World Oil®

FORECAST AND DATA 2018
EXECUTIVE SUMMARY

Worldwide Drilling, Production and Reserves **WorldOil.com**

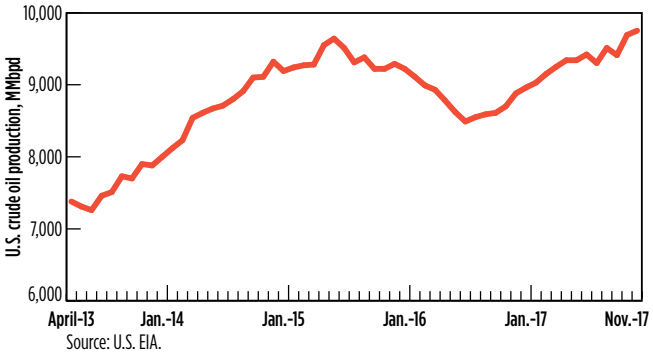
Better days ahead, as industry sits on brink of recovery

WORLD OIL EDITORIAL TEAM

The past year has been marked by rising rig counts, rising oil prices, and rising oil and gas production. The worst of the downturn that struck the E&P sector in 2014 is over, and the recovery is now progressing. Operators are producing hydrocarbons more efficiently than ever before, primed to capitalize on favorable crude prices in 2018, with OPEC's cooperation.

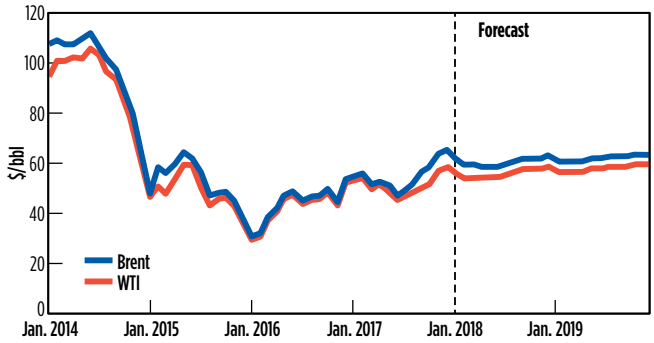
As upstream activities continue to expand in North America, demand for oilfield services is also increasing, which will help service companies begin to garner more pricing power during 2018. In fact, onshore activity picked up so much in 2017 that the oilfield services sector is still struggling to keep up. A build-up of drilled-but-uncompleted (DUC) wells has inhibited the U.S. rig count's growth rate in the last six months, and a shortage of pressure pumping crews has caused a bottleneck in hydraulic fracturing activity. Though drilling and production activity is increasing throughout much of the U.S., the country's top focus will remain the Permian basin, and any meaningful recovery in the offshore sector still seems to be on hold.

Fig. 1. U.S. oil production ramped up in 2017 and is on pace to eclipse the peak of 2015.



Source: U.S. EIA.

Fig. 2. WTI and Brent crude prices have steadily improved from the lows of February 2016 and are forecast to continue on a stable incline.



Source: U.S. EIA.

These market factors have been confirmed through *World Oil*'s surveys of U.S. operators, U.S. state agencies, and international petroleum ministries and departments. Thus, *World Oil*'s editorial staff presents its 2018 industry forecast:

- U.S. drilling will increase 12%, to 27,095 wells
- U.S. footage will increase 14.8%, to a total of 308,331.2 ft
- Offshore drilling in the U.S. Gulf of Mexico will decrease 8.4%, to 109 wells drilled
- Canadian activity, for the moment, is in a holding pattern, with 7,000 wells expected
- Global drilling should increase 4.6%, to 43,456 wells, with offshore activity improving 10.4%, to 2,355 wells.

U.S. MARKET FACTORS

E&P activity in the U.S. has been stimulated by growing oil prices, as operators increased capex in 2017 and are expected to continue expanding budgets during 2018. Natural gas demand also will play a part, as the U.S. became a net exporter of the resource in January. Operationally, companies are becoming better at extracting unconventional oil and gas. They are leveraging lessons learned during the recent downturn to drill for, and produce, hydrocarbons more economically—drilling shale wells with increased depths and lateral lengths, and completing wells with greater proppant volumes, Fig. 1.

Oil and gas prices. Brent and WTI prices have risen substantially since January 2017, from around $50 to $55/bbl in the early part of last year, up to around $60 to $70/bbl in the last two months, Fig. 2. A major driver for this is the sustained effort by OPEC and Russia to continue with oil supply cuts into the foreseeable future, although shale oil production has trended upward along with oil prices. With a vast array of acreage that operators can choose from in the U.S. Lower 48—each with a different break-even oil price level—shale activity has insulated oil price growth in the past year. The limits of shale geology are sure to be tested in 2018, as service costs rise along with increased activity, which could make increased investment in these unconventional regions less attractive.

Though natural gas pricing has been more volatile in the past year, the Henry Hub spot price spiked from a low of about $2.600/MMBtu in December 2017, to a high of about $3.200/MMBtu in January 2018, Fig. 3. Demand for natural gas energy is expected to remain substantial, as the U.S. prepares to increase its LNG export capacity. The U.S. has one export facility, the Sabine Pass terminal in Louisiana, but at least two new LNG export facilities are planned to launch during 2018. As long as free trade of energy between the North American countries remains intact, the U.S. is looking to increase its supply of natural

gas via pipeline to Mexico. Net exports of U.S. natural gas are estimated at 0.4 Bcfd in 2017, up from net imports of 1.8 Bcfd in 2016, according to the U.S. EIA.

Capex. Not surprisingly, U.S. E&P spending is projected to continue increasing during 2018, following the recent gains in commodity prices. Investment banking firm Evercore ISI forecasts U.S. capex to increase an estimated 15% in 2018, according to the company's December 2017 outlook. The report says that while 2018 will be a year of consecutive improvement when it comes to upstream spending, capex levels are still expected to sit below 50% of peak-2014 spending levels.

Much, if not all, of the money coming back into the U.S. E&P sector is expected to be set aside for shale development. Companies that persevered through the downturn in oil prices have emerged with a new focus for return-on-investment, rather than "unbridled production growth," as the team at Evercore puts it. This dynamic could keep the majors and larger independents in more short-cycle unconventional plays, rather than multi-year deepwater projects, until something forces these companies to change course—such as "a looming supply shortfall," suggests Evercore. Otherwise, operators are expected to remain conservative, leaning toward small shale projects that allow companies to turn a profit in a matter of months.

The Permian basin remains the king of all shale plays. As majors divert cash away from large international projects, the Permian seems to be the main beneficiary. Majors are now competing head-to-head with larger independents, as well as small private equity-backed outfits in the unconventional plays of West Texas and southeastern New Mexico. "With higher Brent prices, however, international/offshore projects will need to be pursued, to replace larger legacy declines, and perhaps near-term cash flow stimuli in (North America) could compel majors to commit to sustainable investment internationally," the Evercore report states.

Oilfield service companies look to keep pace with demand. With capex increasing in 2018, a meaningful uptick in business for oilfield service companies is inevitably on the way, as well. However, the growth is expected to look different than oilfield service activity trends have traditionally appeared. Though the average monthly U.S. rig count exhibited a 66.6% year-over-year gain from 2016 to 2017, the rise in drilling rigs began to stagnate in late 2017, and rig count levels could remain steady for the first half of 2018, barring any sudden spikes in oil prices, Fig. 4.

Operators learned to squeeze more production out of each well—by high-grading acreage, drilling longer laterals and pumping higher proppant volumes. These tactics have lessened the need for a large volume of wells to substantially increase production. For example, while the U.S. rig count is nowhere close to its level in summer 2014, production is soaring, and could surpass 10 MMbopd as early as February. U.S. crude production could even reach 11 MMbpd by year-end 2019.

Yet, operators also need to address a rising DUC count before planning any vast drilling project expansions. Austin-based research firm DrillingInfo defines DUCs as wells that have been drilled and remain uncompleted for more than six months. For instance, as of December, the firm had a count of about 539 Permian DUC wells, and the company tracked an average of about 30 new DUC wells per month in the region during 2017. While a big buildup in DUC wells may not be great news for drilling contractors, it does mean that the services of hydraulic fracturing providers will be in high demand during 2018. Rates for fracing crews grew 30% in 2017, and could grow by as much as 10% in 2018, according to IHS Markit.

Infrastructure. There has been a push recently to add pipeline capacity, to deal with increased supplies of hydrocarbon energy to Mexico. In December 2017, Texas Railroad Commissioner Ryan Sitton told *World Oil* that he expects about 600,000 boed of added transport capacity in Texas by 2019. This is added infrastructure that will be necessary to help the Permian reach its production potential, and also as support in case of pipeline interruption, such as what occurred during Hurricane Harvey last August. Indeed, Sitton expects that production in the West Texas portion of the Permian will reach 2.0 MMbopd to 3.0 MMbopd within the next 10 years.

U.S. ACTIVITY OUTLOOK

Drilling rigs may not be added as rapidly in 2018 as was observed in early 2017, but as long as oil prices continue trend-

Fig. 3. Henry Hub spot prices have been fairly constant in the past year, and have also had a recent boost due to colder winter temperatures in the U.S.

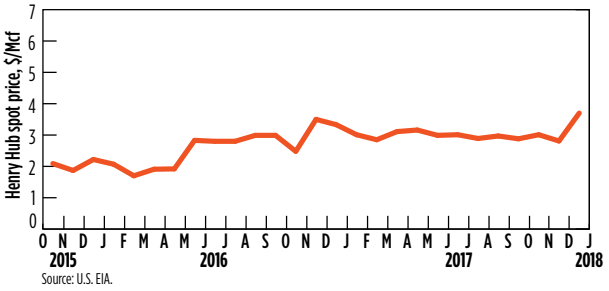
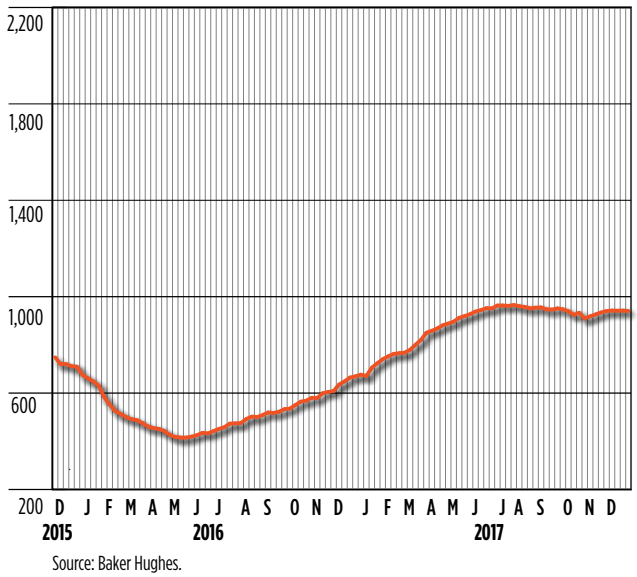


Fig. 4. The U.S. rig count grew substantially in the first half of 2017, but has stagnated in recent months, as operators are drilling wells more efficiently, and as a drilled but uncompleted (DUC) well count buildup is limiting growth in drilling.



ing upward, operators will be drilling more wells. With more operators turning to multi-well pads in shale plays, it seems that companies are also drilling more wells with less rigs. The Permian is expected to continue to drive the growth in drilling activity, but the number of wells drilled will also climb in other major plays, such as the Bakken, Utica, Marcellus and Haynesville. Offshore activity remains in steady decline, with more operators steering capital toward shale development in lieu of deepwater megaprojects. Therefore, *World Oil* forecasts a 12% increase in overall U.S. drilling activity in 2018, up to 27,095 wells drilled. Total footage in the U.S. is also expected to increase 14.8% to 308.3 million ft, indicative of the long laterals that operators are drilling.

Texas. Drilling activity in the Lone Star State is projected to grow 10%, and each district is expected to exhibit improvement. By far, District 8, in the heart of the Permian basin, will garner the largest volume gain, from 4,340 wells drilled in 2017 to a forecast 4,776 wells in 2018, a 10% increase. Other districts that encompass the Permian are also expected to experience growth, with activity in District 7C projected to increase 8.6%, to 1,075 wells drilled, and District 8A will post a 7.4% gain, to 1,019 wells.

A notable uptick is also expected for the Eagle Ford's oil and gas shale plays, and for conventional drilling. Districts 1, 2, 3, 4, 5 and 6 are forecast to experience a combined 10% growth over 2017, up to 4,391 wells drilled this year. Drilling in District 7B, which holds the Barnett shale, is forecast to grow 16.1%. A 17.5% increase is expected for District 10, to 316 wells.

Oklahoma. The SCOOP and STACK plays in Oklahoma may be the most interesting areas for shale development outside of the Permian basin in the entire U.S. So far, the region is still dominated by large and mid-sized independent oil companies. Though these plays haven't gained the notoriety of the Permian, wells in the SCOOP/STACK can achieve prolific production rates—some of the best in all of North America. As such, *World Oil* predicts an annual 13.7% gain in drilling activity for Oklahoma during 2018, up to 2,489 wells drilled.

New Mexico. Though the Land of Enchantment holds much of the western portions of the Permian basin, it has not yet seen the same activity boosts that have taken place in West Texas. However, that started to change in 2017, and it should continue to improve during 2018. Due to its Bone Spring acreage, within the southeastern part of the state, New Mexico is expected to reap an annual 24% gain in drilling activity during 2018, up to 1,748 wells drilled. Nationally, this forecast would put New Mexico in third place for wells drilled, behind *World Oil*'s predictions for Texas and Oklahoma.

North Dakota. The Bakken is still a steady basin with the richest production in America's Heartland. Accordingly, North Dakota's drilling activity is expected to grow from 1,035 wells in 2017 to 1,229 in 2018, an 18.7% increase. While it isn't expected to have any grand performance gains in the near future, it remains a consistent crude producer, led by such operators as Continental and Hess.

Louisiana. The Haynesville gas play in the northern part of the state could ramp up with increased U.S. efforts to export LNG around the world. In 2018, however, based on state agency data, *World Oil* only expects a modest 6.7% increase, from 601

Table 1. Forecast of 2018 U.S. wells and footage to be drilled.

	Total wells			Total footage, 1,000 ft		
State or area	2018 forecast	2017 estimated[4]	% diff	2018 forecast	2017 estimated[4]	% diff
Alabama[1]	55	40	37.5	412.5	292.0	41.3
Alaska	111	131	–15.3	757.0	893.4	–15.3
Alaska–offshore[2]	12	11	9.1	64.8	59.4	9.1
Arkansas	45	36	25.0	350.0	64.8	440.1
California	1,417	1,201	18.0	3,457.5	2,780.3	24.4
California–offshore[2]	28	17	64.7	137.1	82.5	66.2
Colorado	1,275	1,175	8.5	15,682.5	14,217.5	10.3
Gulf of Mexico[2]	109	119	–8.4	2,103.7	2,296.7	–8.4
Illinois	253	207	22.2	708.4	527.9	34.2
Indiana	92	82	12.2	147.2	131.2	12.2
Kansas	1,414	1,337	5.8	4,206.7	3,984.3	5.6
Kentucky	162	161	0.6	270.0	305.0	–11.5
Louisiana[1]	641	601	6.7	6,892.0	6,433.5	7.1
North	544	508	7.1	6,038.4	5,633.7	7.2
South	97	93	4.3	853.6	799.8	6.7
Michigan	45	45	0.0	250.0	250.0	0.0
Mississippi[1]	46	46	0.0	471.5	469.2	0.5
Montana	35	27	29.6	227.5	175.5	29.6
Nebraska	75	58	29.3	337.5	261.0	29.3
New Mexico	1,748	1,410	24.0	23,598.0	17,202.0	37.2
New York	48	21	128.6	88.8	38.9	128.3
North Dakota	1,229	1,035	18.7	25,447.2	21,450.4	18.6
Ohio	507	423	19.9	8,745.8	7,106.4	23.1
Oklahoma	2,489	2,190	13.7	31,361.4	27,375.0	14.6
Pennsylvania	1,115	991	12.5	13,380.0	11,495.6	16.4
South Dakota	3	2	50.0	21.3	6.9	208.7
Tennessee	35	29	20.7	85.8	70.2	22.2
Texas[1]	12,440	11,308	10.0	151,665.5	135,886.1	11.6
District 1	1,669	1,552	7.5	24,701.2	22,348.8	10.5
District 2	1,165	1,091	6.8	17,242.0	15,764.9	9.4
District 3	604	503	20.1	5,768.2	4,778.5	20.7
District 4	428	396	8.1	5,671.0	5,227.2	8.5
District 5	146	128	14.1	1,576.8	1,373.4	14.8
District 6	379	321	18.1	4,434.3	3,739.7	18.6
District 7B	390	336	16.1	1,579.5	1,344.0	17.5
District 7C	1,075	990	8.6	14,781.3	13,563.0	9.0
District 8	4,776	4,340	10.0	64,476.0	58,069.2	11.0
District 8A	1,019	949	7.4	5,910.2	5,314.4	11.2
District 9	473	433	9.2	2,365.0	1,753.7	34.9
District 10	316	269	17.5	3,160.0	2,609.3	21.1
Utah	229	195	17.4	2,404.5	2,026.1	18.7
Virginia	180	211	–14.7	426.9	501.2	–14.8
West Virginia	327	277	18.1	3,760.5	3,130.1	20.1
Wyoming	912	793	15.0	10,716.0	9,119.5	17.5
Others[3]	18	7	157.1	153.6	38.9	294.9
Total U.S.	27,095	24,186	12.0	308,331.2	268,671.5	14.8

[1] Excludes state and federal offshore wells, which are included in the GOM total.
[2] Includes state and federal offshore wells.
[3] Includes Arizona, Florida, Missouri, Nevada and Oregon.
[4] 2017 estimates are based on well counts furnished by state and federal regulatory agencies, and API.

wells drilled in 2017 to 641 in 2018. South Louisiana should receive a 4.3% bump, up to 97 wells drilled in 2018.

Northeastern states. Drilling in the Marcellus and Utica plays remains strong, and operators in these plays have continued to drill longer laterals to generate increased gas production. A 12.5% annual increase is expected for Pennsylvania, up to 1,115 wells drilled, along with a 16.4% annual gain in total footage, up to 13.4 million ft. In Ohio, *World Oil* expects a 19.9% increase in activity, from 423 wells drilled in 2017, to 507 in 2018, with a 23.1% climb in total footage this year, up to 8.7 million ft. West Virginia should see an 18.1% gain, up to 327 wells drilled this year, and the state is expected to increase total footage 20.1%, up to 3.8 million ft in 2018.

Colorado. Activity will be driven upward by its Niobrara and DJ basin resources, along with its share of the San Juan basin play in the southwestern part of the state. *World Oil* predicts that this area will experience 8.5% growth, from 1,175 wells drilled in 2017, to 1,275 wells drilled in 2018. The state's total footage will increase 10.3%, up to 15.7 million ft.

California. Drilling activity on the West Coast, in California, has improved vastly after suffering a reduction of about 80% during the 2014-to-2016 period. This year, onshore operators in the Golden State are expected to drill 1,417 wells, an 18% increase over the 2017 estimate. *World Oil* also expects to see an increase in activity offshore California, up from the estimate of 17 wells in 2017 to 28 wells in 2018.

Alaska. Up in Alaska, onshore activity will slow down a bit and offshore activity will remain fairly consistent. *World Oil* expects a 15.3% decline in onshore drilling activity in Alaska, down to 111 wells drilled. Offshore, the state is predicted to drill 12 wells in 2018, in comparison to 11 wells in 2017.

Gulf of Mexico. With long-term investments still lagging behind shale development, drilling in the U.S. Gulf of Mexico is still in the doldrums. Most of these wells are concentrated offshore Louisiana. In 2018, activity in the GOM is expected to decline 8.4%, down to 109 wells drilled, compared to 119 wells in 2017.

U.S. POLITICAL ISSUES/PRIORITIES

With a new administration in place, along with a changed attitude regarding the oil and gas industry, the U.S. government has begun to change course, when it comes to its direction on hydrocarbon energy. Friendly policy decisions could help bolster increased activity in 2018, as the Trump administration continues its quest to promote American "energy dominance." However, questions remain regarding how the administration will treat its trade agreements, namely the North American

Table 2. Forecast of 2018 drilling outside the U.S.*

Region or country	Wells forecast 2018	Wells drilled 2017	% diff.
North America	**7,105**	**7,295**	**–2.6**
Canada	7,000	7,200	–2.8
Cuba	17	16	6.3
Mexico	84	75	12.0
Others	4	4	0.0
South America	**2,390**	**2,347**	**1.8**
Argentina	1,063	1,007	5.6
Bolivia	15	17	–11.8
Brazil	223	198	12.6
Chile	69	55	25.5
Colombia	70	61	14.8
Ecuador	108	107	0.9
Peru	30	137	–78.1
Trinidad & Tobago	58	54	7.4
Venezuela	580	579	0.2
Others	174	132	31.8
Western Europe	**436**	**386**	**13.0**
Austria	19	13	46.2
Denmark	5	4	25.0
France	18	14	28.6
Germany	36	21	71.4
Italy	18	15	20.0
Netherlands	18	11	63.6
Norway	210	205	2.4
United Kingdom	103	96	7.3
Others	9	7	28.6
Eastern Europe/FSU	**10,889**	**10,186**	**6.9**
Albania	23	20	15.0
Croatia	7	7	0.0
Czech Republic	3	2	50.0
Former Soviet Union	10,700	10,008	6.9
Russian Federation	10,090	9,433	7.0
Others	610	575	6.1
Hungary	5	4	25.0
Poland	39	41	–4.9
Romania	90	86	4.7
Others**	22	18	22.2
Africa	**833**	**784**	**6.3**
Algeria	297	295	0.7
Angola	51	44	15.9
Congo	30	24	25.0
Egypt	277	264	4.9
Gabon	13	11	18.2
Libya	9	5	80.0
Nigeria	85	76	11.8
South Sudan	n.a.	n.a.	...
Sudan	n.a.	n.a.	...
Tunisia	5	8	–37.5
Others	66	57	15.8
Middle East	**3,091**	**3,005**	**2.9**
Iran	n.a.	n.a.	...
Iraq	144	139	3.6
Kuwait	805	771	4.4
Neutral Zone	0	0	...
Oman	958	949	0.9
Qatar	95	88	8.0
Saudi Arabia	599	594	0.8
Syria	n.a.	n.a.	...
Turkey	150	134	11.9
UAE - Abu Dhabi	290	285	1.8
UAE - Dubai	8	8	0.0
Yemen	0	0	...
Others	42	37	13.5
Far East/South Asia	**18,496**	**17,357**	**6.6**
Brunei	40	42	–4.8
China	16,388	15,315	7.0
India	612	604	1.3
Indonesia	520	499	4.2
Japan	5	5	0.0
Malaysia	57	48	18.8
Myanmar	10	10	0.0
Pakistan	90	91	–1.1
Philippines	4	3	33.3
Thailand	740	715	3.5
Vietnam	21	20	5.0
Others	9	5	80.0
South Pacific	**216**	**200**	**8.0**
Australia[1]	207	191	8.4
East Timor	2	2	0.0
New Zealand	4	3	33.3
Papua New Guinea	3	4	–25.0
World Total	**43,456**	**41,560**	**4.6**

*Some countries are estimated.
**Includes Bulgaria, Slovakia, Slovenia and Serbia.

n.a.: Not available.
[1]Does not include a large number of shallow CBM wells.

Free Trade Agreement, which many believe is vital to the U.S. energy industry.

Favorable tax bill. President Trump signed a new tax bill in December that potentially could save oil and gas companies billions of dollars. The savings will come via a reduced corporate income tax rate, from 35% to 21%, and a revised tax treatment for capital expenditures. Companies can now deduct capex in the year of their occurrence, which previously was not an option. Another attachment to the tax bill was the opening up of parts of the Arctic National Wildlife Refuge (ANWR) to oil exploration. However, one would be wise to assume that the fight over the ANWR is far from over, as many environmentalists, who have opposed activity in the region, have stated they will continue to try to block development.

Regulation rollback. In his first year as president, President Trump has proven to be a champion for deregulation, in favor of the oil and gas industry. Several of the rules that have been eliminated by his administration, either by executive order or through other means, include the EPA requirement for oil and gas companies to report methane emissions; a ban on offshore drilling in the Atlantic and Arctic oceans; and denial of the use of seismic air guns for exploration in the Atlantic. The Trump administration also has approved the Keystone XL and Dakota Access pipelines. Other policies that Trump has said the administration will consider changing in the future include Obama's Clean Power Plan—which limits CO_2 emissions from existing power plants, the U.S. pledge to participate in the Paris climate agreement, and safety regulations on offshore drilling implemented after 2010's Macondo disaster.

NAFTA. With the fate of NAFTA in limbo, any change to free trade relations between the U.S., Mexico and Canada could impact the oil and gas industry's ability to transfer resources. Seamless energy trade has been a major boon for U.S. oil companies, and if the vehicle allowing such trade was to be discarded, U.S. operators with significant interests in Mexico or Canada could suffer. Industry groups like API are galvanizing support for the agreement that was signed into law in December 1993. If the agreement falls apart, larger players in the U.S. oil industry will surely lobby for another rule that can achieve similar goals of free energy trade between Mexico and Canada.

INTERNATIONAL FORECAST

World drilling outside the U.S. is forecast to increase 4.6%, to 43,456 wells, led by improvement in Russia, China, Western Europe, Australia and parts of Africa. Global offshore drilling's recovery will outpace the overall trend, gaining 10.4%.

World Oil forecasts 7,000 **Canadian** wells in 2018, a 2.8% drop compared to 2017's level. Canada's biggest hurdles are the lack of market access and regulatory stability, with three major infrastructure projects cancelled or delayed in the past six months. The lack of key energy infrastructure, and further delays to those already approved, send a message to potential investors that Canada's rules and regulations around these projects are subject to continuous change. While the rig market may have bottomed out, meaningful upward movement of day rates remains a struggle.

The **Mexican** government's initiative to bolster sagging production—allowing private companies to lease drilling rights—is starting to pay dividends. Wildcat discoveries in Zama and Ixachi, combined with smaller finds, added approximately 1 Bboe of recoverable reserves during 2017. The giant Zama discovery by Talos Energy, in 546 ft of water, was the first offshore exploration well drilled by a private company in Mexico's history. An appraisal program should begin in second-half 2018. We expect drilling nationwide to increase 12%.

After reaching a record in 2016, **Brazil**'s production is now on track to surpass Norway's output. Accordingly, wells drilled should increase 12.6% during 2018. The country's pre-salt layer continues to garner the attention of E&P companies. Brazil held its third pre-salt bidding round in 2017, drawing bids from majors, including Shell, Statoil and ExxonMobil, for four blocks in the Santos and Campos basins. Additionally, last November, the Libra field consortium announced that the giant, ultra-deepwater field had gone onstream in the Santos basin. The project's first large-scale development phase, involving 17 wells and a 150,000-bopd FPSO, was launched soon thereafter.

Guyana's deepwater sector is gaining traction after ExxonMobil announced its sixth oil discovery. The sizeable finds have been concentrated in the 6.6-million-acre Stabroek Block. The recent discoveries have put this previously non-producing country on the oil market map.

Argentina's largely undeveloped Vaca Muerta shale, holding approximately 16 Bbbl of oil and 308 Tcf of gas, is still straining to get fiscal commitments for full-scale development. Thus far, high well costs and logistical constraints have prevented pilot projects from reaching the development phase. In addition to the Vaca Muerta, the U.S. EIA's 2015 assessment shows that Argentina's untested unconventional prospects could hold a cumulative 801.5 Tcf of technically recoverable wet gas and 27 Bbbl of tight oil. A 5.6% increase in drilling is forecast this year.

Gas production on the **Norwegian** Continental Shelf reached a record high in 2017, while crude production was down slightly. The Norwegian Petroleum Directorate (NPD) says that five new fields went onstream during 2017. In 2018, the NPD expects investments to be approximately $15.59 billion, about the same level as last year. In 2019, investments should rise to just under $17.89 billion. Development plans were submitted for ten new projects, while nine others are underway. In 2017, 34 exploration wells were completed, three fewer than the previous year. Eleven discoveries were made, compared with 18 in 2016. Operators showed significant interest in new acreage during the most recent licensing round, and Norwegian drilling should be up 2.4% this year.

In September 2017, the **UK**'s Oil and Gas Authority (OGA) said that the economic recovery of the country's offshore sector was progressing. According to the OGA, offshore exploratory drilling during 2017, through September, tallied 21 wells, just one less than in 2016. Despite dramatically reduced offshore activity in recent years, the OGA conducted its 30th Offshore Licensing Round, offering 820 blocks for bidding. The OGA also has been working with industry to revitalize UKCS exploration. OGA completed the second government-funded seismic survey acquisition, while funding numerous technical projects in frontier areas. British drilling should improve 7.3%.

An average $34.1 billion/year will be expended on 1,673 oil and gas fields in **Russia** between 2018 and 2020, according to GlobalData. Spending on traditional Russian oil projects will add up to $55 billion over the three-year period, while heavy oil fields will require $7.1 billion. Onshore projects will comprise over 85% of the $102.6 billion of upstream capex by 2020. Russia's natural gas production hit a record level last year, driven by increased sales to Europe and rising domestic demand. With plans to expand into China and new LNG plants, Russia may close the gap on the U.S., which holds the top spot in global LNG production. Russia was the world's most prolific oil producer in 2017, averaging 11.28 MMbpd during the last quarter.

In 2017, state firm SOCAR drilled 114,909 m of new hole section, including 106,593 m of development drilling and 8,316 m of exploratory work in **Azerbaijan**. Since January 2017, 66 new wells were put into operation after being drilled, with most in Bulla-Daniz, Garadagh, and Seadan fields. A PSA for the Azeri-Chirag-Gunashli (ACG) fields (Caspian Sea) was signed in Sept. 2017 by SOCAR and operator BP. The PSA will now be in force through 2049. ACG production averaged 585,000 boed during first-half 2017.

Kazakhstan officials are talking to a major oil company, in an effort to increase output at Kashagan field. The $55-billion Kashagan development should produce 260,000 bopd during 2018. Output from other fields in the region will be lowered, to keep the country from exceeding its OPEC-set production limit.

Egypt's Nooros and Zohr mega-fields reportedly will double the country's natural gas output by 2020. In 2018, the country is on track to end natural gas imports and become completely self-reliant. During 2017, Egypt's production increased to 5.1 Bcfd, from about 4.4 Bcfd the year prior. Production at Nooros field hit record levels early in the year. In December, Eni's super-giant Zohr field was brought onstream. According to Eni, 20 wells will be drilled at Zohr by the end of 2019. Meanwhile, BP's West Nile Delta offshore development continues to contribute to Egypt's E&P growth. We expect Egyptian activity to increase 5% in 2018.

As **Nigeria** endures continued militant attacks, protests and underinvestment, the country is still struggling to recover after a dramatic production decline during 2016. Despite its troubles, the Nigerian government set a new production target of 2.5 MMbopd last year, hoping to reach it by 2020. Because of the ongoing push to boost production, *World Oil* anticipates the well count in Nigeria will climb 11.8%.

Angola was hit hard by slumping oil prices. Early last year, Eni started producing through the *Armada Olombendo* FPSO vessel on the East Hub Development Project, in deepwater Block 15/06. This production was added to that of the existing West Hub Project. Accordingly, the block was due to hit peak production of 150,000 bopd last year. Likewise, Chevron

Table 3. Forecast of 2018 offshore drilling worldwide.*

Region or country	Wells forecast 2018	Wells drilled 2017	% diff.
North America	**198**	**194**	**2.1**
Canada	5	9	–44.4
Cuba	0	0	...
Mexico	44	38	15.8
U.S. - Alaska	12	11	9.1
U.S. - California	28	17	64.7
U.S. - Gulf of Mexico	109	119	–8.4
Others	0	0	...
South America	**89**	**82**	**8.5**
Argentina	1	0	...
Brazil	60	58	3.4
Chile	0	0	...
Colombia	2	3	–33.3
Ecuador	0	0	...
Peru	0	0	...
Trinidad & Tobago	18	16	12.5
Venezuela	2	2	0.0
Others	6	3	100.0
Western Europe	**337**	**315**	**7.0**
Denmark	5	4	25.0
France	0	0	...
Germany	3	1	200.0
Italy	3	1	200.0
Netherlands	14	9	55.6
Norway	210	205	2.4
United Kingdom	93	88	5.7
Others	9	7	28.6
Eastern Europe/FSU	**98**	**90**	**8.9**
Croatia	2		#DIV/0!
Former Soviet Union	90	86	4.7
Russian Federation	n.a.	n.a.	...
Others	90	86	4.7
Poland	1	1	0.0
Romania	5	3	66.7
Others	0	0	...
Africa	**187**	**148**	**26.4**
Angola	50	44	13.6
Congo	28	24	16.7
Egypt	27	20	35.0
Gabon	3	3	0.0
Libya	6	5	20.0
Nigeria	35	28	25.0
South Africa	3	0	...
Tunisia	1	1	0.0
Others	34	23	47.8
Middle East	**321**	**299**	**7.4**
Iran	n.a.	n.a.	...
Neutral Zone	0	0	...
Oman	1	2	–50.0
Qatar	67	61	9.8
Saudi Arabia	74	73	1.4
Turkey	1	0	...
UAE - Abu Dhabi	159	145	9.7
UAE - Dubai	8	8	0.0
Others	11	10	10.0
Far East/South Asia	**1,094**	**986**	**11.0**
Brunei	29	30	–3.3
China	280	230	21.7
India	101	96	5.2
Indonesia	48	46	4.3
Japan	1	1	0.0
Malaysia	57	49	16.3
Myanmar	2	3	–33.3
Pakistan	0	0	...
Philippines	1	1	0.0
Thailand	545	505	7.9
Vietnam	21	20	5.0
Others	9	5	80.0
South Pacific	**31**	**19**	**63.2**
Australia	27	16	68.8
East Timor	2	2	0.0
New Zealand	1	0	...
Papua New Guinea	1	1	0.0
World Total	**2,355**	**2,133**	**10.4**

*Some countries are estimated.

n.a.---Not available.

started producing from the main facility of the Mafumeira Sul Project, in Block 0. With these key projects starting up, Angola will likely see drilling increase 15.9% during 2018.

Approximately 37 mi off **Ghana**'s western coast, Eni started production from the Offshore Cape Three Points (OCTP) Block last year. The project was brought onstream in just two-and-a-half years. It contains Sankofa Main, Sankofa East and Gye-Nyame fields, which hold about 500 MMbbl of oil and 40 Bcm of non-associated gas. The *John Agyekum Kufuor* FPSO unit produces up to 85,000 boed through 18 subsea wells.

Kenya has seen numerous, recent discoveries. Following Tullow Oil's successful year of exploration in 2016, Africa Oil Corp. concluded its 2017 E&A campaign in November, reporting two more finds. The Erut-1 well proved that oil has migrated to the northern limit of the South Lokichar basin, within the East African Rift. Correspondingly, the Emekuya-1 well encountered significant oil sands in the Greater Etom structure, further de-risking the basin's northern portion.

In **Mozambique**, Area 4 partners secured project financing in December for Eni's Coral South FLNG project. This project will see gas development in the southern part of the Coral gas reservoir. Similarly, Anadarko Petroleum received the government's go-ahead for design and construction of marine facilities for its LNG project in northern Mozambique. Anadarko is developing the country's first onshore LNG plant, featuring two initial trains with a capacity of 12 MMtpa, which will support Golfinho/Atum field in Offshore Area 1.

Libya has been stepping up its efforts to boost oil output. The country has withstood a copious amount of disruption to its energy sector in recent years, and was exempt from OPEC's deal to cut back production. Consequently, Libyan output climbed to 1 MMbopd by year-end 2017, after dropping to a low of about 550,000 bopd in April. Its present production level is the highest in about four years, but still not the 1.25-MMbpd mark desired by its National Oil Corporation.

Saudi Arabia and Russia unexpectedly joined forces in late 2016 to arrest the decline in global oil prices. But before Saudi oil minister Khalid Al-Falih could rein in production, the Kingdom's output reached an all-time high of 10.72 MMbopd in November 2016. In accordance with the OPEC agreement, Saudi Arabia reduced its crude output 6.9%, to 9.978 MMbpd. During 2017, drilling has remained resilient, with about 100 rigs working onshore, and another 19 posted at offshore locations. Saudi Arabia seeks to sell as much as 5% of state firm Saudi Aramco in a public offering, to establish a sovereign wealth fund and reduce the economy's reliance on hydrocarbons. Saudi Arabian drilling activity should increase 1%.

Iraqi oil production has risen 36% since 2014, according to a cabinet official. In addition, associated gas production has increased 50%. The country has been reluctant to cut production, citing its terrorism-battered economy, but has pledged to reduce output. Last March, Iraqi petroleum exporting company, SOMO, said that the country had reduced crude flow by 300,000 bpd to 4.46 MMbpd. In fourth-quarter 2017, Iraq averaged 4.41 MMbopd, according to the IEA. Iraqi activity will likely jump 3.6%, to 144 wells.

Now that **Iran** is no longer under sanctions, the country's E&P community has joined forces to share knowledge and encourage outside investments. Leaders want to launch an investment fund, to foster new approaches for providing capital. Development is underway at Azar field, which started producing in March 2017 at an initial rate of 15,000 bopd. Production should reach 65,000 bopd by March 2018.

While activity continues in **Israel**'s Tamar and Leviathan natural gas fields, development of Karish and Tanin fields is quickly becoming a focal point. After acquiring the fields in 2016, Energean Oil & Gas plans to develop the fields, estimated to hold 2.4 Tcf, plus 33 MMbbl of hydrocarbon liquids. First gas is expected in 2020. At Leviathan, Noble Energy's initial development will involve four subsea wells. The field contains 22 Tcf of gross recoverable resources, and should produce first gas by the end of 2019.

In **Turkey**, Condor Petroleum said its Poyraz West 2 appraisal encountered 465 ft of net pay. The pay zone is deeper than two previously assessed intervals. After drilling five wells and completing a processing facility and pipeline system, Condor announced first gas in December. Operators will drill 12% more wells during 2018.

China began 2018 by opening its second Sino-Russian oil pipeline, which runs parallel to the first, spanning about 585 mi between Mohe and Daqing. Now, China can import about 600,000 bpd (double its previous amount) from Russia, as the countries enjoy firm energy cooperation. China's LNG imports soared to a record, amid peak winter demand in November. The spike in demand results from President Xi Jinping's effort to transition the country from coal to gas. To prop up China's production, drilling during 2018 is expected to rise 7%.

Pursuing a comeback in energy investments, **Indonesia** saw some E&P progress last year. In August, CNOOC reported first gas at BD field in the Madura Strait, offshore East Java, with two of four wells producing. A peak of 25,500 boed is anticipated this year. The country suffered a blow last July, when ExxonMobil withdrew from the East Natuna project. The 46-Tcf gas field's development will thus see further delay. Indonesia's drilling should receive a 4.2% boost to 520 wells forecast.

International Petroleum Corp. (IPC) recently began drilling the first two infill wells planned for **Malaysia**'s Bertam field, 108 mi offshore peninsular Malaysia in Block PM307. Bertam field includes an unmanned wellhead platform and 12 horizontal wells, which produce to a moored FPSO. According to IPC, the infill wells are targeting gross contingent resources of about 2.3 MMboe. The drilling campaign was set to conclude by the end of February 2018. Malaysia will likely see an 18.8% rise to 57 wells.

Australia has seen significant progress, with two major projects starting up. Last October, Chevron reported that LNG production had begun at the Wheatstone Project in western Pilbara, west of Onslow. It is the country's first natural gas hub, processing gas from Chevron's Wheatstone and Iago fields. Last August, BP started up the Persephone Project, offshore Western Australia. Peak production should reach 48 MMscfd. Companies, including Beach Energy and Northwest Energy, have reported discoveries in Australia within the last year. The increased activity likely will continue through 2018. WO