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ONE HUNDRED THIRTEENTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
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MEMORANDUM

February 4, 2013

To: Subcommittee on Energy and Power Democratic Members and Staff

Fr: Committee on Energy and Commerce Democratic Staff

Re: Hearing on "American Energy Security and Innovation: An Assessment of North America's Energy Resource"

On Tuesday, February 5, 2013, at 10:00 a.m. in room 2322 of the Rayburn House Office Building, the Subcommittee on Energy and Power will hold a hearing on "American Energy Security and Innovation: An Assessment of North America's Energy Resources."

I. OIL AND GAS RESOURCES IN THE UNITED STATES

A. Crude Oil Production

Domestic crude oil production has increased significantly over the past few years, reversing a decline that began in 1986. According to the Energy Information Administration (EIA), U.S. crude oil production increased from 5.1 million barrels per day in 2007 to 6.4 million barrels per day in 2012, the highest level since 1997.[1] EIA expects crude oil production to continue to grow rapidly, increasing to an average of 7.3 million barrels per day in 2013 and 7.9 million barrels per day in 2014 (Figure 1).[2] Drilling in shale and tight oil plays in the Williston Basin's Bakken formation in North Dakota and Montana, the Western Gulf Basin's Eagle Ford formation in Texas, and the Permian Basin in West Texas accounts for most of the projected rise in production over the next two years.[3]

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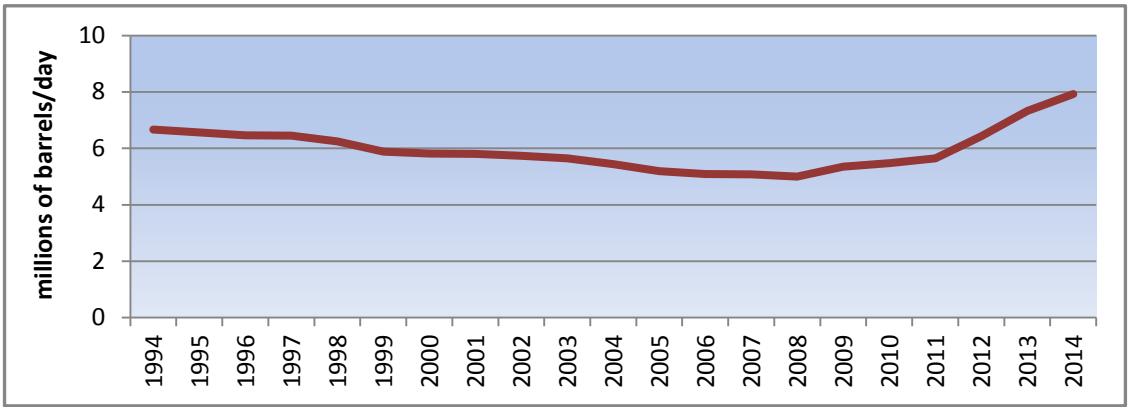
[1] Energy Information Administration, *Annual Energy Outlook 2013 Early Release,* Table 11: Liquid Fuels Supply and Disposition Balance (Dec. 2012); Energy Information Administration, *Historical Data on Crude Oil Production: 1859-2011* (online at www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm).

[2] Energy Information Administration, *Short-Term Energy Outlook* (Jan. 8, 2013).

[3] *Id.*

Figure 1. Domestic Production of Crude Oil in the United States, 1994-2014



In 2005, the United States imported 60% of the petroleum it consumed.[4] In 2012, the United States imported about 41% of the petroleum that it consumed, the lowest level in decades, a decline attributed primarily to a rise in domestic oil production, increased use of biofuels, and adoption of higher fuel efficiency standards for vehicles.[5] EIA projects that U.S. petroleum imports will fall to 32% of consumption in 2014, primarily because of continued increases in domestic crude oil production.[6]

The International Energy Agency (IEA) projects that by around 2020, the United States will become the largest global oil producer (overtaking Saudi Arabia until the mid-2020s), driven almost entirely by shale oil and other tight oil production in North Dakota, Texas, Montana, and elsewhere.[7] IEA also projects that the United States will reduce its reliance on imported oil to less than 30% of consumption by 2035.[8]

B. <u>Natural Gas Production</u>

A decade ago, experts predicted that the United States would become increasingly dependent on natural gas imports to meet domestic demand. In recent years, however, natural gas producers have discovered new ways—using a combination of hydraulic fracturing and horizontal drilling—to access natural gas trapped in shale formations, such as the Marcellus Shale located underneath Pennsylvania, New York, and West Virginia and the Barnett Shale located underneath Texas.

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[4] *Id.*

[5] Energy Information Administration, *Annual Energy Outlook 2013 Early Release,* at 9-10, and Table 11: Liquid Fuels Supply and Disposition Balance (Dec. 2012).

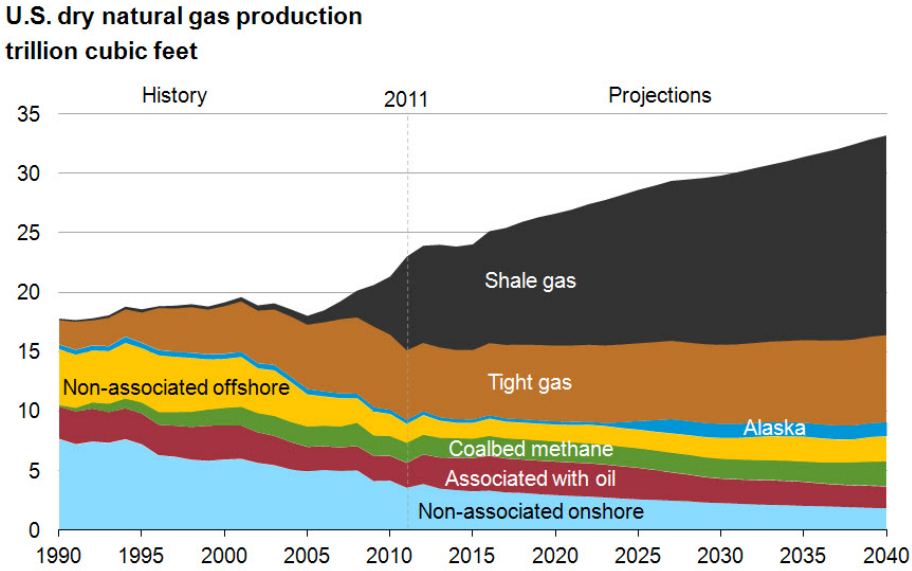
[6] Energy Information Administration, *Short-Term Energy Outlook* (Jan. 8, 2013).

[7] International Energy Agency, *World Energy Outlook 2012,* at 23, 106 (Nov. 2012).

[8] *Id.* at 76.

EIA now projects that U.S. natural gas production will increase from 23 trillion cubic feet in 2011 to 33 trillion cubic feet in 2040, a 44% increase. This increase is due almost entirely to the projected growth in shale gas production (see Figure 2).[9] EIA estimates that the United States could become a net exporter of liquefied natural gas (LNG) by 2016 and an overall net exporter of natural gas in 2020.[10]

Figure 2. U.S. Dry Natural Gas Production (Trillion Cubic Feet)



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013 Early Release*

C. <u>Liquefied Natural Gas (LNG) Exports</u>

The growth of shale gas production in the U.S. has created a glut of gas supply, lowering the domestic price. This has generated benefits for manufacturers that use natural gas as a feedstock or fuel but has made drilling less economically viable for gas producers. Natural gas prices are much lower in the United States (less than $4) than in Europe (around $10) and East Asia ($12-$15), a differential that is expected to continue for an extended period of time.

As a result of over-supply at home and this price differential, companies have filed 21 applications with the Department of Energy (DOE) to export liquefied natural gas. Under the Natural Gas Act, DOE is required to grant an application to export natural gas to a country without a free trade agreement with the United States unless it finds that the proposed export will not be consistent with the public interest. For export to countries with a free trade agreement, the Natural Gas Act requires DOE to deem such applications consistent with the public interest and grant them without modification or delay. As a practical matter, each potential LNG export

[9] Energy Information Administration, *Annual Energy Outlook 2013 Early Release*, Table 13: Natural Gas Supply, Disposition, and Prices (Nov. 2012).

[10] *Id.* at 10-11.

facility applies to export to both sets of countries. The Federal Energy Regulatory Commission (FERC) is responsible for issuing permits for specific LNG export facilities.

In May 2011, DOE granted an authorization for LNG exports from the Sabine Pass project in Louisiana. DOE commissioned a two-part study to help it decide how to address the remaining applications. The first part of the study was an EIA report released in January 2012 that examined the impacts of LNG exports on domestic energy markets. The second part of the study is a private contractor (National Economic Research Associates or NERA) study of the economic impacts of a range of LNG export levels. DOE is currently taking public comments on the NERA study.

Proponents of LNG exports point to a number of studies that project positive, but modest, net economic, jobs, and trade balance benefits from such exports. They contend that the resulting increases in domestic natural gas prices will be modest and will have limited impacts on domestic manufacturing and energy intensive industries. Proponents also argue that the global natural gas market will effectively limit the amount of economically competitive U.S. exports (i.e., as exports increase, domestic prices will rise and the price gap between U.S. exports and other sources of natural gas will shrink or disappear). Proponents argue that exports would reduce global carbon emissions by displacing coal generation in some countries.

Opponents argue that LNG exports will raise domestic natural gas prices in the United States, harming domestic manufacturing, energy intensive industries, and other natural gas consumers. They also contend that most of the natural gas needed for export would come from increased domestic production, primarily from shale gas resources, and that increased gas drilling will have adverse impacts on air quality, water quality, and other natural resources.

II. COAL RESOURCES IN THE UNITED STATES

In 2011, U.S. coal companies produced almost 1.1 billion tons of coal, a number that has remained fairly constant since 1990. Over time, however, production has moved from coal basins east of the Mississippi to basins west of the Mississippi (Figure 3).[11]

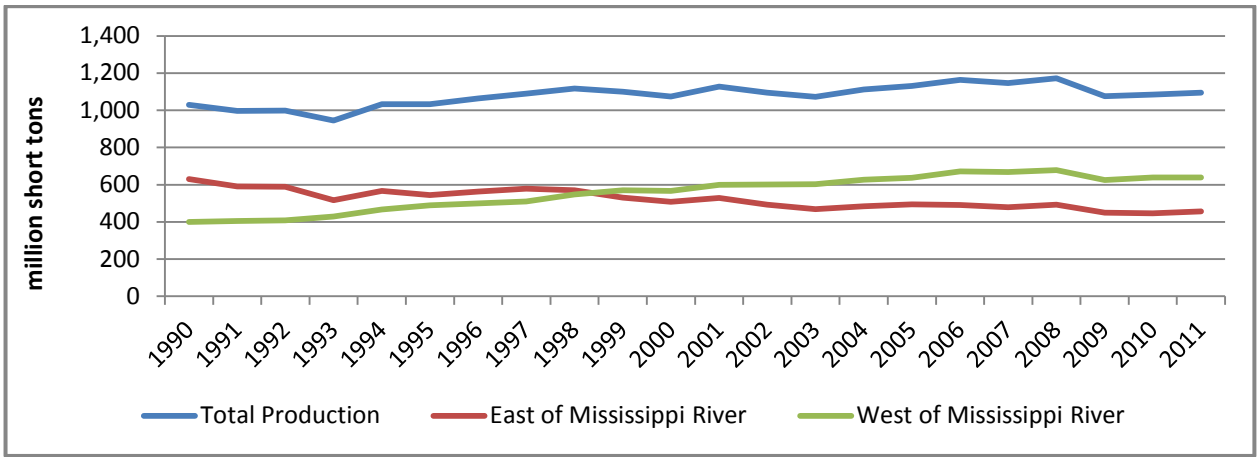
The U.S. Geological Survey (USGS) has begun the process of assessing how much of America's remaining coal supply is both economically recoverable and of sufficient quality to use if mined. In 2009, USGS published *The National Coal Resource Assessment Overview*, which concluded "the amount of economically recoverable resources is substantially less than the total original coal resources."[12] In the Central Appalachian Basin, for example, USGS determined that only 10% of the recoverable coal resources were economically recoverable,

[11] Energy Information Administration, *Annual Energy Review*, Table 7.2: Coal Production, 1949-2011 (Sept. 2012).

[12] U.S. Geological Survey, *The National Coal Resource Assessment Overview*, *Chapter D*, at 15 (2009).

given current prices and technology.[13] In the Illinois Basin study area, only 9% was economically recoverable.[14]

Figure 3. Coal Production in the United States



III. CLEAN ENERGY RESOURCES IN THE UNITED STATES

Barring significant changes in U.S. policy, EIA projects that renewable sources, including hydropower, will make up 16% of the U.S. electricity mix by 2040, up from 12% in 2012.[15] But the United States has significant potential for renewable sources to generate an even higher percentage of the nation's electricity.

The National Renewable Energy Laboratory (NREL) estimates that the technical potential of utility-scale photovoltaic (PV) and concentrated solar power (CSP) technologies in the United States is approximately 80,000 gigawatts and 37,000 gigawatts, respectively.[16] (As context, total electricity generating capacity in the United States was 998 gigawatts in 2012.) The total wind resource potential in the United States is 10,400 gigawatts.[17] The U.S. wind industry installed a record 13.2 gigawatts of new electricity generating capacity in 2012, the most

[13] U.S. Geological Survey, *The National Coal Resource Assessment Overview*, *Chapter D*, at 12 (2009).

[14] *Id.*

[15] *Id.* at 12.

[16] National Renewable Energy Laboratory, *Renewable Electricity Futures Study (RE Futures)*, at xxvii (July 2012).

[17] American Wind Energy Association, *Industry Statistics* (online at http://awea.org/learnabout/industry_stats/index.cfm).

for a single year. Wind now accounts for 60 gigawatts of electricity generating capacity in the United States, or 6% of the country's total capacity.[18]

NREL released a report in July 2012 showing that renewable electricity generation from technologies that are commercially available today could supply 80% of total U.S. electricity generation in 2050 while meeting electricity demand throughout the country.[19] If the United States achieved 80% electricity generation from renewables by 2050, annual greenhouse gas emissions from both coal-fired and natural gas-fired sources would fall by 80%.[20]

In April 2012, the IEA released a report finding that the global transition to clean, low-carbon energy is not occurring quickly enough to avoid the worst impacts of climate change.[21] According to IEA, without a global effort to transition to a lower-carbon energy system, carbon emissions will double by 2050, causing global average temperatures to climb at least 6°C (10.8°F) and leading to irreversible impacts for the environment and human health.[22] Richard Jones, IEA's deputy executive director, said that it is "ambitious but still possible" to limit global average temperature increases to 2°C above pre-industrial levels but only if the world's leading economies prioritize the rapid development and deployment of cleaner energy technologies.[23]

IV. CLIMATE CHANGE AND CARBON POLLUTION FROM ENERGY GENERATION

In 2012, combustion of petroleum, primarily from the transportation sector, accounted for 42% of energy-related carbon dioxide emissions. Coal combustion, almost entirely in the electric power sector, accounted for 32% of emissions. EIA projects—assuming the United States does not significantly change its energy and climate policy—that carbon dioxide emissions from energy-related combustion will increase slightly by 2040, from 5,361 million metric tons of carbon dioxide equivalent in 2012 to 5,691 in 2040.[24] As vehicles become more

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[18] *Burst of construction in December delivers record year for US wind*, Bloomberg (Jan. 18, 2013).

[19] National Renewable Energy Laboratory, *Renewable Electricity Futures Study (RE Futures)*, at xxxv (July 2012).

[20] *Id.* at xlii.

[21] International Energy Agency, *Tracking Clean Energy Progress: Energy Technology Perspectives 2012 excerpt as IEA input to the Clean Energy Ministerial* (Apr. 2012) (online at www.iea.org/media/etp/Tracking_Clean_Energy_Progress.pdf).

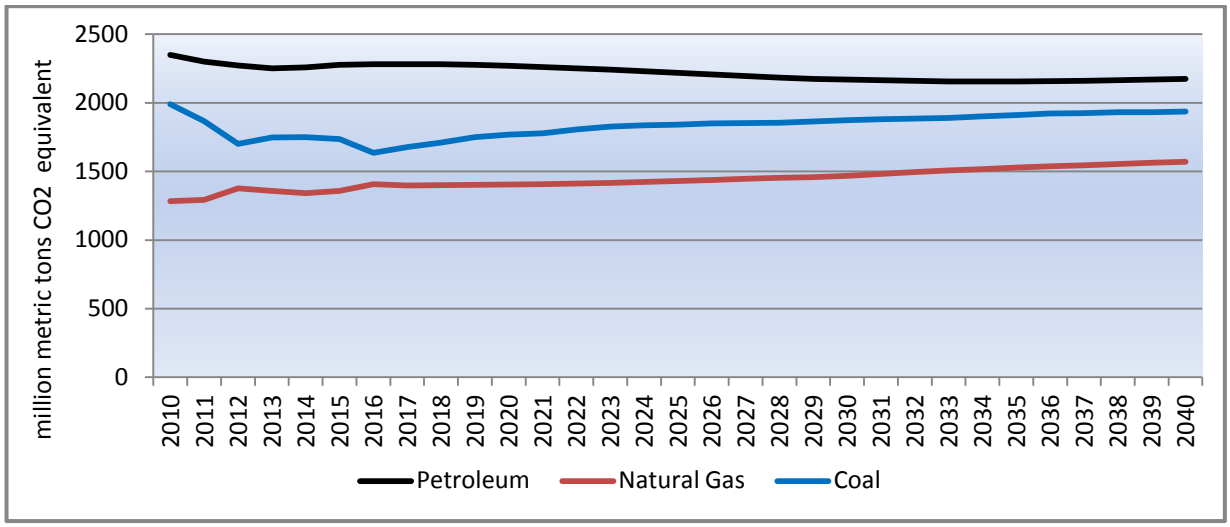
[22] *Id.* at 15.

[23] *Id.* at 13; *Clean energy lag means world is headed for 6-degree-Celsius temperature rise, says IEA*, E&E ClimateWire (Apr. 26, 2012).

[24] Energy Information Administration, *Annual Energy Outlook 2013 Early Release*, Table 18: Carbon Dioxide Emissions by Sector and Source (Dec. 2012).

fuel efficient, emissions from petroleum consumption will fall, but emissions from coal and natural gas combustion will rise (Figure 4).[25]

Figure 4. Carbon Dioxide Emissions by Fuel Source Under Status Quo Policies (2010-2040)



New scientific studies have shown that it may already be too late limit global warming to 2°C, given past and projected global carbon emissions. The third U.N. Environmental Programme (UNEP) Emissions Gap Report, which evaluates current emission trends and mitigation actions necessary to limit warming to 2°C, found that this challenge "may be insurmountable or at best, very costly," without urgent action.[26] Similarly, IEA found that our current global energy system is "unsustainable" and predicted that by 2035 the global temperature could increase 3.6°C.[27] IEA concluded that it is still possible to prevent more than 2°C of warming if action to reduce CO_2 emissions is taken prior to 2017.[28] IEA also found that "rapid deployment of energy efficient technologies" would extend the time period for action to prevent more than 2°C of warming until 2022.[29] Researchers from the Global Carbon Project also have concluded that if "large and concerted global mitigation efforts" are not introduced soon, limiting warming to 2°C "will very soon become unachievable."[30]

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[25] *Id.*

[26] U.N. Environment Programme, *The Emissions Gap Report 2012*, at viii (2012).

[27] International Energy Agency, *World Energy Outlook 2012*, at 1 (Nov. 2012).

[28] *Id.* at 3.

[29] *Id.*

[30] Glen P. Peters, Robbie M. Andrew, et al., *The challenge to keep global warming below 2°C*, Nature Climate Change, Advanced Online Publication, at 1 and 2 (Dec. 2, 2012).

V. KEYSTONE XL PIPELINE

A. Tar Sands

Tar sands, which are also known as "oil sands," are a combination of clay, sand, water, and bitumen, a heavy, black, asphalt-like hydrocarbon that cannot be extracted through a well like conventional oil.[31] Canada's economically recoverable tar sands deposits in Alberta are estimated at 173 billion barrels, making Canada second after Saudi Arabia in oil reserves.[32]

Studies estimate that shifting from conventional oil to tar sands fuel substantially increases lifecycle greenhouse gas emissions, although numeric estimates vary depending on the extraction method used, the petroleum products produced, the type of conventional crude oil considered, and the scope of the upstream activities included in the lifecycle estimate.[33] For example, a lifecycle analysis report commissioned by the European Commission found that tar sands are 23% more greenhouse gas intensive than conventional oil, while the State Department EIS highlights a DOE National Environmental Technology Lab estimate that tar sands are 17% more greenhouse gas intensive.[34] Actual life-cycle emissions may well be higher, as these estimates do not include greenhouse gas released from land disturbance from tar sands production or the carbon pollution associated with the large quantities of petroleum coke

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[31] Department of Energy, Office of Petroleum Reserves, *Fact Sheet: U.S. Tar Sands Potential* (online at http://fossil.energy.gov/programs/reserves/npr/Tar_Sands_Fact_Sheet.pdf); Energy Information Administration, *Glossary* (online at www.eia.gov/tools/glossary/).

[32] IHS Cambridge Energy Research Associates, *Growth in the Canadian Oil Sands: Finding the New Balance*, at I-1 (2009).

[33] Natural Resources Defense Council, *GHG Emission Factors for High Carbon Intensity Crude Oils*, (June 2010) (surveying results from five studies compared to 2005 baseline and finding that emissions are 8% to 37% higher compared to the 2005 U.S. baseline fuel supply); IHS CERA, *Oil Sands, Greenhouse Gases, and U.S. Oil Supply: Getting the Numbers Right – 2012 Update* (Nov. 2012) (finding that emissions are 5% to 23% higher than the average crude refined in the United States, or 14% on average).

[34] Adam R. Brandt, Stanford University, *Upstream greenhouse gas (GHG) emissions from Canadian oil sands as a feedstock for European refineries*, at 37 (Jan. 18, 2011); U.S. Department of State, *Final Environmental Impact Statement for the Proposed Keystone XL Project*, ES-15 (Aug. 26, 2011).

produced by upgrading bitumen.[35] Petroleum coke substitutes for coal, but it is more greenhouse gas intensive and lower priced, driving additional greenhouse gas emissions.[36]

Canada exports roughly one-third of its oil production, and 99% of Canada's oil exports go to the United States.[37] Canada projects that its greenhouse gas emissions will grow by 25% between 2005 and 2020. Emissions from tar sands production will be the single largest contributor to that emissions growth, accounting for about 44% of the increase.[38] Emissions from tar sands production are projected to almost triple over this period.[39]

B. Keystone XL Pipeline Permit Process

As originally proposed by TransCanada, Keystone XL is a multi-billion dollar pipeline that would transport up to 830,000 barrels per day (bpd) of tar sands crude oil almost 1,700 miles from Alberta to refineries in the Gulf Coast.[40] That project is now proceeding in two parts. The southern portion, which extends from Cushing, Oklahoma to the Gulf Coast, does not require a presidential permit and is already under construction. The northern portion would extend 850 miles from the border crossing in Montana to Steele City, Nebraska.[41]

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[35] Rebecca C. Rooney, Suzanne E. Bayley, and David W. Schindler, University of Alberta, *Oil sands mining and reclamation cause massive loss of peatland and stored carbon*, Proceedings of the National Academy of Sciences (Mar. 12, 2012) (finding that the destruction of the peat just from the tar sands mines that have already been approved will release between 11.4 and 47.3 million metric tons of stored carbon, the equivalent of seven years of tar sands mining and upgrading emissions at 2010 production levels); Oil Change International, *Petroleum Coke: The Coal Hiding in the Tar Sands* (Jan. 2013).

[36] Oil Change International, *Petroleum Coke: The Coal Hiding in the Tar Sands* (Jan. 2013).

[37] Energy Information Administration, *Country Analysis Briefs; Canada; Oil* (online at www.eia.doe.gov/cabs/canada/Oil.html).

[38] Government of Canada, *Turning the Corner; Detailed Emissions and Economic Modeling*, at 41-42 (Mar. 2008).

[39] *Id.*

[40] TransCanada Keystone Pipeline, L.P., *Application of TransCanada Keystone Pipeline, L.P. for a Presidential Permit Authorizing the Construction, Operation, and Maintenance of Pipeline Facilities for the Importation of Crude Oil to be Located at the United-States-Canada Border*, 7-9 (Sept. 19, 2008); U.S. Department of State, *Supplemental Draft Environmental Impact Statement, Keystone XL Project, Applicant for Presidential Permit: TransCanada Keystone Pipeline, LP*, 1-5 (Apr. 22, 2011).

[41] U.S. Department of State, *Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SEIS) and To Conduct Scoping and To Initiate Consultation Under Section 106 of the National Historic Preservation Act for the Proposed TransCanada Keystone LX Pipeline Proposed To Extend From Phillips, MT (the Border Crossing) to Steele City, NE*, 77 Fed. Reg. 36032 (June 15, 2012) (hereinafter *Notice of Intent*). The pipeline would extend another 329 miles into Canada.

The President has delegated the authority to permit transboundary pipeline projects to the State Department pursuant to Executive Orders 11423 and 13337, which require a finding that a project is in the national interest.[42] Prior to making the national interest determination, the National Environmental Policy Act (NEPA) requires the State Department to prepare an environmental impact statement that assesses impacts on the environment that would result from a project and evaluates alternatives that would avoid or minimize adverse environmental effects.[43]

The State Department issued a final EIS on August 26, 2011.[44] However, on November 10, 2011, the State Department announced that it needed to seek additional information and study alternative routes in Nebraska, given concerns from the State of Nebraska and many commenters regarding the proposed route through the sensitive Sand Hills area.[45] President Obama supported this decision, noting the potential effects of the pipeline on health, safety, and the environment. He concluded that "we should take the time to ensure that all questions are properly addressed and all the potential impacts are properly understood."[46] Further, the President stated that the final decision on the permit "should be guided by an open, transparent process that is informed by the best available science and the voices of the American people."[47]

On December 23, 2011, Congress passed the Temporary Payroll Tax Cut Continuation Act of 2011, which required the President to determine within 60 days whether the Keystone XL pipeline is in the national interest. On January 18, 2012, the State Department recommended that the permit for the proposed pipeline be denied because the Department did not have sufficient time to obtain the information necessary to assess whether the project is in the national interest.[48]

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[42] Exec. Order No. 11423, 33 Fed. Reg. 11741 (Aug. 16, 1968); Exec. Order No. 13337, 69 Fed. Reg. 25299 (Apr. 30, 2004).

[43] National Environmental Policy Act of 1969, Pub. L. No. 94-83.

[44] U.S. Department of State, *Notice of Availability of the Supplemental Draft Environmental Impact Statement for the Proposed TransCanada Keystone XL Pipeline Project*, 76 Fed. Reg. 22744 (Apr. 22, 2011); U.S. Department of State, *Final Environmental Impact Statement Fact Sheet* (Aug. 26, 2011); U.S. Department of State, *Final Environmental Impact Statement for the Proposed Keystone XL Project; Public Meetings*, 76 Fed. Reg. 53525 (Aug. 26, 2011); U.S. Department of State, *Notice of Availability of the Final Environmental Impact Statement for the Proposed Keystone XL Project*, 76 Fed. Reg. 55155 (Sept. 6, 2011).

[45] U.S. Department of State, *Keystone XL Pipeline Project Review Process: Decision to Seek Additional Information* (Nov. 10, 2011).

[46] The White House, *Statement by the President on the State Department's Keystone XL Pipeline Announcement* (Nov. 10, 2011).

[47] *Id.*

[48] U.S. Department of State, *Report to Congress Under the Temporary Payroll Tax Cut Continuation Act of 2011, Section 501(b)(2), Concerning the Presidential Permit Application of the Proposed Keystone XL Pipeline* (Jan. 2012).

At that time, there was no identified route through Nebraska. Based on the State Department's recommendation, President Obama denied the application, stating that "the rushed and arbitrary deadline insisted on by Congressional Republicans prevented a full assessment of the pipeline's impact, especially the health and safety of the American people, as well as our environment."[49]

TransCanada then split the project into two pieces, and submitted a new application for a presidential permit for the northern portion on May 4, 2012.[50] On June 15, 2012, the State Department published a notice of intent to prepare a supplemental EIS for the new application, which the State Department is expected to release soon.[51] On January 22, 2013, the Governor of Nebraska approved a new route for the pipeline through the state.[52]

VI. WITNESSES

The following witnesses have been invited to testify:

- **The Honorable Adam Sieminski**
  Administrator
  U.S. Energy Information Administration

- **Mr. Daniel Yergin**
  Vice Chairman
  IHS

- **Mr. Harry Vidas**
  Vice President
  ICF International

- **Ms. Mary Hutzler**
  Senior Fellow
  Institute for Energy Research

- **Ms. Jennifer Morgan**
  Director, Climate and Energy Program
  World Resources Institute

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[49] Statement by President Barack Obama on the Keystone XL Pipeline (Jan. 18, 2012).

[50] TransCanada Keystone Pipeline LP, *Presidential Permit Application* (May 4, 2012) (online at http://keystonepipeline-xl.state.gov/proj_docs/permitapplication/index.htm).

[51] U.S. Department of State, *Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SEIS) and To Conduct Scoping and To Initiate Consultation Under Section 106 of the National Historic Preservation Act for the Proposed TransCanada Keystone LX Pipeline Proposed To Extend From Phillips, MT (the Border Crossing) to Steele City, NE*, 77 Fed. Reg. 36032 (June 15, 2012).

[52] Governor Dave Heineman, *Governor Approves Pipeline Route* (Jan. 22, 2013).