFORNIA
RANKING MEMBER

ONE HUNDRED TWELFTH CONGRESS

Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115

Majority (202) 225–2927
Minority (202) 225–3641

March 3, 2011

Chris Busch, Ph.D.
Director of Policy and Program
Apollo Alliance
330 Townsend Street, Suite 205
San Francisco, CA 94107

Dear Dr. Busch:

Thank you for appearing before the Energy and Power Subcommittee on February 10, 2011, to testify at the hearing entitled "The Effects of Middle East Events on U.S. Energy Markets."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions to witnesses, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and then (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please e-mail your responses in Word or PDF format, to carly.mcwilliams@mail.house.gov by the close of business on Friday, March 17, 2011.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Ed Whitfield
Chairman
Energy and Power Subcommittee

cc: The Honorable Bobby L. Rush, Ranking Member,
Subcommittee on Energy and Power

Attachments

The Honorable Henry A. Waxman

In your study, you examined the effect of AB 32 on California's bill for imported oil. What were the import cost savings associated with the demand reduction of 75 million barrels of oil?

March 8, 2011

Mr. Henry Waxman
House of Representatives
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Waxman, Chairman Whitfield, and Ranking Member Rush,

I appreciated the opportunity to testify in front of your Committee. Thank you for the invitation, and for your follow up question: "In your study, you examined the effects of AB 32 on California's bill for imported oil. What were the import cost savings associated with the demand reduction of 75 million barrels of oil?"

In my testimony I referenced research undertaken to look at the issue of energy price shocks. This was work completed with Jamie Fine and Remy Garderet: *Shockproofing Society: How California's Global Warming Solutions Act (AB 32) Reduces the Economic Pain of Energy Price Shocks.*[1] Our study looked at a hypothetical situation in which both oil and gas prices spike simultaneously. However, given the focus of the hearing on concerns about the supply of oil due to Middle East political instability, I thought it most appropriate to focus on the oil part of the research.

We estimated that AB 32 would avoid demand for imported oil by 75 million barrels in 2020, which would save just under nine billion dollars ($9 billion) on California's import bill at $114.50 per barrel. This price of $114.50 per barrel was the mid-range price ("reference price") energy price forecast from the Annual Energy Outlook prepared by the Department of Energy's Energy Information Agency. We were working with the update 2009 version of the Annual Energy Outlook forecast. Under the price spike scenarios we considered, the savings would have been considerably larger, increasing directly as a function of price. That is to say, if the price of oil doubles, then the monetary value of savings is doubled.

Thank you again for the honor of testifying in front of your Committee.

Good luck with your important work on behalf of the American people.

Sincerely,

Chris Busch
Director of Policy and Program
The Apollo Alliance

[1] http://www.resource-solutions.org/pub_pdfs/Shockproofing%20Society.pdf

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