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PREPARED TESTIMONY:

US ENERGY SECURITY: THE SIGNIFICANCE OF CANADA'S OIL SANDS

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SUMMARY

The impact of high oil and gasoline prices on the economy and the American people is a deep concern. Today's high prices are a headwind against economic recovery and are a major worry, especially during a time of high unemployment. Energy security is, again, high on the agenda. Potentially momentous change in North Africa and the Middle East along with rising demand from emerging markets raises questions about availability of oil and future oil price trends. This is an important opportunity to assess the current and future role of Canadian oil supply in the US market and how it helps address these concerns. In the realm of US energy security, one of the biggest achievements of the past decade has been the growing role of Canadian oil sands production in supplying the US market. Oil sands production has made Canada the number one supplier, by far, of foreign oil to the United States. Without oil sands we would be facing a tighter oil market and higher oil prices. Thus, it is particularly important to have a fact-based discussion and an informed dialogue on this topic that will help both Americans and Canadians enhance mutual prosperity and security.

- **In the 1970s there were no oil sands imports into the United States. Today, the Canadian oil sands are poised to become the largest single source of foreign oil to the US market.** In 2010 the United States imported about 2 million barrels per day (mbd) of Canadian crude oil—22 percent of total imports. More than half—1.1 mbd—was oil sands, which is equivalent to the entire volume of imports from the number two supplier, Mexico.
- **Trade, jobs, and oil are the interconnected pillars of the US-Canada relationship.** Trade between the two countries totaled $525 billion in 2010. Eight million American jobs depend on trade with Canada. More than 20,000 American jobs already depend on oil sands development—and this number could grow significantly if oil sands investment expands**.** The proposed $7 billion Keystone XL pipeline project is among the largest "shovel-ready" projects in the United States.
- **Canadian oil sands could play an even larger role in supplying the US market, benefitting consumers. But North American pipeline infrastructure needs to**

adjust to the much greater availability of this new "mega" resource from Canada for this to happen. The lack of significant pipeline capacity to transport Canadian oil beyond its traditional US Midwest market artificially deprives the broader US market of oil that is available. A more flexible and robust supply system is better able to manage unexpected supply or demand developments, which would be a big positive for the US economy and consumers. Oil producers in Canada—which include many American companies—would develop export markets in Asia if they are unable to broaden their reach into the US market.

- **Environmental issues surrounding energy development, including in the oil sands, are controversial, but they are also manageable.** Ongoing advances in technology and operational experience have demonstrated that environmental concerns—particularly greenhouse gas (GHG) emissions—are being addressed. Life-cycle GHG emissions for the average oil sands product actually imported into the United States are just 6 percent higher than those from the average crude oil consumed in the United States.

US ENERGY SECURITY:
THE SIGNIFICANCE OF CANADA'S OIL SANDS

It is an honor to speak on the role of Canadian oil supply in the United States before the US House Subcommittee on Energy and Power of the 112th Congress. Over the past decade Canada has become the largest foreign supplier of oil to the United States. Today, there is deep concern about the impact of high oil and gasoline prices on the economy and the American people. A period of potentially momentous change in North Africa and the Middle East along with rising demand from emerging markets raises questions energy security and future oil price trends. This provides a most timely opportunity to assess the current role of Canadian oil in the US market and the dynamics that will shape future oil trends between the United States and its most important trading partner. I will discuss the development of the Canadian oil sands, how Canadian oil sands have enhanced US energy security and provide a perspective on key issues that will shape the future flow of oil from Canada to the United States.

MORE THAN A SHARED BORDER: THE US-CANADA RELATIONSHIP

Oil sands and energy trade in general are part of a much larger, dense network of trade and investment between the United States and Canada. A shared border stretching 5,521 miles—one of the longest in the world—saw $525 billion worth of goods traded in 2010. Canada is the number one destination for US exports. Eight million American jobs depend on trade with Canada.[1] With regard to oil, Canada supplies 22 percent of US crude oil imports, up from 15 percent a decade earlier. Higher oil sands output drove the increase. More than 20,000 American jobs already depend on oil sands development—and this number could grow significantly if oil sands investment expands.[2] The proposed $7 billion Keystone XL pipeline project is among the largest "shovel-ready" projects in the United States.

A cooperative and mutually beneficial relationship stretches back many decades. During World War II, for example, cooperation led to the border's being "ignored in order that necessary programs might be carried forward with a minimum of dislocation and inefficiency."[3]

More recently, the 1989 US-Canada free trade agreement and the 1993 North American Free Trade Agreement (NAFTA) established a strong foundation for economic relations. The 1989 agreement encouraged the "fullest possible" trade in energy. NAFTA reaffirmed the oil and gas trading framework between Canada and the United States. Energy trade is a key pillar of the relationship—and a growing one. Cross-border investment has also created a deepening web of connections. US-based companies are among the largest oil and gas producers—including in the oil sands—in Canada. Canadian companies have significant investments in the US energy sector and are particularly important in pipeline transportation.

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1. Laura M. Baughman and Joseph Francois, *U.S.-Canada and U.S. State Level Production and Employment: 2008*. Accessed at http://www.canadainternational.gc.ca/washington/assets/pdfs/Jobs_Study_2008_FINAL-en.pdf.

2. Afshin Honarvan et al., *Economic Impacts of New Oil Sands Projects in Alberta (2010–2035)*, May 2011, Canadian Energy Research Institute.

3. Paul Chastko, *Developing Alberta's Oil Sands,* quoting from *A History of the Petroleum Administration for War: 1941–45,* Washington, DC, Government Printing Office.

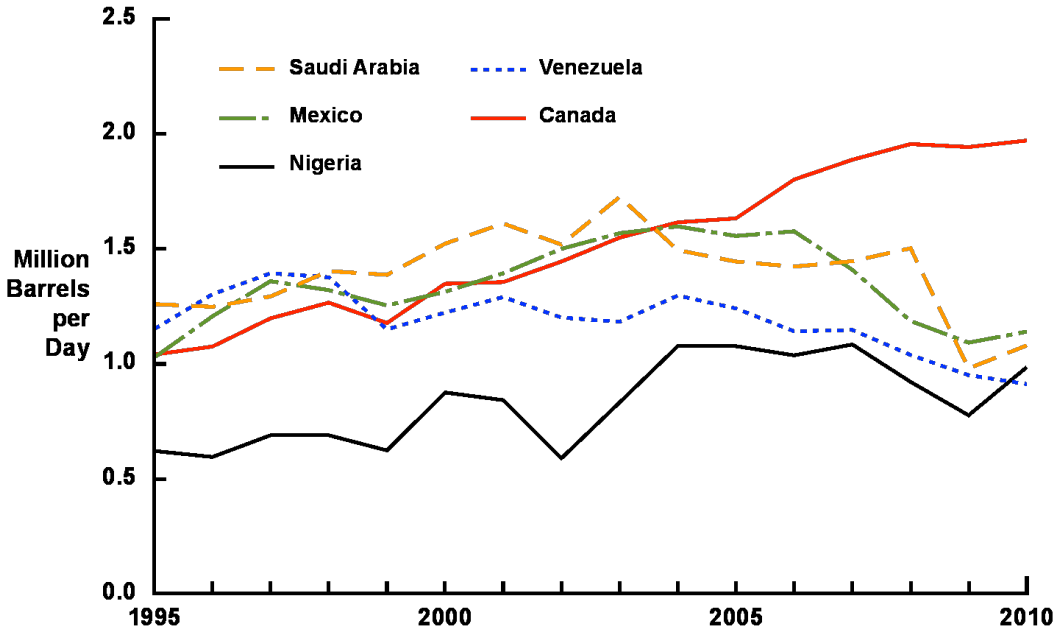
OIL'S ROLE IN US-CANADA RELATIONS

The energy relationship between the United States and Canada—in oil, gas, and electric power—is profound and reflects a shared vision of the benefits of an integrated continental market. Oil is the most important component and has long played a key role in the relationship. During World War II the United States was the main supplier of oil to Canada. Today Canada is the largest foreign supplier of oil to the United States. Unlike other foreign sources of oil, Canadian oil is linked to the United States by pipeline and is not dependent on waterborne crude oil carriers.

Among members of the Organization of Economic Cooperation and Development (OECD), Canada has an unusual oil supply growth story. In 2000 Canada supplied about 1.3 million barrels per day (mbd) of crude oil to the United States, accounting for 15 percent of total US imports. Canada was the number three supplier at the time, behind Saudi Arabia and Venezuela. By 2010—just a decade later—Canadian crude oil exports had increased 54 percent—from 1.3 mbd to nearly 2 mbd. This represented 22 percent of total 2010 crude oil imports and made Canada the number one foreign supplier (see Figure 1).

Figure 1

Trends in Volume of Crude Oil Exports to the United States by Top Suppliers



Source: US Energy Information Administration.
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THE CANADIAN OIL SANDS

The principal driver of Canada's expanding role in supplying the US petroleum market is higher production from the Canadian oil sands. The oil sands have become part of the fabric of our continental energy security. Since 2000 Canadian oil sands output has more than doubled: from 600,000 barrels per day (bd) to about 1.5 mbd in 2010. Canadian oil exports to the United States would be much less if not for the growth in oil sands. Indeed, the world would be facing a tighter oil market and higher oil prices without the oil sands.

What exactly are the oil sands? They are grains of sand covered with water, bitumen, and clay. The "oil" in the oil sands comes from bitumen, an extra-heavy oil with high viscosity. Bitumen does not flow like a liquid at room temperature. Instead, raw bitumen is akin to an ice hockey puck. Oil sands producers separate the bitumen from the sand and water to derive marketable oil.

A signature feature of the Canadian oil sands is their immensity. The amount of oil that can be economically recoverable is approximately 175 billion barrels, and the potential is much greater, with over 1.7 trillion barrels in place. The 175 billion barrels of recoverable oil is more than eight times greater than US crude oil reserves. Canadian oil reserves rank third in the world behind Saudi Arabia and Venezuela, which only recently released reserve estimates that surpass Canada. The oil sands make Canada one of the very few countries in the world that could substantially increase oil production for the next several decades.

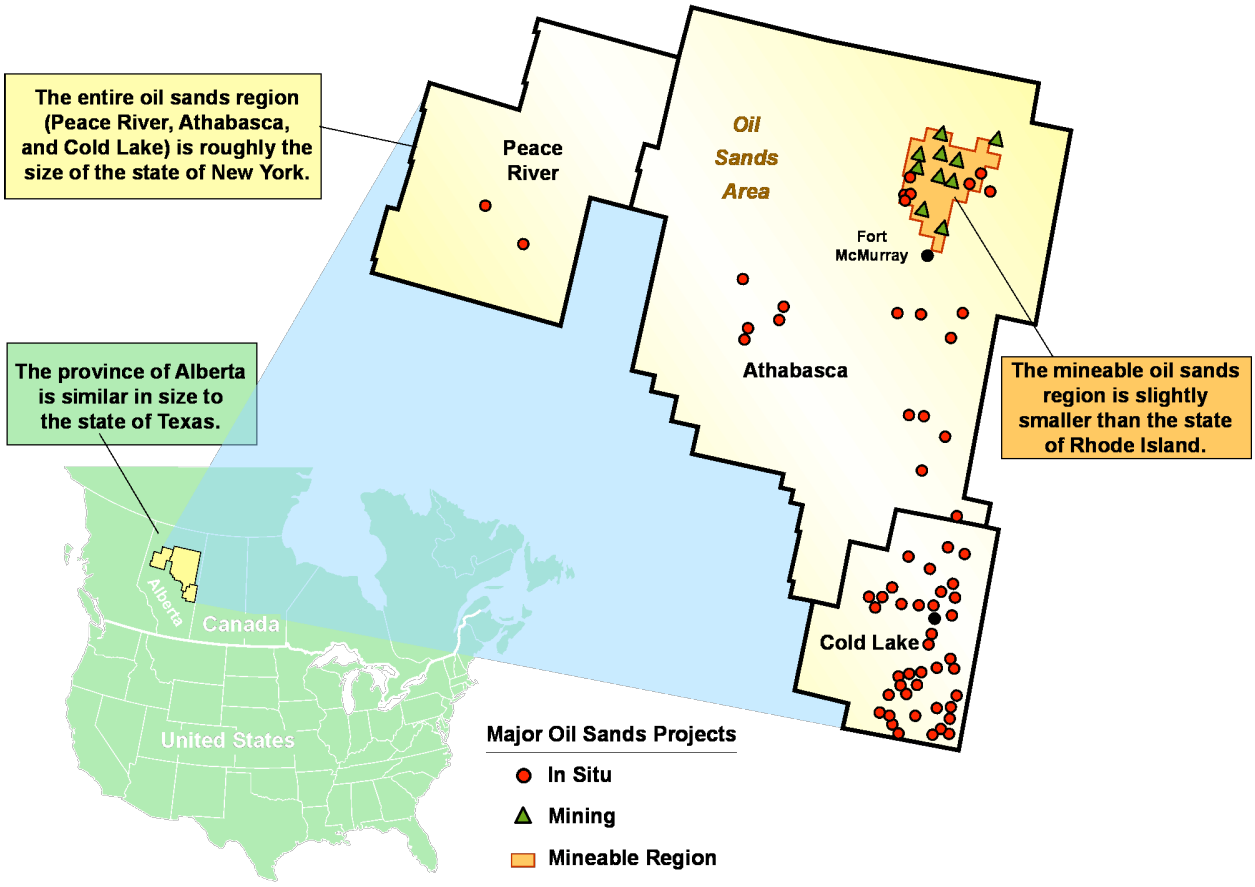
Canada's oil sands are concentrated in three major deposits in the western province of Alberta. The largest is the Athabasca, a region around Fort McMurray in northeastern Alberta. The other two areas are Peace River in northwest Alberta and Cold Lake, east of Edmonton (see Figure 2).

Recognition of the oil sands potential as a modern energy resource stretches back to the nineteenth century. However, the technical and economic barriers separating early pioneering efforts from large-scale commercialization were formidable and stubborn. Commercial oil sands production began in the late 1960s. Even then, it took until 2000—and required many advances in engineering—for the oil sands industry to reach a production level of 600,000 bd, equivalent to the output of a medium-size oil company. Over the past decade production growth picked up rapidly and supply more than doubled to about 1.5 mbd in 2010. This is greater than the 1.2 mbd that Libya exported to the global market in 2010, before the civil war.

The rise in oil prices, a stable operating environment, significant technological advancements, attractive fiscal terms, and the open investment climate in Canada—all these collectively spurred the rise in oil sands output. To put this in perspective, if measured as an individual country, production growth since 2000 from the Canadian oil sands would be far ahead of most countries, including many major producers such as Iran. The bottom line is the oil sands have become a major engine of global oil supply growth—and the only growing supplier with a land-based connection to the US market.

Figure 2

Location of Canadian Oil Sands Resources



Source: IHS CERA.
Note: Comparisons to US states are to the total areas of the states, including land and water.
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KEY ISSUES SHAPING THE FUTURE OF THE OIL SANDS

The oil sands are a big resource, but they also face challenges. The cost of developing and producing oil sands varies according to shifts in the cost of steel, mining equipment, drilling rigs, human resources, and other inputs. There is a range of processes and techniques used across the oil sands, so those choices also determine the cost of a specific project. Investment in the oil sands—like that in other oil projects—is vulnerable to a major fall in oil prices. But apart from the broad oil price risk, two key issues will influence the future role of Canada's oil sands in the United States: increased access to the US oil market and GHG emissions.

Access to the US Oil Market

Currently the United States is virtually the only export market for oil sands. In 2010, out of total oil sands production of about 1.5 mbd, about 1.1 mbd was exported to the United States.[4] This is a near tripling of oil sands volumes headed to the United States since 2000. The potential exists for even more growth—and for many years to come. But for this potential to be realized, pipeline infrastructure needs to expand in order to transport oil sands beyond their traditional market in the US Midwest to the US Gulf Coast. The US Gulf Coast is the largest refining center in the United States and has among the largest concentrations of refining capacity in the world. Much of the refining capacity in the US Gulf Coast is geared to process heavy crude oils, which are similar to much of the oil sands product.

Why is pipeline access to the US Gulf Coast so critical? US imports of oil sands are concentrated among refiners in the Midwest, but refineries there are nearing a saturation point—most likely around 2015—in their capacity to process oil sands. Expanding pipeline capacity from Canada to the US Gulf Coast, as proposed by the Keystone XL project, would provide more flexibility to the US supply system and allow pipeline infrastructure to begin to catch up with oil supply trends—primarily the growing flow of Canadian oil, but also increasing production in the upper Midwest. The initial capacity of Keystone XL would be 700,000 bd of crude oil. The project could also allow transport of crude oil produced in the US Midwest—particularly rapidly expanding production from the Bakken formation in North Dakota and Montana.

Economic logic makes clear that consumers benefit from increased flexibility and availability made possible by a larger and more dynamic pipeline network that reflects changing supply trends. The benefit is in the form of lower prices compared with a case of a more constricted and limited pipeline system. The lack of significant pipeline capacity from Canada to the US Gulf Coast deprives a key market of available oil.

A sign of the need to expand pipeline capacity out of the Midwest is a lower price for West Texas Intermediate (WTI) crude oil relative to other major crude oils, including those traded on the US Gulf Coast and elsewhere in the world. WTI is priced at Cushing, Oklahoma, and is the oil price that appears in the daily news. Historically WTI was priced at a premium to other crude oils. The US Midwest was "short" of crude oil, and a higher price was needed to attract supply to refineries in the region and to reflect the high quality of WTI. Consequently, pipeline infrastructure was built to transport oil *to* the Midwest, but not *from* the Midwest. Cushing pipeline connections do not flow south to the US Gulf.

In a break from historical trends, there were times from 2006 to 2010 when WTI was priced several dollars below Light Louisiana Sweet (a crude oil produced in the US Gulf Coast) and Brent crude oil (a global price benchmark produced in the United Kingdom). But in recent months, the WTI discount has ballooned to as much $18 per barrel as landlocked supply growth overwhelmed the Midwest crude oil market. WTI will remain vulnerable to significant discounts to other crude oils until more "export" capacity is developed to transport crude out of the Midwest to the US Gulf Coast.

4. The balance of oil sands output (0.4 mbd) was refined in Canada.

What if increased oil sands access to the US market is derailed? Apart from the loss to consumers of a more dynamic pipeline network, Canadian oil sands producers would likely turn to Asia as a new export market, and US Gulf Coast refiners would continue to draw on current suppliers. However, some current suppliers, such as Mexico and Venezuela, are struggling to maintain production volumes and other suppliers are needed.

WTI Discount Does Not Lead to Lower Gasoline Prices

Does a lower WTI price relative to other crude oils result in lower gasoline prices for consumers in the Midwest? The answer is no. The price a consumer pays for a gallon of gasoline in the Midwest is comparable to the US average. There is no WTI discount for gasoline. Indeed, the year-to-date average retail price for gasoline in the Midwest is $3.43 per gallon, 2 cents above the national average. These prices are slightly higher because the Midwest must import gasoline from outside the region. In 2010 the net volume of Midwest gasoline imports from elsewhere in the United States amounted to about 500,000 bd. To attract this supply, Midwest gasoline buyers must pay global market prices; otherwise sellers would supply other markets.

Another significant impact of an enduring disconnect of WTI from the global market is a potential erosion in the importance of the US oil futures market. If WTI does not "reconnect" to the global market, then participants will not view it as representative of global demand and supply conditions. This would encourage greater use of foreign benchmarks—such as Brent—instead of WTI, which would diminish the influence of the United States on the global crude oil market.

Greenhouse Gas Emissions

GHG emissions related to the production and consumption of oil sands are another factor shaping the future of US energy security. Environmental issues surrounding energy development, including in the oil sands, are controversial, but they are also manageable. Ongoing advances in technology and operational experience have demonstrated that environmental concerns—particularly GHG emissions—are being addressed. The debate is fueled by differing estimates of the "life-cycle" GHG emissions of oil sands and how they compare to those of other fuels.

Evaluation of life-cycle emissions is also known as a "well-to-wheels" analysis. A life-cycle analysis aims to calculate all the GHG emissions linked to the production, transport, and consumption of a fuel, such as in an automobile engine. How life-cycle GHG emissions of oil sands compare to other crude oils is a key question.

Evaluating and comparing the life-cycle GHG emissions of fuels is a complex process owing to differences in the data used and in the types of inputs considered. Estimates obtained from rules of thumb or broad assessments, or those based on a small number of projects, can be helpful for general discussion, but they are not robust or specific enough to support sound public policy.

To compare the life-cycle GHG emissions of oil sands to other crude oils, IHS CERA conducted a meta-analysis of 13 publicly available life-cycle studies.[5] A meta-analysis combines and analyzes studies with the goal of providing more accurate data than any single study can.

Awareness of where and how GHG emissions occur in the life cycle is crucial to understanding the differences in emissions among crudes. About 70 to 80 percent of GHG emissions are released during the combustion of refined products (such as gasoline and diesel) in the engine of an automobile. Emissions do not vary with the origin of the crude oil used to manufacture gasoline. On a life-cycle basis, fuels produced solely from oil sands result in 5 to 15 percent more GHG emissions than the average crude oil refined in the United States.

Although oil sands (and the synthetic crudes derived from oil sands) are more carbon intensive than the average crude oil consumed in the United States, they are among several other carbon-intensive crudes oils produced, imported, or refined in the United States. Moreover, the average life-cycle GHG emissions for the average oil sands product *actually imported into the United States* is about 6 percent higher than those of the average crude oil consumed in the United States. This 6 percent figure is based on the actual extraction method and composition of oil sands exports to the United States instead of an overall range for oil sands produced in Canada.[6] A key factor behind the 6 percent figure is that much of the oil sands product that is transported to the United States contains a blend of bitumen and condensates, which are light liquids and less carbon intensive to produce.

Differences with the SDEIS

As part of its process of reviewing the proposed Keystone XL pipeline, the Department of State commissioned a study to evaluate life-cycle GHG emissions. This was part of the Supplemental Draft Environmental Impact Study (SDEIS) released for comment in April 2011. This study calculated that GHG emissions from oil sands imported into the United States are 17 percent higher than those from the average crude oil consumed in the United States. This is above the 5 to 15 percent range for all oil sands in the IHS CERA meta-analysis and is significantly higher than the 6 percent average for oil sands product actually imported into the United States.

The primary reason for the difference between the figure cited in the SDEIS and the IHS CERA result is that the GHG figures included in the SDEIS assume that the GHG intensity of oil sands production is 1.5 times higher than the IHS CERA figure.[7] This higher GHG intensity figure in the SDEIA is outside the range of other studies. On this basis, it could be viewed as a mischaracterization of the GHG intensity of oil sands production.

Another discrepancy between IHS CERA's analysis and the SDEIS is in the comparison of oil sands GHG emissions with likely substitute crude oils if the Keystone XL pipeline is not built. The point in question is that refineries in the US Gulf Coast will continue to refine crude

5. For more details and an explanation of this study, see the IHS CERA Special Report *Oil Sands, Greenhouse Gases, and US Oil Supply: Getting the Numbers Right (September 2010)*.

6. Based on 2009 data, oil sands products processed in the United States were concentrated among synthetic crude oil imports from mining operations and bitumen blended with condensate, which is a less carbon-intensive liquid.

7. The SDEIS report cited GHG emissions that relied on results from a previous study conducted by the Department of Energy's National Energy Technology Laboratory (DOE NETL). The DOE NETL study used 2005 data for its calculation, which are not reflective of typical or current GHG emissions.

oil, but will GHG emissions differ if they process oil sands or other crude oils? IHS CERA calculates that the Keystone XL pipeline would result in incremental GHG emissions that are much less than the levels of the SDEIS base case.[8]

There are two reasons for this discrepancy. First, the SDEIS assumed that all oil sands supply is substituted with relatively light crude oil from the Middle East. IHS CERA believes this is unlikely. Much of the refining capacity on the US Gulf Coast is highly sophisticated and built to process heavy crude oils like the oil sands. It is unlikely that refiners would switch to relatively lighter and higher priced crude oil as a replacement, especially since they currently process large volumes of heavy crude from Venezuela and Mexico. Second, the high side of the SDEIS GHG emissions figure reflects the findings of a study using old data that result in GHG emissions estimates that are outside the range of other studies. IHS CERA's results are consistent with the incremental emissions produced by two other studies, Jacobs 2009 and Tiax 2009.[9] In any case, future growth in oil sands supply will likely be exported to other markets, such as Asia, if greater access to the US market is not granted. Higher volumes of oil sands will still be produced and consumed.

CONCLUSION

The oil sands provide an example of the need to find the right balance among economic, security, and environmental concerns. A fact-based discussion and an informed dialogue will help both Canadians and Americans achieve a balance that will enhance mutual prosperity and security. Key fundamental facts are

- The oil sands are a "mega" resource right next door to the United States.
- Higher oil sands supply has made Canada the number one supplier, by far, of foreign crude oil to the United States.
- Growth in oil sands production is reorienting imports and enhancing energy security through a land-based pipeline system with a neighboring country, not waterborne imports.
- The US pipeline system needs to "catch up" with changing supply patterns resulting from growth in oil sands production and higher production in the upper US Midwest.
- A larger and more dynamic pipeline system benefits consumers compared with a constricted and more limited system that is less able to handle shifts in demand and supply patterns.
- The oil sands are part of a larger and dense network of trade and investment relations between the United States and Canada. Eight million American jobs depend on trade with Canada. Failure to enable oil sands broader access to the US

8. IHS CERA estimates of incremental GHG emissions from Keystone XL would be from 7.5 to 11 million tons of carbon dioxide equivalent (CO_2e) per year. This is equal to 1.5 to 2.1 million more vehicles or about 1.8 to 2.5 average-size coal-fired power plants. The SDEIS base case calculated a range of 10 to 23 million tons of CO_2e per year.

9. *Life-Cycle Assessment Comparison of North American and Imported Crudes*, Jacobs Consultancy, 2009; *Comparison of North American and Imported Crude Oil: Life-Cycle GHG Emissions*, Tiax LCC, 2009.

market could damage a bilateral relationship that has proved to be mutually beneficial for many years.

- Life-cycle GHG emissions of oil sands are 5 to 15 percent higher than the average crude oil consumed in the United States. Moreover, the composition of oil sands products actually imported into the United States means that life-cycle GHG emissions of US oil sands imports are only 6 percent higher than the average.

The United States and Canada have a deep and mutually beneficial relationship rooted in strong economic, political, and cultural connections. Energy, and oil in particular, is a key element of the overall relationship. Canada's oil sands have become an integral part of the fabric of US energy security—with the potential to play an increasingly important role for many years to come.

James Burkhard, Managing Director of IHS CERA's Global Oil Group, leads the team of IHS CERA experts that analyze market conditions and changes in the oil and gas industry's competitive environment. A foundation of this work is detailed short- and long-term outlooks for global crude oil and refined products markets that are integrated with outlooks for other energy sources, economic growth, geopolitics, and security. Mr. Burkhard's expertise covers geopolitics, industry dynamics, and global oil demand and supply trends.

His team leads the Oil Sands Dialogue, which brings together policymakers, industry representatives, non-governmental organizations—including environmental groups—and other related stakeholders to advance the conversation surrounding Canadian oil sands development. The objective is to enhance understanding of critical factors and questions surrounding industry issues.

Mr. Burkhard also leads the IHS CERA Global Energy Scenarios, which combines energy, economic, and security expertise across the IHS Insight businesses into a comprehensive, scenarios-based framework for assessing and projecting global and regional energy market and industry dynamics. Previously he led Dawn of a New Age: Global Energy Scenarios for Strategic Decision Making—The Energy Future to 2030, which encompassed the oil, gas, and electricity sectors. He is the coauthor of IHS CERA's respected World Oil Watch, which analyzes short- to medium-term developments in the oil market. In addition to leading IHS CERA's oil research, Mr. Burkhard served on the US National Petroleum Council (NPC) committee that provided recommendations on US oil and gas policy to the US Secretary of Energy. He led the team that developed demand-oriented recommendations that were published in the 2007 NPC report Facing the Hard Truths About Energy. Before joining IHS CERA Mr. Burkhard was a member of the United States Peace Corps in Niger, West Africa. He directed infrastructure projects to improve water availability and credit facilities. Mr. Burkhard holds a BA from Hamline University and an MS from the School of Foreign Service at Georgetown University.