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CRUDE OIL EXPORT RESTRICTIONS

Studies Suggest Allowing Exports Could Reduce Consumer Fuel Prices

Statement of Frank Rusco, Director, Natural Resources and Environment

Accessible Version

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GAO Highlights

Highlights of GAO-15-745T, a testimony before the Committee on Agriculture, House of Representatives

Why GAO Did This Study

After decades of generally falling U.S. crude oil production, technological advances in the extraction of crude oil from shale formations have contributed to increases in U.S. production. In response to these and other market developments, some have proposed removing the 4 decade old restrictions on crude oil exports, underscoring the need to understand how allowing crude oil exports could affect crude oil prices, and the prices of consumer fuels refined from crude oil, such as gasoline and diesel.

This testimony discusses what is known about the pricing and other key potential implications of removing crude oil export restrictions. It is based on GAO's September 2014 report (GAO-14-807), and information on crude oil production and prices updated in June 2015. For that report, GAO reviewed four studies issued in 2014 on crude oil exports; including two sponsored by industry and conducted by consultants, one sponsored by a research organization and conducted by consultants, and one conducted at a research organization. Market conditions have changed since these studies were conducted, underscoring some uncertainties surrounding estimates of potential implications of removing crude oil export restrictions. For its 2014 report, GAO also summarized the views of a nongeneralizable sample of 17 stakeholders including representatives of companies and interest groups with a stake in the outcome of decisions regarding crude oil export restrictions, as well as academic, industry, and other experts.

View GAO-15-745T. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

What GAO Found

In September 2014, GAO reported that according to studies it reviewed and stakeholders it interviewed, removing crude oil export restrictions would likely increase domestic crude oil prices, but could decrease consumer fuel prices, although the extent of price changes are uncertain and may vary by region. The studies identified the following implications for U.S. crude oil and consumer fuel prices:

- **Crude oil prices**. The four studies GAO reviewed estimated that if crude oil export restrictions were removed, U.S. crude oil prices would increase by about $2 to $8 per barrel—bringing them closer to international prices. Prices for some U.S. crude oils have been lower than international prices—for example, one benchmark U.S. crude oil averaged $52 per barrel from January through May 2015, while a comparable international crude oil averaged $57. In addition, one study found that, when assuming low future crude oil prices overall, removing export restrictions would have no measurable effect on U.S. crude oil prices.
- **Consumer fuel prices.** The four studies suggested that U.S. prices for gasoline, diesel, and other consumer fuels follow international prices. If domestic crude oil exports caused international crude oil prices to decrease, consumer fuel prices could decrease as well. Estimates of the consumer fuel price implications in the four studies GAO reviewed ranged from a decrease of 1.5 to 13 cents per gallon. In addition, one study found that, when assuming low future crude oil prices, removing export restrictions would have no measurable effect on consumer fuel prices.

Some stakeholders cautioned that estimates of the price implications of removing export restrictions are subject to several uncertainties, such as the extent of U.S. crude oil production increases, and how readily U.S. refiners are able to absorb such increases. Some stakeholders further told GAO that there could be important regional differences in the price implications of removing export restrictions.

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

- **Crude oil production**. Removing export restrictions may increase domestic production—over 8 million barrels per day in 2014—because of increasing domestic crude oil prices. Estimates ranged from an additional 130,000 to 3.3 million barrels per day on average from 2015 through 2035.
- **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.
- **The economy**. Three of the studies projected that removing export restrictions would lead to additional investment in crude oil production and increases in employment. This growth in the oil sector would—in turn—have additional positive effects in the rest of the economy, including for employment and government revenues.

Chairman Conaway, Ranking Member Peterson, and Members of the Committee:

Thank you for the opportunity to discuss our work on the implications of removing crude oil export restrictions. After decades of generally falling U.S. crude oil production, technological advances in the extraction of crude oil from shale formations have contributed to increases in U.S. production. Crude oil production increased by about 74 percent from 2008 through 2014 to reach over 8 million barrels per day in 2014, and production increases in 2012, 2013, and 2014 were the largest annual increases since the beginning of U.S. commercial crude oil production in 1859, according to the Energy Information Administration (EIA).[1] More recently, however, crude oil prices have declined by 40 percent, from about $100 per barrel in the summer of 2014, to about $60 in May 2015. In response to these and other market developments, some have proposed removing the 4 decade old restrictions on crude oil exports, underscoring the need to understand how allowing crude oil to be exported could affect crude oil prices, and the prices of consumer fuels refined from crude oil, such as gasoline and diesel.

My testimony discusses what is known about the pricing and other key implications of removing crude oil export restrictions. It is based on our September 2014 report that examined these and other issues,[2] and information on crude oil prices and production updated in June 2015. For the 2014 report, we reviewed four studies issued in 2014 on crude oil exports; including two sponsored by industry and conducted by consultants, one sponsored by a research organization and conducted by

[1]EIA is a statistical agency within the Department of Energy that collects, analyzes, and disseminates independent information on energy issues.

[2]GAO, *Changing Crude Oil Markets: Allowing Exports Could Reduce Consumer Fuel Prices, and the Size of the Strategic Reserves Should Be Reexamined,* GAO-14-807 (Washington, D.C.: Sept. 30, 2014).

consultants, and one conducted at a research organization.[3] Market conditions have changed since these studies were conducted, underscoring some uncertainties surrounding estimates of potential implications of removing crude oil export restrictions. For our 2014 report, we also summarized the views of a nongeneralizable sample of 17 stakeholders including representatives of companies and interest groups with a stake in the outcome of decisions regarding crude oil export restrictions, as well as academic, industry, and other experts. Although not generalizable to all potential stakeholders, these views provide illustrative examples. More details on our scope and methodology for that work can be found in the issued report. We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

The export of domestically produced crude oil has generally been restricted since the 1970s. In particular, the Energy Policy and Conservation Act of 1975 (EPCA) led the Department of Commerce's Bureau of Industry and Security (BIS) to promulgate regulations that require crude oil exporters to obtain a license.[4] These regulations provide that BIS will issue licenses for the following crude oil exports:

- exports from Alaska's Cook Inlet,
- exports to Canada for consumption or use therein,
- exports in connection with refining or exchange of SPR crude oil,
- exports of certain California crude oil up to twenty-five thousand barrels per day,

[3]Resources for the Future, *Crude Behavior: How Lifting the Export Ban Reduces Gasoline Prices in the United States* (Washington, D.C.: Resources for the Future, February 2014, revised March 2014); ICF International and EnSys Energy (ICF International), *The Impacts of U.S. Crude Oil Exports on Domestic Crude Production, GDP, Employment, Trade, and Consumer Costs* (Washington, D.C.: ICF Resources, Mar. 31, 2014); IHS, *U.S. Crude Oil Export Decision: Assessing the Impact of the Export Ban and Free Trade on the U.S. Economy* (Englewood, CO: IHS, 2014); NERA Economic Consulting, *Economic Benefits of Lifting the Crude Oil Export Ban* (Washington, D.C.: NERA Economic Consulting, Sept. 9, 2014).

[4]15 C.F.R. § 754.2(a).

- exports consistent with certain international energy supply agreements,
- exports consistent with findings made by the President under certain statutes, and
- exports of foreign origin crude oil that has not been commingled with crude oil of U.S. origin.

Other than for these exceptions, BIS considers export license applications for exchanges involving crude oil on a case-by-case basis, and BIS can approve them if it determines that the proposed export is consistent with the national interest and purposes of EPCA.[5] In addition to BIS's export controls, other statutes control the export of domestically produced crude oil, depending on where it was produced and how it is transported.[6] In these cases, BIS can approve exports only if the President makes the necessary findings under applicable laws.[7] Some of the authorized exceptions, outlined above, are the result of such presidential findings.

As we previously found, recent increases in U.S. crude oil production have lowered the cost of some domestic crude oils.[8] For example, prices for West Texas Intermediate (WTI) crude oil—a domestic crude oil used as a benchmark for pricing—were historically about the same price as Brent, an international benchmark crude oil from the North Sea between Great Britain and the European continent.[9] However, from 2011 through 2014, the price of WTI averaged $12 per barrel lower than Brent (see fig.

[5]15 C.F.R. § 754.2(b)(2).

[6]For example, the Mineral Leasing Act of 1920 restricts exports of domestically produced crude oil transported by pipeline over certain rights-of-way (30 U.S.C. §185(u)); the Outer Continental Shelf Lands Act restricts exports of crude oil from the outer continental shelf (29 U.S.C. §1354); the Naval Petroleum Reserves Production Act restricts the export of crude oil produced from the Naval Petroleum Reserves (10 U.S.C. §7430) and Section 201 of Pub. L. No. 104-58, "Exports of Alaskan North Slope Oil," provides for exports of domestically produced crude oil transported by pipeline over rights-of-way granted pursuant to section 203 of the Trans-Alaska Pipeline Authorization Act (30 U.S.C. §185(s)).

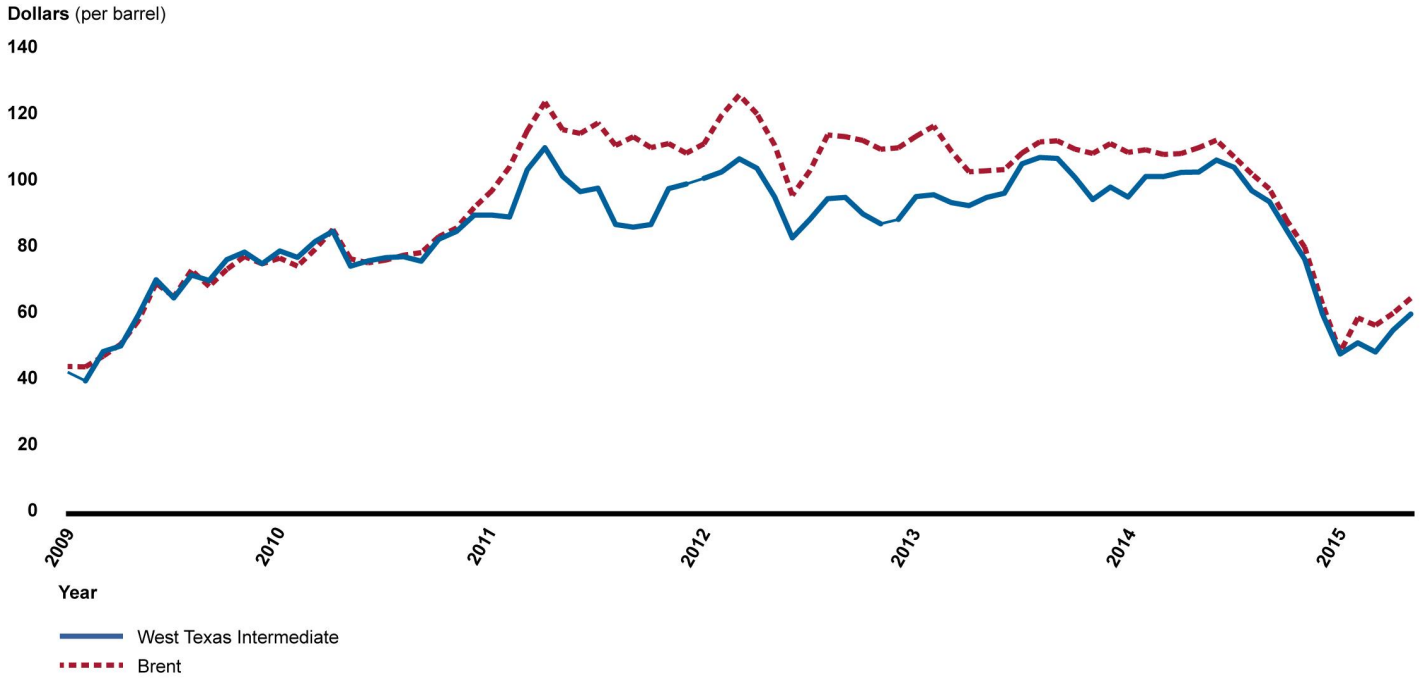
[7]15 C.F.R. § 754.2(c).

[8]GAO, *Petroleum Refining: Industry's Outlook Depends on Market Changes and Key Environmental Regulations,* GAO-14-249 (Washington, D.C.: Mar. 14, 2014).

[9]Because of the large number of grades of crude oils, buyers and sellers use benchmark crude oils as a reference in pricing crude oil. A benchmark crude oil is typically an abundantly produced and frequently traded crude oil. For example, crude oils produced in North and South America are typically priced in reference to WTI.

1). In 2014, prices for these benchmark crude oils narrowed as global oil prices declined, and WTI averaged $52 from January through May 2015, while Brent averaged $57. The development of U.S. crude oil production has created some challenges for crude oil transportation infrastructure because some production has been in areas with limited linkages to refining centers. According to EIA, these infrastructure constraints have contributed to discounted prices for some domestic crude oils.

Figure 1: Monthly West Texas Intermediate and Brent Crude Oil Prices, 2009-May 2015



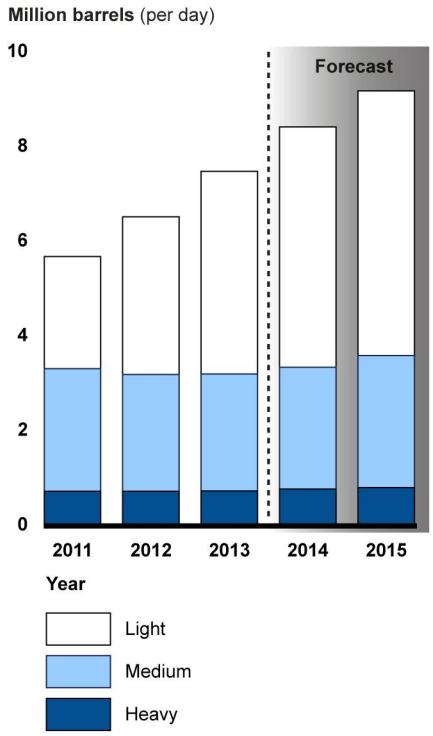
Source: GAO analysis of Energy Information Administration data. | GAO-15-745T

Note: West Texas Intermediate is a domestic crude oil used as a benchmark for pricing, and Brent is an international benchmark from the North Sea between Great Britain and the European continent.

Much of the crude oil currently produced in the United States has characteristics that differ from historic domestic production. Crude oil is generally classified according to two parameters: density and sulfur content. Less dense crude oils are known as “light,” and denser crude oils are known as “heavy.” Crude oils with relatively low sulfur content are known as “sweet,” and crude oils with higher sulfur content are known as “sour.” As shown in figure 2, according to EIA, most domestic crude oil produced over the last 5 years has tended to be light oil. Specifically,

according to EIA estimates, about all of the 1.8 million barrels per day increase in production from 2011 to 2013 consisted of lighter sweet crude oils.[10]

Figure 2: U.S. Crude Oil Production and Energy Information Administration Forecast of Production by Crude Oil Type, 2011-2015



Source: GAO analysis of Energy Information Administration data. | GAO-15-745T

Note: The density, or gravity, of a crude oil is specified using the American Petroleum Institute (API) gravity standard, which measures the weight of crude oil in relation to water, which has an API gravity of 10 degrees. Heavy crude oils include those with an API gravity of less than 27; medium includes crude oil with an API from 27 to 35; and light includes crude oil with API gravities of 35 and above.

[10]The density, or gravity of a crude oil is specified using the American Petroleum Institute (API) gravity standard, which measures the weight of crude oil in relation to water, which has an API gravity of 10 degrees. For the purposes of this estimate, we considered light oils as those with an API gravity of 35 degrees or above. See: Energy Information Administration, *U.S. Crude Oil Production Forecast-Analysis of Crude Types* (Washington, D.C.: May 29, 2014).

Light crude oil differs from the crude oil that many U.S. refineries are designed to process. Refineries are configured to produce transportation fuels and other products (e.g., gasoline, diesel, jet fuel, and kerosene) from specific types of crude oil. Refineries use a distillation process that separates crude oil into different fractions, or interim products, based on their boiling points, which can then be further processed into final products. Many refineries in the United States are configured to refine heavier crude oils and have therefore been able to take advantage of historically lower prices of heavier crude oils.[11] For example, in 2013, the average density of crude oil used at domestic refineries was 30.8, while nearly all of the increase in production in recent years has been lighter crude oil with a density of 35 or above.

According to EIA, additional production of light crude oil over the past several years has been absorbed into the market through several mechanisms, but the capacity of these mechanisms to absorb further increases in light crude oil production may be limited in the future for the following reasons:

- **Reduced imports of similar grade crude oils:** According to EIA, additional production of light oil in the past several years has primarily been absorbed by reducing imports of similar grade crude oils. Light crude oil imports fell from 1.7 million barrels per day in 2011 to 1 million barrels per day in 2013. As a result, there may be dwindling amounts of light crude oil imports that can be reduced in the future, according to EIA.
- **Increased crude oil exports:** Crude oil exports have increased recently, from less than thirty thousand barrels per day in 2008 to 396 thousand barrels per day in June 2014. Continued increases in crude oil exports will depend, in part, on the extent of any relaxation of current export restrictions, according to EIA.
- **Increased use of light crude oils at domestic refineries:** Domestic refineries have increased the average gravity of crude oils that they refine. The average American Petroleum Institute (API) gravity of crude oil used in U.S. refineries increased from 30.2 degrees in 2008 to 30.8 degrees in 2013, according to EIA. Continued shifts to use additional lighter crude oils at domestic refineries can be enabled by

[11]In general, heavier crude oils require more complex and expensive refineries to process the crude oil into usable products but have been less expensive to purchase than lighter crude oils.

investments to relieve constraints associated with refining lighter crude oils at refineries that were optimized to refine heavier crude oils, according to EIA.

- **Increased use of domestic refineries:** In recent years, domestic refineries have been run more intensively, allowing the use of more domestic crude oils. Utilization—a measure of how intensively refineries are used that is calculated by dividing total crude oil and other inputs used at refineries by the amount refineries can process under usual operating conditions—increased from 86 percent in 2011 to 88 percent in 2013. There may be limits to further increases in utilization of refineries that are already running at high rates, according to EIA.

Removing Crude Oil Export Restrictions Is Expected to Increase Domestic Crude Oil Prices and Could Decrease Consumer Fuel Prices

In our September 2014 report, we reported that according to the studies we reviewed and the stakeholders we interviewed, removing crude oil export restrictions would likely increase some domestic crude oil prices, but could decrease consumer fuel prices, although the extent of consumer fuel price changes are uncertain and may vary by region. As discussed earlier, increasing domestic crude oil production has resulted in lower prices of some domestic crude oils compared with international benchmark crude oils. Three of the studies we reviewed also concluded that, absent changes in crude oil export restrictions, the expected growth in crude oil production may not be fully absorbed by domestic refineries or through exports (where allowed), contributing to even wider differences in prices between some domestic and international crude oils. According to these studies, by removing the export restrictions, these domestic crude oils could be sold at prices closer to international prices, reducing the price differential and aligning the price of domestic crude oil with international benchmarks.

While the studies we reviewed and most of the stakeholders we interviewed agreed that domestic crude oil prices would increase if crude oil export restrictions were removed, stakeholders highlighted several uncertainties that could affect the extent of price increases. The studies we reviewed made assumptions about these uncertainties, and actual price implications of removing crude oil export restrictions may differ from those estimated in these studies depending on how export restrictions and market conditions evolve. Specifically, stakeholders raised the following three key uncertainties:

- **Extent of future increases in crude oil production**. According to two stakeholders, in the absence of exports, higher production of domestic light sweet crude oil would tend to increase the mismatch

between such crude oils and the refining industry. This was corroborated by two of the studies. As a result, one study indicated that a greater increase in production would increase the price effects of removing crude oil export restrictions. On the other hand, lower than anticipated production of such crude oil would lower potential price effects as the additional crude oil could more easily be absorbed domestically.

- **Extent to which crude oil production increases can be absorbed**. The domestic refining industry and exports to Canada have absorbed the increases in domestic crude oil production thus far, and one stakeholder told us the domestic refining industry could provide sufficient capacity to absorb additional future crude oil production. On the other hand, some stakeholders suggested that the U.S. refining industry will not be able to keep pace with increasing U.S. light crude oil production. For example, IHS stated that refinery investments to process additional light crude oil face significant risks in the form of potentially stranded investments if export restrictions were to change, and this could result in investments not being made as quickly as anticipated.[12]
- **Extent to which export restrictions change**. Aspects of the export restrictions could be further defined or interpreted in ways that could change the pricing dynamics of domestic crude oil markets. In 2014, for example, the Department of Commerce provided clarifications that condensate—a type of light crude oil[13]—that has been processed through a distillation tower is not considered crude oil and so not

[12]IHS is a firm that provides comprehensive economic and financial information on countries, regions, and industries.

[13]Specifically, the Department of Commerce's definition of crude oil includes condensates, which are light liquid hydrocarbons recovered primarily from natural gas wells.

subject to export restrictions.[14] One stakeholder stated that this may lead to more condensate exports than expected.[15]

Within the context of these uncertainties, estimates of potential price effects vary in the four studies we reviewed, as shown in table 1. Specifically, estimates in these studies of the increase in domestic crude oil prices due to removing crude oil export restrictions ranged from about $2 to $8 per barrel.[16] For comparison, at the beginning of June 2014, WTI was $103 per barrel, and these estimates represented 2 to 8 percent of that price. In addition, NERA Economic Consulting found that removing export restrictions would have no measurable effect in a case that assumes a low future international oil price of $70 per barrel in 2015 rising to less than $75 by 2035.[17] According to the NERA Economic Consulting study, current production costs are close to these values, so that removing export restrictions would provide little incentive to produce more light crude oil.

[14]Specifically, companies often process condensate through stabilization units to reduce their volatility and prepare the condensate for transport to markets. Some stabilization units include distillation towers. In March and May 2014, the Department of Commerce issued commodity classifications to two companies that determined that condensates processed through a crude oil distillation tower, as described by the two companies requesting clarification, did not meet the definition of crude oil in BIS's regulations and thus were not subject to the export prohibitions applicable to U.S. produced crude oil. The Department of Commerce clarified the factors it will consider in determining whether a product has been "processed through a crude oil distillation tower" in December, 2014.

[15]This clarification provided by the Department of Commerce occurred after the publication of the Resources for the Future, ICF International, and IHS studies and thus this was not taken into consideration in the studies. NERA Economic Consulting also did not consider the potential effect of the clarification in its study.

[16]Unless otherwise noted, dollar estimates in the rest of this report have been converted to 2014 year dollars. These are average price effects over the study time frames, and some cases in some studies projected larger price effects in the near term that declined over time.

[17]NERA Economic Consulting is a global firm of experts dedicated to applying economic, finance, and quantitative principles to complex business and legal challenges.

Table 1: Crude Oil Price Implications of Removing Crude Oil Export Restrictions from Four Studies Issued in 2014

	Resources for the Future	ICF International	IHS	NERA Economic Consulting
U.S. crude oil price	Midwest refiner acquisition costs increase $6.68 per barrel.[a]	West Texas Intermediate crude oil prices increase $2.35 to $4.19 per barrel on average from 2015-2035.	Prices increase $7.89 per barrel on average from 2016-2030.	Prices increase $1.74 per barrel in the reference case and $5.95 per barrel in the high case on average from 2015-2035.[b]

Sources: GAO analysis of Resources for the Future, ICF International, IHS, and NERA Economic Consulting studies. | GAO-15-745T

Note: Estimates are in 2014 year dollars.

[a]Refiner acquisition costs are the costs of crude oil including transportation and other fees paid by the refiner. Such costs may be closely related to the prices of crude oil.

[b]Implications refer to the difference between the reference case and its baseline with export restrictions in place, and also the difference between the high oil and gas recovery case and its corresponding baseline. NERA Economic Consulting also found that removing crude oil export restrictions would have no measurable effect in the low world oil price case.

Regarding consumer fuel prices, such as gasoline, diesel, and jet fuel, the studies we reviewed and most of the stakeholders we interviewed suggested that consumer fuel prices could decrease as a result of removing crude oil export restrictions. A decrease in consumer fuel prices could occur because such prices tend to follow international crude oil prices rather than domestic crude oil prices, according to the studies reviewed and most of the stakeholders interviewed. If domestic crude oil exports caused international crude oil prices to decrease, consumer fuel prices could decrease as well.[18] Table 2 shows that the estimates of the price effects on consumer fuels varied in the four studies we reviewed. Price estimates ranged from a decrease of 1.5 to 13 cents per gallon. These estimates represented 0.4 to 3.4 percent of the average U.S. retail gasoline price at the beginning of June 2014. In addition, NERA Economic Consulting found that removing export restrictions would have no measurable effect on consumer fuel prices when assuming a low future world crude oil price.

[18]Resources for the Future also estimates a decrease in consumer fuel prices but this decrease is as a result of increased refinery efficiency (even with an estimated slight increase in the international crude oil price).

Table 2: Consumer Fuel Price Implications of Removing Crude Oil Export Restrictions from Four Studies Issued in 2014

	Resources for the Future	ICF International	IHS	NERA Economic Consulting[a]
U.S. consumer fuel prices	Gasoline prices would decline by 1.8 to 4.6 cents per gallon on average.	Petroleum product prices would decline by 1.5 to 2.4 cents per gallon on average from 2015-2035.	Gasoline prices would decline by 9 to 13 cents per gallon on average from 2016-2030.	Petroleum product prices would decline by 3 cents per gallon on average from 2015-2035 in the reference case and 11 cents per gallon in the high case. Gasoline prices would decline by 3 cents per gallon in the reference case and 10 cents per gallon in the high case. Fuel prices would not be affected in a low world oil price case.

Sources: GAO analysis of Resources for the Future, ICF International, IHS, and NERA Economic Consulting studies. | GAO-15-745T

Note: Dollar estimates are in 2014 year dollars.

[a]Implications refer to the difference between the reference case and its baseline with export restrictions in place, and the difference between the high oil and gas recovery case and its corresponding baseline.

Price Effects of Allowing Alaskan North Slope Crude Oil Exports

In 1995, Congress removed the restrictions on the export of Alaskan North Slope crude oil. From the time the restrictions were removed until 2004, about 2.7 percent of Alaskan North Slope crude oil was exported; however, no Alaskan North Slope crude oil has been exported since 2004.The experience of allowing Alaskan North Slope crude oil exports may illustrate some of the potential effects of removing crude oil export restrictions nationally. In 1999, we reviewed the effects of allowing Alaskan North Slope crude oil exports and concluded that:[a]

- lifting the export ban raised the relative prices of Alaskan North Slope and comparable California crude oils by between $0.98 and $1.30 per barrel;[b]
- some refiners' costs increased commensurate with the increase in crude oil prices; and
- consumer fuel prices for gasoline, diesel, and jet fuel did not increase.

The effect of removing the export restrictions for Alaskan North Slope oil is not completely understood due to data limitations and the difficulty of separating the effects of removing the export restrictions from other market changes that occurred at the same time.

Source: GAO. | GAO-15-745T

[a]GAO, Alaskan North Slope Oil: Limited Effects of Lifting Export Ban on Oil and Shipping Industries and Consumers, GAO/RCED-99-191 (Washington, D.C., July 1, 1999).

[b]These estimates have not been adjusted for inflation.

The effect of removing crude oil export restrictions on domestic consumer fuel prices depends on several uncertainties, as we discussed in our September 2014 report.[19] First, it would depend on the extent to which domestic versus international crude oil prices determine the domestic price of consumer fuels. A 2014 research study examining the relationship between domestic crude oil and gasoline prices concluded that low domestic crude oil prices in the Midwest during 2011 did not result in lower gasoline prices in that region.[20] This research supports the assumption made in the four studies we reviewed that to some extent higher prices of some domestic crude oils as a result of removing crude oil export restrictions would not be passed on to consumer fuel prices. However, some stakeholders told us that this may not always be the case and that more recent or detailed data could show that lower prices for some domestic crude oils have influenced consumer fuel prices.

Second, two of the stakeholders we interviewed suggested that there could be important regional differences in consumer fuel price implications and that prices could increase in some regions—particularly the Midwest and the Northeast—due to changing transportation costs and potential refinery closures. For example, these two stakeholders told us that because of requirements to use more expensive U.S.-built, -owned, and -operated ships to move crude oil between U.S. ports, allowing exports could enable some domestic crude oil producers to ship U.S. crude oil for less cost to refineries in foreign countries.[21] Specifically, representatives of one refiner told us that, if export restrictions were removed, they could ship oil to their refineries in Europe at a lower cost than delivering the same oil to a refinery on the U.S. East Coast. According to another stakeholder, this could negatively affect the ability of some domestic refineries to compete with foreign refineries. Additionally, because refineries are currently benefiting from low domestic crude oil prices, some studies and stakeholders noted that refinery margins could be reduced if removing export restrictions increased domestic crude oil prices. As a result, some refineries could face an increased risk of

[19]GAO-14-807.

[20]See Severin Borenstein and Ryan Kellogg, "The Incidence of an Oil Glut: Who Benefits from Cheap Crude Oil in the Midwest?" *The Energy Journal 35, no. 1* (2014).

[21]The Merchant Marine Act of 1920, also known as the Jones Act, in general, requires that any vessel (including barges) operating between two U.S. ports be U.S.-built, -owned, and -operated.

closure, especially those located in the Northeast. However, according to one stakeholder, domestic refiners still have a significant cost advantage in the form of less expensive natural gas, which is an important energy source for many refineries. For this and other reasons, one stakeholder told us they did not anticipate refinery closures as a result of removing export restrictions.

Removing Crude Oil Export Restrictions Is Expected to Increase Domestic Production and Have Other Implications

The studies we reviewed for our September 2014 report,[22] generally suggested that removing crude oil export restrictions may increase domestic crude oil production and may affect the environment and the economy:

- **Crude oil production.** Removing crude oil export restrictions may increase domestic crude oil production. Even with current crude oil export restrictions, given various scenarios, EIA projected that domestic production will continue to increase through 2020.[23] If export restrictions were removed, according to the four studies we reviewed, the increased prices of domestic crude oil are projected to lead to further increases in crude oil production. Projections of this increase varied in the studies we reviewed—from a low of an additional 130,000 barrels per day on average from 2015 through 2035, according to the ICF International study, to a high of an additional 3.3 million barrels per day on average from 2015 through 2035 in NERA Economic Consulting's study.[24] This is equivalent to 1.5 percent to almost 40 percent of production in April 2014.
- **Environment.** Two of the studies we reviewed stated that the increased crude oil production that could result from removing the restrictions on crude oil exports may affect the environment. Most stakeholders we interviewed echoed this statement. This is consistent

[22]GAO-14-807.

[23]See EIA, *Annual Energy Outlook 2015, DOE/EIA-0383(2015)* (Washington, D.C.: April 2015).

[24]In addition, Resources for the Future estimated that oil production in Canada and in the Midwest United States would gradually increase if the restrictions were lifted by about 84,000 barrels per day. Resources for the Future estimated production elsewhere in the United States and the rest of the world would increase by 54,000 barrels per day for a total increase in world production of 138,000 additional barrels per day. IHS projected an additional 1.2 to 2.3 million barrels per day of crude oil production from 2016 through 2030.

with what we found in a September 2012 report.[25] In that 2012 report we found that crude oil development may pose certain inherent environmental and public health risks. However, the extent of the risk is unknown, in part, because the severity of adverse effects depends on various location- and process-specific factors, including the location of future shale oil and gas development and the rate at which it occurs. It also depends on geology, climate, business practices, and regulatory and enforcement activities. The stakeholders who raised concerns about the effect of removing the restrictions on crude oil exports on the environment identified risks including those related to the quality and quantity of surface and groundwater sources; increases in greenhouse gas and other air emissions, and increases in the risk of spills from crude oil transportation.

- **The economy.** The four studies we reviewed suggested that removing crude oil export restrictions would increase the size of the economy. Three of the studies projected that removing export restrictions would lead to additional investment in crude oil production and increases in employment. This growth in the oil sector would—in turn—have additional positive effects in the rest of the economy.[26] For example, NERA Economic Consulting's study projected an average of 230,000 to 380,000 workers would be removed from unemployment through 2020 if export restrictions were eliminated in 2015.[27] These employment benefits would largely disappear if export restrictions were not removed until 2020 because by then the economy would have returned to full employment. Two of the studies we reviewed suggested that removing export restrictions would increase government revenues, although the estimates of the increase vary. One study estimated that total government revenue would increase by a combined $1.4 trillion in additional revenue from 2016 through 2030,

[25]GAO, *Oil and Gas: Information on Shale Resources, Development, and Environmental and Public Health Risks,* GAO-12-732 (Washington, D.C.: Sept. 5, 2012).

[26]Growth in one sector of the economy can result in economy-wide growth through follow-on effects. For example, researchers at the Federal Reserve Bank of Dallas found that oil development in the Eagle Ford region of South Texas has had profound effects on jobs, income, and spending in the region with effects beyond those in the oil sector alone. See: Gilmer, Robert W., Raúl Hernandez, and Keith Phillips, "Oil Boom in Eagle Ford Shale Brings New Wealth to South Texas," *Southwest Economy* (Federal Reserve Bank of Dallas: Second Quarter, 2012).

[27]According to the NERA study, because of the increase in economic growth triggered by investment in more production capacity and infrastructure, there will be a corresponding acceleration of the rate at which the economy moves toward full employment.

and another study estimated that U.S. federal, state, and local tax receipts combined with royalties from drilling on federal lands could increase by an annual average of $3.9 to $5.7 billion from 2015 through 2035.

Chairman Conaway, Ranking Member Peterson, and Members of the Committee, this completes my prepared statement. I would be pleased to answer any questions that you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff members have any questions concerning this testimony, please contact me at (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Other individuals who made key contributions include Christine Kehr (Assistant Director), Quindi Franco, Alison O'Neill, and Kiki Theodoropoulos.

Appendix I: Accessible Data

Data Table for Figure 1: Monthly West Texas Intermediate and Brent Crude Oil Prices, 2009-May 2015

Dollars (per barrel)

Year	Month	West Texas Intermediate	Brent
2009	January	41.71	43.44
	February	39.09	43.32
	March	47.94	46.54
	April	49.65	50.18
	May	59.03	57.3
	June	69.64	68.61
	July	64.15	64.44
	August	71.05	72.51
	September	69.41	67.65
	October	75.72	72.77
	November	77.99	76.66
	December	74.47	74.46
2010	January	78.33	76.17
	February	76.39	73.75
	March	81.2	78.83
	April	84.29	84.82
	May	73.74	75.95
	June	75.34	74.76
	July	76.32	75.58
	August	76.6	77.04
	September	75.24	77.84
	October	81.89	82.67
	November	84.25	85.28
	December	89.15	91.45
2011	January	89.17	96.52
	February	88.58	103.72
	March	102.86	114.64
	April	109.53	123.26
	May	100.9	114.99
	June	96.26	113.83
	July	97.3	116.97
	August	86.33	110.22
	September	85.52	112.83
	October	86.32	109.55

Year	Month	West Texas Intermediate	Brent
	November	97.16	110.77
	December	98.56	107.87
2012	January	100.27	110.69
	February	102.2	119.33
	March	106.16	125.45
	April	103.32	119.75
	May	94.66	110.34
	June	82.3	95.16
	July	87.9	102.62
	August	94.13	113.36
	September	94.51	112.86
	October	89.49	111.71
	November	86.53	109.06
	December	87.86	109.49
2013	January	94.76	112.96
	February	95.31	116.05
	March	92.94	108.47
	April	92.02	102.25
	May	94.51	102.56
	June	95.77	102.92
	July	104.67	107.93
	August	106.57	111.28
	September	106.29	111.6
	October	100.54	109.08
	November	93.86	107.79
	December	97.63	110.76
2014	January	94.62	108.12
	February	100.82	108.9
	March	100.8	107.48
	April	102.07	107.76
	May	102.18	109.54
	June	105.79	111.8
	July	103.59	106.77
	August	96.54	101.61
	September	93.21	97.09
	October	84.4	87.43
	November	75.79	79.44

Year	Month	West Texas Intermediate	Brent
	December	59.29	62.34
2015	January	47.22	47.76
	February	50.58	58.1
	March	47.82	55.89
	April	54.45	59.52
	May	59.27	64.08

Source: GAO analysis of Energy Information Administration data. | GAO-15-745T

Note: West Texas Intermediate is a domestic crude oil used as a benchmark for pricing, and Brent is an international benchmark from the North Sea between Great Britain and the European continent.

Data Table for Figure 2: U.S. Crude Oil Production and Energy Information Administration Forecast of Production by Crude Oil Type, 2011-2015

Million barrels (per day)

Year	Heavy	Medium	Light
2011	0.69	2.59	2.37
2012	0.69	2.47	3.33
2013	0.7	2.47	4.28
2014 (Forecast)	0.74	2.57	5.08
2015 (Forecast)	0.77	2.79	5.59

Source: GAO analysis of Energy Information Administration data. | GAO-15-745T

Note: The density, or gravity, of a crude oil is specified using the American Petroleum Institute (API) gravity standard, which measures the weight of crude oil in relation to water, which has an API gravity of 10 degrees. Heavy crude oils include those with an API gravity of less than 27; medium includes crude oil with an API from 27 to 35; and light includes crude oil with API gravities of 35 and above.