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2017 Top Markets Report Upstream Oil and Gas Equipment

A Market Assessment Tool for U.S. Exporters

May 2017

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Julius Svoboda and **Victoria Yue** served as lead authors of this report. A special note of thanks goes to **Lindsey Ricchi** who contributed to the study.

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Executive Summary

In 2016, the global oil and gas (O&G) industry experienced sustained low crude oil prices and slow price gains, culminating in a major production cut agreement among members of the Organization of Petroleum Exporting Countries (OPEC) as well as non-members in November 2016. The coordinated production increase the international price of crude oil to around \$50 per barrel as of the writing of this report. The OPEC production cut and resulting price increase have prompted U.S. shale oil producers to restart projects that were not economically feasible at lower prices, and the outlook for U.S. crude oil production in 2017 appears positive.

We expect 2017 and 2018 to be a buyers' market for crude oil and natural gas as global production appears to be outpacing demand growth. The modest increase in crude oil prices that resulted from OPEC's coordinated production cut, have not trickled down to natural gas, and prices remain low in a well-supplied international market. Despite low natural gas prices, the United States began exporting liquefied natural gas (LNG) from the lower-48 states for the first time in fifty years. Cheniere Energy, the only U.S. company with an operating liquefaction and export facility in the United States, shipped its one-hundredth LNG cargo in April 2017, a milestone that demonstrates the competitiveness of U.S. produced natural gas. While 2016 was positive for U.S. natural gas exporters, the future looks rocky as more liquefaction and export capacity in the United States and around the world is scheduled to come online in an already oversupplied international market.

ITA's *2017 Upstream Oil and Gas Equipment Top Markets Report* is designed to provide market intelligence to U.S. companies, as well as inform policy-makers on O&G markets where U.S. Government (USG) resources can make the biggest impact in support of increased U.S. equipment exports. The report ranks 151 markets based on export potential for U.S. O&G equipment through 2020. Markets ranked highly represent those countries with significant potential for increased U.S. O&G equipment exports. The report further looks at the export opportunities for the U.S. O&G equipment sector in six strategic markets and three regions with additional information on U.S. crude oil and LNG exports.

Key Findings

This report evaluates the following markets in greater detail: Australia, Brazil, Guyana, India, Kuwait, and Singapore. The report also evaluates three regions: North America, the Caspian Sea, and West Africa. ITA chose markets that offer potential opportunities for increased exports of upstream O&G equipment and where there is a strong need for USG engagement. Some of these countries may be more challenging markets for U.S. exporters and therefore do not appear on ITA's list of top thirty export markets for upstream O&G equipment [see Figure 1]. This is a result of higher rankings do not necessarily indicate markets with the greatest need for policy engagement or where U.S. companies are otherwise limited in their ability to sell O&G equipment by foreign government measures—*i.e.*, where the USG has a relatively important role in creating export opportunities.

Figure 1: Top Thirty Upstream Oil & Gas Equipment Export Markets

1. Canada	7. Nigeria	13. Denmark	19. Saudi Arabia	25. Kuwait
2. Mexico	8. Argentina	14. Israel	20. Ecuador	26. Qatar
3. United Kingdom	9. Australia	15. Singapore	21. Azerbaijan	27. Italy
4. Norway	10. Colombia	16. Germany	22. Spain	28. Kazakhstan
5. Brazil	11. China	17. Trinidad & Tobago	23. Poland	29. Malaysia
6. Netherlands	12. U.A.E.	18. Chile	24. Vietnam	30. India

The country case studies in this report were selected based on their commercial opportunity and trade policy environment. Each country has different challenges and opportunities, so business leaders will need to evaluate the strengths and weaknesses of exporting to and initiating projects in a target country. At the same time, policy-makers will also need to adapt commercial and policy strategies to address foreign trade barriers in the O&G sector. In particular, ITA notes that policy-makers and exporters alike should consider the risk and potential reward associated with each market. ITA believes that by evaluating a country's market size, resource endowment and investment climate, appropriate strategies become clear.

U.S. Competitiveness in the Upstream O&G Sector

In the years ahead, ITA projects global trade in O&G equipment to increase as higher oil prices result in increased investments. As a result of the decreased global price of oil that began in late 2014, U.S. exports of oil and gas equipment as well as overall global trade declined in 2015 and 2016. We anticipate higher global trade in 2017 as a result of higher global oil prices from the OPEC production cut, but this effect will not be seen in trade statistics until 2018 at the earliest.

Today, the United States is the world's fourth largest exporter of upstream O&G equipment, with close to \$18 billion in annual exports worldwide. While the market is projected to increase, there are regulatory and legal constraints that threaten to inhibit greater global trade in some strategic markets. U.S. exporters face local content requirements, local labor requirements and other trade restrictions, increasing costs and reducing competitiveness of U.S. exports.

U.S. O&G equipment suppliers face strong competition from Chinese, Korean, and German O&G equipment manufacturers. By comparison, U.S. companies are particularly competitive in high-end sinking and boring parts and parts for derricks, whereas Korean exports are concentrated in vessels with derricks with few sinking or boring parts, and Chinese exports are concentrated in vessels with drilling platforms and equipment and pipe. These trends will likely continue, with U.S. exports weighted more toward specialized high-tech equipment, especially relating to unconventional and ultra-deepwater O&G exploration and production.

The projected increase in demand for U.S. exports of O&G equipment through 2020 may be further driven by the fundamental changes in U.S. O&G production during the last several years. Having been among the first in the world to develop unconventional and ultra-deepwater resources, U.S. equipment manufacturers and service suppliers have the opportunity to seize the first-mover advantage in overseas markets that are seeking to emulate the United States' rapid expansion in energy production.

While the United States is likely to remain competitive in the O&G equipment sector, the share of U.S. equipment being exported to the global market, as a proportion of world O&G equipment exports to the global market, is projected to decline in the years to come. This may be a demonstration of greater consumption of U.S. equipment domestically, but is also a reflection of greater competition from foreign equipment producers, as other countries have increased the proportion of equipment exports to the global market. While U.S. export figures remained relatively flat from 2013 to 2014, the share of U.S. exports to the global market (as a proportion of total world exports) increased. In absolute terms, U.S. exports in the sector are projected to increase in the next five years, but the U.S. proportion of the overall world market for O&G equipment is projected to decrease through 2020.

In 2017 and 2018, we anticipate a very competitive global market with U.S. companies facing increasing competition from foreign manufacturers in a soft international market. Although competition will be stiff, there will also be more opportunities for business as global energy demand increases.

Frequently Used Acronyms

bbl/d	barrels per day
Bcf	billion cubic feet
Bcm	billion cubic meters
BMI	Business Monitor International
boe	barrels of oil equivalent
Btu	British thermal units
CAGR	compound annual growth rate
EIA	U.S. Energy Information Administration
EITI	Extractive Industries Transparency Initiative
EOR	enhanced oil recovery
FDI	Foreign Direct Investment
FPSO	Floating Production, Storage and Offloading
FSRU	Floating Storage and Regasification Unit
FTA	free trade agreement
HTS	harmonized tariff schedule
IOC	international oil company
JV	joint venture
LCR	local content requirements
LNG	liquefied natural gas
mbpd	million barrels per day
mm Btu	million British thermal units
mtpa	million tons per annum
NOC	national oil company
OECD	Organization for Economic Cooperation and Development
O&G	oil and gas
OPEC	Organization of Petroleum Exporting Countries
PSA	production sharing agreement
SOE	state owned enterprise
Tcf	trillion cubic feet
Tcm	trillion cubic meters
WTI	West Texas Intermediate

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Overview and Key Findings

Introduction

In 2016, the global oil and gas (O&G) industry experienced sustained low crude oil prices and slow price gains, culminating in a major production cut agreement among members of the Organization of Petroleum Exporting Countries (OPEC) as well as non-members in November 2016. The coordinated production increase the international price of crude oil to around \$50 per barrel as of the writing of this report. The OPEC production cut and resulting price increase have prompted U.S. shale oil producers to restart projects that were not economically feasible at lower prices, and the outlook for U.S. crude oil production in 2017 appears positive.

We expect 2017 and 2018 to be a buyers' market for crude oil and natural gas as global production appears to be outpacing demand growth. The modest increase in crude oil prices that resulted from OPEC's coordinated production cut, have not trickled down to natural gas, and prices remain low in a well-supplied international market. Despite low natural gas prices, the United States began exporting liquefied natural gas (LNG) from the lower-48 states for the first time in fifty years. Cheniere Energy, the only U.S. company with an operating liquefaction and export facility in the United States, shipped its one-hundredth LNG cargo in April 2017, a milestone that demonstrates the competitiveness of U.S. produced natural gas. While 2016 was positive for U.S. natural gas exporters, the future looks rocky as more liquefaction and export capacity in the United States and around the world is scheduled to come online in an already oversupplied international market.

ITA's *2017 Upstream Oil and Gas Equipment Top Markets Report* is designed to provide market intelligence to U.S. companies, as well as inform policy-makers on O&G markets where U.S. Government (USG) resources can make the biggest impact in support of increased U.S. equipment exports. The report ranks 151 markets based on export potential for U.S. O&G equipment through 2020. Markets ranked highly represent those countries with significant potential for increased U.S. O&G equipment exports. The report further looks at the export opportunities for the U.S. O&G equipment sector in six strategic markets and three regions with additional information on U.S. crude oil and LNG exports.

Key Findings: Top Markets and Methodology

Top Markets

This report evaluates the following markets in greater detail: Australia, Brazil, Guyana, India, Kuwait, and Singapore. The report also evaluates three regions: North America, the Caspian Sea, and West Africa. ITA chose markets that offer potential opportunities for increased exports of upstream O&G equipment and where there is a strong need for USG engagement. Some of these countries may be more challenging markets for U.S. exporters and therefore do not appear on ITA's list of top thirty export markets for upstream O&G equipment [see Figure 1]. This is a result of higher rankings do not necessarily indicate markets with the greatest need for policy engagement or where U.S. companies are otherwise limited in their ability to sell O&G equipment by foreign government measures—*i.e.*, where the USG has a relatively important role in creating export opportunities.

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Each country has different challenges and opportunities, so business leaders will need to evaluate the strengths and weaknesses of exporting to and initiating projects in a target country. At the same time, policy-makers will also need to adapt commercial and policy strategies to address foreign trade barriers in the O&G sector. ITA believes that by evaluating a country's market size, resource endowment and investment climate, appropriate strategies become clear. In particular, we note that policy-makers and exporters alike should consider the risk and potential reward associated with each market. The country case studies in this report were selected based on their commercial opportunity and trade policy environment.

Methodology

Ample data exist to analyze upstream O&G exploration equipment, allowing detailed export and import projections and trends through 2020. The analysis in this report relies primarily on U.S. export data to support the policy recommendations.

To determine market rankings, the *2017 Upstream Oil and Gas Equipment Top Markets Report* employed a modified "score card" analysis that grouped countries with greater or lesser amounts of opportunities for increased exports from the United States.

The score card methodology used in this study employed qualitative and quantitative indicators to measure future opportunity for exports from the United States. Indicators included are:

- 1) Proximity of a country to the United States;
- 2) U.S. export trends for O&G field equipment;
- 3) The U.S. share and the market size of a country's O&G equipment imports;
- 4) A country's natural gas and oil reserves and future production;
- 5) Total upstream project investments in the country (as publicly available);
- 6) An institutional risk assessment variable;
- 7) An overall business environment variable; and
- 8) A qualitative ranking of the country as an export destination.

For each of the major export opportunity indicators, the quantitative information was ranked and then re-grouped into quartiles for each of the 151 key countries involved in upstream activities. The "score" for each indicator was an average of the quartile ranking across the sub categories, which were then summed and weighted for a final score. Using quartiles allows for relative rankings rather than absolute rankings; that is, the rank is an indicator showing whether the export opportunity indicator is a high (quartile rank 4), medium/high (quartile rank 3), medium/low (quartile rank 2) or small/low range (quartile rank 1). Analyzed as a whole, this approach allows the top prospective markets across multiple "best" categories to rise to the top. (see Appendix I: Methodology, for greater detail of the methodology)

Caveats

The *2017 Upstream Oil and Gas Equipment Top Markets Report* focuses on upstream U.S. O&G equipment exports to draw larger conclusions about the nature of the global O&G sector as a whole. As export data on services is neither readily available nor consistent across markets, trade statistics for O&G equipment are used as a proxy indicator for services exports. If a country imports O&G equipment, it will likely have associated trade in services related to O&G exploration and production as well. The report uses 2016 trade data when available (*i.e.*, U.S. export figures) to analyze global imports, and relies on 2015 data when 2016 figures are unavailable. ITA projections for U.S. exports and global imports do not take into account price-based forecasting.

This analysis also does not fully take into consideration the recent fluctuations in the international price of oil and its impacts on the O&G sector. While the price of crude oil will impact a company's investment decisions, this report employs historical data to analyze global exports of equipment and current O&G resource endowments. Trade data was adjusted to consider the current low price environment where possible, and U.S. export and global import market projections for 2016 and 2017 (when actual 2017 figures were unavailable) were reduced to reflect expected market changes.

Case Studies

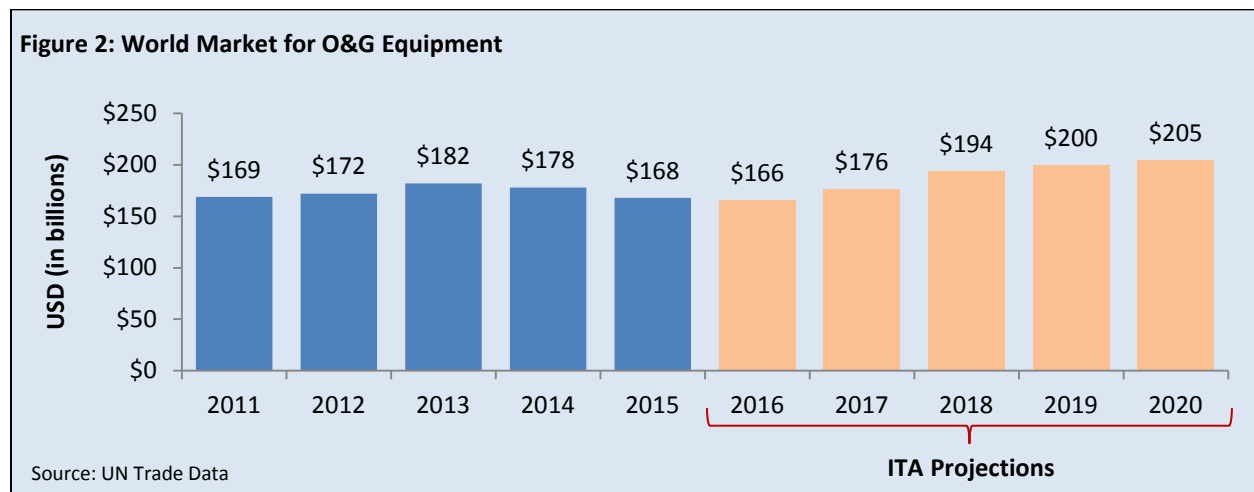
The six countries were identified for greater analysis are: Australia, Brazil, Guyana, India, Kuwait, and Singapore. The report also evaluates three regions: North America, the Caspian Sea, and West Africa. The markets in the *2017 Upstream Oil and Gas Equipment Top Markets Report* represent a range of opportunities to demonstrate the typography of commercially focused opportunities in the O&G sector.

Industry Overview and Competitiveness

For the purposes of this report, the upstream O&G equipment industry is defined as establishments primarily engaged in the manufacture of:

- 1) Submersible and semi-submersible drilling platforms;
- 2) O&G field machinery and equipment;
- 3) O&G field production machinery and equipment;
- 4) O&G field derricks; and
- 5) Pipe and tube.

The United States is home to many O&G equipment manufacturers, service suppliers and technology producers, many of which are world renowned. In fact, U.S. companies are very competitive in foreign markets and are known for both quality and service. Within the next five years, the global market for this industry is projected to increase to \$205 billion in 2020 from \$166 in 2016 [see Figure 2].

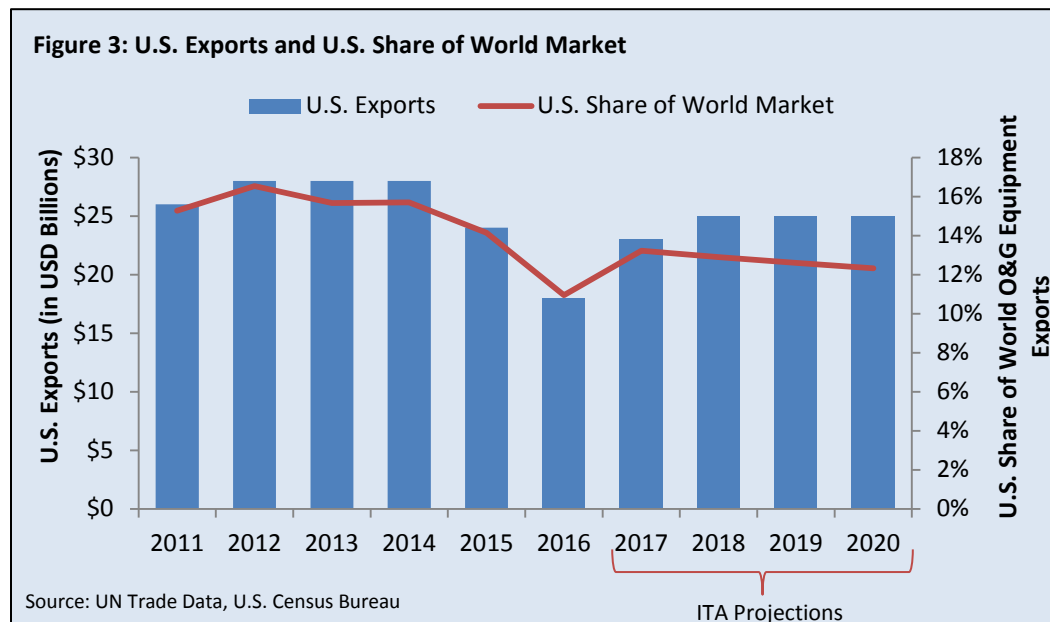


U.S. O&G equipment suppliers face strong competition from Chinese, Korean, and German O&G equipment manufacturers. By comparison, U.S. companies are particularly competitive in high-end sinking and boring parts and parts for derricks, whereas Korean exports are concentrated in vessels with derricks with few sinking or boring parts, and Chinese exports are concentrated in vessels with drilling platforms and equipment and pipe. These

trends will likely continue, with U.S. exports weighted more toward specialized high-tech equipment, especially relating to unconventional and ultra-deepwater O&G exploration and production.

The projected increase in demand for U.S. exports of O&G equipment through 2020 may be further driven by the fundamental changes in U.S. O&G production during the last several years. Having been among the first in the world to develop unconventional and ultra-deepwater resources, U.S. equipment manufacturers and service suppliers have the opportunity to seize the first-mover advantage in overseas markets that are seeking to emulate the United States' rapid expansion in energy production.

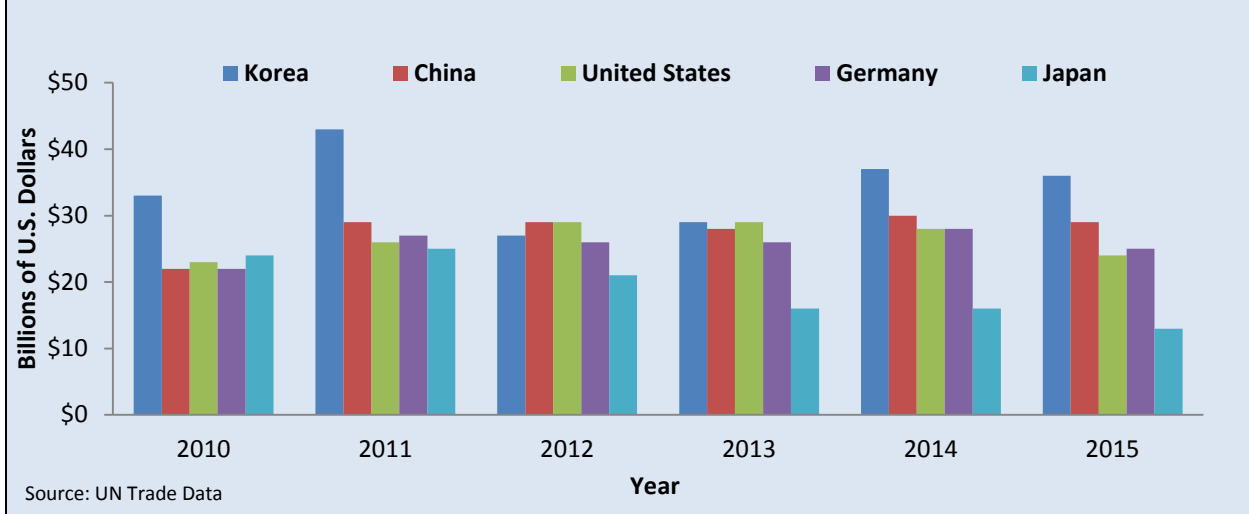
While the United States is likely to remain competitive in the O&G equipment sector, the share of U.S. equipment being exported to the global market, as a proportion of world O&G equipment exports to the global market, is projected to decline in the years to come [see Figure 3]. This may be a demonstration of greater consumption of U.S. equipment domestically, but is also a reflection of greater competition from foreign equipment producers, as other countries have increased the proportion of equipment exports to the global market. While U.S. export figures remained relatively flat from 2013 to 2014, the share of U.S. exports to the global market (as a proportion of total world exports) increased. In absolute terms, U.S. exports in the sector are projected to increase in the next five years, but the U.S. proportion of the overall world market for O&G equipment is projected to decrease through 2020.



Global Industry Landscape

The international O&G equipment market is dominated largely by five countries: Korea, China, Germany, United States, and Japan. The exports profile of these countries are characterized by a heavy manufacturing for the ships and offshore platforms in Korea, low cost inputs originating from China, and high-tech components and advanced manufacturing from the United States, Germany, and Japan. In 2015, Korea was the world's largest O&G equipment exporter, exporting \$36 billion to global markets, while China and Germany were the next largest O&G equipment exporters to the world with \$29 billion and \$25 billion in exports, respectively. The United States was the fourth largest exporter in 2015, exporting \$24 billion to global markets [see Figure 4].

Figure 4: Top Five Oil & Gas Equipment Exporting Countries

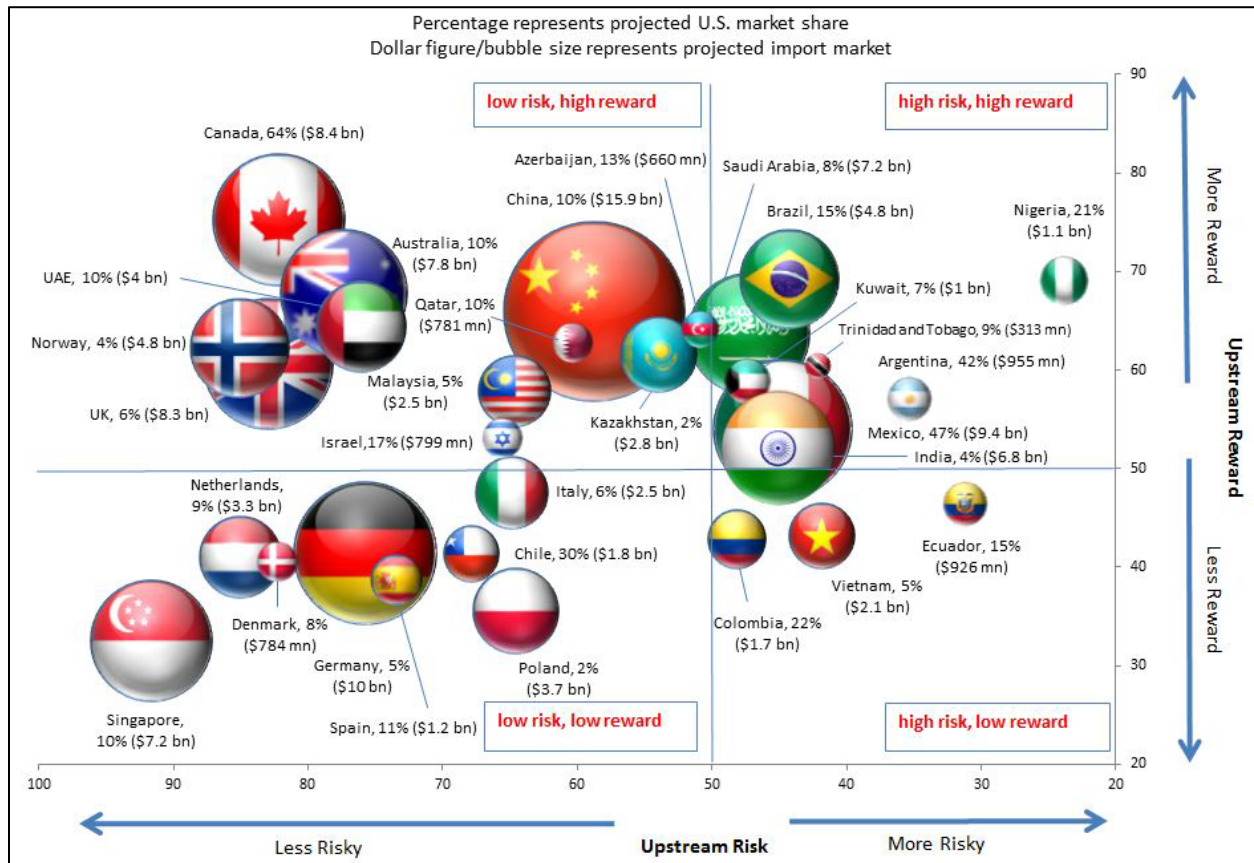


Opportunities and Challenges

The O&G sector can generate large profits, but has always been characterized by a high degree of risk. O&G companies are faced by a number of risks not only related to finding oil or gas under the ground, but also financial, political, and security risks. The *2017 Upstream Oil and Gas Equipment Top Markets Report* analyze those countries with the most potential for equipment sales against the associated risks and rewards of that country's O&G sector.

The top thirty countries from the *2017 Upstream Oil and Gas Equipment Top Markets Report* are plotted on a Risk-Reward Matrix [see Figure 5, next page], which illustrates each country's relative upstream challenges and opportunities. The rewards are heavily weighted toward below-ground resources, while the risks are more weighted toward government policy. In a case such as Singapore, a company might encounter few unanticipated regulatory challenges (*i.e.* low risk), but would also have lower profits (*i.e.* lower reward) from investments. In contrast, a high risk, high reward country, such as Nigeria, may potentially yield significant profits in the O&G equipment sector, but there is a greater number of risks (*i.e.* import regulations, corruption, infrastructure constraints) that companies will have to consider when conducting business there.

Figure 5: Top Thirty Import Markets for U.S. O&G Equipment Exports in 2020



Sector Snapshots

This section contains snapshots that summarize export opportunities for U.S. oil and gas commodities. The overviews outline ITA's analysis of the export potential for each commodity and offer commentary on the relative competitive position of U.S. suppliers.

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2017 Top Markets Report Oil and Gas Equipment Sector Snapshot

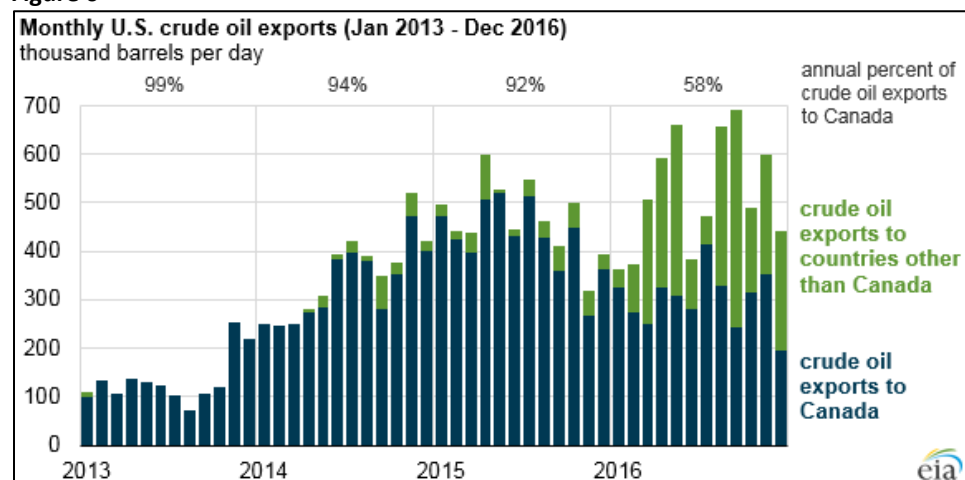
U.S. Crude Oil Exports

U.S. Industry Overview

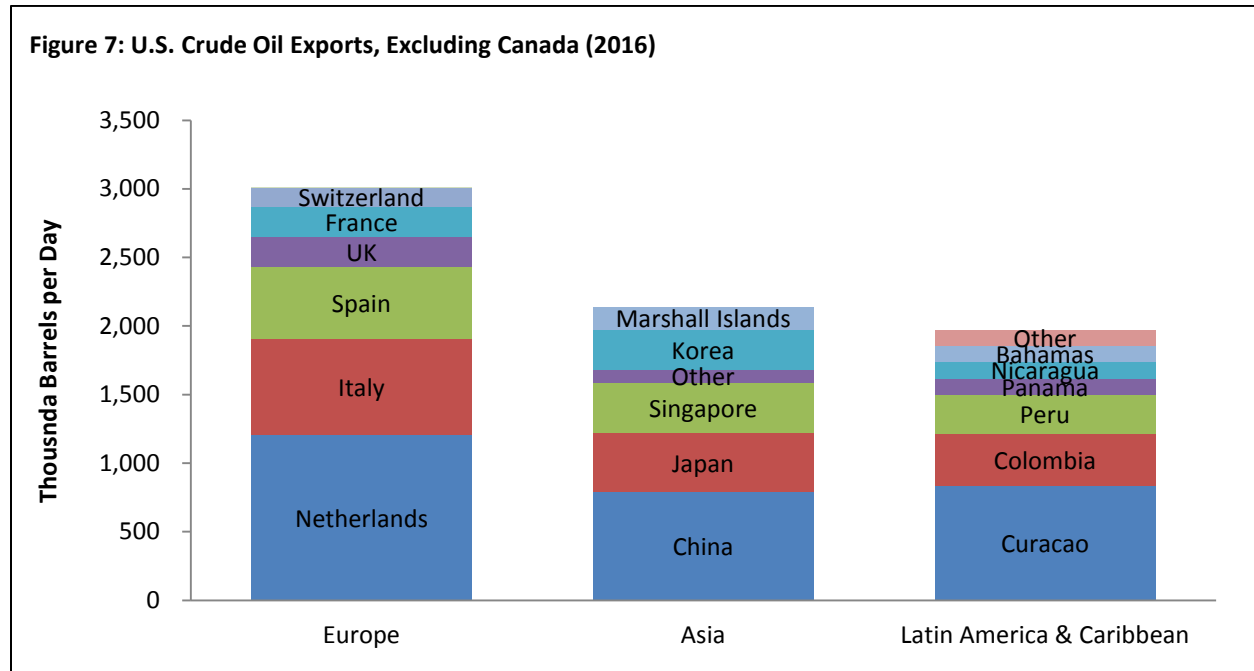
The profile and direction of U.S. oil and gas production has changed significantly in the last ten years, and global market dynamics are also changing as a result. More efficient and advanced technologies to extract shale oil have reversed the U.S. crude oil production profile from a crude oil importer and price taker, to a major producer and competitor on the global market. The United States is now considered one of the world's swing producers, because U.S. crude oil export restrictions were removed in December 2015, allowing for U.S. crude oil to be exported to world markets. The removal of U.S. oil export restrictions allows U.S. producers to challenge the dominant market position of OPEC countries in the global crude oil marketplace. While OPEC's November 2016 coordinated production cut has led to an increase in global crude oil prices, U.S. oil producers have benefited the most.

We have not seen a significant or sudden increase in the total number of barrels of U.S. crude oil shipments since the export ban was lifted, particularly because U.S. oil production has declined from its 2015 levels. Despite this, U.S. crude oil reached new markets in 2016. In 2016, U.S. crude oil exports averaged 520,000 bbl/d, comprising a twelve percent increase above the 2015 level.¹ While this is a notable increase, the removal of the U.S. crude oil export ban did not lead to high amounts of U.S. crude flooding the global market. Rather, we saw U.S. crude oil exports reach new markets globally, including in Europe and more recently Asia, while exports to Canada decreased. Although Canada remains the United States' largest customer for crude oil exports, the share of U.S. crude oil exports to Canada in 2016 dropped to 58 percent, from 92 percent the previous year [see Figure 6].²

Figure 6



In 2016, U.S. crude oil exports reached 26 countries, compared with ten countries in 2015.³ Some countries that were recorded as receiving U.S. crude oil exports may have been the site for crude oil transfers from smaller to larger vessels and may not be the final consumers of the product. After Canada, the largest importers of U.S. crude oil were in Europe followed by Austral-Asia, with smaller amounts shipped to Latin America, the Caribbean, and Africa. Exports to Europe hit a record 209,000 bbl/d in September 2016 when the Brent/ WTI spread averaged \$1.68 per barrel.⁴ In recent months, U.S. crude oil exports have reached new Asian markets in Singapore, Korea, Marshall Islands, Thailand, and Hong Kong [see Figure 7].



Source: U.S. Census Bureau

Opportunities for U.S. Companies

In 2017, we anticipate that U.S. crude oil exports will increase as a result of decreasing global crude oil production, a widening price differential between Brent and WTI benchmarks, and declining crude oil shipping costs. Opportunities for increased U.S. crude oil exports have emerged due to OPEC attempts to raise crude oil prices by limiting oil production. U.S. crude oil exports to Asia are likely to increase as traditional sources for Asian refiners, historically dominated by OPEC, is supplanted by other non-OPEC suppliers. In 2015, the bulk of OPEC crude oil was exported to the Asia Pacific region, at a volume of 14.5 mbpd.⁵ With total OPEC crude oil exports reaching 23.6 mbpd in 2015, exports to Asian refiners comprised over 60 percent of total exports.⁶ However, in November 2016, OPEC agreed to cut oil production by 1.8 mbpd for the first half of 2017, which has reduced the supply of Middle East crudes to Asian markets. At the same time, the OPEC production cut has allowed U.S. shale producers to ramp up domestic production and fill the gap in global crude oil output.

Increasing domestic production and growing U.S. crude inventories have resulted in lower priced WTI futures relative to Brent futures. In March 2017, the discount for WTI versus Brent reached \$3.07 per barrel, its widest spread since the crude oil export ban was lifted in December 2015.⁷ A rise in the price of Dubai-linked crude, which is the benchmark for Asia, has narrowed the spread between OPEC and Brent benchmarks, and WTI has averaged 22 cents below Dubai this year.⁸ The first shipments of U.S. crude oil to Singapore were exported in August 2016 and shipments to Korea and Thailand soon followed in September 2016. Rising U.S. crude oil exports continued

into 2017, and in March, weekly exports reached more than one mbpd, which is double the average amount exported in 2016.⁹

Declining freight costs also support the attractiveness of U.S. crude, as the cost of shipping crude from the United States has declined. The cost of shipping crude oil from the largest vessels in the Caribbean to Asia fell by about \$15 million in March 2017 to \$3.8 million.¹⁰ With OPEC considering a six-month extension for production cuts and U.S. domestic production continuing to rise, these additional cost savings will further support an increase in U.S. crude exports to global markets.

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2017 Top Markets Report Oil and Gas Equipment Sector Snapshot

U.S. Liquefied Natural Gas Exports

U.S. Industry Overview

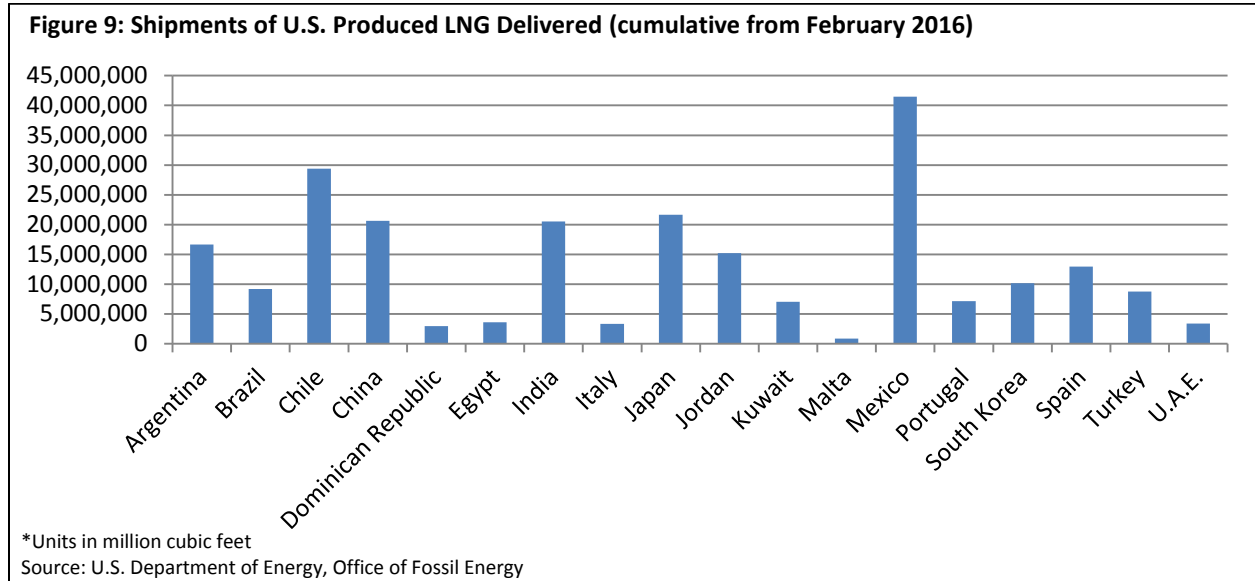
The U.S. LNG industry re-emerged in 2016 after fifty years as Cheniere Energy began exporting natural gas from the lower-48 United States. The first shipments of U.S. produced LNG were sent from Cheniere Energy's facility in Sabine Pass, Louisiana, train 1. A few months later, more LNG was exported when train 2 became operational. In March 2017, Cheniere Energy brought train 3 into service, with train 4 expected to become fully operational by the end of 2017. In total, Cheniere Energy expects to have eighteen mtpa of export capacity by the end of the year. In April 2017, Cheniere Energy celebrated its one-hundredth LNG export shipment, after shipping to eighteen countries on five continents.

Other U.S. companies are also constructing LNG export terminals, while Cheniere Energy continues to maintain its market dominance. Dominion is constructing a LNG export terminal in Maryland, which is scheduled to start exporting later this year. The Cove Point terminal will bring an additional 5.3 mtpa of U.S. LNG export capacity as well as the capacity for regasification and natural gas storage.¹¹ In 2014, Cameron LNG began construction on a three train facility, which will have a 13.5 mtpa export capacity once finished. The first train is expected to be in operation in 2018 and the entire facility is scheduled to be fully operational in 2019.¹² Freeport LNG is also constructing an LNG terminal in Quintana Island, Texas, that once complete will be able to export 13.9 mtpa. The first train is schedule to start in September 2018 and all three trains are planned to be running by August 2019.¹³ Cheniere Energy has not stopped with its Sabine Pass facility and is also constructing two additional LNG trains in Corpus Christie, Texas. The two train facility will be able to export nine mtpa, with both trains scheduled to start operating in 2018.¹⁴ This sums up to three trains currently in operation with another eleven under construction with a total nameplate capacity of 13.5 mtpa of current capacity and 58.6 mtpa of planned LNG export capacity by the end of 2019 [see Figure 8].

Figure 8: U.S. LNG Facilities (in operation and under construction)

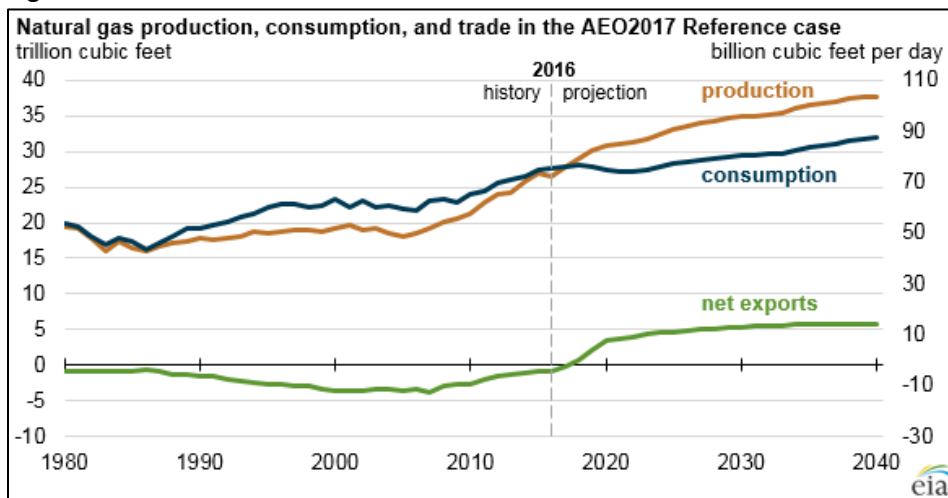
Company Name	Facility	Trains	Name Plate Capacity (mtpa)	Year Operational
Cheniere Energy	Sabine Pass, LA	Train 1	4.5	2016
		Train 2	4.5	2016
		Train 3	4.5	2017
		Train 4	4.5	2017*
Dominion	Cove Point, MD	Train 1	2.15	2017*
		Train 2	2.15	2017*
Cameron LNG	Hackberry, LA	Train 1	4.5	2018*
		Train 2	4.5	2019*
		Train 3	4.5	2019*
Freeport LNG	Quintana Island, TX	Train 1	4.6	2018*
		Train 2	4.6	2019*
		Train 3	4.6	2019*
Cheniere Energy	Corpus Christie, TX	Train 1	4.5	2018*
		Train 2	4.5	2018*
		Total mtpa:	58.6	*scheduled completion

From February 2016 to March 2017, U.S. LNG exports have been shipped to eighteen countries at a low price of \$3.12 and for as much as \$7.52 per mm Btu. Mexico, Chile, and China received the most U.S. shipments, with fourteen, ten, and seven cargoes respectively. Most U.S. LNG shipments went to Latin American markets, with additional destinations in Asia and Europe [see Figure 9].



EIA expects LNG exports to drive natural gas trade. EIA projections from the Annual Energy Outlook 2017 (AEO2017) show that U.S. piped natural gas imports are declining while piped natural gas exports are increasing. LNG is projected to make up a larger portion of U.S. natural gas exports once the additional LNG trains currently under construction become operational. Considering total U.S. energy production and increased capacity LNG export capacity, the United States is projected to become a net energy exporter of total energy in the 2020s [see Figure 10].¹⁵

Figure 10



Regional Case Studies

The following pages include regional country case studies that summarize export opportunities for U.S. oil and gas equipment and services and overall trade trends in selected regions. The regions highlighted represent a range of countries to illustrate a variety of points—not the top markets overall.

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2017 Top Markets Report **Oil and Gas Equipment** Regional Case Study

North America

Although low oil prices have hindered the pace of new O&G projects in North America, Canada and Mexico remain the top markets for U.S. O&G equipment exports. Given the advanced technical capabilities of many U.S. companies, there are significant opportunities for developing Mexico's deepwater and unconventional oil resources, which are largely undeveloped. There is also a high demand for U.S. technologies for oil sands production because the U.S. companies have technologies that support protecting local communities and compliance with environmental regulations.

Canada

Overall Rank

1

Mexico

Overall Rank

2

Market Overview

Canada

Canada has the third largest oil reserves after Venezuela and Saudi Arabia, and was the fifth largest oil producer in the world with production output of 4.4 mbpd in 2015. Canada's National Energy Board (NEB) projects that the country's oil production dropped in 2016, to 3.9 mbpd.¹⁶ Oil sands play a large role in Canada's O&G industry as oil sands reserves comprise more than 98 percent of Canada's total oil reserves.¹⁷ The majority of Canada's oil sands are recoverable through *in situ* methods, although mining is also used. Canada's refineries are only able to process less than half of the crude oil produced domestically and the country lacks sufficient pipeline infrastructure to transport crude feedstock to downstream facilities.

Canada is also the world's fifth largest producer of natural gas with annual output projected at 5.5 Tcf in 2016.¹⁸ All of Canada's current natural gas exports are transported via pipeline to U.S. markets. However, Canada intends to expand its export capacity through the construction of new LNG liquefaction facilities. Although the NEB has received more than thirty LNG export applications, it is unclear how many terminal projects will be successful in the current low price environment, as development costs are severely higher due to limited existing infrastructure and inadequate midstream capacity.

Mexico

Mexico is one of the world's top ten oil producers and the fifth largest in the Americas after the United States, Canada, Brazil, and Venezuela. Mexico has seven oil and gas basins within the Gulf of Mexico and along its Gulf Coast. Altogether, they represent reserves of 55 billion boe. In 2015, Mexico produced 2.6 mbpd of crude oil amid significant production declines over the past decade.¹⁹ Slowed oil production rates are likely to continue, and it is projected that Mexico will produce 2.5 mbpd by 2020.²⁰ Petróleos Mexicanos (PEMEX) operates six domestic refineries but these facilities are underutilized due to a lack of financing for needed upgrades. Mexico's downstream sector is opening up to private sector participation. PEMEX's recently formed a partnership with France's Air Liquide SA, to operate an existing hydrogen plant, and build a second plant at its Tula refinery.²¹

In 2015, Mexico produced 1.5 Tcf of natural gas and holds an estimated 544 Tcf of technically recoverable shale gas resources.²² Despite its large shale gas resources and rising demand for natural gas for power production,

insufficient water resources, pipeline infrastructure, and roadways challenge increased shale gas development in Mexico. In addition, Mexico's increasing reliance on inexpensive natural gas imports from the United States is likely to continue discouraging the development of its own shale gas resources.

Market Analysis

Canada and Mexico remained the largest destinations for U.S. exports of O&G equipment in 2016. Despite representing more than one-third of total U.S. exports of O&G equipment to global markets, U.S. exports of O&G equipment to North American markets dropped significantly in 2016 to \$6.5 billion, from \$7.9 billion in 2015. Canada and Mexico are two of the larger O&G equipment importers globally, and combined, their imports totaled close to \$13.6 billion in 2015. We expect Canada and Mexico to remain the largest destinations for U.S. exports of O&G equipment, and project U.S. exports to North American markets to reach nearly \$10 billion in 2020.

In 2015, the United States was by far the largest source for Mexican and Canadian imports of O&G equipment, holding a 51 percent market share. After the United States, the largest sources for O&G equipment were Germany and China with ten and eight percent market shares, respectively. Canada's most significant imports were parts and attachments for derricks (16 percent), filtering/purifying machines for gases (14 percent), and machines/mechanical applications with individual functions (14 percent). Mexico's most significant imports were machines/mechanical applications with individual functions (32 percent), filtering/purifying machines for gases (22 percent), and rotary positive displacement pumps (7 percent). In 2016, the greatest amount of U.S. exports to North America were filtering/purifying machines for gases (22 percent) and machines/mechanical applications with individual functions (20 percent).

The trade of crude oil, natural gas, and refined petroleum products among North American markets is sizeable and flows in all directions. In 2016, the United States imported 1.3 billion barrels of crude oil from Canada and Mexico, with nearly 85 percent coming from Canada. Canada and Mexico both produce large amounts of heavy, sour crude, which is typically refined by U.S. Gulf Coast refineries that have the advanced refining technologies to process heavy crude. As such, the United States exported 267 million barrels of refined fuels to North American markets last year, with 58 percent of products going to Mexico. The United States did not export any crude oil to Mexican markets in 2016, but did export 110 million barrels of crude oil to Canada. North America's natural gas pipeline infrastructure is well-integrated, and the United States received 2.8 Tcf of natural gas from North American markets while exporting 1.6 Tcf of natural gas to Canada and Mexico via pipeline.

Challenges Facing U.S. Exporters

Canada

O&G companies have significantly reduced investments in Canada's oil sands in recent years as a result of low oil prices, high operating costs, and competition from shale plays in the United States. According to the Canadian Association of Petroleum Producers (CAPP), capital investment in the Canadian energy sector dropped 62 percent in two years.²³ Although projects currently under way will be completed, investment in new start-ups and project expansions has significantly decreased. Royal Dutch Shell, Marathon Oil Corporation, and ConocoPhillips are the most recent companies to divest from Canadian oil sands assets to reduce debts and focus on higher-margin assets. Despite declining investment, the Alberta government predicts that higher oil prices and declining conventional production will encourage oil sands production to surpass 2.9 mbpd in 2017 and reach 3.3 mbpd by 2020.²⁴

Canada's new environmental policies create additional challenges for local O&G exploration and production projects, which have already been affected by low oil prices. Alberta's new carbon tax is particularly impactful as the province's oil sands reserves are the third-largest proven crude oil reserves in the world and oil sands

production is highly carbon-intensive.²⁵ The regulation sets emission taxation on businesses and homeowners for their consumption as a rate of emission, and is also applied to large industrial emitters including any firm operating in O&G production and refining. As of January 1, 2017, a carbon levy will be charged on all fuels that emit greenhouse gas emissions when combusted at a rate of \$14.83 per ton in 2017 and \$22.25 per ton in 2018.²⁶ A carbon tax also exists in British Columbia, where the current rate has been \$22.25ⁱ per ton since 2012.²⁷

Mexico

Low oil prices and increased competition from private companies have caused PEMEX to suffer huge losses in recent years, and are affecting the investment environment in Mexico in addition to threatening to derail the success of Mexico's energy reforms. As a result, PEMEX has made cuts to capital expenditures and jobs, and reported that it eliminated forty percent of its senior management positions last year. In 2016, budget cuts totaled 22 percent, and PEMEX's 2017 budget was cut by an additional \$5.3 billion to \$20.7 billion.²⁸ The Mexican government estimates that budget cuts will cause oil production to drop to 1.9 mbpd, the lowest since 1980.²⁹ Corruption and inefficiencies further impact PEMEX's losses, and Moody's downgraded the company's credit rating last year, which will make it more difficult for PEMEX to borrow money. Mexico's presidential election in 2018 could cause further uncertainties about the future of the energy reforms, as new policies could be put in place to slow the sector's liberalization.

While Mexico's regulatory and fiscal terms for O&G upstream projects are reasonable, LCRs do exist and may create challenges for O&G equipment and service providers exporting to Mexico. Mexico's LCRs are lower than other countries in Latin America, with local content for new projects set at 25 percent to increase to 35 percent by 2025. There are some LCR exemptions for deepwater projects, and local content is set at three percent to increase to eight percent by 2025, which were the terms in place for Mexico's successful deepwater bidding round 1.4 in December 2016.³⁰ Regardless of the rate of local content, the reporting requirements for firms to demonstrate they have met LCRs are burdensome. In addition to LCRs, PEMEX is required to have a 20-percent stake in all cross-border fields, including deepwater and onshore shale projects.³¹

Opportunities for U.S. Companies

Canada

Although Canada is itself a leader in technology, equipment, procedures and personnel for the O&G industry, it remains a premier export market for U.S. O&G machinery and equipment and related supply chain goods and services. Although exploration for new offshore deepwater, unconventional oil, and Arctic projects is unlikely to increase in the near term due to low profitability, Canada's oil sands production is expected to grow. Alberta oil sands production has typically relied heavily on U.S. suppliers for the capital intensive equipment needed, and we expect this trend to continue. According to CAPP, more than 1,900 U.S.-based companies supplied equipment, parts and services used in Alberta's oil sands between 2013 and 2015,³² and the Conference Board of Canada has predicted that the United States will supply over \$48.2 billion in manufactured equipment for Canada's oil sands by 2035.³³

Demand is likely to increase for technologies used in oil sands production that ensure the protection of local communities and compliance with environmental regulations, such as those associated with protecting local water resources, land reclamation, and reducing associated greenhouse gas emissions. Upstream O&G facilities will need new energy efficient environmental controls and site reclamation technologies, and existing equipment will need upgrading. U.S. manufacturers of drilling tools have done exceptionally well in Canada, as well as steel fabrication companies, as local production cannot meet industry demand. There is also an increased focus on innovative methods for cutting down operating costs and increasing the value of existing assets. New technologies under

ⁱ Figure as of April 19, 2017, when the conversion rate was 1 CAD to .74 USD.

development include solvent injection/co-injection (*in situ*), waterless extraction (mining), radiofrequency heating/electrical heating (*in situ*), and “field” upgrading techniques.

Some specific equipment and services opportunities in Canada include:

- Maintenance, repair and operation services;
- O&G technology and services, field machinery and equipment, exploration and drilling services, refinery equipment, and pipeline construction equipment including tanks, centrifuge technology, pigs, pumps, and pipe;
- Specialty mining and extraction equipment and services, general mining equipment replacement parts, and mobile mining equipment, including trucks and support gear (bulldozers, tires, excavators, shovels);
- General construction materials, choking and recovery units, instrumentation and control systems, safety and security equipment, pressure vessels, heat exchangers, and transportation equipment.

Mexico

Mexico represents a major market for offshore O&G equipment and services for the foreseeable future. U.S. companies are likely to find more business opportunities in Mexico’s energy sector as a result of liberalization efforts. In recent years, energy reforms ended PEMEX’s 76-year monopoly over the O&G sector and instituted flexible terms for foreign companies operating in Mexico. Subsequent reforms have encouraged the development of Mexico’s deepwater and unconventional resources, providing significant opportunities for U.S. companies given their advanced technical capabilities.

Mexico’s deepwater auction in December 2016 was highly successful and demonstrated foreign investors see Mexico’s as a profitable market, even with low oil prices. As part of bidding round 1.4, Mexico auctioned exploration licenses for ten deepwater blocks, with eight of the blocks receiving bids. The December auction also included a farm-out opportunity with PEMEX for the Trion field, which was awarded to Australia’s BHP Billiton. The blocks could generate \$40 billion in investment, and in combination with output from Trion, are expected to add 900,000 bbl/d to Mexico’s oil production in the next decade.³⁴ The December auction marked the entrance of supermajors and international oil companies such as ExxonMobil, Chevron, Total, BP, Statoil, Petronas, and the state-owned China National Offshore Oil Corporation (CNOOC) to the Mexican market.

In addition, new discoveries in shallow water blocks auctioned during previous rounds, such as ENI’s recent oil find in unknown areas of a block in the Bay of Campeche, are exciting investors. Mexico’s second round of licensing auctions are planned for 2017, with three phases of shallow water and onshore block auctions scheduled for June and July.³⁵

Despite budget cuts, PEMEX’s 2017 budget remains substantial at \$20.7 billion and the company has outlined several ambitious projects in its business plan for 2017 to 2021 that provide commercial opportunities for U.S. companies.³⁶

- Drilling: Over 30,000 wells planned (exploration, development, shale gas) in alliances with private companies (farm-outs);
- Storage: Plans to invite Public-Private Partnerships for 77 existing Storage/Distribution Terminals (TAR);
- Refineries: Five refineries upgrades to produce low sulfur diesel;
- Pipeline: Gulf of Mexico-Pacific Ocean Pipeline (300 km, 44 inch diameter) totaling \$200 million;
- Gas Stations: Opening of supply concessions and new gas stations.

Some specific equipment and services opportunities in Mexico include:

- Support equipment and services, from environmental protection and spill cleanup to helicopters, fire response, and security systems;
- Marine seismic exploration services;
- Platform rigs, drillships, tender assist rigs, jack-ups, semi-submersibles;
- Inland barges;

- Drilling: Well control, pressure management;
- Station keeping: Mooring and dynamic positioning;
- Current and vessel hydrodynamics;
- Pipelines: Construction and maintenance;
- Subsea completions: Processing, control systems, well maintenance and seafloor processing.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Canada and Mexico.

- International Trade Administration Country Commercial Guide
 - Canada: <https://www.export.gov/article?id=Canada-Oil-and-Gas>
 - Mexico: <https://www.export.gov/article?id=Mexico-Upstream-Oil-and-Gas>
- Canadian Association of Oilwell Drilling Contractors: <http://www.caodc.ca/>
- Alberta Energy Research Institute: <http://www.aeri.ab.ca/>
- Canadian Society for Unconventional Resources: <http://www.csur.com/>
- Petroleum Services Association of Canada: <http://www.psac.ca/>
- Natural Resources Canada: <http://www.nrcan.gc.ca/home>
- Canadian Energy Pipeline Association: <http://www.cepa.com/>
- Canadian Association of Petroleum Producers: <http://www.capp.ca/>
- Secretariat of Energy (SENER), Mexico: <http://www.energia.gob.mx>
- Energy Regulatory Commission (CRE), Mexico: <http://www.cre.gob.mx>
- PEMEX: <http://www.pemex.com>
- PEMEX Procurement International: <http://www.pemexprocurement.com>
- College of Petroleum Engineers of Mexico (CIPM): <http://www.cipm.org.mx>
- Mexican Association of Petroleum Service Companies: <http://www.amespac.org.mx>
- Agency for Security, Energy and Environment (ASEA): <http://www.asea.gob.mx>
- National Hydrocarbons Commission: <http://www.cnh.gob.mx>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- Global Petroleum Show, June 13-15, 2017 – Calgary, Canada: <https://globalpetroleumshow.com/>
- Oil Sands Trade Show and Conference, September 12-13, 2017 – Fort McMurray, Canada: <https://oilsandstradeshows.com/>
- Louisiana Gulf Coast Oil Exposition (LAGCOE) 2017, October 24-26, 2017, Lafayette, Louisiana: <http://www.lagcoe.com>
- International Pipeline Exposition (IPE), September 25-27, 2018 – Calgary, Canada: <https://internationalpipelineexposition.com/>

International Trade Administration, U.S. Commercial Service Contacts

Canada

Ms. Crystal Roberts, Commercial Specialist
Email: Crystal.Roberts@trade.gov

Mexico

Mr. Francisco Ceron, Commercial Specialist
Email: Francisco.Ceron@trade.gov

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2017 Top Markets Report **Oil and Gas Equipment** Regional Case Study

The Caspian Sea

Low oil prices have significantly impacted the economies and O&G sectors in the Caspian region. However, large hydrocarbon resources in Azerbaijan and Kazakhstan and recent investment in large production and transportation infrastructure projects provide commercial opportunities for U.S. companies. While regulatory challenges exist in both countries, U.S. companies interested in Azerbaijan and Kazakhstan can look to both countries' national oil companies, the State Oil Company of the Azerbaijan Republic (SOCAR) and KazMunayGaz (KMG), for opportunities in the upstream, midstream, and downstream sectors.

Azerbaijan

Overall Rank

21

Kazakhstan

Overall Rank

28

Market Overview

Large upstream projects in Kazakhstan and Azerbaijan may contribute to an increase in the Caspian Sea's O&G production in 2017. According to the EIA, Kazakhstan is ranked eleventh in the world in terms of proven oil reserves and fourteenth for natural gas reserves, and has the largest proven oil reserves in the Caspian Sea region.³⁷ Azerbaijan is ranked nineteenth in the world in terms of proven oil reserves and 24th for natural gas reserves.³⁸

Azerbaijan

Subsoil O&G resources are the sole property of the Azerbaijani state and the SOCAR has stakes in all of the country's O&G projects. The Azeri-Chirag-Gunashli (ACG) field is the largest oil field in Azerbaijan and accounted for about three-quarters of Azerbaijan's petroleum and other liquids production in 2015, although production from the ACG project is expected to decrease in 2017 due to aging fields.³⁹ The development of the Shah Deniz II natural gas and condensate field is nearly complete and is expected to more than double Azerbaijan's natural gas exports by 2020.⁴⁰

Azerbaijan plays a significant role in the transportation of oil and gas to European markets. Azerbaijan is the beginning of a key East-West energy corridor that is in the process of expansion. The Baku-Tbilisi-Ceyhan (BTC) oil pipeline stretches from Baku in Azerbaijan, through Tbilisi, Georgia, to a terminus at Ceyhan in Turkey. The South Caucasus Gas Pipeline (SCP) roughly parallels the BTC route, but ends in Erzurum, Turkey. Work is underway to expand the SCP and build two new gas pipelines that will take gas from the Shah Deniz II offshore project across Turkey (via the Trans-Anatolian Pipeline, or TANAP) and then across Albania and Greece to Italy (via the Trans-Adriatic Pipeline, or TAP). These pipelines together complete the Southern Gas Corridor to provide a new route for new gas sources to reach Europe, enhancing regional and European energy security.

Kazakhstan

Chevron recently invested \$36.8 billion to expand Kazakhstan's onshore Tengiz project and add 260,000 bbl/d of production by 2022.⁴¹ Although its development costs have ballooned since discovery in 2000, from around \$10 billion to more than \$50 billion, Kashagan, the world's second-largest field with recoverable reserves estimated at

nine to thirteen billion barrels of oil, came online last year.⁴² According to ENI, peak production from Kashagan will reach 370,000 bbl/d in 2017, which is more than its initial 200,000 bbl/d production that started in October 2016.⁴³ Kazakhstan has three large domestic refineries – Atyrau, Pavlodar, and Shymkent – which are undergoing upgrades to produce larger gasoline volumes.

Market Analysis

In 2016, U.S. exports of O&G equipment to Azerbaijan and Kazakhstan totaled \$154 million, an increase of 26 percent from the previous year. The most significant U.S. exports to the region were parts for boring or sinking machinery and machinery/mechanical appliances with individual functions, which represented 45 percent of total U.S. exports of O&G equipment to Azerbaijan and Kazakhstan. Azerbaijan and Kazakhstan represent medium-sized import markets, and imported a total of \$4.1 billion of O&G equipment in 2015, which was an 88 percent increase from 2014.

In 2015, the United States was the seventh largest source for O&G equipment, and only four percent of the O&G equipment imported by Azerbaijan and Kazakhstan was sourced from the United States. The largest sources for O&G equipment were Japan and Germany – in 2015, Japan held a 45 percent market share in Azerbaijan and Germany held a forty percent share in Kazakhstan. The region's greatest amount of imports were line pipe for O&G pipelines, casing and tubing, and parts for boring or sinking machinery, which represented nearly sixty percent of total O&G imports. Line pipe for O&G pipelines was the most significant import in Kazakhstan and Azerbaijan, comprising 48 percent and 39 percent, respectively.

Challenges Facing U.S. Exporters

Azerbaijan

Low crude oil prices have impacted the health of Azerbaijan's financial institutions and economy, which are likely to impact U.S. companies working in Azerbaijan. In 2015, two currency devaluations in response to declining oil prices fueled an economic slowdown, with Azerbaijan's gross domestic product shrinking by 3.8 percent year-on-year in 2016.⁴⁴ This placed significant stress on the country's banking sector, as O&G revenues account for 75 percent of state revenues. Despite this, international financial institutions like the World Bank and Asian Development Bank (ADB) continue to approve loans for O&G projects in Azerbaijan. In December 2016, the World Bank approved a \$400 million loan to Azerbaijan for the TANAP project to transport natural gas from Azerbaijan to Europe,⁴⁵ and ADB announced it will provide \$1 billion in private and public sector assistance to expand the country's Shah Deniz II gas field.⁴⁶ However, Azerbaijan was recently suspended from the EITI due to concerns about civil society freedoms, which led to the country withdrawing itself from EITI entirely. Azerbaijan's lack of participation in EITI is likely to erode international trust in its O&G sector and may jeopardize future funding from international lenders.

Provisions requiring use of local workforce and promoting local production are also challenges for U.S. O&G companies operating in Azerbaijan. According to the Law on Application of a special economic regime to export-oriented O&G operations, at least eighty percent of contractors (subcontractors) must be Azerbaijani citizens for projects lasting longer than six months. This is the government's preferred mechanism to preserve the O&G industry and reduce the dependence on foreign personnel expertise. In addition, the Azerbaijani government aims to reduce its dependence on imports and encourage increased local production. To achieve these goals, different stimulant tax and customs benefits are applied for local businesses. This may affect the competitiveness of U.S. and other international O&G equipment and services in the long term. However, for the next five to ten years, Azerbaijan is not expected to fully eliminate its dependence on imports, especially for O&G equipment and services.

Kazakhstan

Similar to Azerbaijan, low crude oil prices have also impacted Kazakhstan's economy, and issues within the O&G sector, such as corruption and labor strikes, serve as additional risks for foreign companies operating in Kazakhstan. Shortly after crude prices began falling, the Kazakh *tenge* went free-float and experienced a strong devaluation, dropping from 120 *tenge* to the U.S. dollar in 2013 to a low of 386 *tenge* to the U.S. dollar in January 2016.⁴⁷ The economy has been significantly affected by the drop in oil prices, cutting Kazakhstan's annual rate of economic growth from six percent in 2013 to one percent in 2016.⁴⁸ In addition, although Kazakhstan has improved its ranking for the World Bank's ease of doing business indicators, corruption remains a weak area for the country, particularly in its O&G sector. Oil theft remains a problem in Kazakhstan, with suspects of oil theft being detained as recently as December 2016.⁴⁹ Low oil prices have also caused KMG to reduce capital expenditures and operating costs, with job cuts affecting nearly twenty percent of the sector being initiated in late 2016 and the closure of the Confederation of Independent Labor Unions of Kazakhstan in early 2017, which led to widespread worker strikes.⁵⁰

Although the regulatory environment in Kazakhstan is becoming more flexible, unclear legislation continues to pose challenges to foreign companies operating in the O&G sector. The government of Kazakhstan is working to abolish legislation related to LCRs as a result of Kazakhstan's accession to the World Trade Organization. LCRs can vary from contract to contract and local subsidiaries of foreign companies or joint ventures between Kazakhstani and international companies are often considered "local" within the context of LCRs. However, amendments to the Expatriate Workforce Quota and Work Permit Rules, which went into effect on January 1, 2017, have created confusion concerning work permits as the process to obtain work permits contains contradictory rules on intra-company transfers, the length of validity of work permits, and requirements for Kazakh language fluency.⁵¹ In addition, the maximum term for a work permit has been decreased from three years to one year (with the possibility of extension) and work permits are now valid for only one region of Kazakhstan.⁵² The U.S. Embassy and international business associations continue to seek clarification from the government of Kazakhstan regarding these changes, and there are indications that modifications to the new legislation are forthcoming.⁵³

Opportunities for U.S. Companies

Azerbaijan

The O&G sector is expected to remain the most lucrative market in Azerbaijan for foreign businesses for years to come. Due to extensive onshore and offshore resources, the O&G sector remains the country's largest sector in terms of revenue generated as a percentage of gross domestic product (GDP). Commercial opportunities for U.S. companies include most types of equipment related to the exploration, development, and transportation of O&G, particularly the latest technology for offshore deepwater exploration in the Caspian Sea, as well as exploration, surveying, and enhanced oil recovery technologies for onshore brownfield projects. Project management and engineering services and petroleum products, as well as abatement and environmental services also hold potential for U.S. firms in this area. In addition to O&G field development and transportation routes, there are opportunities for downstream petrochemical and refining, and Azerbaijan is planning a new O&G processing complex and polypropylene/polyethylene production facility.

Kazakhstan

Despite a prolonged period of lower oil prices, over sixty percent of FDI in Kazakhstan continues to be in the O&G sector.⁵⁴ Opportunities remain for U.S. companies in virtually every sub-sector associated with oil extraction, processing, and transportation. Best prospects include drilling, research and data management, laboratory studies, oil spill cleanup technologies, and pipeline equipment and services. To date, Kazakhstani companies have no experience in offshore production and operations. This experience gap offers many opportunities for U.S. service companies in rig work, support infrastructure, and environmentally sensitive technologies. The Caspian Basin's oil-

bearing formations are generally quite deep (15,000 feet), under considerable pressure, and often contain a high degree of sulfur and other contaminants, making special Western-made drilling and processing equipment necessary.

U.S. O&G equipment suppliers have the potential for solid growth over the next decade as new fields are brought on-stream and secondary recovery methods are introduced to existing deposits. The most promising sub-sectors are offshore/onshore O&G exploration and production equipment; turbines, compressors and pumps for pipeline applications; measurement and process control equipment for pipeline applications; industrial automation, control and monitoring systems for refineries, gas processing, and petrochemical plants; seismic processing and interpretation; petroleum software development; sulfur removal and disposal technologies; well stimulation and field abandonment services.

There are significant opportunities for companies producing O&G equipment and machinery such as drilling and wellhead equipment, Christmas trees, valves, pumps, motors, compressors, electrical submersible and jet pumps, underwater repair equipment, and oil spill containment equipment. Good prospects also exist for firms offering downstream engineering and services such as fabrication, welding, engineering services, and testing in accordance with American Petroleum Institute and the American Society of Mechanical Engineers standards.

The Government of Kazakhstan is pursuing a development program of Caspian Sea oilfields in order to increase oil production to about three mbpd. This will require the development of significant terrestrial infrastructure. The offshore development program also calls for more new offshore blocks to eventually be privatized through open tenders. This also presents an opportunity for a logistics and pipeline projects over the next few decades.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Azerbaijan and Kazakhstan.

- U.S. Department of Commerce Country Commercial Guides:
 - Azerbaijan: <https://www.export.gov/article?id=Azerbaijan-Oil-and-Gas>
 - Kazakhstan: <https://www.export.gov/article?id=Kazakhstan-Oil-and-Gas-Equipment-and-Services>
- State Oil Company of the Azerbaijan Republic: <http://www.socar.az/>
- Ministry of Energy of Azerbaijan: <http://www.minenergy.gov.az/>
- BP Caspian: <http://www.bp.com/caspian/>
- Caspian World: <http://www.caspianworld.com/>
- State Statistics Committee of Azerbaijan: <http://www.stat.gov.az/>
- State Oil Fund of Azerbaijan: <http://www.oilfund.az/>
- Caspian Pipeline Consortium: www.cpc.ru/
- Ministry of Energy of the Republic of Kazakhstan: <http://en.energo.gov.kz/>
- Kazakh Institute of Oil and Gas (KING): www.king.kz/
- Kazakhstan Petroleum Association: www.kpa.kz/
- KazEnergy Association: www.kazenergy.com/
- KazMunayTeniz: www.kazmunayteniz.kz/
- KazStroyService: www.kazstroysevice.kz/
- KazTransGas: www.kaztransgas.kz/
- KMG: www.kmg.kz/
- KMG Exploration Production: www.eng.kmgep.kz/

- North Caspian Operating Company: www.ncoc.kz/

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 - Houston, Texas.: <http://www.otcnet.org/>
- Oiltech Kazakhstan, April 11-13, 2017 - Atyrau, Kazakhstan: <http://www.oil-gas.kz/en/>
- Caspian Oil & Gas Azerbaijan, May 31-June 3, 2017 - Baku, Azerbaijan: <http://www.caspianoilgas.az/>
- Kazakhstan International Oil & Gas Exhibition and Conference (KIOGE), October 4-6, 2017 - Almaty, Kazakhstan: <https://www.kioge.kz/en/>

International Trade Administration, U.S. Commercial Service, Contacts

The International Trade Administration, U.S. Commercial Service does not have an office in Azerbaijan, and works closely with colleagues from the U.S. State Department on commercial issues affecting U.S. companies in Azerbaijan.

U.S. Embassy, Baku, Azerbaijan Contact

Ms. Govhar Mammadova, Commercial Assistant

Email: MammadovaG@state.gov, BakuCommercial@state.gov

U.S. Commercial Service, Kazakhstan Contact

Ms. Azhar Kadrzhanova, Commercial Specialist

Email: Azhar.Kadrzhanova@trade.gov

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2017 Top Markets Report **Oil and Gas Equipment** Regional Case Study

West Africa

The recent discovery of a significant offshore natural gas field on the maritime border of Senegal and Mauritania holds the potential to be transformative for the two economically strapped countries. The field is also large enough to justify construction of a LNG export terminal, but the question remains: where the terminal will be built? At the same time, Senegal's first significant offshore play has gone through its appraisal and is on the road to development in earnest and companies are actively exploring for resources in offshore Mauritania. While potential exists, all of these projects are still years away from full production and more infrastructure is needed.

Senegal

Overall Rank

54

Mauritania

Overall Rank

40

Market Overview

Senegal

Senegal is a politically stable country with a positive economic outlook. The country's offshore sector is starting to show promise as source of both O&G production, but there is still work to be done. Senegal is working on updating legislation to better support O&G development, but it is not yet complete. Kosmos Energy made a significant offshore gas discovery along Senegal's northern maritime border with Mauritania (Tortue), which is estimated to hold at least 25 Tcf of natural gas and has the potential of fifty Tcf.⁵⁵ BP farmed into the play in late 2016, an indication of Tortue's potential. At the same time, Cairn Energy announced appraisal success in its SNE discovery, an oil rich play that holds an estimated 473 million barrels of crude oil.⁵⁶ While both of the projects hold significant potential, they are years away from full production.

The Ministry of Energy and Renewable Energy Development (MERED) is responsible for Senegal's O&G sector, under the Directorate of Hydrocarbons. MERED oversees Senegal's offshore and onshore O&G exploration and production, transport, storage, refining, and marketing. The Ministry also oversees Senegal's NOC (PETROSEN), which is responsible for resource evaluation and promoting O&G development by international companies, as well as negotiating PSAs. In 2016, President Sall established COS-PETROGAZ, a governmental steering body that will create a plan for the development of Senegal's hydrocarbon resources and expenditures of the revenues. COS-PETROGAZ will be responsible for ensuring compliance with the EITI as a means for reducing corruption, and working with the Ministry of Energy on O&G development policies.

Mauritania

Mauritania is one of the poorest countries in the world with a *per capita* income of just \$1,200. It is moderately politically stable and one of the least densely populated countries in the world, with just over four million people. It is ninety percent desert but has a 500 mile Atlantic coastline. O&G development only started in the last fifteen years when Woodside discovered oil in the Chinguetti field, and has recently gained the attention of larger O&G companies with Kosmos Energy's large natural gas discovery in Tortue in 2014 and Tullow Oil's 3D seismic surveys later this year. Supporting the regulatory, safety and environmental needs of O&G companies and maintaining

strong bilateral relations with Senegal are critical in order to encourage further O&G exploration and production in Mauritania. However, the country's legal structures will need modernizing to achieve these aims.

Market Analysis

In 2016, Senegal and Mauritania were minor import markets for U.S. O&G equipment. Senegal imported \$76 million in equipment from around the world, which represented an 18 percent decline from 2015 imports. Senegal's three main trading partners are France, Morocco, and the United States with 28, 9, and 9 percent market shares, respectively. The majority of the products that are imported by Senegal are parts for derricks, light vessels, and drill pipe.

Trade statistics for Mauritania from 2014, the latest trade data available, shows that \$970 million in O&G equipment was imported, and a fourfold jump in imports can be seen from 2012 to 2013. Mauritania's main trading partners are the United States, Belgium and France with 70, 8 and 5 percent market shares, respectively. Mauritania's main imports in 2014 were floating production platforms, parts for derricks, and boring and sinking machinery.

Challenges Facing U.S. Exporters

Senegal

The successful negotiation of a unitization agreement between Senegal and Mauritania will determine the success of Kosmos Energy and BP's development of Tortue. Whatever the outcome of the unitization agreement, it will be highly technical for two countries that have limited experience with cross border hydrocarbon development. Initial analysis shows that the Tortue formation splits almost evenly across both countries' maritime border, which has the potential to pose a delicate negotiation as neither country at this point appears to have a majority claim. Senegal and Mauritania are using the Frigg field in the North Sea and the unitization agreement designed by the United Kingdom and Norway as a precedent, but this will be the first time such an agreement will be used to develop LNG from a transnational resource.

Mauritania

Mauritania's recent contract renegotiation on Woodside's interest in the Chinguetti field raises concerns for general contract sanctity in the country. In 2003, Woodside signed four PSAs with the then President Taya. When President Taya was disposed in 2005 in a military coup, the new government objected to the terms of the PSAs and Woodside was forced to renegotiate the terms and pay a \$150 million "profit oil bonus" at the same time that production in the field was declining rapidly.⁵⁷ As a result of operating difficulties, Woodside sold its interest in the Chinguetti field to Petronas in 2007. The Chinguetti field's recoverable reserves have been downgraded from 120 million barrels of recoverable crude oil when it was first discovered to around 34 million barrels today.

Conducting business in Mauritania is challenging as laws governing commerce, taxation, and dispute resolution are either not enforced or do not exist. According to the World Bank's Ease of Doing Business indicator, companies rank Mauritania among the more difficult countries in the world to do business. In 2016 Mauritania ranked 160 out of 190 countries as companies struggle to legally pay taxes, trade across borders, and gain access to electricity.

Opportunities for U.S. Companies

Senegal

Senegal is one of the more stable countries in West Africa and has a positive economic outlook with more than six percent GDP growth over the last two years. The national government is implementing the Emerging Senegal Plan (ESP), a coordinated plan for economic development that includes infrastructure development, export promotion,

human capital development and a focus on good governance. The ESP is endorsed by the International Monetary Fund through a three-year program called a Policy Support Instrument. The Policy Support Instrument supports low-income countries that do not want—or need—financial assistance from the International Monetary Fund (IMF) but seek to consolidate their economic performance with IMF monitoring and support.⁵⁸

Mauritania

To develop the Tortue field, Mauritania will need to support a massive infrastructure program to bring energy to both domestic and international markets. Kosmos Energy's Tortue field is located approximately 93 miles from the Mauritania/Senegal coast, but currently has no infrastructure to transport resources to shore or to markets abroad. Kosmos Energy and BP need to decide on the best method for developing the natural gas from Tortue, whether floating LNG (FLNG) or a land-based liquefaction facility—both having their benefits and drawbacks. Either way, there will be a multi-billion dollar investment program to monetize Tortue's development.

In addition to Kosmos Energy and BP, Tullow Oil is exploring in Mauritania's offshore area as part of a minimum work obligation. Tullow Oil announced plans to conduct 3D seismic surveys this year to determine the potential for a number of their offshore blocks. Tullow Oil is conducting this before the second phase runs out in November 2017. Depending on the results of the seismic survey, the phase three survey phase would require two wells to be drilled on the block.⁵⁹

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Senegal and Mauritania.

- U.S. Embassy Business Information
 - Senegal: <https://dakar.usembassy.gov/doing-business-local.html>
 - Mauritania: <https://mr.usembassy.gov/business/getting-started-mauritania/>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 - Houston, Texas.: <http://www.otcnet.org/>

International Trade Administration, U.S. Commercial Service Contacts

U.S. Commercial Service Partner Post, South Africa (Senegal)

Ms. Kirsten Bell, Commercial Specialist
Email: Kirsten.bell@trade.gov

The International Trade Administration, U.S. Commercial Service does not have offices in Senegal or Mauritania, but works closely with colleagues from the U.S. State Department on commercial issues affecting U.S. companies in both Senegal and Mauritania.

Senegal

Ms. Youhanidou Wane, Commercial Specialist
Email: wanebay@state.gov

Mauritania

Commercial Section
Email: NouakchottEconComm@state.gov

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For additional content, please visit www.trade.gov/topmarkets.

Country Case Studies

The following pages include country case studies that summarize export opportunities for U.S. oil and gas equipment and services in selected markets. The markets represent a range of countries to illustrate a variety of points— not the top markets overall.

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For additional content, please visit www.trade.gov/topmarkets.

2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

Australia

Commercial opportunities in Australia's O&G industry have been significantly hampered by low O&G prices, and U.S. exports of O&G equipment to Australia dropped by nearly 30 percent in 2016. Despite this, Australia is undertaking new upstream projects and additional LNG facility construction as it prepares to become the world's largest LNG exporter by 2020. Although we do not project significant increases in U.S. market share through 2020, there are opportunities for U.S. companies to provide equipment and services related to LNG facility construction and maintenance, unconventional gas, subsea and marine services, and pipeline infrastructure.

Overall Rank

9

Market Overview

In 2014, Australia produced 2.2 Tcf of natural gas and was the fourteenth largest natural gas producer. Australia's proved natural gas reserves were more than thirty Tcf as of December 2015, but could be as high as 114 Tcf when considering proved and probable reserves.⁶⁰ More than half of Australia's reserves are conventional natural gas resources and are located offshore in the North West Shelf as well as onshore in the Gippsland Basin. The country's coal bed methane (CBM) resources are estimated to comprise 38 percent of Australia's proved and probable reserves at 43 Tcf, and are primarily located in the northeastern Queensland Province.⁶¹ While large reserves of shale gas, estimated to be in the order of 396 Tcf, have been identified across South Australia, the Northern Territory, and Western Australia, there is no substantial commercial production of shale gas at this time.

In 2015, Australia became the second largest exporter of LNG behind Qatar, and is expected to become the world's largest LNG exporter by 2020 as additional liquefaction capacity is completed.⁶² In 2016, Australia's exported 2.1 Tcf of LNG, up from about 1.4 Tcf in 2015, primarily to Asian markets.⁶³ As of January 2017, Australia had seven operating LNG export facilities with a total capacity of nearly 2.9 Tcf per year, including Chevron's massive Gorgon LNG terminal which came online in 2016.⁶⁴ In an effort to meet the region's growing natural gas demand, Australia is building three new LNG facilities totaling more than \$81 billion in capital costs, including the world's first floating LNG project – Shell Prelude – which is slated to become operational in 2018.⁶⁵ To meet its growing LNG exports, the country's natural gas production is expected to reach 5.3 Tcf in 2020; however, high volumes of LNG exports may threaten natural gas supply for domestic consumption.⁶⁶

Market Analysis

Although Australia was the tenth largest destination for U.S. exports of O&G equipment in 2016, U.S. exports of O&G equipment to Australia dropped 28 percent to \$471 million, from \$655 million in 2015. U.S. exports peaked in 2012 – the year Pluto LNG commenced operations – at \$1.3 billion and have declined since, with 2016 marking the lowest U.S. exports of O&G equipment to Australia since 2004. The greatest amount of U.S. exports to Australia were parts and attachments for derricks (31 percent), machines/mechanical appliances with individual functions (12 percent), and filtering/purifying machines for gases (8 percent).

Australia is one of the top ten O&G equipment importers and imported \$5.8 billion in 2015, which marks a marginal decrease from 2014. In 2015, Japan was the largest source for Australian imports of O&G equipment and held a 25 percent market share, followed by the United States (with a 14 percent share), China (with a 11 percent share), and Indonesia (with a 9 percent share). Australia's most significant imports were line pipe greater than 16 inches (23 percent), machines/mechanical appliances with individual functions (22 percent), and parts and attachments for derricks (9 percent).

Challenges Facing U.S. Exporters

The cost of doing business in Australia is high and may make it difficult for U.S. O&G equipment and service providers to enter the market. Low O&G prices have reduced investment in exploration and production activities in Australia, particularly for offshore projects, due to the need for companies to cut capital expenditures.⁶⁷ For projects that remain, firms are focused on lowering operational costs, particularly since salary levels, overhead costs, and transportation costs in Australia are high. The depreciation of the Australian dollar has made imported products more expensive, and local distributors often apply higher margins when working with U.S. O&G equipment providers to counter smaller sales volumes.

Opportunities to increase U.S. company participation in Australia's upstream sector are limited due to strict environmental regulations on unconventional as well as conventional onshore production in some territories. Public resistance to the potential environmental impact of O&G activities has led to several state governments to develop strict and widespread environmental regulations that limit onshore O&G exploration and production. The Northern Territory has proposed a moratorium on hydraulic fracturing and New South Wales has placed a moratorium on the development of unconventional resources (both CBM and shale gas). In Victoria, a moratorium is in place on all onshore exploration, including the extraction of conventional resources until 2020.⁶⁸ While environmental regulations related to water use and disposal and land rights in CBM and shale gas projects exist at the federal level, Prime Minister Turnbull has expressed his displeasure with the bans, indicating a lack of national support for such measures.⁶⁹

Opportunities for U.S. Companies

The Australian political and regulatory environments, as well as Australia's proximity to Asian markets, provide stable, attractive investment opportunities for U.S. O&G equipment and service providers. Australia has three major domestic O&G companies – Woodside, BHP-Billiton, and Santos. Many large multinational oil companies are also exploring, operating, and partnering in one or more projects, including BP, Chevron, Conoco-Phillips, ExxonMobil, INPEX, Royal Dutch Shell, and Total. Service companies such as Halliburton, Bechtel, Schlumberger, and TechnipFMC further enhance the international nature of the local industry. Australia is a receptive market to international operators, consultants, contractors, and equipment, as well as service providers.

Western Australia has committed \$94.1 billion for planned and under construction O&G resource and infrastructure projects,⁷⁰ the majority of which are LNG projects located offshore.⁷¹ Projects under construction include the Wheatstone and Ichthys LNG terminals and Shell Prelude, which are expected to come online in 2017 and 2018.⁷² The Government of Western Australia has identified investment opportunities in various areas of the state's O&G activities, including subsea and marine, unconventional gas, training and skills, operations and maintenance, engineering, design and fabrication, and research and innovation.⁷³ Australian firms prefer high-quality and reliable machinery to help offset the high capital and depreciation costs for the industry and increase worker safety.

Approximately forty percent of machinery, labor and inputs for Australian LNG projects are imported. U.S. exports of O&G equipment to Australia peaked in 2012, at over \$1.3 billion. With the bulk of the major LNG projects now completed, the Australian O&G industry is transitioning from the investment and construction stage of the life cycle to the operations stage. The annual operating expenditure for the LNG sector is expected to increase from almost \$900 million in 2014 to \$ 3.4 billion in 2020. The best prospects for U.S. suppliers will be for maintenance and support contracts.

Insufficient infrastructure to distribute domestic natural gas supply may provide opportunities for U.S. equipment and service suppliers related to pipeline construction. Due to declining production in Victoria, Australia may require additional midstream infrastructure to transit natural gas to high consumption areas in the east of the country, which accounts for nearly 75 percent of total Australian energy consumption.⁷⁴ Though the east has a relatively well-developed midstream infrastructure, little infrastructure exists connecting the east to Western Australia.⁷⁵ Proposals for natural gas pipelines connecting the Amadeus Basin in the Northern Territory to the Cooper Basin in South Australia have been made;⁷⁶ however, such pipelines would only connect the east to resources located in the North West of Western Australia. The Perth and Carnarvon Basins would remain connected only via LNG terminals.

Some specific equipment and services opportunities in Australia include:

- Subsea and marine, including expanded remote operated vehicle (ROV) operator capacity, offshore supply, operation, and maintenance of vessels, and flexible pipe technology;
- Unconventional gas, including horizontal drilling rig expertise and maintenance, hydraulic fracturing technologies, and water management;
- Operations and maintenance, including specialized inspection and auditing services, and on-location support services;
- Logistics and transport, including rotary aviation training and facilities;
- Research and innovation, including mini and micro LNG facilities and intelligent operations/automation.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Australia.

- International Trade Administration Country Commercial Guide: <https://www.export.gov/article?id=Australia-Oil-and-Gas>
- Australian Petroleum Production & Exploration Association (APPEA): <http://www.appea.com.au/>
- Australian Pipelines & Gas Association Ltd. (APGA): <http://www.apga.org.au/>
- Geoscience Australia: <http://www.ga.gov.au/energy.html>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- APPEA 2017 Conference and Exhibition, May 14-17, 2017 – Perth, Australia: <https://www.appeaconference.com.au/>
- Australasian Oil & Gas Exhibition & Conference, March 14-16, 2018 – Perth, Australia: <http://aogexpo.com.au/>

International Trade Administration, U.S. Commercial Service, Australia Contact

Ms. Donna Carter, Commercial Specialist
Email: donna.carter@trade.gov

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For additional content, please visit www.trade.gov/topmarkets.

2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

Brazil

After a rocky year, Brazil's O&G sector seems to be moving toward a more measured state of development. U.S. firms remain competitive in Brazil's O&G sector and policy reforms to the sector have made it more business friendly. U.S. companies can look to services to support Petrobras shut-ins, as well as purchase assets that the company is looking to sell. Opportunities also exist for companies to bid during the upcoming auction for oil blocks. While these reforms have been popular for business development, the uncertain oil price outlook and opposition to more long term and flexible local content legislation is likely to curtail too much optimism.

Overall Rank

5

Market Overview

In 2015, Brazil ranked twelfth in world crude oil production, fifth in the Americas, third in Latin America, and second in South America. Brazil holds 12.67 billion barrels of proven oil reserves, and 13.13 Tcf of natural gas, and 22.7 billion barrels of probable reserves and 22.5 Tcf of possible gas reserves. In 2016, Brazil produced 2.5 million bbl/d of crude oil, 95 percent of which came from offshore, ultra-deepwater reserves. The development of deepwater and especially "pre-salt" resources have driven dramatic increases in Brazil's production, with pre-salt production making up for 40.7 percent of overall production. Due to the decrease in global oil prices and Petrobras' adverse financial situation, production targets for Brazil have declined from 3.7 mbpd to 2.77 mbpd by 2021.

Despite the current economic outlook and low price of oil, long term growth in the O&G sector remains strong because of proved below ground resources, a well-developed and sophisticated O&G sector, and a diversified economy. At the same time, Petrobras has pursued a strategy of reducing debt, which has helped build confidence within the private sector that it can be trusted to prioritize greater efficiency and profitability ahead of politics. The current Petrobras financing problems, low price of oil, and a more business friendly administration have driven recent reforms in Brazil's offshore sector, and will likely improve the fiscal terms for new bid rounds. At the same time, the corruption scandal that is gripping Petrobras and the federal government has also shaken investor confidence, forcing senior management to decrease investments for 2016 in an effort to restore financial stability.

Since January 2016, Petrobras has begun to shore up its finances by decreasing investments, selling assets, and shutting in wells. The low price of oil and the corruption scandal surrounding the company has placed pressure on Petrobras to pursue a more conservative course toward new investments. The corruption investigation, known as the *Lava Jato* or "Car Wash," alleges that foreign companies paid bribes to Petrobras for lucrative supply contracts. The Rousseff Administration is implicated in the scandal as having received illegal payments that went toward her 2014 presidential campaign.

Market Analysis

In 2016, Brazil was the seventeenth largest destination for exports of O&G equipment, though exports dropped to \$2.5 billion from \$3.3 billion in 2015. Brazil's main import partners were China, the United States and Korea, with 35, 14 and 9 percent market share respectively. Exports were downhole wireline tools, floating cranes, and parts for derricks, which represented more than 60 percent of Brazil's global imports.

The United States exported \$352 million worth of equipment to Brazil in 2016, a 29 percent decrease from 2015, and almost half of U.S. exports to Brazil in 2014. In 2016 the main U.S. exports to Brazil were parts for derricks, downhole wireline tools, reciprocating positive displacement pumps, and oil separation equipment.

Challenges Facing U.S. Exporters

The main impediments for U.S. companies wanting to operate in the Brazilian petroleum sector are LCRs and priority given to Petrobras. However, Brazil's lower house passed legislation that removed restrictions on offshore O&G production and reshaped state-owned oil company Petrobras' role in Brazil's deep water "pre-salt" fields.⁷⁷ While the new law still maintains Petrobras' right of first refusal, its previously burdensome production and equity requirements have been removed. However, the concession regime is also in force in Brazil's O&G sector, and will continue to apply for non-"pre-salt" fields. Oil companies worldwide can now participate in the oil bid rounds that the Brazilian Hydrocarbon Regulatory Agency, ANP, will hold in 2017, including one on a "pre-salt" field, under a PSA, and two under a model concession contract.⁷⁸ One of the upcoming bid rounds will be for marginal oil fields though details have not yet been published. Companies should also be aware of the Brazilian Ministry of Mines and Energy (MME) plans to launch a long term oil auction calendar to 2019.⁷⁹

On March 28, 2017, the Industry and Competitiveness Development Secretariat of the Brazilian Ministry of Industry and Foreign Trade (MDIC) published Resolution #1 ratifying proposals to LCR changes. The reforms, which will initially apply to the fourteenth bid round (concession regime) and for the 3rd "pre-salt" (PSA regime) round, have lowered the percentage of Brazilian-made goods and services required for O&G exploration and production. New LCRs for deepwater O&G exploration fell by half on average, to a minimum of 18 percent, down from 37 percent for previous auctions, and LCRs for deepwater production development will now follow macro-segments: 25 percent for oil and/or gas well construction; 40 percent for subsea production activities; and 25 percent for oil offshore production units. Previous LCRs for the production and development phase were set at 55 percent. Onshore exploration and development LCRs, previously set at 70 percent and 77 percent, respectively, were reduced to 50 percent as well.

All the existing oil exploration and production concession and/or PSAs will continue to follow their LCR percentages, as the new rule will only apply for the upcoming 2017 bid rounds. Currently, exploration phase activities require between 37 and 85 percent local goods and services, and development phase activities must use between 55 and 80 percent Brazilian content.

The new rules also establish a one percent charge to producers, the proceeds of which will go to increasing local industry's competitiveness with imports. The Brazilian government also announced that waiver requests will not be issued for LCRs in the petroleum industry. According to the revised regulations, if the percentage of violated LCR is less than 65 percent of the established local content, the fine will be forty percent of the value of the non-compliant investment. In a case where the violated LCR reaches 65 percent or above, the fine will vary from 40 to 75 percent, following the same principle.

Another upcoming change that oil operators in Brazil are looking for is the extension of the Special Customs Regime of Export and Import of Goods destined to Exploration and Production of Oil and Natural Gas, REPETRO. This program aimed to reduce the tax burden levied on exploration and production of oil and gas fields. REPETRO suspends and provides exemption of Import Duty ("II"), Excise Tax ("IPI"), and Social Contribution on Imports ("PIS/COFINS-*Importação*") to goods listed in the appendix of the Normative Ruling N. 844/08 ("IN 844/08"). This regime will expire in 2019, but MME is working with the Ministry of Treasury to extend it for another twenty years, allowing oil companies to take long term investment decisions.

The *Lava Jato* corruption scandal has had a chilling effect on Brazil's O&G sector, but the severe reaction to the scandal by Brazilian authorities has brought credibility to the proceedings. In response to the scandal, Petrobras has implemented more stringent integrity evaluations to vet their suppliers, a move that foreign companies see as headed in the right direction. As foreign firms supplying Petrobras must retain a local legal representative, due diligence needs to be conducted before establishing partnerships with Brazilian companies as they may be facing restrictions to participate in Petrobras tenders.

Opportunities for U.S. Companies

Since state-owned Petrobras' monopoly ended in 1998, more than ninety firms – half of which are non-Brazilian companies – entered the Brazilian market and competed for over 1,000 oil blocks awarded through thirteen oil-concession licensing rounds, plus the first "pre-salt" round. With Petrobras winning the majority of these concessions, the firm continues to be the main buyer of U.S. O&G equipment and services, despite financial difficulties and the ongoing investigations. The Petrobras 2017-2021 investment plan calls for total investments of \$74.1 billion, 82 percent of which earmarked for exploration and production.⁸⁰

Petrobras is expected to raise nearly \$20 billion through a divestment plan that creates strategic partnerships in the areas of exploration and production, refining, transportation, logistics, and fuel distribution, among other segments. In the previous biannual divestment plan (2015-2016), Petrobras divested \$13.6 billion by concluding sales of its 60 percent stake in the Carcará pre-salt oil field to Statoil, the sale of LPG Liquigás subsidiary to the Ultragas/Ultrapar group, and the sale of its Southeast Gas Transportation subsidiary (NTS) to the Canadian company Brookfield.

Proposed reductions in LCRs for the 2017 oil bidding rounds will improve profitability for U.S. equipment manufacturers and service suppliers. However, significant opposition to MME's plan to extend the changes beyond 2017 will continue to exist. While favorable to new investments, companies that are currently exploring in production blocks must still abide by the more restrictive LCR percentages agreed in their contracts. For example, exploration phase activities require between 37 and 85 percent local goods and services, and development phase activities must use between 55 and 80 percent Brazilian content. In recent years, ANP has fined Petrobras and other oil operators for not complying fully with their LCRs. A number of appeal and waiver processes have been filed and are awaiting final decision by ANP.

Some specific equipment and services opportunities in Brazil include:

- Construction of high angle wells;
- Well integrity services; New alloys to reduce costs of well materials;
- Reservoir characterization services;
- EOR technologies;
- Flexible risers for water depth of 2,200m (7,218 ft);
- Flow assurance systems;

- Scaling controls;
- Mooring in 2,200m water depth;
- CO2 processing and compression;
- Winches, cranes, and several others related to “pre-salt” development areas;
- Oil rig decommissioning services;
- Gas pipelines and gas processing units will also be in demand.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Brazil.

- International Trade Administration Country Commercial Guide: https://www.export.gov/article?series=a0pt0000000PAatOAAW&type=Country_Commercial_kav
- Brazil National Petroleum Agency (ANP), <http://www.anp.gov.br/wwwanp/>
- Brazil-U.S. Business Council, <http://www.brazilcouncil.org/>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- Brasil Offshore, June 20-23, 2017 – Macaé, Brazil: <http://www.brasiloffshore.com/en/>
- OTC Brasil, October 24-26, 2017 Rio de Janeiro, Brazil: <http://www.otcbrasil.org/>
- Rio Oil & Gas, October 2018, Rio de Janeiro, Brazil: <http://www.riooilgas.com.br/?lang=en>

International Trade Administration, U.S. Commercial Service, Brazil Contacts

U.S. Consulate General Rio de Janeiro

Mr. Mark Russell, Principal Commercial Officer
55-21-3823-2000
Email: Mark.Russell@trade.gov

Ms. Regina Cunha, Senior Commercial Specialist
Email: regina.cunha@trade.gov

2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

Guyana

Unlike in other markets, commercial opportunities in Guyana's O&G sector have not been hampered by the low price of oil. Guyana's O&G sector is not well developed and the value of recent offshore discoveries could lead to issues with corruption. Despite this, the Government of Guyana is highly motivated to develop its O&G resources and there are opportunities for U.S. companies to provide equipment and services for drilling and seismic surveys, onshore processing facilities, pipeline and storage infrastructure, and engineering and consulting services.

Overall Rank

47

Market Overview

In May 2015, ExxonMobil announced the discovery of significant quantities of "high quality" oil in the Liza field of Guyana's 6.6-million-acre Stabroek block, which runs nearly the entire length of the country's offshore zone. Liza is being developed by ExxonMobil's local subsidiary Esso Exploration and Production Guyana, the operator of the field, Hess Guyana Exploration, and CNOOC Nexen Petroleum Guyana.⁸¹ The Liza field is roughly 120 miles off the coast of Guyana and is estimated to contain more than one billion boe.⁸² Recent appraisal drilling at ExxonMobil's Liza-3 well has identified a new reservoir beneath the Liza field, which is estimated to contain 100-150 million boe.⁸³ In addition to Liza, ExxonMobil announced a second oil discovery in January 2017 on the Stabroek Block in the Payara field, which is about ten miles northwest of the Liza discovery. Other international O&G companies such as CGX, Repsol, Royal Dutch Shell, and Tullow Oil, also hold exploration concessions in Guyana, and Anadarko previously conducted exploration in the area and has announced plans to return in the next few years.

Despite the large amounts of crude oil that the country will soon be producing, Guyana does not have any domestic refineries. The state-owned Guyana Oil Company Limited imports all of Guyana's refined fuels (mainly gasoline), which totaled 5 million barrels in 2015.⁸⁴ In 2014, Trinidad and Tobago (42 percent), Venezuela (37 percent), and Suriname (19 percent) accounted for the majority of these imports.⁸⁵ Guyana does not currently import refined products from the United States.

Market Analysis

In 2016, U.S. exports of O&G equipment to Guyana reached an all-time high and totaled \$35.1 million. Despite the small size of Guyana's market, U.S. exports of O&G equipment have increased significantly in recent years due to increased offshore exploration. Although the O&G industry is still developing and the country is not a large consumer of O&G equipment, Guyana's imports of O&G equipment increased two hundred percent year-on-year in 2016 to \$62.4 million.

In 2015, the United States was the largest source for Guyanese imports of O&G equipment, holding a 55 percent market share. The next largest sources were Trinidad and Tobago and Germany, with 19 percent and 15 percent, respectively. Guyana's most significant imports were parts for boring or sinking machinery (26 percent), parts and attachments for derricks (25 percent), drill pipe (16 percent), and light vessels, fire floats, floating cranes, and

docks (14 percent). In 2016, the greatest amount of U.S. exports to Guyana were casing over 16 inches (30 percent), other casing and tubing (23 percent), and parts for boring or sinking machinery (22 percent).

Challenges Facing U.S. Exporters

Guyana lacks legislation, regulatory frameworks, and institutions specific to the O&G industry, which pose challenges to U.S. firms operating in Guyana. Since ExxonMobil's Liza field was the first major hydrocarbon discovery in Guyana, the government is still developing the governance structure for the O&G sector. The government is currently negotiating and drafting a Petroleum Act to serve as the legal framework for the industry,⁸⁶ and the Ministry of Natural Resources has prioritized the establishment of a Petroleum Directorate—the Ministry's office of experts—and a Petroleum Commission, a regulatory and research body.

Although the Guyanese government plans to implement stricter regulatory and fiscal terms in new PSAs with IOCs, these changes are unlikely to significantly impact investor interest in Guyana's O&G sector. According to Guyana's Minister of Natural Resources, Raphael Trotman, PSA modifications are being considered to ensure that at least 50 percent of profits would go to Guyana.⁸⁷ In addition, the Ministry would like amendments to establish royalties, evaluate taxation policies, and review contract length.⁸⁸ In addition, the Ministry is considering legislation with LCRs to mandate the use of local products and develop a local workforce. Minister Trotman estimates that local content legislation will be developed in the next five years, and it is unclear how flexible these requirements would be.⁸⁹ Currently, the Guyanese labor force is only capable of providing cross-cutting sectoral experts, such as accountants, lawyers, and economists, but the government has acknowledged the desire to develop local technical expertise.⁹⁰

The value of recent oil discoveries well exceeds Guyana's current GDP and raises concerns that large oil revenues could lead to widespread corruption. Guyana's low ratings in the World Bank's 2015 Worldwide Governance Indicators resulted in the country scoring in the lowest quartile for control of corruption and second lowest quartile for government effectiveness and regulatory quality as part of the methodology for this report.⁹¹ In addition, Guyana already faces corruption in its refined petroleum products sector, and a fuel-smuggling scheme uncovered early last year led to the ouster of officials at the Guyana Energy Agency.⁹² However, the Government of Guyana is taking steps to mitigate these risks and the election of a reform-minded coalition in 2015 resulted in improvements to government responsiveness and accountability. The Government of Guyana also intends to establish a Sovereign Wealth Fund to safeguard oil wealth for future generations by stipulating specific savings and including investment and budget stabilizing features.⁹³ Additionally, Guyana has begun the process of applying to the EITI, which helps countries overcome the "resource curse" by emphasizing the public disclosure of accurate resource revenue figures accrued by the government.⁹⁴ The government is receiving guidance from several international institutions on this process, including the Inter-American Development Bank and the World Bank.⁹⁵ These measures provide encouraging evidence that the government and regulatory framework is becoming increasingly friendly for U.S. businesses.

Finally, border disputes with Venezuela could delay the commercial production of Guyana's offshore oil resources. Tensions with Venezuela remain high regarding an ongoing border dispute between the two countries, leading some in Venezuela's legislature to call for a halt on exploration and drilling in disputed waters until the issue is resolved.⁹⁶ Moreover, Liza strains an already-tenuous relationship between ExxonMobil and Venezuela, who have been fighting a legal battle over expropriated oil projects since 2007.⁹⁷ Any border issue resolutions in Venezuela's favor could undermine contracts between U.S. companies and the Government of Guyana.

Opportunities for U.S. Companies

Since the Government of Guyana is focused on developing a legislative framework and regulatory structure to best serve the O&G industry, there may not be opportunities for government procurement of industry-specific technologies at this time. However, the Ministry of Natural Resources has stated that it would like to encourage more investor interest in onshore and shallow water exploration opportunities within the country. In addition, there are available offshore blocks that have yet to be explored and licenses should still be possible to obtain.

Although no O&G related tenders have been announced by the Government of Guyana, there are opportunities for U.S. companies to enter the Guyanese market through IOCs conducting exploration and production activities. In December 2016, ExxonMobil awarded contracts to SBM Offshore for a FPSO vessel for its Liza project.⁹⁸ U.S. companies can look to ExxonMobil's online supplier registration portal to learn more about ExxonMobil's upcoming tenders for equipment and services. U.S. companies providing drilling and seismological equipment and services may find opportunities with ExxonMobil and other IOCs currently conducting exploration activities. Service providers will become increasingly important as Guyana's O&G industry develops and engineering firms and consultancies may also find opportunities to provide exploration support.

U.S. companies will find opportunities to procure O&G equipment and services for projects related to the commercial production of Guyana's offshore resources. Guyana will need to invest in pipelines and other transportation and storage infrastructure to meet the needs of increasing offshore activities.⁹⁹ In addition, the Guyanese government has announced plans to build a \$500 million petroleum processing and service center to service offshore exploration and production activities in Berbice, Guyana, although it is unclear if there is sufficient funding for the project.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Guyana.

- International Trade Administration Country Commercial Guide: <https://www.export.gov/article?id=Guyana-Oil-and-Gas>
- Guyana Office for Investment: <http://goinvest.gov.gy/>
- Guyana Geology and Mines Commission: <http://www.ggmc.gov.gy/main/?q=divisions/petroleum>
- Ministry of Natural Resources and the Environment: <http://nre.gov.gy/>; <http://news.exxonmobil.com/press-release/exxonmobil-announces-significant-oil-discovery-offshore-guyana>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017: <http://www.otcnet.org/>

International Trade Administration, U.S. Commercial Service, Guyana Contact

The International Trade Administration, U.S. Commercial Service does not have an office in Guyana, and works closely with colleagues from the U.S. State Department on commercial issues affecting U.S. companies in Guyana.

Ms. Sandra Zuniga Guzman, Economic and Commercial Officer
Email: ZunigaGuzmanS@state.gov

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2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

India

India has the potential to be a major market for U.S. O&G equipment and services exports, but more needs to be done to make the investment environment for new exploration and production more attractive. Last year, India implemented a policy to encourage domestic O&G production, which is important to counter India's growing reliance on imported energy. Without more incentives and improvements to its business environment, India's energy security will be at risk and its domestic O&G resources may remain undeveloped or underdeveloped for the foreseeable future.

Overall Rank

26

Market Overview

Projects related to India's mass urbanization efforts are raising energy security concerns as the country's current dependence on foreign energy is unsustainable. India is the third largest energy consumer in the world today and in the coming years is projected to be the world's largest source of new energy demand growth. The International Energy Agency (IEA) projects that by 2040 some 315 million people, which is equivalent to almost the entire population of the United States, will be added to India's urban population. As a result, India's oil demand will increase more than any other country, approaching ten million bbl/d by 2040 with a projected 90 percent dependence on imports.¹⁰⁰ To meet its growing energy demand, India will need \$140 billion in energy investment per year,¹⁰¹ but it is unclear where the needed investment will come from or how it will be distributed across the energy sector.

India consumes approximately 4.1 million bbl/d of crude oil, most of which is imported, and only three companies are responsible for the majority of its domestic production. India's NOCs, Oil & Natural Gas Corporation (ONGC) and Oil India Limited (OIL), account for 70 percent of India's 1 million bbl/d of crude oil production.¹⁰² Cairn India Limited produces about 200,000 bbl/d, primarily from its production blocks in Rajasthan. The Gas Authority of India Limited (GAIL), the state-owned transmission and marketing company operates two major natural gas pipelines, but additional private companies in the natural gas sector, such as Reliance Industries and Petronet LNG Limited, have formed in recent years to market LNG.

The Ministry of Petroleum & Natural Gas (MOP&NG) is the primary agency for regulating the O&G industry in India. The Petroleum and Natural Gas Regulatory Board (PNGRB) is responsible for handling legislation and issues related to exploration and production of O&G as well as refining, distribution and marketing, imports, exports and conservation of petroleum products. The PNGRB is also the nodal agency for the city and local natural gas distribution networks. It decides on the period of exclusivity for building and operating the pipeline network, and lays down technical standards including safety standards for pipelines and other infrastructure projects.

Market Analysis

In 2016, India was the seventeenth greatest destination for U.S. exports of O&G equipment at \$279 million, its highest level in three years. The most significant U.S. exports to India were parts for boring or sinking machinery, floating production platforms, and downhole wireline tools.

In 2016, India was the world's seventh largest import market for O&G equipment, importing \$5.8 billion and increasing imports overall 22 percent from 2015. China was by far the largest exporter to India with a 37 percent market share, followed by Japan (eight percent), Germany (seven percent) and the United States (six percent). Over half of all of India's O&G equipment imports come from three products: light vessels and floating cranes (29 percent); downhole wireline tools (thirteen percent); and floating and submersible drilling and production platforms (twelve percent).

Challenges Facing U.S. Exporters

India's NOCs are likely to be consolidated, which may make market entry for foreign exploration and production companies more difficult in the long run and could be difficult for U.S. equipment and service suppliers in the near term. Although India's O&G sector is dominated by ONGC, the Indian government has announced plans to form an even larger, fully integrated NOC. In the 2017 budget released in February, the government announced plans to consolidate the thirteen state-owned oil companies operating in the exploration, production, refining and marketing space into one firm to enhance India's competitiveness in international markets. With such a large and vertically integrated public company, there is a risk that its "national champion" status may prevent increased foreign company participation in India's O&G industry. At the same time, such a massive consolidation could take several years and U.S. product and service suppliers could experience disruptions due to changes to the bidding process, which international O&G companies already consider to be complicated and cumbersome.

The high rates of import duties and involvement with multiple government agencies are additional barriers that U.S. companies need to consider when entering the Indian market. The Indian market for O&G equipment and services is highly competitive, as most Indian O&G companies prioritize cost when choosing vendors. Low O&G prices have compounded the need for local companies to prioritize cost when procuring equipment and services, as lower profits have led companies to cut capital expenditures and operating costs. In addition, there are a large number of foreign players in the Indian O&G market, and while a preference exists for high quality products and innovative technologies from U.S. suppliers, U.S. companies looking to supply to Indian companies should anticipate tight margins for delivery contracts.

Opportunities for U.S. Companies

LNG and the technologies and services that support natural gas imports and consumption are a bright spot for foreign companies looking to do business in India's O&G sector. Companies can expect India's natural gas demand growth to increase due to government initiatives to reduce pollution through increased power generation from cleaner fuel sources. On February 1, 2017, Prime Minister Modi reduced natural gas import taxes from five percent to 2.5 percent, which will help drive down natural gas costs for domestic consumers. In addition, India is constructing four new LNG import terminals, which will support greater LNG import capacity. India's ability to transport natural gas imports to domestic consumers is also improving as a result of infrastructure buildouts, and the most recent development is GAIL's approval of a portion of the 440km Kochi-Mangalore natural gas pipeline.

To counter declining production and increasing demand, the Indian government has adopted more business-friendly exploration and production policies that allow for foreign direct investments in the O&G sector. These policies allow for greater foreign investment in exploration and production, refining, petrochemical processing, natural gas transmission, and infrastructure related to the marketing of petroleum products. In 2016, the government also introduced the new Hydrocarbon Exploration and Licensing Policy (HELP) 2016, which is more flexible than the previous licensing policy. HELP covers all hydrocarbons under a single license, allows for unsolicited bidding and revenue sharing, and provides marketing and pricing freedoms.

India's latest bid round results has the potential for new business development, but the contract areas are for small fields and there was little foreign participation. Equipment and service contract may be small and companies will have to create business relationships with the fifteen new companies that entered the Indian exploration and production sector. In 2016 India's Directorate General of Hydrocarbons held a bid round that resulted in 31 new approved contract areas for 22 single companies or consortia.¹⁰³ The results of the round provides licenses to 23 onshore and eight offshore contract areas, under lower royalty rates and no upfront signature bonus.

It is advisable to work with a local Indian partner who can manage the bidding process, though many of them may look to their American partners for financial support to participate in these tenders. Partnership with local companies is recommended to understand and successfully navigate the dynamics of the Indian market. Companies that supply basic commodity products may find it difficult to enter and sustain the market as the cost of imports and other overheads coupled with easy availability of alternative products may make the product expensive for domestic consumption, especially since the Indian consumer is extremely price-sensitive.

Some specific equipment and services opportunities in India include:

- Seismic surveying for new leases from recent bid round;
- Equipment and services for the upstream and downstream O&G sectors;
- Midstream equipment and services for new pipeline construction around the Kochi LNG terminal;
- New fields for exploration;
- Deepwater applications;
- Pipelines/city gas distribution;
- Crude oil storage systems for developing strategic reserves;
- Offshore technologies, products and services;
- Enhanced oil recovery systems;
- Equipment and services for pipelines and multi-product pipelines;
- LNG imports/LNG terminals.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in India.

- International Trade Administration Country Commercial Guide: https://www.export.gov/article?series=a0pt000000PAu0AAG&type=Country_Commercial_kav

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- Petrotech, December 2018 – New Delhi, India: www.petrotech.in

International Trade Administration, U.S. Commercial Service, India Contact

Mr. Sanjay Arya, Commercial Specialist

Email: Sanjay.Arya@trade.gov

2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

Kuwait

Kuwait is pursuing a major investment plan with the production goal of 4 million bbl/d by 2020, but at the same time its OPEC commitments have it reducing production by 131,000 bbl/d. Kuwait's overwhelming reliance on oil export revenues has revealed vulnerabilities of its reluctance to allow for greater foreign participation. Kuwait Petroleum Corporation will need to balance long term production targets with near-term realities of a soft international market that is price sensitive to production increases. The ambitious targets for 2020 should mean business opportunities for foreign companies, but the ease and profitability of doing business in Kuwait will need to improve as other countries are pursuing similar goals and it is unclear how and if the current international price of crude oil will maintain its \$50 per barrel price level.

Kuwait

Overall Rank

25

Market Overview

Kuwait is a major oil supplier and a member of the OPEC consortium and the tenth largest oil producer in 2015. Oil comprises nearly half of Kuwait's GDP, around 95 percent of export revenues, and 68 percent of government revenue.¹⁰⁴ Kuwait holds approximately eight percent of global oil reserves and has a current production capacity of about three million barrels per day. The IMF estimates that Kuwait is well positioned to mitigate the impact of lower oil prices with low debt, and a well-capitalized financial sector.¹⁰⁵ While the Government of Kuwait is investing in policies to reduce its reliance on oil export revenues and boost private sector growth, it is also pursuing a plan to increase production from around three million bbl/d currently to four million bbl/d by 2020. Kuwait is also a participant in the November 2016 Vienna Agreement by OPEC and non-OPEC members to cut global oil production. Kuwait's commitment to the agreement was to reduce output by 131,000 bbl/d.

The Government of Kuwait owns and controls all the development of the O&G sector, and the Supreme Petroleum Council, headed by the Prime Minister, is responsible for regulating and setting policy. Kuwait's NOC, the Kuwait Petroleum Corporation (KPC), manages domestic and foreign oil investments, and its subsidiary, the Kuwait Oil Company (KOC), manages specifically the upstream investment portion. Kuwait has three private oil development companies, Independent Petroleum Group, Aref Energy Holding, and Kuwait Energy Company.

Market Analysis

In 2015, Kuwait was a major market for global O&G equipment exports, importing just over \$1 billion, which is an increase of eight percent from 2014. Kuwait's three main trading partners are China, the United States, and Japan with 44, 14, and 8 percent market shares, respectively. The majority of the products that Kuwait imported are parts for offshore production platforms, drill pipe with joint tools, steel tube and pipe, and boring tools for natural gas platforms. Kuwait's main imports from the United States were also parts for offshore production platforms, O&G field machinery for lifting and loading, and reciprocating pumps. U.S. companies also provide a significant amount of services to Kuwait, though official trade statistics are unavailable.

Challenges Facing U.S. Exporters

There is little evidence that the conflict over the Partitioned Neutral Zone (PNZ) will resolve soon, so Kuwait will need to search for increases elsewhere to meet its four million bbl/d production target. Kuwait and Saudi Arabia have jointly developed the PNZ, territory between Kuwait and Saudi Arabia with a production capacity of 600,000 bbl/d in 2015.¹⁰⁶ However, the production in the PNZ was shut down due to a dispute between Saudi Arabia and Kuwait and it has since been offline. Kuwait has been able to maintain its production levels, but this required aggressive output increases from other fields.

Foreign companies need to invest significant time and resources to develop business in Kuwait and the cost of doing business can be higher than anticipated, while small and medium-sized companies have the most challenges. The majority of public tenders are awarded to the lowest bidder once technical specifications are established, and winning bidders must sign the contract or forfeit a performance bond which can be 5-10 percent of the contract's value.¹⁰⁷ Public tenders can also be delayed for a variety of reasons, as BP and Shell experienced when their enhanced technical-service agreements were held up because of allegations that contracts were awarded without proper competition. The pre-qualification process is lengthy and the requirement to submit three years of audited financial statements puts small and medium U.S. companies at a disadvantage.¹⁰⁸ Foreign companies cannot sell directly to the government and can only participate in public tenders through a local agent. In the oil sector, suppliers must be approved by an internal committee and placed on a list of "pre-approved" companies. For major projects, international companies are usually invited to pre-qualify.¹⁰⁹

Opportunities for U.S. Companies

KPC's five year investment plan is significant and ambitious, and will require more foreign involvement to be achieved. KPC's 2015-2030 Strategic Plan is at \$75 billion investment, with \$80 billion from international companies, focused on upstream, downstream, international development, petrochemicals, and transportation. In addition to the four million bbl/d target by 2020, KPC also aims to develop non-associated natural gas production to 2.5 Bcf/d by 2030.¹¹⁰ The investment plan requires 400-500 wells to be drilled each year until 2020 with an increased focus on drilling efficiency and increased recovery.¹¹¹ Implementation of the 2030 Strategic Plan by KOC also outlines a major effort to reduce gas flaring to one percent from its current level of 70 percent.

Some specific projects, equipment and services opportunities in Kuwait include:

- Environmental and corporate social responsibility consulting services;
- Gas flaring reduction technologies;
- First eocene full field steamflood;
- Second eocene full field development;
- Humma pressure maintenance;
- SF Ratawi Oolite – EOR, central gas utilization plant;
- Development of green field non-associated gas;
- Development of Lulu and Hout Fields.¹¹²

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Kuwait.

- International Trade Administration Country Commercial Guide for Kuwait
 - <https://www.export.gov/article?id=Kuwait-Oil-Field-Equipment-and-Services>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- Kuwait Oil & Gas Show and Conference (KOGS) 2017, October 16-18, 2017 – Mishref, Kuwait: <http://kogs2017.com/>
- Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), November 13-16, 2017 – Abu Dhabi, UAE: <https://www.adipec.com/>
- Annual Maintenance Kuwait Summit, February 5-8, 2018 – Salwa, Kuwait: <https://maintenancekuwait.igpc.ae/>

International Trade Administration, U.S. Commercial Service, Kuwait Contact

Ms. Dina Al-Shawa, Commercial Specialist

E-mail: Dina.Al-Shawa@trade.gov

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2017 Top Markets Report **Oil and Gas Equipment** Country Case Study

Singapore

Singapore is a more challenging market than it has been in recent years due to low oil prices and reduced investment in offshore O&G infrastructure and development, but remains a competitive market for U.S. O&G equipment. Despite a significant decline in demand for new oil rigs and FPSOs manufactured in Singapore, there are opportunities for U.S. companies to support regional marine and subsea operations, LNG infrastructure and bunkering, and refinery upgrades. We anticipate that the United States will remain the largest source for Singaporean imports of O&G equipment in 2017.

Overall Rank

15

Market Overview

Although it is not a producer of crude oil or natural gas, Singapore serves as an important hub for O&G equipment trade to Asia. Singapore is the market leader for FPSOs conversions and offshore jack-up rigs, and many oilfield service and subsea companies have operations in Singapore due to the presence of major international and local offshore and marine firms, such as Baker Hughes, Schlumberger, Halliburton, Transocean, Keppel Corporation and Sembcorp Marine. Singapore has become one of the most important shipping centers in Asia and is one of the world's top five oil trading and refining hubs with a total crude oil refining capacity of 1.5 mbpd. Singapore's downstream sector is well-developed, and it is one of the top ten exporters of refined oil products in Asia.

Singapore's only LNG regasification terminal is also being expanded to enhance the country's position as the premier center for natural gas trading and trans-shipment in Asia. Upon completion in 2019, the \$500 million LNG terminal expansion project is expected to intake nine million metric tons of LNG per year. This project will allow Singapore to increase LNG imports for re-exporting purposes. Singapore also plans to provide LNG bunkering to ships starting in 2017, and awarded the first pair of bunkering licenses to Pavilion Gas and a JV between Keppel Offshore & Marine and BG (now Royal Dutch Shell).¹¹³ In 2016, the Singapore Exchange set a spot price index for Asian LNG, known as Singapore SLInG, and is set to start an index that will track the price of LNG in the Middle East and India.¹¹⁴

Market Analysis

In 2016, Singapore was the eleventh largest destination for U.S. exports of O&G equipment, though exports dropped to \$458 million from \$1.07 billion in 2015. The most significant U.S. exports to Singapore were parts for boring or sinking machinery, machines or mechanical appliances with individual functions and reciprocating positive displacement pumps, which represented about half of total U.S. exports of O&G equipment to Singapore.

In 2015, the United States was by far the largest source for Singaporean imports of O&G equipment, holding a 25 percent market share. After the United States, Singapore's largest sources for O&G equipment were China, Malaysia and Indonesia, holding 13, 9, and 8 percent market shares, respectively. Parts for boring or sinking

machinery (43 percent of imports) and parts and attachments for derricks (15 percent) represented the majority of Singapore's O&G equipment imports.

Singapore is a net exporter of O&G equipment and was the tenth largest shipper in the world in 2015, with nearly \$7.5 billion in total equipment exports. Its top export markets were Indonesia (\$1.2 billion in exports), Malaysia (\$824 million) and Australia (\$762 million), and exports to Asia comprised approximately 50 percent of total exports. Singapore's greatest amount of exports were parts for boring or sinking machinery and floating or submersible drilling/production platforms, which represented nearly 60 percent of total Singaporean exports of O&G equipment.

Challenges Facing U.S. Exporters

Low oil prices have impacted demand for new rigs and profits for offshore O&G companies, and pose challenges to increased U.S. O&G equipment exports to Singapore. However, as government financing programs and rising oil prices help the Singapore offshore O&G industry to recover, we expect new commercial opportunities to arise for U.S. companies.

Falling rig counts in Asia have reduced demand for new oil rigs and offshore equipment manufactured in Singapore, in turn, impacting demand for U.S. O&G equipment exports to this market. From June 2014 to April 2016, rig counts in Asia declined by nearly 29 percent from 251 rigs to only 179 rigs, before increasing marginally to 198 rigs in operation in January 2017.¹¹⁵ Low oil prices have slowed investment in upstream activities and have reduced capital expenditures in oil producing countries, which has greatly reduced demand for new rigs as many oil producers have halted new projects.

Reduced demand for new rigs and offshore equipment has severely affected the health of Singapore's offshore O&G sector, as the existing fleet is underutilized and a supply overhang for new builds remains. Keppel Corporation, one of the larger offshore and marine firms in Singapore, reported that its 2016 net profits were down 49 percent from 2015, largely due to lower contributions from Keppel Offshore & Marine.¹¹⁶ Keppel Corporation also reported that they will be closing three of their nine shipyards in Singapore and have been forced to make cuts totaling 10,600 positions, which is 35 percent of the Keppel Offshore & Marine direct workforce.¹¹⁷ Despite cuts to capital expenditures and the workforce, offshore companies continue to face significant debt issues, resulting in the offshore services firm, Swiber Holdings, to file for bankruptcy last year.

Government loan programs are expected to play a significant role in the recovery of Singapore's offshore O&G industry, particularly in combination with rising oil prices and gradual demand increases for offshore services. Singapore-based O&G companies are facing substantial refinancing pressures, as more than forty percent of the debt accrued by the most fifteen indebted offshore services companies comes due in 2017.¹¹⁸ In December 2016, the Ministry of Trade and Industry introduced two measures to help marine and offshore firms gain access to capital and financing. The first measure increases the trade agency IE Singapore's finance scheme for the sector to \$70 million per borrower group from the current \$30 million, and the second measure reintroduced a bridging loan scheme that allows Singapore-based firms to borrow up to \$5 million each for up to six years to finance operations and bridge short-term cash flow gaps.¹¹⁹ The Singapore government estimates the schemes could lead to \$1.6 billion of loans in one year, which amounts to almost half of the total debt, owed by listed O&G companies, maturing in 2017.¹²⁰

Opportunities for U.S. Companies

Transparent business practices as well as a well-regulated and fully privatized O&G industry make Singapore an ideal location for U.S. companies to expand operations and enter the Asian market. Singapore's hospitable business environment creates intense global competition within its offshore O&G and marine sectors, and U.S. companies looking to enter Singapore and Asian markets should emphasize the quality and technological advancements of their products and services. Quality products and superior after-sale service are essential to competing effectively in Singapore. Although standards need to be further developed, more local companies are adopting the American Petroleum Institute's industry standards, increasing the competitiveness of U.S. technologies and practices.

Despite the current challenges facing Singapore's offshore O&G sector, there are commercial opportunities for U.S. companies to support regional marine and subsea operations, LNG infrastructure and bunkering, and refinery upgrades. In the area of marine and subsea operations, there is a need for companies to support existing upstream projects in the region, in particular for conducting geographical surveys, navigation and positioning, hydrographic surveys and underwater inspection services, information systems and marine forecasting. In addition to opportunities surrounding the LNG regasification terminal expansion project, Singapore aims to meet its domestic natural gas needs from LNG sources and may require the construction of an additional LNG regasification terminal. Although concrete plans for additional LNG infrastructure have not been released, it is anticipated that a FSRU may be best suited in the long term to meet Singapore's increasing LNG imports. In the downstream sector, refinery upgrades are needed to improve feedstock flexibility and plant performance and ensure domestic refiners maintain a competitive advantage over others refiners in the region. Refiners are also being encouraged to undergo upgrades to improve energy efficiencies and minimize carbon output ahead of Singapore's carbon tax measure, which will be implemented in 2019.

Some specific equipment and services opportunities in Singapore include:

- Technologies relating to enhanced oil recovery and drilling fluids for offshore projects;
- Equipment and services for the upstream and downstream oil and gas sectors, shipbuilding, marine, mechanical and electrical construction, oxidation additives and various control systems;
- Oilfield equipment that includes instrumentation such as drilling information systems, drilling monitors, mud logging units, mud monitoring systems, torque gauges, pressure gauges, weight indicators, deadline anchors, valves/actuators, performance testing and design control systems;
- Tubular products such as casings, tubing, carbon steel line pipes, drill pipes, heavy wall pipes, drill collars, drill stem tubular accessories, and mechanical alloy steel tubes.

Guidance and Resources for Exporters

The following information is intended to provide guidance and resources for U.S. exporters looking to sell their services in Singapore.

- International Trade Administration Country Commercial Guide: https://www.export.gov/article?series=a0pt0000000PAuoAAG&type=Country_Commercial_kav
- Other ITA Market Research: <https://www.export.gov/article?id=Singapore-Oil-and-Gas>
- Singapore Economic Development Board (SEDB): <https://www.edb.gov.sg>
- International Enterprise Singapore (IE Singapore): <http://www.iesingapore.gov.sg/>
- Spring Singapore: <http://www.spring.gov.sg>

Trade Shows

- Offshore Technology Conference (OTC) 2017, May 1-4, 2017 – Houston, Texas: <http://www.otcnet.org/>
- OSEA 2018, December 4-6, 2018 – Singapore: <http://www.osea-asia.com>

International Trade Administration, U.S. Commercial Service, Singapore Contact

Mr. CHAN Y K, Commercial Specialist

Email: yiukei.chan@trade.gov

Appendix I: Methodology

ITA’s methodology is applied to a sample size of 151 countries to determine the greatest market opportunities for U.S. O&G equipment exports. This year’s sample size is expanded to include 151 countries, which differs from the 74 countries sample size included in previous editions of this report. The sample size includes countries with O&G reserves as reported by the U.S. Energy Information Administration, as well as countries without O&G reserves whose import market for O&G equipment exceeded \$10 million in 2015 and countries without O&G reserves which received more than \$10 million in U.S. exports of O&G equipment in 2015.

To calculate market opportunities for U.S. O&G equipment exports, the eight indicators listed below are weighted and summed together to provide a relative ranking that results in a list of possible top market prospects. The list includes countries in diverse geographic areas and is consistent with where there is projected upstream investment. A country may be included as a top market prospect even if it is not ranked highest for one or two indicators, provided the country has sufficiently favorable rankings in other indicators. When summing across the “export opportunity” indicators ranked by quartile, the initial top thirty markets emerge, spanning all continents except Antarctica.

Proximity to the United States

The Proximity Indicator, or the distance goods must travel from point of origin to point of destination, is statistically significant in explaining changes in international trade. The indicator is used to as a proxy for transportation costs, which are not consistently available for U.S. O&G equipment shipments. The study employs a proximity variable based on the French Research Center in International Economics that provides bilateral distances in kilometers for the countries selected using a population-weighted center. The country distances from the United States are divided into quartiles (with 4 being the closest), which are then added to the final score to rank countries against one other. Because proximity was found to be very relevant to export trends, the Proximity Rank is given 10 percent of the overall weight of the final score [see Figure 11].

Indicator	Quartile	Range (Numerical)	Score/ Rank
Proximity to the United States	Closest	1,623.7 - 7,771.8 km	4
	2nd Closest	7,825.1 – 9,461.0 km	3
	3rd Closest	9,705.8 – 12,155.9 km	2
	Furthest	greater than 12,196.2 km	1

U.S. Exports

In 2016, U.S. O&G equipment and pipe exports totaled \$18.3 billion. According to ITA projections, \$25.3 billion in U.S. O&G equipment and pipe will be exported in 2020. The U.S. Exports variable captures future trends and preferences for countries’ imports from the United States and is weighted as 25 percent of a country’s overall score.

To determine the U.S. Exports Indicator, we employ data on U.S. shipments of pipe and equipment to each country as reported by the United States. These figures are not necessarily identical to those each country reports as pipe and equipment imports from the United States, as country standards for classifying imports may differ from U.S.

standards for classifying exports. Despite this discrepancy, we believe that export figures reported by the United States are the most appropriate data available for the purposes of this report. To provide a more realistic projection based on the current low oil price environment and its effect on O&G equipment trade, 2017 U.S. export projections are adjusted to include a 9 percent decrease.

The U.S. Exports Indicator is subdivided into equipment and pipe exports. These subdivisions are further divided into 2016 values, 2020 projected values, and the projected CAGR 2016-2020. Each figure is grouped into four quartiles, and the quartile rankings are averaged to provide a score for the U.S. Exports Indicator for each country. The countries with the greatest amount of U.S. exports in receive a rank of 4, while the countries with the least amount of U.S. exports receive a rank of 1. The countries with the highest growth rates between 2016 and 2020 receive a rank of 4 while the countries with the lowest growth rates receive a rank of 1. Quartile ranges for equipment and pipe export values differ, and some countries are highly ranked for equipment exports but not for pipe exports. For example, South Africa is in the top quartile for U.S. equipment exports but not for U.S. pipe exports in 2020 [see Figure 12].

Figure 12: Legend, U.S. Exports Indicator

Indicator		Quartile	Range (Numerical)	Score/ Rank	
Projected U.S. Exports in 2020 *	equipment	2016 value	Largest	\$74.9 - \$3,440.4 million	4
			2nd Largest	\$10.5 - \$69.0 million	3
			3rd Largest	\$2.5 - \$10.4 million	2
			Smallest	less than \$2.3 million	1
		Projected 2020 value	Largest	\$98.6 - \$4,413.7 million	4
			2nd Largest	\$17.7 - \$91.0 million	3
			3rd Largest	\$3.8 - \$17.5 million	2
			Smallest	less than \$3.2 million	1
		CAGR 2016-2020	Largest	13.3 – 45.9%	4
			2nd Largest	6.2 – 12.8%	3
			3rd Largest	-(0.5%) – 6.2%	2
			Smallest	less than -0.9%	1
	pipe	2016 value	Largest	\$4.0 - \$389.7 million	4
			2nd Largest	\$881,933 - \$3.9 million	3
			3rd Largest	\$58,650 - \$874,894	2
			Smallest	less than \$44,542	1
Projected 2020 value		Largest	\$11.8 - \$998.3 million	4	
		2nd Largest	\$2.0 - \$10.5 million	3	
		3rd Largest	\$155,781 - \$2.0 million	2	
		Smallest	less than \$154,235	1	
CAGR 2016-2020		Largest	24.9 – 121.4%	4	
		2nd Largest	9.5 – 24.2%	3	
		3rd Largest	-(3.2) – 8.6%	2	
		Smallest	less than -3.3%	1	

Import Market

Global O&G equipment import markets are estimated to reach \$205 billion in 2020, with a projected \$25.3 billion originating from U.S. equipment and pipe suppliers. The Import Market indicator reflects demand and forecasts openness and growth for U.S. exporters and is weighted to provide 15 percent of the final score. To provide more realistic projections based on the current low oil price environment and its effect on O&G equipment trade, 2016 import market projections are adjusted to account for a 15 percent decrease and 2017 projections are adjusted to account for a 9 percent decrease.

The Import Market Indicator is subdivided into equipment and pipe, which are further divided into the projected market size in 2020, 2015-2020 market growth rate and projected U.S. share of the market in 2020. Each figure is grouped into four quartiles, and the quartile rankings are averaged to provide a score for the Import Market indicator. A rank of 4 is issued to countries with the largest values within each concept [see Figure 13, next page].

Figure 13: Legend, Import Market Indicator

Indicator		Quartile	Range (Numerical)	Score/ Rank		
Projected Market Size in 2020*	equipment	2015 value	Largest	\$923.8 - \$13,202.6 million	4	
			2nd Largest	\$92.7 - \$871.0 million	3	
			3rd Largest	\$11.3 - \$89.9 million	2	
			Smallest	less than \$10.7 million	1	
	equipment	Projected 2020 value	Largest	\$1,195.4 - \$15,975.7 million	4	
			2nd Largest	\$225.1 - \$1,192.3 million	3	
			3rd Largest	\$50.9 - \$224.2 million	2	
			Smallest	less than \$43.6 million	1	
	equipment	CAGR 2015-2020	Largest	10.3 – 44.0%	4	
			2nd Largest	3.2 – 10.1%	3	
			3rd Largest	-(1.5) – 3.1%	2	
			Smallest	less than -1.6%	1	
	equipment	U.S. Share of the market in 2020	Largest	greater than 18.7%	4	
			2nd Largest	5.9 – 18.3%	3	
			3rd Largest	2.5 – 5.9%	2	
			Smallest	less than 2.5%	1	
	pipe	pipe	2015 value	Largest	\$104.0 - \$2,167.5 million	4
				2nd Largest	\$20.5 - \$103.5 million	3
				3rd Largest	\$1.6 - \$19.5 million	2
				Smallest	less than \$1.5 million	1
pipe		Projected 2020 value	Largest	\$239.5 - \$2,197.6 million	4	
			2nd Largest	\$36.6 - \$227.4 million	3	
			3rd Largest	\$7.2 - \$34.2 million	2	
			Smallest	less than \$6.6 million	1	
pipe		CAGR 2015-2020	Largest	12.7 – 53.6%	4	
			2nd Largest	3.6 – 12.3%	3	
			3rd Largest	-(3.0) – 3.3%	2	
			Smallest	less than -3.1%	1	
pipe		U.S. Share of the market in 2020	Largest	greater than 11.5%	4	
			2nd Largest	2.8 – 11.3%	3	
			3rd Largest	0.7 – 2.7%	2	
			Smallest	less than 0.7%	1	

Below Ground Resources

The Below Ground Resources Indicator measures a country’s estimated, economically-viable O&G reserves. The variable is subdivided into a country’s estimated oil reserves and natural gas reserves, respectively, and further divided into projected reserves for 2020 and projected production in 2020 based on the U.S. Energy Information Administration history and BMI forecasts. The figures are then divided into quartiles, ranked and averaged to form the Below Ground Resources score. Countries with zero projected reserves, zero projected production or no data available are ranked a score of 1 and the remaining countries are re-divided into each quartile. During the

regression analysis, we determined that below ground resources do not have a significant impact on a country's imports. As a result, this variable is only weighted 5 percent of the overall score [see Figure 14].

Figure 14: Legend, Below Ground Resources Indicator

Indicator		Quartile	Range (Numerical)	Score/ Rank	
Below Ground Resources, 2020	Gas	Projected reserves	Largest	586 – 47,306 Bcm	4
			2nd Largest	37 - 577 Bcm	3
			3rd Largest	0.3 - 35 Bcm	2
			Smallest	no projected reserves	1
		Projected production	Largest	28 - 647 Bcm	4
			2nd Largest	4 - 28 Bcm	3
			3rd Largest	0.1 - 3 Bcm	2
			Smallest	no projected production	1
	Oil	Projected reserves	Largest	1,915.3 – 299,626.8 mn bbl	4
			2nd Largest	113.0 – 1,710.2 mn bbl	3
			3rd Largest	0.4 – 105.8 mn bbl	2
			Smallest	no projected reserves	1
		Projected production	Largest	60.8 – 4,615.6 mn bbl	4
			2nd Largest	5.4 – 58.3 mn bbl	3
			3rd Largest	0.04 – 5.3 mn bbl	2
			Smallest	no projected production	1

Upstream Project Investments

Using publicly available information, the Upstream Project Investment variable summarizes investments for specific O&G projects by country. BMI maintains a database of on-going upstream projects, including project parameters and the known investments. Data are available for 61 countries as of December 19, 2016 when data were pulled. Some countries, such as China, Mexico and Brazil, do not publically report all upstream project investments as these investments may be associated with a state-owned enterprise. Similar to other variables, country investment figures are ranked into quartiles to determine each country's score for the Upstream Project Investment indicator. The indicator is only weighted 5 percent of the overall score as upstream investments are not shown to have significant impact on a country's imports [see Figure 15].

Figure 15: Legend, Known Upstream Investment Projects Indicator

Indicator		Quartile	Range (Numerical)	Score/ Rank
Known Upstream Investment Projects	Only 61 countries' data available	Largest	\$20,800 - \$265,297 mn	4
		2nd Largest	\$4,388 - \$20,300 mn	3
		3rd Largest	\$27 - \$4,300 mn	2
		Smallest	no data available/\$0	1

Institutional Risk

The Institutional Risk Indicator represents above-ground risk as institutions play a significant role in the risk profile facing companies. Corruption, the absence of rule of law and civil unrest can all negatively affect trade with

otherwise high-potential markets. Together, the Institutional Risk indicator is given a 5 percent weight towards the overall score.

The World Bank's Worldwide Governance Indicators assess the quality of institutions by using data from a variety of organizations to comprise six concepts: (i) Control of Corruption, (ii) Rule of Law, (iii) Regulatory Quality, (iv) Government Effectiveness, (v) Political Stability and Absence of Violence, and (vi) Voice and Accountability. The Worldwide Governance Indicators have been updated annually since 1996, and the most recently available data set comes from 2015.

To calculate the Institutional Risk score, each country is ranked according to their percentile scores and divided into quartiles for each of the six identified measures. The quartile ranks are summed and averaged to calculate the Institutional Risk score. The scores range from 4 (least risky), for countries like Canada, Australia and Norway, to 1 (most risky), for countries like Iraq and Venezuela [see Figure 16].

Figure 16: Legend, Institutional Risk Indicator

	Indicator	Quartile	Range (Numerical)	Score/ Rank
Institutional Risk	Control of Corruption: Percentile Rank	Largest	72.3-100	4
		2nd Largest	45.7-70.7	3
		3rd Largest	23.1-45.2	2
		Smallest	0-22.6	1
	Government Effectiveness: Percentile Rank	Largest	76.0-100	4
		2nd Largest	51.4-75.0	3
		3rd Largest	26.4-51.0	2
		Smallest	0-26.0	1
	Voice and Accountability: Percentile Rank	Largest	71.4-100	4
		2nd Largest	47.3-69.5	3
		3rd Largest	24.6-46.8	2
		Smallest	0-24.1	1
	Rule of Law: Percentile Rank	Largest	74.5-100	4
		2nd Largest	47.6-73.1	3
		3rd Largest	25.0-47.1	2
		Smallest	0-24.5	1
	Regulatory Quality: Percentile Rank	Largest	75.0-100	4
		2nd Largest	51.9-74.5	3
		3rd Largest	29.3-51.4	2
		Smallest	0.5-28.8	1
Political Stability and Absence of Violence/Terrorism: Percentile Rank	Largest	65.2-99.0	4	
	2nd Largest	43.8-64.8	3	
	3rd Largest	21.4-42.9	2	
	Smallest	0-21.0	1	

Business Environment

The Business Environment Indicator considers the quality and efficiency of business regulations facing companies in foreign markets. Similar to institutional risk, low quality, non-transparent and inefficient business processes can

negatively affect trade with otherwise high-potential markets. This variable reflects the general business environment for each country and does not consider business regulations or processes specific to the O&G sector. The Business Environment Indicator is weighted 10 percent of the overall score.

The Business Environment Indicator uses data from the World Bank’s Ease of Doing Business ranking, which is based on country rankings for 10 topics within its *Doing Business* report. The *Doing Business* report has been published annually by the World Bank since 2003, and the most recently available data set comes from the 2017 edition of the report.

To calculate the Business Environment Indicator, each country is ranked according to their Ease of Doing Business scores and divided into quartiles. The quartile rankings range from 4 (most business-friendly), for countries like Singapore, New Zealand and Denmark, to 1 (least business-friendly), for countries like Venezuela and Libya [see Figure 17]. Ease of Doing Business scores for Turkmenistan are unavailable.

Figure 17: Legend, Business Environment Indicator

Indicator	Quartile	Range (Numerical)	Score/ Rank
Business Environment	Highest	73.2-87.0	4
	2nd Highest	63.8-73.1	3
	3rd Highest	54.5-63.7	2
	Lowest	no data available/20.3-54.4	1

Qualitative Ranking

The Qualitative Rating Indicator incorporates O&G industry knowledge from ITA, Industry and Analysis Unit’s Office of Energy and Environmental Industries. The variable attempts to capture qualitative issues in a quantitative measure for the purposes of the Top Markets Report. The Qualitative Rating Indicator complements the Business Environment indicator to quantify potential commercial opportunities and considers the business environment specific to the O&G sector.

Scores for this indicator are calculated by evaluating each country’s proven O&G reserves and new O&G discoveries as well as market access issues such as regulatory framework and environmental regulations. Countries with significant commercial opportunities receive a score of 4 while countries with no commercial opportunities or countries currently under sanctions receive a score of 1. The Qualitative Rating Indicator is weighted 25 percent of the overall score [see Figure 18].

Figure 18: Legend, Qualitative Rating Indicator

Indicator	Quartile	Score/ Rank
Qualitative Rating	Significant commercial opportunities	4
	Some commercial opportunities	3
	Few commercial opportunities	2
	Little to no commercial opportunities	1

Analysis Used to Determine Indicator Weights

To determine which markets might be most promising for U.S. exporters based on the information available, we had to determine the relative importance of the eight measured indicators on future U.S. exports. Weights were assigned to each indicator following a regression analysis based on econometrics and industry knowledge from ITA.

Final Weights Calculated

Proximity to the U.S.: Slightly Strong Weight (10 percent)
U.S. Exports: Relatively Strong Weight (25 percent)
Import Market: Slightly Strong Weight (15 percent)
Below Ground Resources: Weak Weight (5 percent)
Upstream Projects: Weak Weight (5 percent)
Institutional Risk: Weak Weight (5 percent)
Business Environment: Slightly Strong Weight (10 percent)
Qualitative Rating: Relatively Strong Weight (25 percent)

Appendix II: Full Country Rankings

Sample Size: 151 Countries	Proximity to the U.S.	U.S. Exports	Import Market	Below Ground Resources	Upstream Projects (on-going)	Institutional Risk	Business Environment	Qualitative Rating (Commercial Opportunities)	Final Weighted Scenario	
	French Research Center for International Economics	ITA	ITA	EIA/BMI forecast	Publicly Available Upstream Investment, BMI	World Bank	World Bank	ITA	Weighted Score	Final Rank
Canada	4	3.50	3.63	4	4	4.00	4	4	3.82	1
Mexico	4	3.67	3.38	3.75	4	2.17	3	4	3.62	2
United Kingdom	4	3.17	3.00	3.75	4	3.83	4	4	3.62	3
Norway	4	3.33	3.00	4	4	4.00	3	4	3.58	4
Brazil	3	3.67	3.88	3.75	4	2.33	2	4	3.50	5
Netherlands	4	3.50	3.25	3.25	1	4.00	4	4	3.58	6
Nigeria	2	3.83	3.13	4	4	1.17	4	4	3.49	7
Argentina	3	3.67	3.63	3.75	4	2.00	2	4	3.45	8
Australia	1	3.50	3.25	3.75	4	4.00	4	4	3.45	9
Colombia	4	4.00	3.63	3.25	2	2.33	3	3	3.37	10
China	2	3.67	3.25	4	3	2.17	3	4	3.36	11
United Arab Emirates	1	3.33	3.00	4	4	3.50	4	4	3.36	12
Denmark	4	2.67	2.63	2.75	3	4.00	4	4	3.35	13
Israel	2	3.50	3.38	2.75	3	3.50	3	4	3.34	14
Singapore	1	3.67	3.50	1.25	1	3.67	4	4	3.24	15
Germany	4	3.17	3.25	3.25	1	3.83	4	3	3.23	16
Trinidad and Tobago	4	3.17	2.88	3.25	2	2.83	2	4	3.23	17
Chile	3	3.67	3.50	2.5	2	3.83	3	3	3.21	18
Saudi Arabia	2	3.50	3.38	4	4	2.50	1	4	3.21	19
Ecuador	4	3.67	3.63	3	3	1.67	2	3	3.19	20
Azerbaijan	2	3.17	2.75	4	4	1.67	3	4	3.19	21
Spain	4	3.33	3.00	2	1	3.67	4	3	3.17	22
Poland	3	3.17	3.13	3	2	3.67	4	3	3.14	23
Vietnam	1	3.17	3.25	3.75	3	2.17	3	4	3.13	24
Kuwait	2	2.83	2.75	3.75	4	2.50	3	4	3.13	25
Qatar	2	2.67	3.00	4	3	3.33	3	4	3.13	26
Italy	3	3.50	3.25	3	2	3.17	3	3	3.12	27
Kazakhstan	2	2.50	2.63	3.75	4	2.00	4	4	3.11	28
Malaysia	1	3.33	3.38	4	4	3.00	1	4	3.09	29
India	1	3.33	3.25	4	3	2.33	2	4	3.09	30
Ghana	2	3.33	2.88	2.75	3	2.83	2	4	3.09	31
Thailand	1	3.00	3.38	3.5	3	2.17	3	4	3.09	32
Turkey	2	3.33	3.00	2.5	1	2.50	3	4	3.08	33
Oman	1	3.50	3.00	4	4	2.83	1	4	3.07	34
Angola	2	3.33	3.38	3.5	4	1.17	1	4	3.07	35
Romania	3	3.17	2.88	3	2	3.00	4	3	3.07	36
Egypt	2	3.00	2.88	4	4	1.33	2	4	3.05	37
Ireland	4	2.83	2.63	1.75	2	4.00	4	3	3.04	38
Venezuela	4	3.50	3.13	3.75	4	1.00	1	3	3.03	39
Mauritania	4	2.83	2.50	1.75	2	1.17	3	4	3.03	40

Full Country Rankings (continued)

Sample Size: 151 Countries	Proximity to the U.S.	U.S. Exports	Import Market	Below Ground Resources	Upstream Projects (on-going)	Institutional Risk	Business Environment	Qualitative Rating (Commercial Opportunities)	Final Weighted Scenario	
	French Research Center for International Economics	ITA	ITA	EIA/BMI forecast	Publicly Available Upstream Investment, BMI	World Bank	World Bank	ITA	Weighted Score	Final Rank
Japan	2	3.17	3.00	2.25	1	4.00	4	3	2.95	41
Iraq	2	3.67	1.88	3.75	4	1.00	1	4	2.94	42
Mozambique	1	3.17	3.13	3	3	1.50	2	4	2.94	43
Russia	3	3.33	3.50	4	4	1.50	3	2	2.93	44
Indonesia	1	3.67	2.88	4	4	2.17	2	3	2.91	45
France	4	3.33	2.75	2	1	3.83	4	2	2.89	46
Guyana	4	2.83	2.13	1	2	2.00	2	4	2.88	47
Peru	4	3.67	3.25	3	2	2.33	2	2	2.87	48
South Africa	1	2.83	3.25	2.25	3	2.83	4	3	2.85	49
Bahrain	2	3.33	2.88	2.75	1	2.50	3	3	2.83	50
Bolivia	4	3.17	3.00	3	2	1.67	1	3	2.83	51
Ukraine	3	2.17	2.63	3.25	1	1.67	3	4	2.83	52
Korea	2	3.50	3.38	1.25	1	3.50	2	3	2.82	53
Senegal	3	2.33	2.63	1	1	2.50	3	4	2.80	54
Taiwan	2	3.33	3.00	2	1	4.00	4	2	2.73	55
Belgium	4	2.83	3.25	1	1	4.00	3	2	2.70	56
Dominican Republic	4	2.83	2.75	1	1	2.33	2	3	2.69	57
Algeria	3	2.83	2.63	4	3	1.50	1	3	2.68	58
Lithuania	3	2.33	2.75	1.5	1	3.83	3	3	2.66	59
Panama	4	3.33	3.13	1	1	3.00	2	2	2.65	60
Finland	4	2.33	2.75	1.5	1	4.00	4	2	2.62	61
Bulgaria	3	1.83	2.75	2	1	3.00	4	3	2.62	62
New Zealand	1	2.83	2.88	2.5	2	4.00	2	3	2.61	63
Cyprus	2	1.83	2.38	1	1	3.83	3	4	2.61	64
Georgia	2	2.33	2.38	1.75	1	3.17	4	3	2.59	65
Uruguay	3	2.50	2.63	1	1	3.67	2	3	2.55	66
Latvia	3	2.50	2.50	1.25	1	3.67	2	3	2.55	67
Sweden	4	2.83	3.13	1.25	1	4.00	4	1	2.54	68
Philippines	1	2.67	2.88	2.25	3	2.33	4	2	2.48	69
Austria	3	2.00	2.63	2.25	1	4.00	4	2	2.46	70
El Salvador	4	2.17	2.25	1	1	2.50	2	3	2.45	71
Switzerland	4	2.67	2.75	1	1	4.00	4	1	2.43	72
Libya	3	1.00	2.50	3.75	2	1.00	4	3	2.41	73
Jordan	2	2.50	2.38	1.75	1	2.67	2	3	2.40	74
Portugal	4	1.83	1.88	1.25	1	4.00	2	3	2.40	75
Greece	3	1.67	2.00	1.75	2	2.83	3	3	2.40	76
Kenya	1	2.83	2.75	1.25	1	1.67	2	3	2.37	77
Estonia	3	2.00	2.38	1.25	1	4.00	4	2	2.37	78
Czech Republic	3	2.67	2.63	2	1	3.83	4	1	2.35	79
Morocco	4	2.67	2.75	1.75	1	2.33	1	2	2.33	80

Full Country Rankings (continued)

Sample Size: 151 Countries	Proximity to the U.S.	U.S. Exports	Import Market	Below Ground Resources	Upstream Projects (on-going)	Institutional Risk	Business Environment	Qualitative Rating (Commercial Opportunities)	Final Weighted Scenario	
	French Research Center for International Economics	ITA	ITA	EIA/BMI forecast	Publicly Available Upstream Investment, BMI	World Bank	World Bank	ITA	Weighted Score	Final Rank
Brunei	1	2.17	2.75	3	3	3.50	3	2	2.33	81
Jamaica	4	2.17	2.13	1.25	1	3.00	3	2	2.32	82
Costa Rica	4	2.83	2.63	1	1	3.33	3	1	2.32	83
Croatia	3	1.50	1.88	2	1	3.00	3	3	2.31	84
Congo	2	3.00	2.63	3	3	1.17	1	2	2.30	85
Cameroon	2	3.17	3.00	2.5	1	1.00	1	2	2.27	86
Tunisia	3	1.83	2.38	2.75	2	2.33	3	2	2.27	87
Mongolia	2	1.67	2.38	1.5	1	2.50	3	3	2.27	88
Belarus	3	1.67	2.50	2.5	1	1.83	4	2	2.26	89
Nicaragua	4	2.67	2.63	1	1	1.83	1	2	2.25	90
Pakistan	1	2.50	2.50	3.25	2	1.67	3	2	2.25	91
Tanzania	1	2.83	3.13	2	1	2.00	2	2	2.23	92
Guatemala	4	3.00	2.75	1.5	1	1.67	2	1	2.22	93
Equatorial Guinea	2	2.83	1.00	3	2	1.17	1	3	2.22	94
Myanmar	1	2.17	1.00	2.5	3	1.00	1	4	2.22	95
Honduras	4	2.17	2.50	1	1	1.67	2	2	2.20	96
Bahamas	4	2.67	2.63	1	1	3.50	2	1	2.19	97
Uganda	1	1.83	2.50	2.5	2	1.67	2	3	2.19	98
Turkmenistan	2	2.33	1.00	3.75	3	1.17	1	3	2.18	99
Uzbekistan	2	2.00	1.00	3.5	3	1.17	2	3	2.18	100
Suriname	4	3.00	2.75	1.75	1	2.33	1	1	2.17	101
Armenia	2	1.33	1.88	1	1	2.17	4	3	2.17	102
Lebanon	2	2.17	2.38	1	1	1.50	1	3	2.12	103
Ivory Coast	3	2.67	2.88	2.25	3	1.83	1	1	2.10	104
Gabon	2	2.33	2.63	2.75	2	1.67	1	2	2.10	105
Kyrgyz Republic	2	2.00	2.00	1.75	1	1.33	4	2	2.10	106
Luxembourg	4	1.67	2.13	1	1	4.00	4	1	2.09	107
Hungary	3	2.17	2.00	2.5	1	3.17	3	1	2.03	108
Slovakia	3	1.83	1.88	2	1	3.50	4	1	2.01	109
Benin	2	2.33	2.50	1	1	2.33	1	2	1.98	110
Mauritius	1	1.83	2.13	1	1	3.83	3	2	1.97	111
Papua New Guinea	1	2.67	2.63	3	2	1.83	2	1	1.95	112
Namibia	1	2.17	2.38	1	1	3.00	2	2	1.95	113
Paraguay	3	2.00	2.38	1.25	1	1.83	3	1	1.91	114
Belize	4	1.83	2.38	1.5	1	2.33	2	1	1.91	115
Botswana	1	1.83	1.88	1	1	3.33	3	2	1.91	116
Serbia	3	2.17	2.00	2.25	1	3.00	2	1	1.90	117
Malta and Gozo	3	2.33	2.38	1	1	4.00	1	1	1.89	118
Iceland	4	1.17	1.63	1	1	4.00	4	1	1.89	119
Albania	3	1.67	2.13	2.25	1	2.67	3	1	1.88	120

Full Country Rankings (continued)

Sample Size: 151 Countries	Proximity to the U.S.	U.S. Exports	Import Market	Below Ground Resources	Upstream Projects (on-going)	Institutional Risk	Business Environment	Qualitative Rating (Commercial Opportunities)	Final Weighted Scenario	
	French Research Center for International Economics	ITA	ITA	EIA/BMI forecast	Publicly Available Upstream Investment, BMI	World Bank	World Bank	ITA	Weighted Score	Final Rank
Sri Lanka	1	2.00	2.25	1	1	2.67	2	2	1.87	121
Barbados	4	1.67	1.75	1.25	1	3.83	2	1	1.83	122
Ethiopia	1	2.17	2.38	2	1	1.50	1	2	1.82	123
Afghanistan	2	2.17	1.75	1	1	1.00	1	2	1.75	124
Bangladesh	1	1.83	2.25	2.5	1	1.33	1	2	1.74	125
Yemen	1	1.67	1.88	2.75	3	1.00	1	2	1.74	126
Rwanda	1	1.67	1.75	1	1	2.83	2	2	1.72	127
Mali	3	1.50	1.88	1	1	1.67	3	1	1.69	128
Liberia	3	2.83	1.00	1	1	1.50	1	1	1.68	129
Syria	2	1.17	2.13	3.25	1	1.00	1	2	1.67	130
Zambia	1	2.17	2.38	1	1	2.17	2	1	1.66	131
Nepal	1	1.83	1.88	1	1	1.50	4	1	1.66	132
Niger	2	2.00	2.38	2	1	1.67	1	1	1.64	133
Montenegro	3	1.50	1.13	1	1	3.00	3	1	1.64	134
Moldova	3	1.50	1.38	1	1	2.00	3	1	1.63	135
Cambodia	1	1.33	2.00	1	1	1.50	2	2	1.61	136
Malawi	1	1.50	1.75	1	1	2.17	4	1	1.60	137
Burkina	3	1.67	2.13	1	1	2.17	1	1	1.59	138
Guinea	3	1.17	1.63	1	1	1.17	1	2	1.59	139
Slovenia	3	1.17	2.13	1.25	1	3.83	1	1	1.56	140
Bosnia-Herzegovina	3	1.00	1.63	1	1	2.00	3	1	1.54	141
Fiji	2	1.50	1.75	1	1	2.50	2	1	1.51	142
Madagascar	1	1.33	1.88	1	1	1.67	1	2	1.50	143
Seychelles	1	1.17	1.25	1	1	3.17	4	1	1.49	144
Tajikistan	2	1.17	1.00	1	1	1.00	2	2	1.49	145
Chad	2	2.17	1.00	2	1	1.00	1	1	1.44	146
Togo	2	1.50	2.25	1	1	1.50	1	1	1.44	147
Macedonia	3	1.17	1.50	1	1	2.67	1	1	1.40	148
Democratic Republic of the Congo	1	2.50	1.00	1	1	1.00	1	1	1.38	149
Somalia	1	1.33	1.00	1	1	1.00	4	1	1.38	150
Zimbabwe	1	1.50	2.00	1	1	1.17	1	1	1.28	151

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