



US CRUDE OIL EXPORTS WILL LOWER CONSUMER GASOLINE PRICES

A SUMMARY OF 13 INDEPENDENT STUDIES



1. U.S. Energy Information Administration

“Petroleum product prices in the United States, including gasoline prices, would be either unchanged or slightly reduced by the removal of current restrictions on crude oil exports. As shown in a previous EIA report (What Drives U.S. Gasoline Prices?, October 2014) petroleum product prices throughout the United States have a much stronger relationship to Brent prices than to WTI prices. In the high production cases considered in this study (HOG and HOG/LP), the elimination of current restrictions on crude oil exports narrows the Brent-WTI spread by raising the WTI price. As domestic producers respond to the higher WTI price with higher production, the global supply/demand balance becomes looser unless increased domestic production is fully offset by production cuts elsewhere. The looser balance implies lower Brent prices, which in turn results in lower petroleum product prices for U.S. consumers.”

U.S. Energy Information Administration, Effects of Removing Restrictions on U.S. Crude Oil Exports, September 2015

2. Harvard Business School

“Crude oil exports increase the competitiveness of domestic oil production without affecting U.S. consumers. The U.S. price for gasoline and other refined products is closely tied to global market prices for these products, because the U.S. places no restrictions on their import or export. However, the existing ban on crude oil exports hurts domestic producers while benefitting domestic refiners, because U.S. producers must sell their crude at a discount to U.S. refiners. Therefore, exports will not cause an increase in prices at the pump, and few, if any, other U.S. industries would be affected.”

Harvard Business School, America’s Unconventional Energy Opportunity, June 2015

3. Center for a New American Security

“[Lifting the oil ban] requires a major effort to educate policymakers and the public about how such a policy change would benefit consumers by contributing to lower gasoline prices. If policymakers fail to chart this course, they would undercut dynamic American potential and miss an important opportunity to contribute to U.S. prosperity and security.”

Center for a New American Security, Crude Oil Export & U.S. National Security, May 2015

4. IHS

“On a per household basis, the net benefit of a US free trade policy for crude oil translates to an average gain of \$158 in labor income per year in the Base Production Case and \$285 in the Potential Production Case in 2016-30. These findings are in the absence of the recent drop in global oil prices. Consumer benefits are expected to strengthen as gasoline prices decline.”

IHS, Unleashing the Supply Chain: Assessing the Economic Impact of a US Crude Oil Free Trade Policy, March 2015

5. Rice University

“Some have argued that crude oil exports would increase gasoline prices in the U.S. However, because refined products, such as gasoline, can be freely exported, the prices of refined products sold in the US are in a parity relationship with international prices for refined products. Thus, the discounted prices of oil produced in the US are not reflected in US gasoline and refined product prices. Thus, removing the crude export ban, although it would raise the price of domestic crude oil, would not increase the price of gasoline in the US. In fact, the results herein indicate that the biggest determinant of US gasoline price is the price of oil in the international market.”

Rice University’s Baker Institute for Public Policy, To Lift or Not to Lift? The US Crude Oil Export Ban: Implications for Price and Energy Security, March 2015

6. Columbia University

“We estimate lifting current crude export restrictions could increase US crude production anywhere between 0 and 1.2 million barrels per day on average between now and 2025, and reduce domestic gasoline prices by between 0 and 12 cents per gallon.”

Columbia University, Navigating the U.S. Oil Export Debate, January 2015

7. Congressional Budget Office

“There are a number of ways that Congress could affect shale development and thus affect the oil and gas markets, economic output, and the federal budget. This report considers options that would change export policies—easing the current ban on exports of crude oil, repealing it, or changing the government’s criteria for judging applications to export liquefied natural gas (LNG)—and concludes that the options would probably increase domestic production but have little effect on prices. That increase in production would probably make GDP and federal revenues slightly higher than they would be under current export policies.”

Congressional Budget Office, The Economic and Budgetary Effects of Producing Oil and Natural Gas from Shale, December 2014

8. Aspen Institute

“Given the public’s sensitivity to changes in the price of gasoline, many in Congress are reluctant to support eliminating the ban on crude oil exports. The oil market, however, is worldwide and prices of various grades of oil are set in world markets. Producing more oil domestically will put additional downward pressure on the world price of oil. If we export oil and then have to import more of it to offset exports, it might seem a wash and the price of oil would not change. In reality, however, the price of gasoline would likely fall a bit.”

Aspen Institute, Lifting the Crude Oil Export Ban: The Impact on U.S. Manufacturing, October 2014

9. U.S. Energy Information Administration

“Brent crude oil prices are more important than WTI crude oil prices as a determinant of U.S. gasoline prices in all four regions studied, including the Midwest. The effect that a relaxation of current limitations on U.S. crude oil exports would have on U.S. gasoline prices would likely depend on its effect on international crude oil prices, such as Brent, rather than its effect on domestic crude prices.”

U.S. Energy Information Administration, What Drives U.S. Gasoline Prices?, October 2014

10. Brookings Institution

“Allowing crude oil exports is in the national interest. Our analysis shows a direct correlation between increased U.S. oil production, net benefits to society, and lower gasoline prices. As a result, we find the ban an anachronism that has long outlived its utility and now threatens to impair, rather than protect, U.S. energy, economic, and national security... The welfare benefits to U.S. households derive from higher real incomes (from higher wages) and lower gasoline prices. In the reference case, the decrease in gasoline price is estimated to be \$0.09/gallon, but only for about five years. If oil supplies are more abundant than currently expected, the decline in gasoline prices will be larger (\$0.07 to \$0.12 per gallon) and more enduring.”

Brookings Institution, Changing Markets: Economic Opportunities from Lifting the U.S. Ban on Crude Oil Exports, September 2014

11. U.S. Government Accountability Office

“The studies we reviewed and most of the stakeholders we interviewed suggest that consumer fuel prices, such as gasoline, diesel, and jet fuel, could decrease as a result of removing crude oil export restrictions. A decrease in consumer fuel prices could occur because they tend to follow international crude oil prices rather than domestic crude oil prices, according to the studies and most of the stakeholders. If domestic crude oil exports caused international crude oil prices to decrease, consumer fuel prices could decrease as well... Price estimates range from a decrease of 1.5 to 13 cents per gallon.”

U.S. Government Accountability Office, Changing Crude Oil Markets: Allowing Exports Could Reduce Consumer Fuel Prices, and the Size of the Strategic Reserve Should Be Reexamined, September 2014

12. IHS

“By boosting global supplies, the elimination of the ban will result in lower global oil prices. Since US gasoline is priced off global gasoline prices, not domestic crude prices, the reduction will flow back into lower prices at the pump—reducing the gasoline price 8 cents a gallon. The savings for motorists is \$265 billion over the 2016-2030 period.”

IHS, U.S. Crude Oil Export Decision: Assessing the Impact of the Export Ban and Free Trade on the Economy, May 2014

13. ICF International

“U.S. weighted average petroleum product prices decline as much as 2.3 cents per gallon when U.S. crude exports are allowed. The greatest potential annual decline is up to 3.8 cents per gallon in 2017. These price decreases for gasoline, heating oil, and diesel could save American consumers up to \$5.8 billion per year, on average, over the 2015–2035 period.”

ICF International, The Impacts of U.S. Crude Oil Exports on Domestic Crude Production, GDP, Employment, Trade and Consumer Costs, March 2014

Executive Summary:***Effects of Removing Restrictions on U.S. Crude Oil Exports***

September 2015

Recent increases in domestic crude oil production and the prospect of continued supply growth have sparked discussion on the topic of how rising domestic crude oil volumes might be absorbed, including the possibility of removing or relaxing current restrictions on U.S. crude oil exports.

In response to requests from Congress¹ and the Administration, EIA developed several analyses that address these issues. Recent EIA reports have addressed gasoline price determinants (EIA, *What Drives U.S. Gasoline Prices?*, October 2014), changes in U.S. crude oil imports to accommodate increased domestic production (EIA, "Crude oil imports continue to decline", *This Week in Petroleum*, January 23, 2014), options for refinery capacity expansion (EIA, *Technical Options for Processing Additional Light Tight Oil Volumes within the United States*, April 2015), and refinery responses to higher, but fixed, levels of domestic crude oil production under both current crude oil export restrictions and with unrestricted crude oil exports (EIA, *Implications of Increasing Light Tight Oil Production for U.S. Refining*, May 2015). EIA also developed projections of domestic crude oil production by crude type through 2025 (EIA, *U.S. Crude Oil Production to 2025: Updated Projection of Crude Types*, May 2015), supplementing the overall production projection provided in the *Annual Energy Outlook 2015* (AEO2015) and updating a previous report issued in May 2014.

This report builds on these earlier efforts by applying EIA's energy models to directly compare cases over the next decade with and without the removal of current restrictions on crude oil exports. Four baseline cases using EIA's National Energy Modeling System are considered to reflect a range of outlooks for resources and technology as well as prices, which are key drivers of domestic crude oil production.

Current laws and regulations allow for unlimited exports of petroleum products, but require licensing of crude oil exports. Exports of crude oil to Canada for use there are presumptively granted licenses, as are exports of crude oil from Alaska's North Slope (ANS crude), re-exports of foreign-sourced crude, and certain exports from California. In addition, recent rulings by the U.S. Department of Commerce's Bureau of Industry and Security (BIS) have clarified that condensate processed through a distillation tower is classified as a petroleum product and is therefore exportable without a license.² For this analysis, EIA generally assumes that all streams with API gravity of 50 degrees and above (API 50+) would be eligible for processing and export under recent BIS guidance. Through the first five months of 2015, crude oil exports averaged 491,000 b/d. In addition, exports of processed condensate through the first five months of 2015 are estimated to have reached an average of 84,000 b/d.

Although the current policies outlined above are characterized by some as a crude oil export ban, crude oil exports have been rising steadily in recent years (EIA, "Crude exports and re-exports continue to rise; some volumes sent to Europe and Asia," *Today in Energy*, October 31, 2014). Even with current restrictions, a further increase in crude exports, including additional flows to Canada and more exports of ANS crude, is possible. In this analysis, projections under current policies are compared to alternative cases that allow unrestricted exports of crude oil, paralleling the current treatment of petroleum product exports.

Executive Summary:

America's Unconventional Energy Opportunity

June 2015

Unconventional gas and oil resources are perhaps the single largest opportunity to improve the trajectory of the U.S. economy, at a time when the prospects for the average American are weaker than we have experienced in generations. America's new energy abundance can not only help restore U.S. competitiveness but can also create geopolitical advantages for America. These benefits can be achieved while substantially mitigating local environmental impact and speeding up the transition to a cleaner-energy future that is both practical and affordable.

However, America is currently caught in an unproductive, divisive, and often misinformed debate about our energy strategy, which threatens our nation's economic and environmental goals. There is an urgent need for the U.S. to get on a new path. We set forth an overall strategy for unconventional energy development that meets the most important goals of industry, environmental stakeholders, and governments, and allows the U.S. to responsibly achieve the full benefits of this unique and vital opportunity.

THE U.S. COMPETITIVENESS CHALLENGE

The ability of the U.S. economy to improve the standard of living of the average citizen is weaker than it has been in generations. The deterioration began well before the Great Recession and is reflected by slow job growth and stagnating wages, especially for middle- and lower-middle-class Americans. While U.S.-based multinational businesses have outperformed those in other advanced economies, small businesses in the U.S. are registering eroding performance, and business failures have outnumbered new startups from 2009 through 2012—the last year of available data—for the first time since at least the 1970s. U.S. growth has exceeded that of Europe and Japan in recent years, but our growth is still the slowest in many decades.

America's poor economic performance is not cyclical but structural, and it reflects an erosion of the nation's fundamental competitiveness. As documented by the U.S. Competitiveness Project at Harvard Business School (HBS), the overall quality of America's business environment has declined in key areas, including skills, infrastructure, costs of doing business, and corporate tax structure. While the U.S. retains core strengths, partisan political gridlock has meant that little progress has been made on reducing any of America's emerging weaknesses. This project is motivated by that gridlock, which is also threatening one of America's emerging strengths: unconventional energy development.

AMERICA'S UNCONVENTIONAL ENERGY ADVANTAGE

America's abundant and low-cost unconventional gas and oil resources are a once-in-a-generation opportunity to change the nation's economic and energy trajectory. The U.S. now has a global energy advantage, with wholesale natural gas prices averaging about one-third of those in most other industrial countries, and industrial electricity prices 30–50% lower than in other major export nations. That means major benefits for industry, households, governments, and communities, while reducing America's trade deficit and geopolitical risks. The U.S. has had a 10- to 15-year head start in commercializing unconventional resources versus other countries. Though the recent decline in world oil prices has

affected the short-term prospects of U.S. unconventional, low prices are unlikely to significantly impact the fundamental U.S. competitive advantage over the next several decades.

THE ENERGY OPPORTUNITY AT RISK

Despite these major benefits, however, public support for unconventional energy development, and especially hydraulic fracturing, is decidedly mixed and seems to be declining. Further development is increasingly threatened. Opposition reflects both legitimate concerns over local environmental and climate impacts, and widespread confusion over the facts.

In today's status quo, no stakeholder is achieving its most essential goals. The ability to change America's economic trajectory is being eroded, industry is facing stiff opposition, local environmental performance is not improving as rapidly as it can and should, and large-scale progress toward a cleaner-energy and a lower-carbon future remains fiercely contested. There is now a real risk that America will fail to capitalize on this historic opportunity, much less build on it.

CREATING A WIN-WIN STRATEGY

The HBS–Boston Consulting Group (BCG) project was established to develop a shared fact base, engage the key stakeholders, and advance a shared agenda for developing America's unconventional gas and oil resources in a way that addresses the key objectives of all the stakeholders. This win-win pathway involves 11 action steps across three pillars:

- A. Capitalizing on America's new energy advantage to enhance U.S. competitiveness and the prosperity of the average citizen;
- B. Minimizing the local environmental, health, and community impacts of developing the new energy resources at competitive cost;
- C. Utilizing unconventional to accelerate a practical and cost-efficient transition to a lower-carbon, cleaner-energy future.

A. Enhancing the economic opportunity

Unconventionals have already created major economic benefits for the U.S., adding more than \$430 billion to annual GDP and supporting more than 2.7 million American jobs that pay, on average, two times the median U.S. salary. Fully 50% of the unconventional production jobs are middle-skills jobs, accessible to the average citizen. The U.S. is still in the early stages of capitalizing on this economic opportunity, and current activity is concentrated in the upstream energy-production sector. With proper policies and actions by the industry and other stakeholders, this economic opportunity can further spread into downstream industries, such as petrochemicals and energy-intensive industries, and more broadly throughout the economy.

To realize that potential, however, the U.S. must address a number of key challenges:

1. Continuing the timely development of efficient energy infrastructure. Additional pipelines, gathering, and processing infrastructure are needed to safely and efficiently move unconventional gas and oil from producing regions to users across America.

2. Delivering a skilled workforce. The U.S. will need many more trained workers with the right skills across a wide variety of occupations to fill the well-paying middle-skills jobs.
3. Eliminating outdated restrictions on gas and oil exports. With abundant resources, restrictions on exports created in response to the 1970s' energy crises are no longer needed, and exports would boost U.S. economic and job growth while benefitting friendly nations.

B. Minimizing local environmental impacts

The development of unconventional energy resources creates significant environmental risks to water, air, land, and communities, which must be clearly acknowledged. Our research reveals that real progress is being made in managing these environmental risks at a cost that does not threaten competitiveness. In addition, mitigation technology is rapidly improving. Significant progress has also been made in improving regulatory standards in most energy-producing states, and continuous-improvement bodies have been formed to diffuse leading practices among regulators and industry stakeholders.

There is no inherent trade-off between environmental protection and company profitability. With sound regulation and strong compliance, the cost of good environmental performance is modest and gives companies a level playing field on which to compete. However, poor and uneven compliance by some operators and uneven diffusion of leading practices continue to create significant problems. Improvement is needed in four key areas:

4. Developing transparent and consistent environmental performance data. Transparent environmental performance data creates the foundation for monitoring compliance and stimulating innovation. State governments, industry, and NGOs all have roles to play.
5. Setting robust regulatory standards. Better standards are needed to fill gaps, speed adoption of industry-leading practices, and encourage further innovation.
6. Achieving universal regulatory compliance. Both industry and regulators need to strengthen regulatory enforcement and producer compliance.
7. Strengthening bodies driving continuous environmental improvement. Continuous-improvement organizations such as STRONGER and CSSD* have played an important role, but steps are needed to improve collaboration and better disseminate recommendations.

C. Speeding the transition to a cleaner-energy, lower-carbon future

Over the last decade, the U.S. has begun a major transition toward a more-efficient, cleaner, and lower-carbon energy system led by the power sector. Our research finds that that transition will not only continue, but could accelerate over the next 20–30 years and will lead to major economic and environmental benefits.

While many stakeholders still believe that unconventional energy development and America's energy transition are antithetical, they are actually complementary. Natural gas is the only fuel that can cost-effectively deliver large-scale carbon emissions reductions over the next 20 years while also providing a bridge to achieving even lower low-carbon solutions over the long term.

Our analysis shows that developing unconventional resources today is unlikely to delay the rollout of renewables. Instead, it can actually enable their scale-up. We also find that the use of natural gas today

will not lock in greenhouse gas emissions for the indefinite future, and that low-cost natural gas-fired power plants will provide the essential standby power needed to scale up renewables.

However, to achieve this successful transition to a lower-carbon future, the U.S. must address a number of key challenges:

8. Containing methane leakage. Uncontrolled methane leakage can offset the climate benefits of natural gas. Cost-effective methods to contain leakage are available and need to be deployed throughout the natural gas value chain.

9. Setting policies that encourage cost-effective emissions reductions. Climate policies and regulations should be market-based to encourage cost-effective carbon reductions, rather than specifying particular technologies.

10. Fostering clean-energy technologies. The U.S. needs to encourage ongoing private- and public-sector research investments in cost-effective, low-carbon energy technologies and applications, including potentially broader uses of unconventional natural gas.

11. Building out a smart, efficient energy grid. The long-term (by around 2050) transition to a low-carbon energy system will require a robust power grid infrastructure capable of addressing the intermittent nature of renewable power sources. The U.S. and states must invest now in these grid improvements to enable renewables to scale over the long run.

MOVING TO ACTION

These 11 action steps are a practical, achievable strategic agenda for America to make the most of its energy advantage while delivering on the nation's most important economic, environmental, and climate objectives.

To move these steps to action, we need to change the discussion, move beyond ideology, and break the gridlock. Industry, NGOs, governments, and academics must transcend their traditional positions, let go of the exaggerated rhetoric, and start overcoming historic skepticism and distrust that have led to the current, zero-sum mindsets and halting progress. Every stakeholder will be most effective in meeting its essential goals if it can recognize the benefits of working toward a good overall outcome for America, not just maximizing its narrowly defined historical self-interests.

The U.S. needs to achieve a “rational middle” ground to capitalize on this historic opportunity. The stakes are too high to fail. Long-entrenched opposition and antagonism will not dissipate overnight. But we must get started.

CENTER FOR A NEW AMERICAN SECURITY

Executive Summary:

Crude Oil Export & U.S. National Security

May 2015

A dramatic increase in the production of domestic crude oil over the last several years is creating a new era of energy abundance in the United States. In addition to a major economic boost, this provides the United States with important national security benefits. By making the global oil market more stable and better able to adjust to shocks, U.S. producers are reducing the ability of other countries to use energy supply or price decisions to coerce or harm the United States, our allies, and others. The energy boom also provides U.S. policymakers with the ability to impose powerful energy sanctions and gain important leverage in trade negotiations.

Continuing to collect and expand the dividends of American energy resources for our economic strength and international security requires the United States to adapt its energy policy to new market conditions. Promoting the export of U.S. oil, which is currently under nearly complete prohibition, would help to sustain the benefits of the U.S. oil boom. Low oil prices are slowing energy investments and the contribution of the energy boom to U.S. domestic economic growth is diminishing, but the logic of adopting new policies to promote oil export remains squarely within the national interest. Even if it does not lead to more oil production while prices are low, the market will inevitably rebound. Opening up the export market would help make U.S. energy producers more nimble and the economy more resilient, while at the same time strengthening Washington's influence and leverage around the world.

Lifting the oil ban requires policy innovation and a plan for managing the environmental impacts of producing more oil. It also requires a major effort to educate policymakers and the public about how such a policy change would benefit consumers by contributing to lower gasoline prices. If policymakers fail to chart this course, they would undercut dynamic American potential and miss an important opportunity to contribute to U.S. prosperity and security.

The core argument for promoting more U.S. oil export is the economic stimulus and resilience it would provide to the United States and its allies. This economic benefit is also an important national security argument for greater oil export because of the fundamental importance of economic strength to national security. A strong and growing economy supports job creation, investment capital for commercial growth, defense and social spending, and foreign aid, all of which elevate U.S. stature and the ability of U.S. policymakers and entrepreneurs to lead on security and economic matters globally.

There are additional security benefits that have been largely overlooked in the public debate about U.S. oil export. Changing oil market circumstances and grave international security challenges create new opportunities for the United States to leverage its abundant energy; these changes demand a sharper look at the national security arguments for greater energy export.

With a specific emphasis on national security implications, this policy brief describes the recent U.S. energy production expansion and the history of crude export prohibitions. It also discusses the impact on U.S. economic and foreign policy interests of promoting oil export. Specifically, it explores the expanded

C E N T E R F O R A N E W A M E R I C A N S E C U R I T Y

international influence the United States could achieve in the areas of sanctions, security alliance politics, strategic trading and technology export, and promotion of energy security. Finally, the brief provides recommendations for pragmatic policy to expand U.S. crude oil export to enhance American energy security and global leadership.

Executive Summary:***Unleashing the Supply Chain: Assessing the Economic Impact of a US Crude Oil Free Trade Policy***
March 2015

A revival in US crude oil production—up 80% since 2008—is expanding economic activity across the nation through an interdependent, technology-driven supply chain. This supply chain encompasses dozens of important and diverse domestic industries well beyond what is commonly thought of as the “oil industry.” Consumers are now paying substantially less for gasoline, largely due to the impact on global markets of higher US oil production. But lower oil and gasoline prices are just one benefit. In this report, IHS offers further analysis of the benefits that extend across the nation from free trade of crude oil—benefits that are also placed at risk by an outdated trade policy from an era of oil price controls that were abolished in 1981.

Crude oil production depends on an extensive supply chain—a vast network of interconnected labor, commodities and information that reaches into many communities and industries. For example, the diesel engines driving drilling rigs and hydraulic fracturing equipment are largely manufactured in the industrial heartland of Illinois, Indiana, Wisconsin, and Michigan. Many states — New York, Florida, Illinois, and Massachusetts, for example—with modest or negligible oil production sectors have strong manufacturing or service sectors supplying the oil industry in producing states. As IHS reported in its earlier report, *US Crude Oil Export Decision* (herein referred to as the *Export Decision*), if the trade ban is lifted, the number of US jobs is 394,000 to 859,000 higher each year, on average, under the Base Production and Potential Production cases, respectively, between 2016 and 2030. Supply chains represent a substantial share— about 30%—of the total jobs economy-wide: supply chain jobs under free trade average 124,000 to 240,000 annually in the Base and Potential cases, respectively.

What is the supply chain?

This study, *Unleashing the Supply Chain: Assessing the economic impact of a US crude oil free trade policy*, tracks flows of capital expenditures through 60 industry sectors that comprise a large percentage of the oil industry’s upstream supply chain. The supply chain is the extended network of companies providing the labor, commodities, technology, and information required to extract oil and deliver it to the midstream (transportation and logistics) and downstream (processing and marketing) sectors. Capital investment and operating spending in the oil industry, as measured by direct spending within the oil industry’s Tier 1 suppliers, trigger multiple streams of additional economic activity throughout an extended, multi-tiered supply chain that has wide geographical impacts at the national, state and local levels.

The key driver of the widespread macroeconomic benefits is investment in the upstream and midstream oil and gas industries. This investment in US energy infrastructure significantly aided the return of US economic growth following the Great Recession. From 2008–13, while US GDP growth averaged 1.2% per year, economic output in the oil and gas industry grew four times faster, at 4.7%. Over the same period, total US employment declined by 0.1%, while oil and gas industry employment grew 4.3% per year. More broadly, the revolution in the production of “unconventional” oil and gas has been one of the major contributors to the US economic recovery; it is estimated by IHS to have added nearly 1% to US GDP annually, on average, over the past six years, explaining nearly 40% of overall GDP growth in that time.

These macroeconomic impacts would be enhanced by lifting the crude export ban as they extend through a diverse network of suppliers. Suppliers benefit from the investment required for the exploration, production, processing, and transport of oil and gas. In turn, suppliers of materials, capital equipment and services enable operators to deploy technology to commercialize their resources. The “multiplier effect” accelerates as Tier 1 suppliers require more production of goods and services and development of efficient technologies within their respective interlinking supply chains. This benefit cascades across the industrial economy and all states.

The companies in this diverse and far-reaching supply chain contribute to employment and to every US state’s economy—not just oil-producing states. The US oil revival has increased demand for industrial equipment and machinery, construction and well services, information technology, materials, logistics, and professional, and financial and other services and has spurred research and development investment across numerous industries.

Investment in crude production has a far-reaching impact on jobs, with about 10% of the total employment impact flowing directly to producers and another 30% into the supply chain. The remaining 60% derive from the broader impact of workers’ increased income and spending due to higher levels of crude oil activity. In other words, for every job created in the oil and gas extraction sector, three jobs are created in the supply chain and another six jobs in the broader economy. In a similar fashion, contributions to Gross Domestic Product (GDP) also multiply: every dollar of GDP created in the oil and gas sector generates two dollars in the supply chain.

High-quality supply chain jobs also lead to higher wages, reflecting their unique occupations and skill requirements. Supply chain jobs also stand out from other employment opportunities for their technological and innovative nature. The average wage rate in the oil and natural gas extraction and drilling sectors is \$51.19 per hour, and the rate for the broader oil and natural gas extraction sector is \$35.87 per hour. This compares to an economy-wide average wage rate of \$23.96 per hour. The supply chain wage of \$29.93 per hour is 25% above the national average. Higher wages result in larger multiplier and income effects across the economy as more income is spent on general consumer goods and services by oil and gas and supply chain sector workers.

Great revival in US crude production and uncertain future

The large and rising production of US crude oil has significantly reduced US dependence on imported oil—imports last year accounted for just 27% of US oil demand, down from 60% in 2005. With crude oil production now over 9 million barrels per day, the United States is the world’s third-largest crude-oil producer behind Saudi Arabia and Russia. It is the largest producer of oil and natural gas liquids combined.

Continued growth in the oil and gas industry and in the supply chain supporting it could be imperiled by low prices and outdated crude oil export policies that restrain market access and hinder future investment and production. In the early years of the industry’s revival, higher oil prices were unusually stable and allowed for the emergence and advancement of a vibrant domestic tight oil industry. Production techniques improved, costs fell, and higher oil output per well was achieved. It is the success and rapid growth of US production that contributed to the global supply surplus that has driven down global oil prices over the past six months. Consumers are already reaping great benefits from this drop in prices.

Production will certainly be affected by low prices, but the pace and degree of the impact remains uncertain. The market price has been roughly halved, and the adjustment process is evolving. Many factors will influence the outcome. Oil markets are prone to cycles, which are often rapid and extreme and reflect the challenge of matching short-term changes in demand with long-term investment requirements. Price changes over the past decade reflect the constant changes occurring in oil market fundamentals, economic conditions and geopolitical events that affect oil prices. The monthly average price of Brent crude oil climbed from \$30 per barrel in early 2004 to over \$130 per barrel in July 2008 before falling to \$40 per barrel in December 2008. Prices then rebounded, exceeding \$70 per barrel by August 2009 and remained in the \$100 per barrel range from early 2011 through August 2014. As of this writing, the US benchmark price is below \$60 per barrel. Crude oil price volatility is expected to continue. While low prices are the primary challenge facing the industry in 2015, the ban on exports of US crude oil production will hinder or even cut short any recovery tomorrow.

The export policy problem

The US oil system is nearing gridlock due to a mismatch between the rapid growth of domestic light tight oil production and the inability of the US refining system to economically process the growing volumes. Seasonal gridlock occurred in the second half of 2013 due to refinery maintenance downtimes. But the rapidly declining crude oil price and the increasing storage of crude oil have so far overshadowed the risk of a more permanent and impending gridlock and reduced the domestic crude price discount to global prices. In fact, gridlock would have a doubly chilling effect on investment and job growth in an environment of lower and volatile global crude prices. The supply chain in every region of the nation has benefitted from investment in US oil production and infrastructure—benefits now put at risk.

The nation is benefiting today from increased employment, lower gasoline prices and an improved trade balance as growing US production puts downward pressure on international oil prices. Lifting the export ban and allowing US crude oil to trade into international markets removes a risk that the full benefits from potential US oil production are not realized. The Export Decision report in May 2014 examined the historical context of US export policies; the oil industry's response to a change in policy; and the estimated macroeconomic benefits from free trade accruing to US consumers and the broader US economy. The Export Decision analysis projected substantial increases in capital expenditures by upstream operators if the export ban is lifted, granting them access to global markets.

Since completion of the previous study, two notable market events have occurred. First, the global crude price has declined sharply, largely due to US production increases and weak demand, and second, the Bureau of Industry and Standards (BIS) has clarified existing rules that allow certain very light crude oil (condensate) to be exported as a "refined product" in defined situations involving sufficient processing.

Oil price decline

The rapid crude oil price decline—by roughly half since mid-2014—is a reminder of the cycles and uncertainty of oil and energy markets caused by the differing time scales of demand and supply adjustments. Producers are responding with reduced budgets, smaller drilling programs and cost cutting. While exploration and development costs are expected to also decline, the industry is expected to produce less crude oil as a result of the price decline, and the impact on employment is magnified throughout the supply chain.

Lower global oil prices have the effect of increasing—rather than decreasing, as some might expect—the impact of the export ban. An export gridlock created by the ban would create a domestic oversupply resulting in US crude oil prices (for example, West Texas Intermediate) becoming disconnected and discounted from international prices, such as Brent crude. The resulting lower wellhead price for US producers dampens upstream investment and reduces economic activity and job creation. The resulting lower wellhead price for US producers dampens upstream investment; reduces economic activity and job creation; and, weakens the competitiveness of US companies relative to their international peers.

These employment and economic benefits are increasingly sensitive to declines in crude oil prices. This is because the industry, at lower prices, has a “flatter” supply curve, which means that a small change in price results in a larger supply loss. Therefore, the risk from the export ban is higher in today’s low-priced market.

To demonstrate this effect, consider an IHS study of the US onshore oil wells drilled in 2013, excluding Alaska. Each well’s break-even price was calculated based on estimated costs and actual production. The total investment and production from this analysis is summarized in the graph using an index for the levels of production and investment put at risk as the price declines in \$20 per barrel increments from \$110 to \$50.

As US prices move lower, the investment and production that becomes uneconomic and “at risk” accelerates. For example, the risk to investments in response to the price declining from \$90 to \$70 is about three times greater than when the price moves from \$110 to \$90. The production response is even stronger—about four times—as the price moves from \$110 to \$90 to \$70. Therefore, if the crude export ban were to create a \$10 per barrel price discount to global prices in today’s already low price environment, it would have a much bigger impact on industry investment and production than it would have had in early 2014 when crude was selling for over \$100 per barrel.

At today’s lower global oil price, an export policy-related gridlock would have a doubly chilling effect on investment and job growth.

The industry is dynamic, and efficiencies in production are being realized each year. Still, there is good reason to believe that the shape of the 2013 supply curve is similar today and will remain so for the foreseeable future.

BIS clarification for condensate processing

Some types of very light crude oil (condensate) can be exported after transformation into petroleum products with sufficient processing, as explained by a nuanced clarification of existing regulatory definitions of crude processing.⁶ The BIS has provided general guidance and has issued private rulings to a few companies to permit the export of this processed condensate petroleum (condensate product) from individual facilities that were approved based on equipment and processing configuration. Due to minimal processing, the main product has a broad boiling range and is similar to unprocessed condensate. The condensate product is unfinished and not usable as a fuel but only as a feedstock for further refining. More companies will be given permission or will otherwise be able to export this condensate product. These exports will provide some relief to the impending market gridlock. However, the volume of condensate product available for export remains unclear, because new infrastructure must be put into place to segregate this product stream. Condensate production is significant and estimated to be near 800,000 barrels per day (there is no industry standard for the definition of

condensate); however, little of this production is coastal, and so, to prevent commingling, additional infrastructure is needed to move the condensate product to export terminals. This new infrastructure must be separate from the three existing infrastructures for crude oil and condensate, for natural gas, and for natural gas liquids (NGL). This segregation creates market and capital inefficiencies. Further, market distortions are likely to arise due to artificial distinctions between similar products (unprocessed condensate and condensate product). This policy-driven investment will likely duplicate more efficient facilities already in place, another example of the economic inefficiencies caused by the outdated crude oil export policy.

Despite a declining global oil price, the clarified classification of processed condensate, and the weaker US production outlook in the near-term, the crude oil export ban is a remnant of a long-past era that could constrain future US production growth and result in higher gasoline prices for US consumers. While the unpredictable events of the past six months may have delayed the most severe gridlock temporarily, these same events also highlight that this gridlock could return sooner than expected as US production growth is supported by greater efficiencies and lower costs. When a recovery occurs, the export ban is expected to retard investment, reduce energy security and self-sufficiency, and ultimately lead to higher gasoline prices and lower job creation.

Free trade impacts on the supply chain

IHS has evaluated a change in crude export policy under each of two scenarios for US crude oil production levels:

- The Base Production Case provides a conservative view based on known defined oil and gas plays and assumes limited technology improvements over current performance.
- The Potential Production Case includes additional known, but less well defined areas of existing plays and assumes moderate drilling performance and technology improvements in the future.

These scenarios use production outlooks developed in mid-2014 in the Export Decision study—before the dramatic fall in oil prices. Since then, actual production and efficiency gains have been higher than forecasted but are now being offset by the expected effects of the price decline. IHS' current production forecast remains within the Base and Potential Production bands found in the prior study. The impact of moving from the current restricted trade policy to free trade is quantified for 60 industries in the petroleum production supply chain under each scenario.

Under each scenario, removing the crude oil export ban will have a dramatic economic impact across all US states in terms of more jobs, higher gross state product (GSP), and increased government revenue. The breadth of these trade impacts reflects the capital intensity of the oil industry and its reliance on inputs from a vast network of domestic goods and services suppliers around the United States. The short-term trade impact (2016–20) reflects a rapid increase in capital spending, while the long-term trade impact (2021–30) moderates as the economy adjusts to changes in the trailing level of investment and moves toward a new equilibrium with lower economic impacts.

Measuring the effects of free trade in crude export policy requires a fundamental understanding of the legion of suppliers that often operate out of the spotlight shining on the upstream (production), midstream (transportation and logistics) and downstream (processing and marketing) sectors. Removing

the export ban will contribute to enhanced capital investment in this oil value chain, resulting in increased spending throughout the supply chain.

As beneficiaries of energy capital and operating expenditures, supply chain industries play a fundamental role in generating economic benefits nationwide as a result of a change in US crude oil export policy. The supply chain industries represent significant shares of this national impact in both the Base Production/ Potential Production cases, respectively, across all key economic indicators over the 2016–30 period analyzed:

- 31%/28% of the employment impact,
- 30%/28% of the GDP or value added,
- 38%/35% of labor income, and
- 33%/31% of cumulative government revenue.

The Base Production Case under free trade quantifies the value of the alternative path for a US economy benefitting from crude oil exports. In the Potential Production Case, the overall benefits to the supply chain are significantly higher under free trade (even though the percentage of benefits the supply chain is somewhat lower due partly to economies of scale).

Removing the crude export ban creates the following benefits in 2016–30 as higher activity levels work their way through oil industry's supply chain for the Base Production / Potential Production cases, respectively:

- The crude oil supply chain will add \$26 billion /\$47 billion to GDP per year.
- Supply chain jobs will be 124,000/240,000 higher per year, on average.
- Labor income improves by about \$158/\$285 per year, on average, for each household.
- Cumulative government revenues from corporate and personal taxes attributed to supply chain industries reach \$429 billion/\$868 billion.

Broad benefits

The energy value chain encompasses all 50 states, but state sizes and populations vary widely. To evaluate the regional impact on a more equal population footing and to further quantify the breadth of the supply chain, the supply chain impacts were estimated for each US congressional district, as well as each state. The interdependencies throughout the US economy create an array of benefits in the supply chain and local economies. The key state and congressional district-level findings from the analysis include:

- The economic benefits vary considerably across supply chain industries and across the country. In states where the crude oil industry predominates, such as Texas, core supplier industries such as construction and well services are poised to reap the largest economic benefits in terms of jobs and value added, followed by professional services, which play a large role in supporting crude oil activity.

- In states with low crude oil production, such as Florida and New York, the benefits are distributed differently across the supply chain industries. In these states, key supplier industries that incur the largest benefit associated with the adoption of a crude oil free trade policy include the industrial equipment and machinery, professional services, financial services, and information technology sectors.

In states with a diverse and mature set of supplier industries, the supply chain can account for half of the value added from lifting the export ban. In Washington, for example, where the information technology (seismic and other software) and manufacturing sectors are expected to quickly expand, the supply chain contribution to GDP comprises 47% of the state's total benefit from higher crude oil exports over 2016–30. Illinois, an oil-producing state with diverse supplier industries, will derive 58% and 54% of the total GDP impacts from its supply chain under the Base and Potential Production cases, respectively.

California and Texas, two of the largest state economies, represent nearly 20% of US economic activity. They are not only large oil producers but also rank in the top five in terms of capital spending by oil producers. California and Texas are also the two largest states for their manufacturing activity and their strong diversified supply chain sectors. As a result, these two states are expected to yield the largest benefits from lifting the crude oil export ban in terms of supply chain jobs, value added, and labor income impacts. Under both production cases, California and Texas together account for about 25% of the total US supply chain jobs and labor income contributions and 20% of the value added contributions in 2016–30.

- Non-oil producing states such as Massachusetts and Maryland will also see strong growth in supply chain-associated government revenues in both production cases. They rank among the top 10 states in terms of the GDP and labor income impacts on their supply chain industries, suggesting strong ties between their supply chain activity and their government revenue from associated taxes.
- As observed in the state-by-state analysis, the impact of a change in trade policy will be distributed across suppliers in congressional districts with crude oil activity, as well as in adjacent districts with supporting supply chain sectors. While nearly all congressional districts experience benefits, those districts with crude oil activity and strong supply chains will benefit most.
- Given the breadth of California's and Texas' oil production and the size of their mature supply chain sectors, these major oil-producing states have the largest number of affected congressional districts. However, impacts will be felt in clusters of congressional districts in other states such as Illinois, Florida, and New York, mainly due to their diversified manufacturing and services sectors, and in Massachusetts due to its information technology and professional and financial services.
- The job impact of removing the export ban is spread across nearly every congressional district. The figure compares the peak annual jobs contribution under the free trade Base Production Case to the average net job gain per year under current policy trade for the time period.

Sizing the benefits

The magnitude of the supply chain benefits is significant when compared with the size of entire industries in various states:

- Job impacts in the Base Production Case peak at 293,000 in 2018. That is slightly more than the 285,000 current US workers in the pharmaceutical and medicine manufacturing industry.
- In the Potential Production Case, job impacts peak at more than 439,000—roughly equal to all the non-farm workers in Delaware.
- The value added contribution to GDP from crude oil export supply chain activity reaches a maximum of \$40 billion in the Base Production Case, roughly equal to South Dakota's \$41 billion Gross State Product in 2014.

Executive Summary:***To Lift or Not to Lift? The US Crude Oil Export Ban: Implications for Price and Energy Security***

March 2015

In the past few years, innovative techniques involving the use of horizontal drilling and hydraulic fracturing have triggered unprecedented increases in production of crude oil from shale in the United States. This domestic production surge has reduced US crude oil imports and led to some to call for an end to the 40 year old ban on crude oil exports. In this paper, we lay out a framework for discussing the issues germane to this discussion, and applied empirical tools to evaluate these matters.

We find evidence that the export ban already presents a binding constraint on the domestic market, and has done so for a while. We develop an approach based on a hedonic pricing method to evaluate the discounts being realized on WTI and other domestic crude oil prices over a wide range of global crude oil price environments, ranging from \$30 to \$150 per barrel. The results indicate even in a low international crude oil price environment the importance of addressing the export ban is very high with discounts reaching as high as \$8 per barrel in a \$50 world, depending on the quality of the crude oil that is being produced and marketed.

The US refining sector has already backed out imports of light crude oil and is now backing out imported crude oils that are heavier than WTI and light oils from shale. This is where the discount arises - the domestic crudes, regardless of quality, must compete with medium quality crude oils as the only market outlet is domestic refiners. As more oil is displaced, the competitive margin for domestic production will increasingly be a heavier crude oil, which will drive steeper discounts until a new arbitrage mechanism is introduced, perhaps through either new refinery capacity or a lift of the export ban. We also find that lifting the ban on exports could benefit upstream producers as well as attract capital investment into midstream infrastructure development.

We also find empirical support for the theoretical conjecture that lifting the ban on crude oil exports would not raise gasoline prices in the US. Since refined products, such as gasoline, can be freely traded in the international market, the prices of refined products sold in the US are in a parity relationship with international prices for refined products. Thus, the discounted prices of oil produced in the US are not reflected in US gasoline and refined product prices.

Finally, we also provide an in-depth analysis of the implications of lifting the crude oil export ban for US energy security. Removing the ban generates distinct energy security benefits by providing a more stable and secure source of crude oil to a growing global market. Greater stability lessens price volatility. Since it is well-documented that heightened volatility is associated with macroeconomic malaise to the extent that US crude oil exports increase fungibility and dampen oil price volatility, it will transmit an energy security benefit to US consumers. Longer term, the US can lead a transformation of the global oil market that could see North American and Western Hemisphere production capture a larger portion of a growing international market. This would carry tremendous benefits for US foreign policy endeavors in the US' dealings with hostile oil producing nations. It would also, more generally, provide stability to the global oil market and convey benefits more broadly to the US and its allies.

Executive Summary:

Navigating the U.S. Oil Export Debate

January 2015

Recent innovations in the oil and gas sector have catalyzed a renaissance in US production and a dramatic turnaround in America's international energy trade position. US crude oil production has increased from 5 million barrels per day (b/d) in late 2006 to 9 million b/d in late 2014. Total petroleum production is over 12 million b/d, making the US the largest liquids supplier in the world. Rising production and declining petroleum consumption has reduced US import dependence from 60 percent to 26 percent over the past eight years.

Although the US will likely continue to consume more oil than we produce, and thus remain a net petroleum importer, there are growing concerns about the ability of the US refining system to absorb future growth in domestic crude production. Virtually all the recent and projected growth in US crude output is lighter weight and lower sulfur than the Canadian, Mexican, Venezuelan and Middle Eastern crudes many US refineries are currently configured to process. Refineries elsewhere in the world process light oil, but under current law, US crude oil exports are largely (though not entirely) prohibited. The growing mismatch between domestic crude supply and domestic refining capacity is prompting a re-evaluation of these export restrictions.

There are both proponents and opponents of increasing the amount of crude oil that can be exported from the United States. Domestic oil producers worry that without access to foreign markets, they will have to discount their oil to incentivize refiners to process it at existing facilities or cover the investment required to build new ones. Lower market prices for US crude producers could reduce upstream investment and future domestic production growth. Many refiners worry that allowing crude oil exports will raise domestic crude prices, harm their competitiveness and reduce the incentive for new refining investments. Consumers worry that exporting oil could increase gasoline and diesel prices and leave them more vulnerable to future international supply disruptions. And some environmental groups worry that allowing exports will result in more shale development domestically and more greenhouse gas emissions globally.

This report reviews the origin and current form of US crude export restrictions and analyzes the energy market, economic, security, geopolitical, trade and environmental implications of modifying or lifting those restrictions.

In short, we find:

1. The original rationale for crude export restrictions no longer applies. Today's oil market looks very different than in the 1970s when current crude oil export restrictions were first put in place. At that time, the US had adopted domestic price controls to combat inflation and crude export restrictions were necessary to make those price controls effective. While price controls have long since fallen away, crude export restrictions remain.
2. If recent production growth rates continue, a shortage of US light crude refining capacity will likely reduce domestic crude prices relative to international levels, slowing the pace of upstream investment and future crude output. Modifying or removing crude export restrictions would prevent this from occurring by allowing domestic producers to compete in global markets.
3. Permitting companies to export crude oil in greater quantities may reduce the rents refiners receive relative to leaving current restrictions in place, but will likely decrease the price

Americans pay for gasoline, diesel and other petroleum products and benefit the US economy as a whole.

4. While the nature of the impact of lifting crude export restrictions is relatively clear, the timing and magnitude is highly uncertain. The recent decline in oil prices will slow the pace of US production growth and may delay the point at which domestic light crude refining capacity shortages occur. The speed and cost at which refiners could add or reconfigure capacity is unknown, as is the response of producers elsewhere in the world to any change in US supply.
5. In light of these and other variables, we estimate lifting current crude export restrictions could increase US crude production anywhere between 0 and 1.2 million barrels per day on average between now and 2025, and reduce domestic gasoline prices by between 0 and 12 cents per gallon.
6. Allowing exports would make the US more resilient, not less, to supply disruptions elsewhere in the world. Greater integration into global markets would make US oil supply more responsive to international market developments, mitigating the impact on American consumers and the US economy of production losses in other countries.
7. Lifting crude export restrictions is consistent with past and present US trade policy priorities, would enhance US credibility in current and future trade negotiations, and avoid creating a precedent that could harm US trade policy objectives down the road.
8. Increased US crude production can weaken the economic power, fiscal strength and geopolitical influence of other large oil producing countries. The magnitude of any export policy-driven impact is small, however, relative to recent oil market developments. More important for US foreign policy are the current crude trade relationships retained and new ones created if export restrictions are modified or lifted, along with the potential for greater US diplomatic leverage in future application of sanctions or pursuit of other objectives.
9. To the extent allowing exports lowers crude oil and petroleum product prices, global oil demand will increase, along with oil-related CO₂ emissions. While we do not believe export restrictions are an appropriate or cost-effective way to reduce CO₂ emissions, it is critical that more aggressive policy actions in other areas are taken to demonstrate that boosting domestic supply can be consistent with meeting our climate objectives.

Executive Summary:

The Economic and Budgetary Effects of Producing Oil and Natural Gas From Shale

December 2014

Recent advances in combining two drilling techniques, hydraulic fracturing and horizontal drilling, have allowed access to large deposits of shale resources—that is, crude oil and natural gas trapped in shale and certain other dense rock formations. As a result, the cost of that “tight oil” and “shale gas” has become competitive with the cost of oil and gas extracted from other sources. Virtually nonexistent a decade ago, the development of shale resources has boomed in the United States, producing about 3.5 million barrels of tight oil per day and about 9.5 trillion cubic feet (Tcf) of shale gas per year. Those amounts equal about 30 percent of U.S. production of liquid fuels (which include crude oil, biofuels, and natural gas liquids) and 40 percent of U.S. production of natural gas. Shale development has also affected the federal budget, chiefly by increasing tax revenues.

The production of tight oil and shale gas will continue to grow over the next 10 years—by about 30 percent and about 60 percent, respectively, according to a recent projection by the Energy Information Administration (EIA). Another EIA estimate shows that the amount of tight oil and shale gas in the United States that could be extracted with today’s technology would satisfy domestic oil consumption at current rates for approximately 8 years and domestic gas consumption for 25.

How Will Shale Development Affect Energy Markets?

Total domestic production of oil and natural gas will continue to be higher than it would have been without shale development, reducing the prices of those energy supplies. The lower prices, in turn, will increase domestic consumption of oil and gas, domestic consumption of energy overall, and net exports of gas, while decreasing the production of oil and gas from conventional resources, net imports of oil, and the use of competing fuels.

Shale gas has affected energy prices in the United States more strongly than tight oil has, and it will continue to do so. Indeed, the Congressional Budget Office (CBO) estimates that if shale gas did not exist, the price of natural gas would be about 70 percent higher than currently projected by 2040—whereas if tight oil did not exist, the price of oil would be only about 5 percent higher. One reason for the difference is that shale gas is more plentiful than tight oil, relative to the size of their domestic markets. Another is that the North American market for natural gas is relatively insulated from conditions elsewhere by high transportation costs, so the effects of higher or lower domestic production on market prices are concentrated within the continent; oil, by contrast, is heavily traded in a worldwide market that diffuses the effects of domestic production on prices. (Oil prices are thus influenced by events that occur elsewhere in the world. For example, the recent sharp drop in crude oil prices—as of the end of November 2014, they had dropped about one-third from their recent peak in June—was caused not by any sudden or dramatic increase in the supply of tight oil during that period but by other factors, such as a rapid increase in Libyan production and a slowdown of consumption in Europe and Asia.)

EIA’s projections of the development of shale resources are the most detailed currently available, and CBO considers them an appropriate basis for estimating the potential economic and budgetary effects of shale development. Nonetheless, like all projections of the future, they are subject to significant uncertainty. Many factors contribute to the uncertainty; for example, the abundance of shale resources, the fraction of those resources that will be recoverable with evolving technology, and the costs of

recovering that fraction are not known for certain. Projections of more or less shale development would lead to larger or smaller estimates of the economic and budgetary effects.

How Will Shale Development Affect Economic Output?

The technological innovations behind hydraulic fracturing and horizontal drilling make existing labor and capital— whether they are employed in shale development, in industries using natural gas or oil, or in industries using products derived from natural gas or oil—more productive than they otherwise would be. That heightened productivity has increased gross domestic product (GDP) and will continue to do so.

Shale development also boosts GDP in other ways. The increase in GDP just described represents increased income, which allows people and firms to save and invest more in productive capital, and the higher productivity just described increases wages, raising the amount of labor available. Both the increased capital and the increased labor raise GDP. In addition, in the near term, shale development causes labor and capital to be used that would otherwise be idle, again raising GDP. In the longer term, however, whether shale resources are available or not, the labor and capital available in the economy will be used at roughly their maximum sustainable rates, so the additional labor and capital used to produce shale resources or energy-intensive goods will mostly be drawn away from the production of other goods and services. As a result, there will be no net change in GDP through that last route, although GDP will continue to be increased by shale development in the other ways just described.

On net, CBO estimates that real (inflation-adjusted) GDP will be about two-thirds of 1 percent higher in 2020 and about 1 percent higher in 2040 than it would have been without the development of shale resources. The actual effect on GDP could be higher or lower than that estimate, depending on the uncertain factors noted above—the abundance of shale resources, the fraction of those resources that will be recoverable, and the cost of developing that fraction—as well as on other considerations.

How Will Shale Development Affect the Federal Budget?

The increase in GDP resulting from shale development has increased federal tax revenues, and it will continue to do so. That increase will be slightly larger than the GDP increase in percentage terms, CBO expects. Specifically, CBO estimates that federal tax revenues will be about three-quarters of 1 percent (or about \$35 billion) higher in 2020 and about 1 percent higher in 2040 than they would have been without shale development.

Shale production also contributes to federal receipts through payments that the developers of federally owned resources make to the government—but that contribution has been modest and will continue to be, because most shale resources are not on federal land. Working from EIA's projections of the future production of tight oil and shale gas, and also from its own forecasts of oil and natural gas prices, CBO estimates that federal royalties from shale (minus the amounts that the federal government transfers to the states) will be about \$300 million annually by 2020.

What Policy Options Would Affect Shale Development?

There are a number of ways that the Congress could affect shale development and thus affect the oil and gas markets, economic output, and the federal budget. This report considers options that would change export policies—easing the current ban on exports of crude oil, repealing it, or changing the government's criteria for judging applications to export liquefied natural gas (LNG)—and concludes that the options would probably increase domestic production but have little effect on prices. That increase

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in production would probably make GDP and federal revenues slightly higher than they would be under current export policies.

Policy choices related to environmental regulation, such as whether the federal government should regulate further the environmental effects of shale development or leave such decisions to the states, are outlined in Appendix A. The Congress could also affect shale development through policies not considered here, such as those related to the infrastructure used to transport and process domestic shale gas and tight oil.

Executive Summary:

Lifting the Crude Oil Export Ban: The Impact on U.S. Manufacturing

October 2014

The manufacturing sector is an important source of strength in the U.S. economic recovery. The surging oil and gas production sector, in turn, is a major reason behind the manufacturing sector's robust performance since 2010. This paper employs the Inforum LIFT economic forecasting model to analyze how removing the ban on crude oil exports could add to growth in manufacturing by stimulating higher levels of oil production in the United States. Two scenarios are presented and contrasted with a baseline derived from EIA's base economic projections, a low export case (up to 2 million barrels per day [b/d] at peak year in additional oil production) and a high export case (which would average 2 million b/d and reach a peak of 3.25 million b/d). Higher levels of oil production require higher investment expenditures for capital equipment and construction, which in turn boost overall demand for goods. This stimulates the manufacturing sector and its supply and distribution chains. The resulting improvement in income and employment boosts the economy significantly. Consider several figures from the high export scenario. In that alternative, we have the following highlights:

Macroeconomic Benefits

- GDP is higher by 0.93 percent or about \$165 billion in 2019-2021, and levels off around 0.74 percent higher or \$141 billion in 2025.
- 630,000 jobs added at peak in 2019.
- Real Household Income higher by \$2,000 to \$3,000 per household in 2025, an increase of 2.2 percent, and reaches peak of 2.5 percent on a per household basis in 2019.

Industrial Sector Gains

- Production of Durable Goods and materials gains 1.4 percent (\$8 billion) by 2017.
- Machinery production gains 3.3 percent (\$12.4 billion) in 2017.
- Agriculture, Mining, and Construction Equipment gains 6 percent (\$6.1 billion) in 2017.
- Jobs in Mining (including oil and gas) up by average 43,000 per year through 2025.
- New Construction jobs peak at 216,000 in 2017.
- All Manufacturing jobs see average gain of 37,000 per year through 2025.
- Related Professional Services jobs increase by average 148,000 per year through 2025.
- Capital Investment for Machinery—exploration and development—up by \$7 billion in 2020 and for construction and mining machinery by \$3.6 billion.

In contrast, the refinery sector, because of slightly higher prices for light crude oil, sees its capital investment slip by almost \$1 billion in 2020 from the baseline. Some manufacturing exports are also marginally reduced from the baseline by the effects of higher wages, inflation, and the real value of the dollar. Increased employment, especially good paying semi-skilled production jobs and related engineering and professional services jobs, higher capital investment, and increased production of oil and associated natural gas all combine to strengthen U.S. manufacturing if the crude oil ban is lifted. And strong manufacturing is one key to quickening the pace of economic growth in the United States.

Executive Summary:***What Drives U.S. Gasoline Prices?***

October 2014

This analysis provides context for considering the impact of rising domestic light crude oil production on the price that U.S. consumers pay for gasoline, and provides a framework to consider how changes to existing U.S. crude oil export restrictions might affect gasoline prices.

Given the likelihood of continued growth in domestic crude production, and the recognition that some absorption options, such as like-for-like replacement of imported crude oil streams, are inherently limited, the possibility that a relaxation of current policy limitations on crude exports might affect domestic and international markets for both crude oil and products, particularly gasoline, is an important issue.

EIA's analysis of the factors affecting U.S. gasoline prices is twofold. The analysis first considers the relationship between U.S. spot gasoline prices and international and domestic spot crude oil prices, represented by Brent and West Texas Intermediate (WTI), respectively. The second part of the analysis focuses on the interrelationship of U.S. and worldwide gasoline prices and the extent to which global gasoline prices are important in determining U.S. gasoline prices. This analysis takes into account regional and global gasoline supply/demand balances and arbitrage, as well as how the competitive advantage of U.S. Gulf Coast (USGC) refineries is changing the dynamics of U.S. regional and global gasoline pricing.

Key observations from EIA's analysis of the relationship between gasoline and crude oil prices include:

- Brent crude oil prices are more important than WTI crude oil prices as a determinant of U.S. gasoline prices in all four regions studied, including the Midwest.
- The effect that a relaxation of current limitations on U.S. crude oil exports would have on U.S. gasoline prices would likely depend on its effect on international crude oil prices, such as Brent, rather than its effect on domestic crude prices.
- The WTI crude oil price lost much of its power to explain changes in U.S. gasoline prices after 2010, when its differential to Brent crude became wider and more volatile.
- The Brent crude oil price lost very little of its power to explain changes in U.S. gasoline prices in the post-2010 period.

Key observations from EIA's analysis of global gasoline price relationships include:

- Gasoline is a globally traded commodity and, as a result, prices and changes in prices are highly correlated across global spot markets.
- Gasoline balances and flows around the world are changing. – Increasing demand in Asia, Latin America, and the Middle East has been outpacing increases in gasoline production in those regions.
 - Demand is declining in the United States, but refinery production of gasoline is rising, resulting in increases in U.S. exports of gasoline into the global market.

- Demand is declining in Europe, adding to its gasoline oversupply; excess European gasoline now competes with increased exports from the United States.
- Because of these changing supply and demand patterns, global gasoline price relationships are changing; USGC and Chicago spot gasoline prices, which are closely linked, are now often the lowest in the world during the fall and winter months.
- U.S. gasoline exports grew rapidly from 2009-2012 but have since leveled off; however, Gulf Coast gasoline is now being exported to more distant markets, routinely including Africa and, during the winter months, Asia.

Executive Summary:***Changing Markets: Economic Opportunities from Lifting the U.S. Ban on Crude Oil Exports***

September 2014

The skyrocketing growth of unconventional oil and natural gas production in the United States has ignited an intense debate on the impact of energy exports on U.S. energy and economic security and its foreign policy. Today, rising U.S. crude oil production, combined with declining demand for petroleum products, has led to falling oil imports and increased product exports (which are not prohibited). The absence of logistics systems for many of these new crude oil sources has forced domestic producers to discount prices in order to get them to refineries, while at the same time having to endure higher-cost rail, barge, and truck transportation networks. The market is distorted further by the fact that a large volume of these new crude oil supplies are light sweet crudes which are ill-suited for many existing refineries designed to process heavy crude oil, in the absence of large-scale capital investments. There is intense analytical debate on when the capacity of the U.S. refining system to process the entire volume of light tight oil available will end, the so called “day of reckoning.” Few market observers, including the authors of this report, doubt that the day is coming. If this happens, there will be a mix of pressures on prices: downward pressure on domestic oil prices; slowing domestic production; rising unemployment; and declining tax and royalty revenues for federal, state, and local governments. The market harbinger that a glut is emerging will be widening spreads in the price of Louisiana Light Sweet crude (LLS, the Gulf Coast price marker) against Brent prices (the international marker for the same quality of crude). When that day comes, there will be pressure on the United States to act, to avoid the self-inflicted harm of artificially constraining crude oil exports.

The market distortions arising from this situation have raised a debate on the utility of lifting the decades-old ban on U.S. crude oil exports. The issue has gained great political and economic potency because given current trends, it appears that the crude surplus will continue to grow in coming years. All of these issues together have fostered the need to examine the legitimacy of a set of laws in place for nearly 40 years, long before the unconventional revolution in the United States.

In our 2012 *Liquid Markets* report on U.S. LNG exports, we concluded that the U.S. should neither constrain nor promote LNG exports, but should instead let the market determine the viability of projects and the levels of exports.⁹ We concluded that allowing natural gas exports would not materially impact U.S. natural gas prices, but would contribute to energy security by diversifying global LNG markets while sustaining U.S. natural gas production and providing more competitive gas pricing.

Unlike the market for natural gas where the U.S. has become self-sufficient, the U.S. is still a major importer of heavy crude oil and will remain so for many years. Likewise, while natural gas shortages and price volatility have occurred in the past, these disruptions have been induced either by short-sighted regulatory policy or the absence of adequate pipeline capacity—not by searing politically-motivated interruptions as have been experienced in the oil market.

Our legal analysis shows that the president has the power to act at any time to lift the ban, by declaring exports to be in the national interest under the provisions of the Energy Policy and Conservation Act of 1975 (EPCA). Barring presidential action, Congress could act to lift the ban by amending the EPCA. The current presidential administration seems to believe that if a crude surplus does emerge, it will not happen imminently so there is little reason to propose any significant policy changes until after the 2014 midterm elections.

As in the case of LNG exports, we find that the United States should avoid selective easing of the ban, for example: to allow exports only to nations that are members of the North Atlantic Treaty Organization (NATO), or those who cooperate with U.S. policy in regards to Iran, or are members of the World Trade Organization (WTO). Likewise, we do not support as good policy only lifting the ban on condensates or limiting the volume of exports to some predetermined level. These selective discriminations will lead to market distortions and may violate U.S. trade commitments.

Based on our team's robust macroeconomic modeling of the U.S. economy, global oil markets, and global refining capabilities, we believe that the U.S. should allow the market to determine where crude oil will go and move immediately to lift the ban on all crude oil exports. Our analysis shows categorically that the crude oil export ban does not, and for some time has not, advanced U.S. energy security. To the contrary, our analysis shows that lifting the ban will increase U.S. oil production, diversify global supply, reduce U.S. gasoline prices, and provide net benefits to the U.S. economy. An export option is indispensable to sustaining domestic production; absent the price support that exposure to international markets provides, U.S. production will not reach its full potential.

Below, we highlight the key findings of this report. As a leader in world trade circles, where the U.S. is a consistent advocate for open markets and transparency, continued restrictions on crude oil exports have the potential to tarnish U.S. global standing while hindering its pursuit of energy security. Allowing crude oil exports is in the national interest. Our analysis shows a direct correlation between increased U.S. oil production, net benefits to society, and lower gasoline prices. As a result, we find the ban an anachronism that has long outlived its utility and now threatens to impair, rather than protect, U.S. energy, economic, and national security.

Key Findings

The modeled effects of lifting the ban on crude oil exports from the United States are measured against a baseline projection that assumes the ban continues. The "reference case" is a projection of business-as-usual conditions calibrated to the best estimates of the U.S. Energy Information Administration. The study also examined alternative scenarios in which supplies of economically-recoverable oil turn out to be higher or lower than in the baseline scenario.

One might have guessed that keeping crude oil in the U.S. would make oil and gasoline cheaper here, and thus make Americans better off. So why does lifting the export ban on crude oil prove so beneficial? The answer hinges on how the ban on crude exports affects incentives to invest in domestic oil production and where the crude oil can generate the greatest net value for the resource and the global nature of the oil market:

- Without the ban on exports, U.S. oil producers can sell their product more profitably because they are not forced to sell it to U.S. refiners who discount their kind of crude, which is generally less well-suited to existing refining facilities than imported crude.
- With greater profits, producers invest in producing more oil in the United States, about 1.3 million to 2.9 million barrels per day more in 2020 than under the ban, assuming the ban is lifted in 2015.
- The increase in U.S. oil production makes world oil prices fall. Accordingly, so do U.S. gasoline and diesel prices, at least temporarily. This lowers the costs of production for all kinds of businesses and makes households better off.

- Moreover, U.S. refiners do not spend money on modifying their facilities to accept U.S.-produced LTO.

Thus, allowing U.S. crude oil to go to the refineries that can process it most efficiently, whether at home or abroad, is in the broad national economic interest. Lifting the ban on exports of crude oil also has important foreign policy benefits. U.S. allies in Europe and Asia will be able to diversify their crude oil supply sources away from dependency on Russia (in the case of Europe) and away from seaborne routes in the South China Sea increasingly claimed by China (in the case of Japan and South Korea).

After 40 years of perceived oil scarcity, the United States is in a position to help maximize its own energy and economic security by applying the same principles to free trade in energy that it applies to other goods. By lifting the ban on crude oil exports, the United States also will help mitigate oil price volatility while alleviating the negative impacts of future global oil supply disruptions.

Executive Summary:***Changing Crude Oil Markets: Allowing Exports Could Reduce Consumer Fuel Prices, and the Size of the Strategic Reserve Should Be Reexamined***

September 2014

The studies GAO reviewed and stakeholders interviewed suggest that removing crude oil export restrictions is likely to increase domestic crude oil prices but decrease consumer fuel prices. Prices for some U.S. crude oils are lower than international prices—for example, one benchmark U.S. crude oil averaged \$101 per barrel in 2014, while a comparable international crude oil averaged \$109. Studies estimate that U.S. crude oil prices would increase by about \$2 to \$8 per barrel—bringing them closer to international prices. At the same time, studies and some stakeholders suggest that U.S. prices for gasoline, diesel, and other consumer fuels follow international prices, so allowing crude oil exports would increase world supplies of crude oil, which is expected to reduce international prices and, subsequently, lower consumer fuel prices. Some stakeholders told GAO that there could be important regional differences in the price implications of removing crude oil export restrictions. Some stakeholders cautioned that estimates of the implications of removing export restrictions are uncertain due to several factors such as the extent of U.S. crude oil production increases, how readily U.S. refiners are able to absorb such increases, and how the global crude oil market responds to increasing U.S. production.

The studies GAO reviewed and stakeholders interviewed generally suggest that removing crude oil export restrictions may also have the following implications:

1. **Crude oil production.** Removing export restrictions would increase domestic production—8 million barrels per day in April 2014—because of increasing domestic crude oil prices. Estimates range from an additional 130,000 to 3.3 million barrels per day on average from 2015 through 2035.
2. **Environment.** Additional crude oil production may pose risks to the quality and quantity of surface groundwater sources; increase greenhouse gas and other emissions; and increase the risk of spills from crude oil transportation.
3. **The economy.** Removing export restrictions is expected to increase the size of the economy, with implications for employment, investment, public revenue, and trade. For example, removing restrictions is expected to contribute to further declines in net crude oil imports, reducing the U.S. trade deficit.

Changing market conditions have implications for the size, location, and composition of Department of Energy's (DOE) Strategic Petroleum Reserve (SPR). In particular, increased domestic crude oil production and falling net imports may affect the ideal size of the SPR. Removing export restrictions is expected to contribute to additional decreases in net imports in the future. As a member of the International Energy Agency, the United States is required to maintain public and private reserves of at least 90 days of net imports but, as of May 2014, the SPR held reserves of 106 days—worth about \$73 billion—and private industry held reserves of 141 days. DOE has taken some steps to assess the implications of changing market conditions on the location and composition of the SPR but has not recently reexamined its size. GAO has found that agencies should reexamine their programs if conditions change. Without such a reexamination, DOE cannot be assured that the SPR is sized appropriately and risks holding excess crude oil that could be sold to fund other national priorities.

Executive Summary:***U.S. Crude Oil Export Decision: Assessing the Impact of the Export Ban and Free Trade on the Economy***
May 2014

This report assesses the impact of a change in crude oil export policy to free trade and compares it to maintaining the current policy, which generally bans crude exports. The analysis also examines the historical context in which current export policy was developed during the 1970s. It identifies how dramatically the world oil market—and the US position in it—has changed since that time and how the rationales from the 1970s have faded away.

IMPORTANCE OF CRUDE OIL EXPORT POLICY

A secure supply of oil—and keeping a lid on gasoline prices—is a fundamental US interest. It is supported across the political spectrum because of its importance to the economy, the daily livelihood of Americans, and energy security. Policy regarding crude oil exports will play a key role in shaping how successfully the US accomplishes these objectives in the years ahead.

Since the 1970s, the United States has effectively banned the export of crude oil. The ban was a reaction to the tumult and crises in the world oil market—the 1973 oil embargo against the United States, the nationalization of oil-producing assets held by Western companies, and the 1978 Iranian Revolution. It was also a response to the conviction that the United States was “running out of oil”.

But closer examination finds that the ban was even more specific to the 1970s and the debates of those years. One purpose was to ensure that new North Slope oil coming through the Alaska pipeline was not shipped to Asia. The other was an essential part of the abstruse system of the 1970s oil price controls—to prevent cheaper “old oil” from earning a higher price on the world market. The oil price control system was completely eliminated in 1981. But the ban on exports, a key element of that system, remains in place 33 years later as the last vestige of a price control system long gone.

The export ban was aimed at ensuring US-produced crude oil would stay in the United States. However, this ban, until recently, was of little practical relevance. US crude oil production was in a long period of decline, falling by half between 1970 and 2008. Shrinking domestic output was readily accommodated by a refining system that was increasingly dependent on oil imported from far-flung sources. But the oil market that prevailed in the 1970s—and even as recently as the early 2000s—no longer exists.

THE GREAT REVIVAL IN US PRODUCTION

The United States currently is at the center of one of the most profound changes in the global oil industry since the 1970s. The decades-long decline in US production has been reversed—and in dramatic fashion. A Great Revival in US production is well under way. US crude oil output increased 64%—3.2 million barrels per day (B/D)—from 2008 through March 2014 and helped reduce global oil prices, even as other global crude supplies have faltered. This increase in US output is the fastest in the nation’s history and has exceeded the combined production gains from the rest of the world.

US domestic production growth has led to a decline in import dependence that not long ago would have seemed unimaginable. Net US dependence on imported oil shrunk from 60% of demand in 2005 to less than 30% in early 2014.

This “unconventional” revolution in oil and shale gas has also been one of the major contributors to the US economic recovery; it is estimated by IHS to have added nearly 1% to our GDP in each of the past two years. Will the growth in US domestic crude oil production continue? Geology and technology point toward further gains—and very large ones. According to the International Energy Agency (IEA), the United States is on the path to regain its prior status as the world’s largest crude oil producer within this decade. The United States could continue to move towards a further significant reduction in net imports. But none of this is guaranteed. The price of oil on the global market will have a big influence on production trends. So will US crude oil export policy, which is the subject of our study.

- In our Base Case, with the ban on US exports lifted, production will increase from its current level of 8.2 million B/D to 11.2 million B/D in 2022.
- But if the ban is not lifted, output will be 1.2 million B/D lower. The reason is that, if the ban remains in place, domestic oil will sell at an increasing discount, reducing the amount of investment in new production. The discount results from the nature of the US refining system, particularly along the Gulf Coast, where just over half of the nation’s total refining capacity is located. Over \$85 billion has been spent in the past quarter century to reconfigure these refineries to process heavy oil imported from countries like Venezuela, Mexico and Canada. As a result, there are limits to how much of the new, domestically produced light tight oil (LTO) the refining system can efficiently and effectively process.
- Allowing the export of crude oil would allow LTO to obtain world prices, which in turn would lead to higher investment—nearly \$750 billion more investment—and to higher output.
- The economic benefits from the consequences of free trade in exports would flow through to the economy—and to every state—measured in additional GDP (\$86 billion annually, on average) and nearly 1 million additional peak annual jobs.

WHY DOES US CRUDE OIL EXPORT POLICY MATTER?

US crude oil export policy will have a major impact in determining whether the United States regains its position as the largest crude oil producer in the world and acts as a force for lower gasoline prices. Today, the United States is the third largest crude oil producer, behind Russia and Saudi Arabia. Oil is also our largest energy source, providing 36% of our daily energy needs.

The existing restrictive trade policy has reduced the price that US producers receive for their crude oil relative to the global market. This is because they cannot sell their output outside the United States except under very limited circumstances.

At first glance, this may seem to be a positive for American consumers. If a US refiner purchases lower-cost domestic crude, wouldn’t that translate into lower gasoline prices? This notion may be appealing, but it does not reflect market reality.

Gasoline connects US gasoline prices to the global market—and not to the price of domestically produced US crude oil. This creates a market distortion that disadvantages crude production in the United States relative to global production. Permitting US exports of crude oil would put additional supply onto the world market, lowering international crude prices and international gasoline prices. Lower international gasoline prices flow back into the US gasoline market, resulting in 8 cents per gallon lower prices at the pump for motorists. This creates a savings for consumers of \$265 billion between 2016 and 2030.²

A big risk of the current restrictive export policy is that it will lead to even lower prices for US produced crude oil, while gasoline prices will remain high. Discounted prices for US domestic crude oil—at a level and duration that would throttle back output gains—would occur because the US refining system cannot absorb all the potential growth in production. If low prices for US domestic crude endure—and that risk is growing—investment in crude oil production will slow or even decline. Export markets are needed to sustain US crude oil production gains that cannot be absorbed by our refineries without significant and costly changes to the US refining system.

- The US refining system is the most flexible in the world, but even so is unable to efficiently absorb the quality and quantity of LTO being produced. Specifically, these refiners have too little capacity to process the light part of LTO and too much capacity for the heavy remaining portion of the barrel. As a result, a significant LTO price discount is needed to account for the suboptimal refining of LTO in these heavy crude refineries.
- US refiners' competitive advantage will be maintained under a policy change expanding US crude oil exports. The export of LTO from US shores would provide a competitively priced LTO feedstock (based on offshore market price minus freight cost) that would allow US refiners to economically supply both the domestic and export product markets. While the LTO price under free trade is not severely discounted as in restricted trade, the free trade price provides a competitive advantage relative to imported international crude. In fact, the relative price of LTO under free trade is similar to the price differential that existed from 2011-2013 for US Gulf Coast refiners, a period in which the United States became the largest refined products exporter in the world.
- There is discussion about a policy change that allows the export of condensate—a very light form of oil often derived from natural gas production—instead of a broader crude oil export policy. This would be an important interim step towards relieving the Gridlock and moving towards free trade. However, further changes would be needed to achieve the estimated free trade impacts presented. Moreover, a policy that permanently limits export trade to one type petroleum stream—no matter how carefully defined—could create another market distortion.
- Although not widely recognized, the United States is already a major exporter of refined products, including diesel, gasoline and jet fuel. At almost 4 million B/D, the United States has become the world's largest exporter of products. This is double the level of five years ago. Lifting the ban on exports of crude oil would be consistent with the new realities of US and world oil and would remove one of the last vestiges of the panic-induced policies of the 1970s.

A move to free trade in crude oil would help the United States realize its growth potential for crude oil production. By doing so, US domestic crude oil prices would become linked to the global market and would be a force for lower—not higher—gasoline prices. US crude exports would find ready markets for LTO exports in Europe and Asia. In Europe, it would back out competing crudes from Africa and potentially Russia, which would be reoriented to Asia.

IMPACT OF FREE TRADE VERSUS RESTRICTIVE TRADE

IHS has evaluated the crude export policy decision using two outlooks for US crude oil production. To this point, the impact of lifting the trade policy in the Base Case has been presented above. A more optimistic—but certainly realistic—Potential Case is provided below and throughout our report.

For each of the two production cases—the Base and Potential Cases—two policies were analyzed: free trade, which illustrates the impact of a move to allow exports of US-produced crude oil, and restricted

trade, which assumes that the current ban is maintained. The forecast period for this analysis is 2016-2030.

Industry and economy benefits from free trade of crude oil include:

- The impact for the US economy of a free trade policy on crude exports is significant. The key driver is the difference between free and restricted trade for US oil production and investment, which increases 1.2 million B/D and \$66 billion (peak) in the Base Production Case and 2.3 million B/D and \$82 billion (peak) in the Potential Production Case.
- Gross domestic product (GDP) in the Base Production Case with free trade will peak in 2018 at \$135 billion, or 0.7%, higher than with the current, restricted trade policy. The peak impact is greater in the Potential Production Case when GDP under free trade will be \$221 billion, or 1.2%, higher.
- The impact of free trade and associated higher crude oil production on US petroleum trade is considerable. The 2013 US bill for imported petroleum is calculated at \$218 billion. Free trade reduces this bill by \$67 billion (Base Production) and \$93 billion (Potential Production) over restricted trade per year on average from 2016 through 2030. In overall terms, the oil bill will decline from its 2013 level of \$218 billion to \$48 billion by 2022 – equivalent to 78 percent of 2013 oil trade deficit.
- Increased economic activity will lead to greater job creation and a lower unemployment rate. Total US jobs increase due to free trade will be, on average, 394,000 in the Base Case and 859,000 in the Potential Case. Peak job creation in 2018 is nearly 1 million in the Base Case and over 1.5 million in the Potential Case. A stronger labor market with free trade relative to restricted trade will increase the average annual household's disposable income by \$239 and \$465 during 2016-2030 in the Base and Potential Production Cases, respectively.
- Government revenues from corporate, personal and energy-related taxes and royalties are expected to increase under free trade policy. The cumulative addition to revenue is \$1.3 trillion from 2016 through 2030 in the Base Production Case and more than double— \$2.8 trillion—in the Potential Production Case.
- Benefits from free trade of crude oil are distributed throughout the US. Jobs growth and economic benefits are continent-wide and not just in large oil producing states due to substantial supply chains supporting the field production, capital spending, transportation and refining of crude oil. For example, 24% of the future jobs supporting the oil industry are located in states that essentially produce no crude oil.

OIL MARKET CHANGES POINT TO POLICY CHANGE

Global trade in oil and gas has benefitted the global economy, including the United States. So why is the ban on US crude oil exports, which was a reaction to upheavals during the 1970s in the world oil market, still in place? This oil export ban is indeed one of the last vestiges of an antiquated system in which the federal government once set the price for oil, provided subsidies to refiners that imported crude, and allocated supplies around the country. But the world and US oil industry have changed dramatically in the past four decades, and the US economy and consumers would benefit from an updated policy that responds to these changes by allowing exports of some of the nation's rising crude oil production. Removing the export ban would enhance energy security by strengthening the energy position of the United States, which would regain its stature as the world's largest producer of crude oil. Further, lifting the export ban would stimulate the economy, create new jobs, and reduce the prices that US consumers pay at the pump for their gasoline.

Executive Summary:

The Impacts of U.S. Crude Oil Exports on Domestic Crude Production, GDP, Employment, Trade and Consumer Costs

March 2014

\$5.8b Estimated reduced consumer fuel costs/yr 2015–2035

U.S. weighted average petroleum product prices decline as much as 2.3 cents per gallon when U.S. crude exports are allowed. The greatest potential annual decline is up to 3.8 cents per gallon in 2017. These price decreases for gasoline, heating oil, and diesel could save American consumers up to \$5.8 billion per year, on average, over the 2015–2035 period.

\$70.2b More investment by 2020

An expansion of crude exports would result in \$15.2–\$70.2 billion in additional investment in U.S. exploration, development and production of crude oil between 2015 and 2020.

500,000 Barrels per day increase in domestic crude oil production by 2020

With crude exports, U.S. oil production is expected to grow faster and could result in incremental U.S. oil production of between 110,000–500,000 barrels per day in 2020.

300,000 Potential job gains in 2020

The U.S. economy could gain up to 300,000 jobs in 2020 when crude exports are allowed. Consumer products and services and hydrocarbon production sectors would see the largest gains.

\$38.1b Projected GDP gain in 2020

U.S. GDP is estimated to increase by \$38.1 billion in 2020 if expanded crude exports were allowed. GDP increases are led by increases in hydrocarbon production and greater consumer product spending (due to lower retail prices for gasoline and other petroleum products.)

\$13.5b Estimated government revenues increase in 2020

U.S. federal, state, and local tax receipts attributable to GDP increases from expanding crude oil exports could reach \$13.5 billion in 2020.

\$22.3b Estimated reduction of trade deficit in 2020

Lifting crude oil export restrictions contributes to expanded U.S. exports. This could narrow the U.S. trade deficit by \$22.3 billion in 2020, assuming all else equal, through increased international trade of U.S. crude oil.

100,000 Barrels per day increase in refinery throughput 2015–2035

U.S. refinery throughput is expected to average 15.5 MMBPD without crude export restrictions, which is 100,000 barrels per day higher than with the restrictions. Refinery throughput is slightly higher with

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crude exports because refinery process bottlenecks (caused by mismatched crudes) are more effectively alleviated by the flexibility to exchange crudes in the world market.