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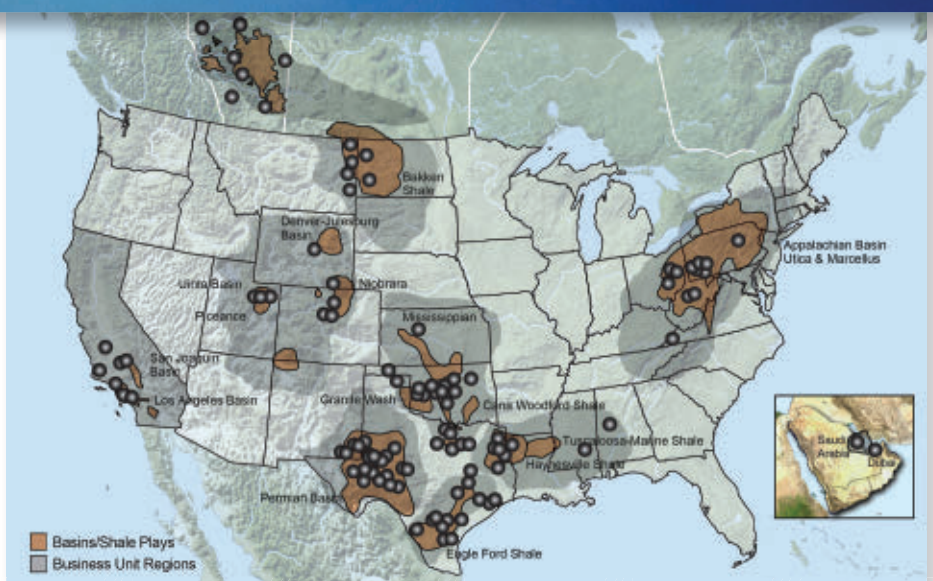

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NORTH EAST	✓	✓	✓	✓	✓	✓
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For any questions, contact **Inquiries@cjenergy.com**.

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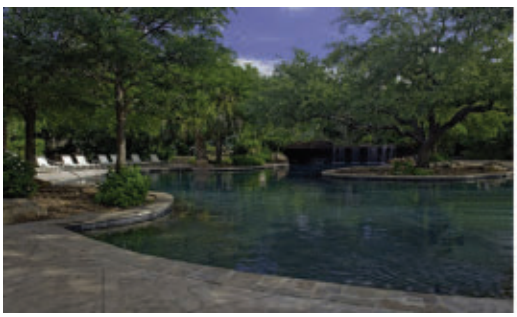
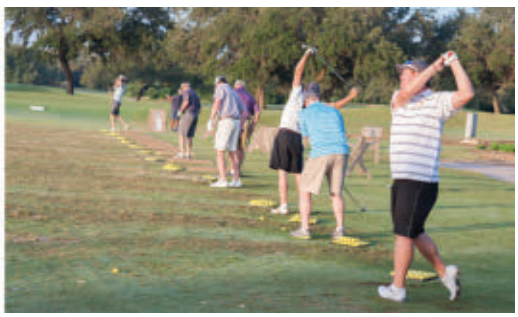
For additional details on TIPRO's 2016 Summer Conference, visit www.tipro.org or call (512) 477-4452.

TIPRO President Ed Longanecker with Pioneer Natural Resources President & COO Timothy Dove at TIPRO's Summer Conference

TIPRO's Summer Conference also provides several opportunities to network with other members of the association and form new business connections.





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GENERAL INTEREST

COVER

Noble Corp. PLC's *Noble Regina Allen jack up rig towers above Semco Maritime AS's new headquarters at the harbor front in Esbjerg, Denmark. Semco Maritime brought together the group's Danish activities at one location in Esbjerg at the end of 2015. Photo by amateur photographer Dennis Lauridsen for Semco Maritime.*


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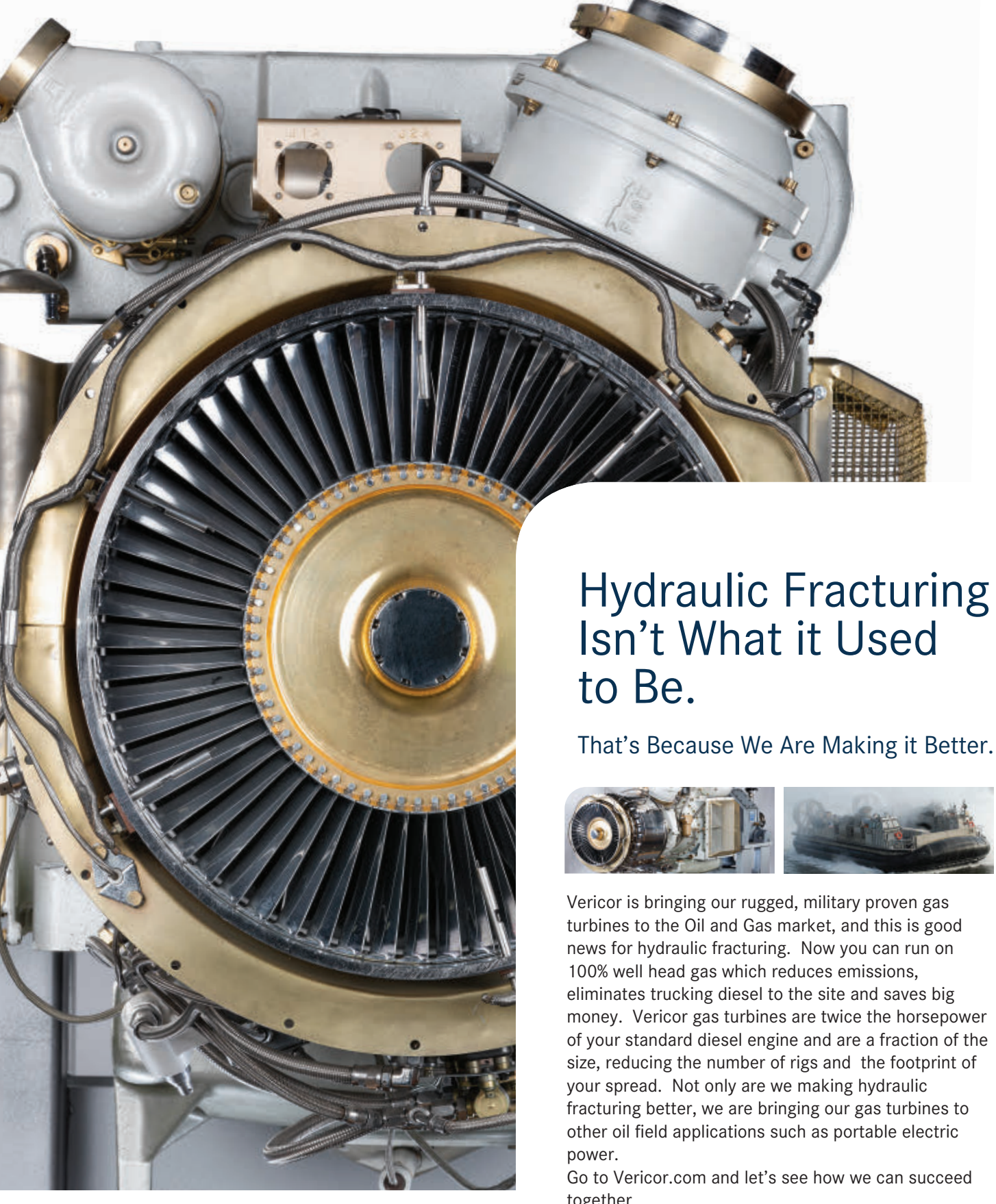

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GENERAL INTEREST QUICK TAKES

Warren Resources files for Chapter 11

Warren Resources Inc., Denver, filed for bankruptcy protection in a Houston federal court on June 2 after negotiating a debt-for-equity swap with a group of senior lenders led by Blackstone Group's GSO Capital Partners. Senior lenders agreed to swap $248 million they are owed for an 82.5% stake in the reorganized company, court papers showed.

Claren Road Asset Management LLC is among second-lien lenders who are owed about $57 million. Court papers showed the Claren-led group would get the rest of the reorganized independent in return for canceling debt. Unsecured bondholders owed $167.3 million would get cash or new notes equal to Claren's equity stake.

Court papers said GSO also agreed to provide $130 million as a bankruptcy-exit loan and an additional $20 million to pay for the Chapter 11 bankruptcy court case.

Warren Resources primarily focuses on oil in Wilmington field in the Los Angeles basin of California, natural gas in the Marcellus shale in Pennsylvania, and the Washakie basin of Wyoming.

Callon Petroleum adds Midland basin acreage

Callon Petroleum Co., Natchez, Miss., has completed its acquisition of certain assets in the Midland basin in Texas operated by Big Star Oil & Gas LLC, Midland, Tex., for $220 million in cash and 9.3 million shares of Callon common stock.

The deal includes 17,298 gross (14,089 net) surface acres, primarily in Howard County, with additional acreage in Martin, Borden, and Dawson counties.

Including the previously reported area of mutual interest transaction in western Reagan County that closed earlier this month, the Big Star acquisition increases Callon's surface acreage position in the Midland basin to 34,000 net acres and establishes a new core area for development.

"We are looking forward to advancing our planned development of this important new acreage position centered in Howard County that we have named the WildHorse area," commented Fred Callon, chairman and chief executive officer. "We currently expect to complete our first well on this acreage in mid-June and are finalizing plans to add a drilling rig to the area in the second half of the year."

Darre to take helm as YPF chief executive officer

Ricardo Darre will take the role of chief executive officer of Argentina's 51% state-owned YPF SA on July 1.

He succeeds Chief Financial Officer Daniel Gonzalez, who has served as interim chief executive officer since the departure of Miguel Galuccio in April under the direction of new Argentinian President Mauricio Macri.

Darre has led Total SA's US exploration and production unit based in Houston since August 2014, overseeing its shale and ultradeepwater operations in the country.

He jointed Total in 1987 and served in technical roles in Tierra del Fuego, France, and Thailand before becoming the head of drilling offshore Argentina and in the country's onshore Neuquen basin. He also has worked in Norway, Russia, and the UK. He began his career at Schlumberger Ltd. in various roles covering oil and gas production in Angola, Zaire, and the Neuquen basin. OGJ

EXPLORATION & DEVELOPMENT QUICK TAKES

SOCAR, BP sign MOU for Caspian Sea exploration

State Oil Co. of Azerbaijan Republic (SOCAR) has signed a memorandum of understanding with BP PLC, giving the operator the exclusive right to negotiate on exploration and development of offshore Block D230 in the North Absheron basin in the Azerbaijan sector of the Caspian Sea. Block D230 lies in 300 m of water with reservoir depths of 3,000-5,000 m.

In April, SOCAR let a contract to Amec Foster Wheeler for work related to the ongoing modernization and expansion of the Heydar Aliyev refinery at Baku in Azerbaijan (OGJ Online, Apr. 26, 2016).

Total E&P's Absheron X-2 well was drilled 100 km southeast of Baku in September 2011. Drilled to 6,874 m in 474 m of water, the well tested one hydrocarbon-bearing interval at 33.9 MMcfd of nonassociated gas and 2,500 b/d of 42.5° gravity condensate (OGJ Online, July 2, 2012).

The Absheron block lies just east of Shah Deniz field where BP let a $1.5-billion contract for the transport and installation of the deeper water subsea production systems for Shah Deniz Stage 2 (OGJ Online, May 6, 2016).

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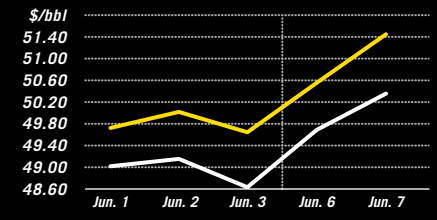
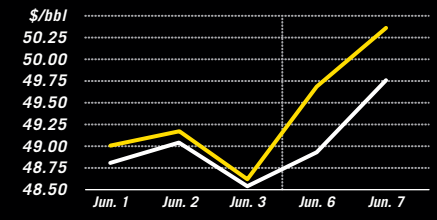
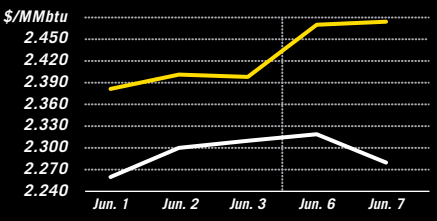


WTI CUSHING / BRENT SPOT



NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



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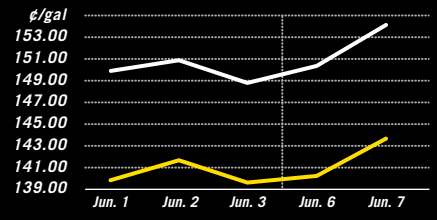
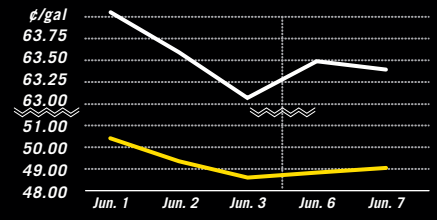
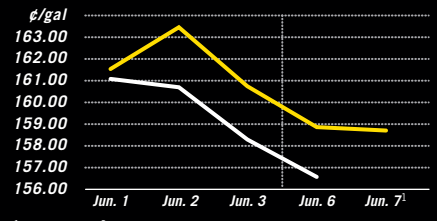


PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



NYMEX GASOLINE (RBOB)[2] / NY SPOT GASOLINE[3]



[1]Not available [2]Reformulated gasoline blendstock for oxygen blending [3]Nonoxygenated regular unleaded

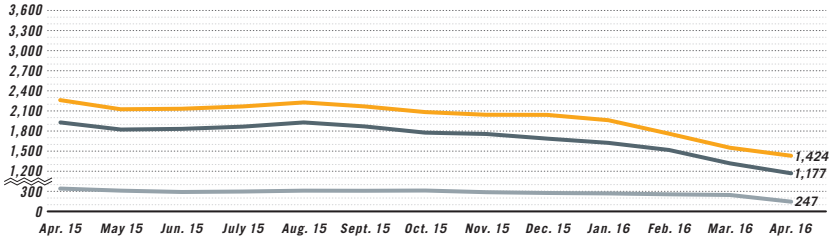
US INDUSTRY SCOREBOARD — 6/13

Latest week 5/27	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Product supplied, 1,000 b/d						
Motor gasoline	9,661	9,294	3.9	9,298	8,916	4.3
Distillate	4,064	4,041	0.6	3,743	4,032	(7.2)
Jet fuel	1,612	1,586	1.6	1,573	1,536	2.4
Residual	290	165	75.8	296	203	45.8
Other products	4,753	4,850	(2.0)	4,950	4,794	3.3
TOTAL PRODUCT SUPPLIED	20,380	19,936	2.2	19,860	19,481	1.9
Supply, 1,000 b/d						
Crude production	8,774	9,447	(7.1)	9,019	9,340	(3.4)
NGL production[2]	3,329	3,100	7.4	3,394	3,081	10.2
Crude imports	7,622	7,037	8.3	7,806	7,276	7.3
Product imports	2,210	2,131	3.7	2,081	2,056	1.2
Other supply[2 3]	2,078	2,028	2.5	2,018	2,346	(14.0)
TOTAL SUPPLY	24,013	23,743	1.1	24,318	24,099	0.9
Net product imports	(1,428)	(1,304)	—	(1,836)	(1,583)	—
Refining, 1,000 b/d						
Crude runs to stills	16,259	16,940	(4.0)	16,031	15,866	1.0
Input to crude stills	16,441	16,609	(1.0)	16,231	16,093	0.9
% utilization	89.8	92.5	—	89.2	89.8	—

Latest week 5/27	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	535,702	537,068	(1,366)	477,415	58,287	12.2
Motor gasoline	238,619	240,111	(1,492)	220,293	18,326	8.3
Distillate	149,623	150,878	(1,255)	132,612	17,011	12.8
Jet fuel–kerosine	42,336	43,138	(802)	38,444	3,892	10.1
Residual	41,029	41,773	(744)	41,036	(7)	(0.0)
Stock cover (days)[4]			Change, %		Change, %	
Crude	32.9	33.1	(0.6)	29.4	11.9	
Motor gasoline	24.7	25.0	(1.2)	23.7	4.2	
Distillate	36.8	36.9	(0.3)	32.8	12.2	
Propane	74.6	70.9	5.2	87.1	(14.4)	
Futures prices[5] **6/3**			**Change**		**Change**	**Change,%**
Light sweet crude ($/bbl)	48.98	49.01	(0.03)	58.38	(9.40)	(16.1)
Natural gas, $/MMbtu	2.37	2.03	0.34	2.75	(0.38)	(13.8)

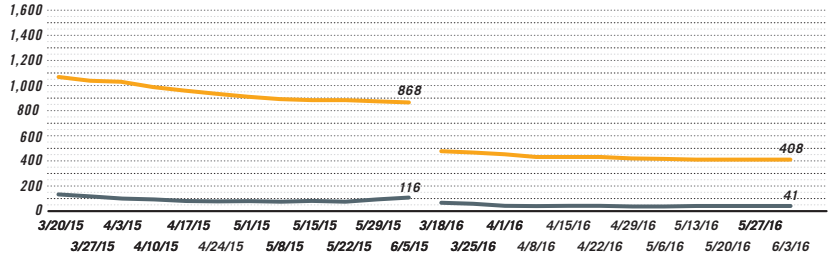
[1]Based on revised figures. [2]OGJ estimates. [3]Includes other liquids, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average of daily closing futures prices.
Source: Energy Information Administration, Wall Street Journal

BAKER HUGHES INTERNATIONAL RIG COUNT: TOTAL WORLD / TOTAL ONSHORE / TOTAL OFFSHORE



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

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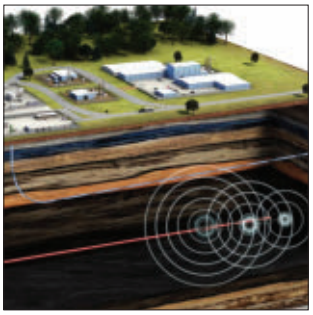

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Inpex spuds exploration well offshore southern Japan

Inpex Corp., Tokyo, commences drilling of an exploration well June 5 offshore the Shimane and Yamaguchi prefectures in southern Japan. The well is 130 km off Shimane in 210 m of water, about halfway between Tsushima and Oki Island.

The well is part of an Agency for Natural Resources & Energy program called Heisei 26-28 Domestic Offshore Drilling Program in Japan, which was announced in mid-2015 (OGJ Online, Aug. 12, 2015).

The Japanese government conducted a geophysical survey over the area in 2011, and Inpex conducted a 3D geophysical survey in 2013 based on the earlier project.

AWE boosts gas reserves onshore Western Australia

AWE Ltd., Sydney, reported a 93% increase in the 2P reserves in its Waitsia natural gas field in the onshore North Perth basin of Western Australia.

The company, which is operator of the field in permits L1/L2, said the 2P reserves had increased to 344 bcf of gas. It added that the 2P reserves plus the 2C contingent resources for the field had increased by 30% to 630 bcf.

In addition, the total gross 2P reserves plus 2C contingent resources when combining Waitsia with nearby finds at Senecio, Irwin, and Synaphea went up by 20% to 867 bcf of gas.

The upgrade follows extensive evaluation of new core data acquired in 2015 from the Waitsia-1 and Waitsia-2 wells along with additional analysis of well test data from Senecio-3 and Waitsia-1.

AWE says the upgrade is another step in the ongoing appraisal of Waitsia gas field. Substantial progress has been made on field modelling and the company is finalizing options for full field development of Waitsia and the satellite fields.

The indications are that an initial plateau rate of about 100 terajoules/day could potentially be achieved from six wells, including the three appraisals already drilled.

Construction and technical work for the preliminary Stage 1A of the Waitsia project is continuing and AWE anticipates delivering contracted initial volumes of 10 terajoules/day of gas into the Western Australian market during this year's third quarter.

Forward plans include another two appraisal wells for Waitsia field in 2017 concentrating on the southeast extent of the structure. These will be completed as production wells if successful.

A total of 15-20 wells are likely to be drilled during the fields expected 20-year life.

The wells will all be connected to a central gas processing facility and sales gas sent to market using existing nearby pipelines. The gas is 93% methane, which means that minimal processing will be required.

AWE has 50% of L1/L2 with fellow Sydney firm Origin Energy Ltd. also holding 50%. OGJ

Noble gets POD approval for Leviathan development

Noble Energy Inc., Houston, reported it has received approval from the Petroleum Commissioner in the Ministry of National Infrastructure, Energy, and Water Resources for the development of the deepwater Leviathan field project offshore Israel.

Last month, the Israeli cabinet approved a revised outline for gas regulation needed for development of Leviathan and expansion of nearby Tamar field (OGJ Online, May 23, 2016).

The approved plan of development (POD) involves a subsea system that connects production wells to an offshore fixed platform with tie-in onshore in northern Israel. The fixed platform's initial capacity is expected to start at 1.2 bcfd of gas, but will be expandable to 2.1 bcfd.

Leviathan is expected to provide a second source of supply and an entry point into Israel's gas transportation system, while also delivering exports to regional countries, Noble said.

Separately, Noble said it signed a gas sales and purchase agreement to supply gas from Leviathan field to IPM Beer Tuvia Ltd. Under the agreement's terms, Noble and the Leviathan partners will supply a gross quantity of as much as 473 bcf of gas to a newbuild independent power facility over an 18-year term, or as much as 72 MMcfd. The company expects gas sales to IPM to start once the field starts up.

The price for the gas is linked to the Public Utility Authority Index and includes a firm floor price, the company said. Noble expects total gross revenues under the contract to be in excess of $2.5 billion.

Noble Energy operates Leviathan with 39.66% working interest. Leviathan is thought to hold an estimated 22 tcf of recoverable gas resources.

Statoil moves toward Utgard development

Statoil SA said it plans to make a final investment decision about development of Utgard gas and condensate field in the Sleipner area of the North Sea after agreeing to acquire 45% interest in the UK portion of the license from JX Nippon.

The field, previously known as Alfa Sentral, straddles the UK-Norwegian sector line. After the JX Nippon deal, Statoil will own 100% and become operator of UK License P312. It holds 62% in and is operator of Norwegian Continental Shelf License PL046.

Statoil envisions subsea development tied back to the Sleipner East platform, which it operates, about 21 km to the east in Norwegian waters. Production would start in 2020.

The company acquired stakes in the UK license from First Oil PLC in October 2015 and from Talisman Sinopec Energy UK Ltd. in December 2015.

Kearl, Albian Sands operations return to normal

Imperial Oil Ltd. said operations have returned to normal at its Kearl oil sands site and that the plant was not damaged by the Alberta wildfires (OGJ Online, May 4, 2016).

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Tel 212 (0) 5 37 23 98 98

Fax 212 (0) 5 37 28 16 34

The terms of reference (CPS) can be downloaded from ONHYM web site (Link: http://www.onhym.com/en/calls-for-tender.html)

The deadline for bid reception is **19 August 2016, at 4 PM.**

As a safety precaution in early May, the company cut workforce levels to essential staff only, reduced production, and then completed a controlled shutdown. On May 19, Imperial said it had restarted limited operations.

Shell Canada Ltd. meanwhile said production has returned to planned levels at the Albian Sands mining operations after being suspended on May 3. Production capacity is 255,000 b/d. Shell also said four Shell gas stations have reopened in Fort McMurray. OGJ

PROCESSING QUICK TAKES

Songo Songo gas plant enters commercial operation

Tanzania Petroleum Development Corp. (TPDC) has commissioned its newly expanded Songo Songo gas plant to process production from Aminex PLC subsidiary Ndovu Resources Ltd.'s Kiliwani North field on Songo Songo Island, 15 km off mainland Tanzania (OGJ Online, Apr. 15, 2011; June 7, 2008).

The Songo Songo gas plant and associated subsea pipeline began operations on June 1, with the first Kiliwani North-1 (KN-1) gas processed and entered into to the regional pipeline system for distribution under a take-or-pay agreement to supply the local power market on June 2, Aminex said on June 6.

Gas rates at the plant and pipeline are planned to increase to 30 MMcfd gradually over the course of the ongoing commissioning phase.

The power generation system and other unidentified auxiliary facilities also have been commissioned, the company said.

Startup of the Songo Songo gas plant follows Aminex's previous announcement in early April that it started initial production from the KN-1 (OGJ Online, Apr. 7, 2016).

With certified reserves of 45 bcf of gas (OGJ Online, Aug. 19, 2015), KN-1 lies just 2 km from the Songo Songo field gas plant that in turn is connected to the mainland and the key Ubungo power plant.

LyondellBasell's ethylene project nears completion

LyondellBasell has entered the final phase of construction on an 800 million-lb/year ethylene expansion project currently under way at its complex in Corpus Christi, Tex. (OGJ Online, July 1, 2013).

Final construction work on the major expansion project will occur over the next few months. Once completed, the expansion will increase ethylene capacity at the Corpus Christi plant by 50% from its current production.

The Corpus Christi expansion comes as part of a multiyear growth program the company launched in 2012 that focuses on debottlenecks and cost-effective expansions at its existing plants, all of which were benefitting from rising North American shale gas production.

Alongside the expansion at Corpus Christi, the program also included ethylene expansion projects at LyondellBasell's La Porte, Tex., and Channelview, Tex., plants (OGJ Online, May 2, 2014).

LyondellBasell previously completed the 800 million lb/year LaPorte (OGJ Online, July 28, 2014) and 250 million-lb/year Channelview expansions in 2014 and 2015, respectively, the company confirmed in its latest annual report.

In addition to its 2016 planned investment of $1.9 billion for a maintenance and growth program aimed at further increasing reliability, efficiency, and production at its existing manufacturing sites, LyondellBasell said it also continues to evaluate a total investment of about $3-4 billion over the next 5 years on other growth projects that, once concluded, could to add another $800-900 million to its annual EBITDA.

In a Nov. 19, 2015, release, the company also confirmed it is moving forward with plans to build the world's largest propylene oxide (PO) and tertiary butyl alcohol (TBA) plant at its Channelview complex.

With front-end engineering and design work on the project now under way, the PO-TBA plant—which would produce about 1 billion lb/year of PO and 29,000 b/d of oxyfuels—is scheduled for startup in 2020, the company said.

Unipetrol breaks ground on polyethylene unit

Unipetrol AS has started construction on a grassroots polyethylene (PE) production unit at its Chempark Zaluzi petrochemical complex in Litvinov, Czech Republic (OGJ Online, Sept. 10, 2015).

The company officially broke ground on construction activities for the 270,000-tonnes/year PE3 unit during a ceremony held on June 7, Unipetrol said.

The unit remains on schedule to be commissioned shortly after construction reaches mechanical completion in mid-2018, the company said.

Unipetrol's total investment in the PE3 project amounts to about $357.5 million, the biggest investment to date in the history of the Czech petrochemical industry.

The PE3 project comes as part of Unipetrol's 2013-17 group strategy, the core of which entails further integration of the company's refining and petrochemical businesses.

Designed to replace the complex's existing 120,000-tpy PE1 unit, the two-line PE3 unit will join the remaining 200,000-tpy PE2 unit to boost Unipetrol's overall HDPE production at the site to 470,000 tpy from its current 320,000 tpy.

In addition to increased production safety and reliability, PE3 also will enable higher utilization of the complex's recently damaged steam cracker (OGJ Online, Aug. 14, 2015), which following its reconstruction (OGJ Online, Dec. 7, 2015), will be able to produce 544,000 tpy of ethylene feedstock for the more-profitable HDPE units as global demand for basic ethylene continues to decline.

Technip Italy SPA is providing engineering, procurement, and construction services for the PE3 unit, which will be equipped with Ineos Technologies Ltd.'s proprietary Innovene S slurry technology for production of mono and bimodal HDPE. OGJ

Oregon town continues train derailment cleanup

An Oregon community ended water use restrictions as cleanup continued of an estimated 1,000 bbl of Bakken crude that leaked from tank cars of a Union Pacific train that derailed on June 3 (OGJ Online, June 5, 2016). But the Mosier City Council and the town's mayor objected on June 6 to the railroad's plans to resume running trains along the affected track before the accident's investigation and the cleanup are complete.

"Everyone wants to see train traffic restarted, but we are very concerned about the safety of our town," added Mosier City Council Pres. Emily Reed. "The new tracks will be no safer than before the derailment, and now we have tens of thousands of gallons of oil sitting in damaged tankers just feet away from the proposed new active tank."

A UP spokesman confirmed that freight trains are running again along new track where the incident occurred, but at a 10 mph speed limit. None carrying crude oil will use the stretch until the cleanup and investigation are concluded, he told OGJ.

More than half the crude in the derailed cars had been loaded onto tanker trucks by that morning for transfer to The Dalles, Wasco County's seat, where it will be staged for rail transportation to Tacoma, Wash., its original destination, the derailment's unified command said in a June 7 update.

"Union Pacific has identified a preliminary cause of the crash, saying a bolt that fastens the rail to the railroad ties may have been at fault," it added. "But the final determination of the cause has not been made."

An estimated 10,000 gal of crude was removed from Mosier's wastewater system following the derailment, with the remaining 32,000 gal either burned off and vaporized, captured by booms in the Columbia River, or absorbed by soil, the unified command said.

KMI gets FERC approval for Elba Island LNG plant

Kinder Morgan Inc. (KMI) subsidiaries Elba Liquefaction Co. LLC (ELC) and Southern LNG Co. LLC received US Federal Energy Regulatory Commission authorization to build and operate the Elba Liquefaction Project at the existing Elba Island LNG terminal near Savannah, Ga. KMI expects the first of 10 liquefaction trains to enter service in second-quarter 2018, with the remaining nine coming online before yearend 2018. Total capacity will be 2.5 million tonnes/year.

Elba Express Co. LLC (EEC) and Southern Natural Gas Co. LLC (SNG), also KMI subsidiaries, received FERC certificates of public convenience and necessity for their EEC Modification Project and SNG Zone 3 Expansion Project. These projects include additional compression and related work for north-to-south capacity expansions on Elba Express pipeline to supply additional gas to industrial and utility customers in Georgia and Florida and to Elba Island for liquefaction. KMI expects the expansion to enter service late in this year's fourth quarter.

The Elba Liquefaction Project in 2012 received authorization from the US Department of Energy to export to Free Trade Agreement (FTA) countries (OGJ Online, Jan. 28, 2013). An application to export to non-FTA countries is pending, but is not required for the project to move ahead.

A 20-year contract with Royal Dutch Shell PLC supports the roughly $2-billion liquefaction project. KMI last year bought 100% of Shell's equity interest in ELC (OGJ Online, July 16, 2015). The pipeline modifications will cost $306 million.

Mackenzie Gas Project extension approved

Canada's National Energy Board has approved a delay in construction of the Mackenzie Gas Project, including the 1,220-km Mackenzie Valley Pipeline between three Arctic fields and northwestern Alberta.

Imperial Oil Resources Ventures Ltd. applied for the extension last year, citing "challenging North American natural gas market conditions (OGJ Online, Aug. 28, 2015)."

NEB said the project remains in the public interest and granted Imperial's request to delay construction-start deadlines for the Mackenzie Valley Pipeline and Mackenzie Gathering System to Dec. 31, 2022. The pipeline extension requires approval by the federal government.

The entire project would involve 1,842 km of pipelines.

Under NEB's original approval of the project, construction was to have started by the end of 2015. Last November, the board extended the sunset clauses to Sept. 30, 2016, so it could consider Imperial's application.

Eos advances Chilean LNG regasification project

Houston-based Eos Investment Group LLC's Chilean LNG import terminal company GNL Talcahuano SPA successfully submitted its environmental impact study to the regional environmental services department for its floating storage and regasification unit offshore Talcahuano, Chile.

Eos and its Chilean partner CRI Investments SPA are developing the FSRU project to serve Chile's south-central region, which has a natural gas pipeline and distribution network last used to deliver supplies from Argentina in 2004. The companies estimate that close to 2 million tonnes/year of LNG demand lies on or near the gas grid infrastructure.

Spanish utility Gas Natural Fenosa recently committed to spending more than $1.1 billion to develop gas markets in south-central Chile and elsewhere in the country. The Chilean government's Energy Ministry estimates that the four-region demand from the Eos LNG import project could reach 5 million tpy within 8 years of startup.

Eos signed an agreement with Stonepeak Infrastructure Partners to provide as much as $150 million of equity capital in return for a stake in the project on financial close. In conjunction with the Stonepeak agreement, Eos is advancing negotiations with Stonepeak investment-target Magnolia LNG to supply 1 million tpy from its Lake Charles, La., plant.

Eos expects financial close in second-quarter 2017 and operations early 2019. OGJ

2016 EVENT CALENDAR

■ *Denotes new listing or a change in previously published information.*

JUNE 2016

SPE Argentina Exploration & Production of Unconventional Resources Symposium, Buenos Aires, web site: www.spe.org/events/laur/2016/ **1-3.**

23rd International Caspian Oil & Gas Conference, Baku, web site: www.oilgasconference.az/2016/?p=index **2-3.**

Society of Petroleum Evaluation Engineers (SPEE) 53rd Annual Meeting, Lake Tahoe, NV, web site: https://secure.spee.org/ **4-9.**

Canadian Energy Research Institute (CERI) 2016 Petrochemical Conference, Kananaskis, Alta., web site: ceri.ca/index.php?option=com_content&view=article&id=57&Itemid=60 **5-7.**

Australian Petroleum Production & Exploration Association (APPEA) Conference & Exhibition, Brisbane, web site: www.appeaconference.com.au/ **5-8.**

SPE Canada Heavy Oil Technical Conference, Calgary, web site: www.spe.org/events/choc/2016/ **7-9.**

Caspian Oil & Gas Exhibition, Baku, web site: www.oilgas-events.com/Caspian-OG-Exhibition/ **7-10.**

Internet of Things (IOT) in Oil & Gas Europe, Aberdeen, web site: energyconferencenetwork.com/iot-oil-gas-europe-2016/ **8-9.**

■ ICOGPE 2016: 18th International Conference on Oil, Gas & Petrochemical Engineering, Toronto, web site: www.waset.org/conference/2016/06/toronto/ICOGPE **13-14.**

SPE Trinidad & Tobago Section Energy Resources Conference, Port of Spain, web site: spettconf.org/ **13-15.**

Nigeria Oil & Gas Conference & Exhibition, Abuja, Nigeria, web site: www.cwcnog.com/ **13-16.**

SPE London Annual Conference: Adapting to a Challenging Oil Price Environment, London, web site: www.spe.org/events/lond/2016/ **14.**

Oil & Gas Polymer Engineering Texas 2016, Houston, web site: www.amiplastics-na.com/events/Event.aspx?code=C734&sec=5725 **14-15.**

LNG Fuels Summit, Amsterdam, website: www.lngfuelssummit.com/**14-15.**

CWC's LNG Fuels Summit, Amsterdam, web site: www.lngfuelssummit.com/ **14-16.**

IADC World Drilling 2016 Conference & Exhibition, Lisbon, www.iadc.org/event/world-drilling-2016/ **15-16.**

IADC World Drilling Conference & Exhibition, Lisbon, web site: www.iadc.org/event/world-drilling-2016/ **15-16.**

AAPG Annual Convention & Exhibition 2016, Calgary, web site: ace.aapg.org/2016 **19-22.**

AAPG 2016 Annual Convention & Exhibition, Calgary, web site: www.aapg.org/events/conferences/ace/ **19-22.**

North American Custody Transfer Measurement Conference, San Antonio, web site: www.ceesi.com **21-23.**

■ ICOGPE 2016: 18th International Conference on Oil, Gas & Petrochemical Engineering, Copenhagen, web site: www.waset.org/conference/2016/06/copenhagen/ICOGPE **27-28.**

The 4th Annual Cyber Security for Oil & Gas Summit, Houston, web site: www.oilandgas-cybersecurity.com/ **27-29.**

Independent Petroleum Association of America (IPAA) 86th Midyear Meeting, Colorado Springs, Colo., web site: www.ipaa.org/meeting-events/event-details/?mid=266 **27-29.**

2016 Exploration & Production Standards Conference on Oilfield Equipment & Materials, Washington, DC, web site: www.api.org/events-and-training/calendar-of-events/2016/e-p **June 27-July 1.**

Papua New Guinea Oil & Gas Summit, Port Moresby, web site: pngoilgas.com/ **28-29.**

JULY 2016

World Congress on Petroleum & Refinery, Brisbane, web site: petroleum.omicsgroup.com/ **21-23.**

AUGUST 2016

SPE/AAPG/SEG Unconventional Resources Technology Conference (URTeC), San Antonio, web site: www.urtec.org/ **1-3.**

Society of Petroleum Engineers (SPE) Nigeria Annual International Conference & Exhibition, Lagos, web site: connect.spe.org/spenc/naice/naice2016/ **2-4.**

NAPE Expo, Houston, web site: napeexpo.com/shows/about-the-show/houston/ **10-11.**

EnerCom's The Oil & Gas Conference-2016, Denver, web site: www.theoilandgasconference.com/ **14-18.**

IADC/SPE Asia Pacific Drilling Technology Conference & Exhibition, Singapore, web site: www.spe.org/events/apdt/2016/ **22-24.**

GeoBaikal 2016: Expand Horizons, Irkutsk, Russia, web site: www.eage.org/event/index.php?eventid=1433&Opendivs=s3 **22-26.**

SPE Asia Pacific Hydraulic Fracturing Conference, Beijing, web site: www.spe.org/events/aphf/2016/pages/general/call_for_papers.php **24-26.**

15th European Conference on the Mathematics of Oil Recovery (ECMOR XV), Amsterdam, web site: www.eage.org/event/index.php?eventid=1416&Opendivs=s3 **Aug. 29-Sept. 1.**

Offshore Northern Seas, Stavanger, web site: www.tofairs.com/expo.php?fair=103366 **Aug. 29-Sept. 1.**

2nd International Congress & Expo on Biofuels & Bioenergy, Sao Paulo, web site: biofuels-bioenergy.conferenceseries.com/ **29-31.**

SEPTEMBER 2016

Second Applied Shallow Marine Geophysics Conference, Barcelona, web site: www. Eage.org/event/index.php?eventid=1421&Opendivs=s3 **4-8.**

EAGE First Conference on Geophysics for Mineral Exploration and Mining, Barcelona, web site: www.eage.org/event/?eventid=1420 **4-8.**

European Association of Geoscientists & Engineers (EAGE) First Conference on Geophysics for Mineral Exploration & Mining, Barcelona, web site: www.eage.org/event/index.php?eventid=1420&Opendivs=s3 **4-8.**

22nd European Meeting of Environmental and Engineering Geophysics, Barcelona, web site: www.eage.org/event/index.php?eventid=1419&Opendivs=s3 **4-8.**

SPE Offshore Europe, Aberdeen, web site: www.offshore-europe.co.uk/ **5-8.**

SPE Intelligent Energy Conference, Aberdeen, web site: www.intelligentenergyevent.com/ **6-8.**

NACE Egypt Corrosion Conference, Cairo, web site: egyptcorrosion.nace.org/ **6-8.**

AAPG SEG International Conference & Exhibition 2016, Cancun, web site: www.aapg.org/publications/blogs/events/article/articleid/23667/increase-your-expo-sure-exhibition-and-sponsorship-opportunities-available/ **6-9.**

AAPG SEG 2016 International Conference & Exhibition, Cancun, web site: www.aapg.org/events/conferences/ice/announcement/articleid/20311/aapg-seg-2016-international-conference-exhibition-cancun **6-9.**

23rd Annual India Oil & Gas Review Summit & International Exhibition, Mumbai, web site: www.oilgas-events.com/india-oil-gas **9-10.**

International Conference on Chemical Engineering, Phoenix, web site: chemicalengineering.conferenceseries.com/ **12-14**.

Geomodel 2016, Gelendzhik, Russia, web site: www.eage.org/event/index.php?eventid=1448&Opendivs=s3 **12-15.**

ESOPE International Exhibition & Symposium for the Pressure Equipment Industry, Paris, web site: www.esope-paris.com/ **13-15.**

SPE Deepwater Drilling & Completions Conference, Galveston, Tex., web site: www.spe.org/events/ddc/2016/ **14-15.**

2nd Annual IoT in Oil & Gas, Houston, web site: energyconferencenetwork.com/iot-in-oil-and-gas-2016/**14-15.**

Rio Oil & Gas Expo & Conference, Rio de Janeiro, web site: www.whereinfair.com/rio-oil-gas-expo/rio-de-janeiro/2016-Sep/ **14-16.**

Turbomachinery & Pump Users Symposium, Houston, web site: tps.tamu.edu/event-info **15-17.**

Iran International Petroleum Congress (IIPC), Tehran, web site: www.iranpetroleumcongress.com/ **19-21.**

The CWC World LNG & Gas Series: Asia Pacific Summit, Singapore, web site: asiapacific.cwclng.com/ **20-23**.

SPE Liquids-Rich Basins Conference—North America, Midland, Tex., web site: www.spe.org/events/lrbc/2016/ **21-22.**

Eastern Section, American Association of Petroleum Geologists 2016 Annual Meeting, Lexington, Ky., web site: www.esaapgmtg.org/ **25-27.**

Corrosion Technology Week 2016, Houston, web site: ctw.nace.org/ **25-29**.

SPE Annual Technical Conference & Exhibition (ATCE), Dubai, web site: www.spe.org/atce/2016/ **26-28.**

SPE Annual Technical Conference & Exhibition, Dubai, web site: www.spe.org/events/calendar/ **26-28.**

Global Oil & Gas South East Europe & Mediterranean Conference, Athens, web site: www.oilgas-events.com/Global-Oil-Gas-Black-Sea-Mediterranean-Conference/ **28-29.**

International Conference on Geophysics, Vancouver, web site: geophysics.conferenceseries.com/ **29-30.**

OCTOBER 2016

ICOGPE 2016: 18th International Conference on Oil, Gas & Petrochemical Engineering, Barcelona, web site: www.waset.org/conference/2016/10/barcelona/ICOGPE **3-4.**

Kazakhstan International Oil & Gas Conference (KIOGE) 2016, Almaty, Kazakhstan, web site: kioge.kz/en/conference/about-conference **5-6.**

USEA 9th Annual Energy Supply Forum, Washington, DC, web site: https://www.usea.org/event/usea-9th-annual-energy-supply-forum **6.**

International Conference on Geosciences, Orlando, web site: geosciences.conferenceseries.com/ **6-7.**

Wastewater disposal questioned

PAULA DITTRICK
Upstream Technology Editor

Numerous headlines appeared in recent weeks about oil and gas wastewater disposal wells, which are the subject of ongoing scrutiny about whether they contribute to increased seismic activity and possible water contamination in producing states.

Studies in scientific journals outlined evidence that chemicals from unconventional natural gas operations reached a stream near a Lochgelly, W.Va., wastewater site featuring an injection well, holding ponds, and storage tanks.

A US Geological Survey scientist led a team of researchers from the University of Missouri and Duke University. They tested water samples downstream of the disposal site, finding chemicals believed to have come from shale gas wells and coalbed methane operations.

Testing showed water and sediment samples collected downstream from the disposal site had higher salt levels, radioactive compounds, and chemicals that disrupt hormones, compared with upstream samples.

The exact source of the surface water contamination was not identified. Researchers stopped short of addressing whether the surface contamination came from the injection well.

"Deep-well injection is widely used by industry," said USGS scientist Denise Akob. "Our results demonstrate that activities at disposal facilities can potentially impact the quality of adjacent surface waters." She called for additional research.

Scientists analyzed samples for chemical markers associated with unconventional oil and gas wastewater. These include sodium, chloride, strontium, lithium, and radium. In addition, scientists analyzed microbial communities in sediments downstream.

These storage tanks and a nearby injection well handle wastewater from unconventional natural gas production in West Virginia. Photo by Kalla Leigh Fleger of US Geological Survey.

The US Environmental Protection Agency regulates Class II injection wells, used to inject brine and other fluids associated with oil and gas production. USGS is researching possible risks to water quality and environmental health posed by waste materials from unconventional development.

Groups sue EPA

Separately, various groups filed a federal lawsuit against EPA in early May, asking for court-established deadlines that would force EPA to comply with an overdue schedule to update waste disposal rules.

The groups want EPA to adopt stricter rules on disposal wells, particularly waste from drilling and hydraulic fracturing. Most injection wells associated with oil and gas are in Texas, California, Oklahoma, and Kansas.

"These rules are almost 30 years overdue," said Adam Kron, senior attorney at the Environmental Integrity Project, which was one of the groups filing the lawsuit in the US District court for the District of Columbia. Other groups involved were the Natural Resources Defense Council (NRDC), Earthworks, Responsible Drilling Alliance, San Juan Citizens Alliance, West Virginia Surface Owners' Rights Organization (WVSORO), and the Center for Health, Environment & Justice.

Julie Archie, WVSORO project manager, said West Virginia has taken steps to improve regulation, but she said the state issues permits for horizontal drilling without considering waste disposal methods.

Amy Mall, NRDC senior policy analyst, said, "Right now, companies can get rid of their toxic mess in any number of ways, from spraying it on icy roads to sending it to landfills…to injecting it underground where it can endanger drinking water and trigger earthquakes."

In 2015, EPA issued a study saying it found no evidence of widespread damage to drinking water from fracturing. Erik Milito, American Petroleum Institute group ddirector of upstream and industry operations, said controversy continues regardless of EPA's findings. "The science is sound. This is a technology that has been around" for decades and has helped boost production, he said. OGJ

NGLs in energy policy

When waterborne exports of ethane began this year from the US East Coast, the tankers and terminals built to accommodate them betokened a broader trend that should steer energy-policy urges away from current headings. The outbound ethane is extracted from natural gas produced in the bountiful Marcellus and Utica shales of the Appalachian basin. That's the gas redrawing North American supply patterns and, in conjunction with production from unconventional resources farther west, supplanting coal in power generation, revitalizing chemical manufacture, and promising affordable fuel to other industries. The new gas production also is boosting supplies of gas liquids.

While production of crude oil from US shales is declining, gas-plant output of NGLs continues to rise. In its Short-Term Energy Outlook for Hydrocarbon Gas Liquids, the US Energy Information Administration projected output during 2015-17 will grow by 450,000 b/d. Of that, 66% will be ethane. According to the report, net ethane exports by the US will reach 250,000 b/d by the fourth quarter of 2017. Annual average net exports of natural gasoline, or plant condensate, in 2017 will be 220,000 b/d out of total production of 460,000 b/d. And net exports of propane and butanes (LPG) that year will average 160,000 b/d from output by gas plants of 1.87 million b/d. For the longer term, EIA's Annual Energy Outlook 2015 predicted increases in production of natural gas plant liquids from 2.14 million b/d in 2012 to 4.04 million b/d in 2020 and a peak of 4.19 million b/d in 2030.

Global NGL surge

Growth in NGL supply won't be confined to the US. A new study by Asia Pacific Energy Consulting, Houston, predicts NGL supply from gas plants worldwide will increase by 5.7 million b/d during 2014-21. In an article for Oil & Gas Journal, APEC Pres. Al Troner wrote that the NGL surge, coupled with growing supplies of light oil from tight formations, is creating a "light-ends space" in the oil market (OGJ, June 6, 2016, p. 26). The liquids increment APEC predicts represents 6% of current, worldwide oil supply. On that basis alone, it's significant to the market. But destinations and uses make it even more interesting.

Traded ethane and LPG go mainly to petrochemical manufacturers, which crack the gas liquids instead of naphtha where they can and when encouraged to do so by price differentials. Condensate not exported for use as a heavy-oil diluent is distilled in a splitter, blended with crude and refined, or cracked to make olefins. Distillation yields of most condensates are at least 50% naphtha. As with ethane and LPG, condensate cracking can displace naphtha.

These trends suggest more production of naphtha and less demand for the material in ethylene manufacture. They won't unfold evenly or predictably because arbitrage will disturb the motivating price relationships. Elements nevertheless are in place for a structural surplus of naphtha, the main nonchemical use for which is as an intermediate feedstock in the production of gasoline.

An overhang of naphtha supply fed by increasing gas production, if it develops like this, will lower the cost of an important gasoline component. It won't be large enough to disconnect the prices of gasoline and crude. But it might suppress gasoline prices in relation to other oil products within cycles still inscribed by movements in the crude price. It might, in other words, moderate the price of traditional automotive fuel while governments pursue visions of transportation powered by electricity from renewable energy. Especially with demand expanded by policy, that electricity won't be cheap.

Nonfossil-energy problems

Markets yield more surprises than fulfilled predictions. This observation partly explains why governments create problems when they dictate energy choices. It also provides reason to expect future events to stray from contemporary forecasts.

Oil and gas markets nevertheless are evolving in ways likely to aggravate chronic competitive problems of nonfossil energy. Energy policies that ignore these developments in deference to carbon avoidance are economically punishing and, therefore, politically doomed. OGJ

Producing nations face big reform tasks amid low prices, speakers say

Nick Snow
Washington Editor

Lower crude oil prices make it essential for Venezuela, Nigeria, and other producing countries to institute major reforms, two speakers agreed on June 2. But reduced revenue from plunging crude production also makes it harder to eliminate subsidies and to reduce social programs that citizens have come to expect, they said during a discussion at the Center for Strategic & International Studies.

"The first rule is to not do harm," said Amos Hochstein, special envoy for international energy affairs at the US Department of State. "Nigeria's previous petroleum minister was corrupt, and it's good that he's gone. We've had good discussions with his successor about making changes. But nobody would want the challenge he faces of Niger Delta terrorism that's shutting down hundreds of thousands of barrels of daily production. He's trying to do a good job."

Ali Moshiri, president of Chevron Corp.'s Africa and Latin America exploration and production division, said, "He needs to address security issues, which have been problems for the last 20 years. The new petroleum minister needs to be willing to address this. If you look at what militants are doing, it's actually more destructive to their own country's government than to the multinational oil companies."

Venezuela is in a class of its own, the speakers observed. "When Hugo Chavez came to power, [Venezuela] had 3 million b/d of production. Now, it's below 2.5 million b/d. It did this on its own, even when prices were $100/bbl," Hochstein said.

Moshiri said national oil company Petroleos de Venezuela SA (PDVSA) "has been abused with a limited budget, limited growth, and limited training." He said, "The oil industry is capital-intensive. The government ordering increased production because of lower prices isn't going to happen. It needs more foreign investment to get production where it was before.

Nigeria's security challenge

"Nigeria is more complicated," Moshiri said. "Security issues are driving investors out. The militants there have been quite busy in the last month or so. The government needs to show it can move in and protect investments. That's not certain. In the last 8 years, not a single project has been developed there. If the government does not watch this and maintain security, production will decline more sharply than before."

Hochstein said, "The government's role, especially in the new structure that's been put in place, is to increase confidence by oil companies and financial sources. I think the latest attacks in the Niger River Delta are a good wake-up call for the US and its allies to begin addressing problems there."

Moshiri noted, "You need to look at it from two points of view. One is production, which I don't think either country is going to turn around quickly. The other is how the government can sustain itself with lower revenue. I think Venezuela's recovery could be fast. It could get back to 3.4 million b/d of production relatively easily. If changes happen and investments return, the resources are there and relatively easier to produce than Nigeria's, which has swamps and offshore."

Hochstein also said he considers it significant that global oil markets hardly reacted when the combination of terrorist attacks in Nigeria and fires in Canada's heavy crude production effectively took more than 1 million b/d of production offline. "The idea that this is just another price swing isn't necessarily so. The technological innovations happened faster than ever before," he said.

"Tight oil is more flexible than conventional onshore and deep offshore production," Hochstein said. "It's faster to come off or come on. And it's easier to manage as a private-led swing producer in the market than a cartel of producing nations. At some point, it will kick-start more US production."

Risk of social strife

It's also significant that the US has become the world's swing producer driven by markets instead of Saudi Arabia and other members of the Organization of Petroleum Exporting Countries, Hochstein said. "It's important to look at how government actions took potential resources off the table. A lot of this has to do with what countries did with their revenue when prices were high. The question now for many producing countries is how to manage this low-price period

without social strife," he said.

More countries will need to change their investment climates to attract more foreign capital, which has worked well in Argentina, the two speakers agreed. Chevron was one of the first companies to invest there following a recent change of government, "and it has worked out well," Moshiri said. "We took our North American experience there and went through a learning curve there more quickly because we could avoid mistakes. At the same time, the government has provided incentives to produce more because it's taking our production and using it domestically while giving us a higher price. It's doing a great job in encouraging investments and technology."

Hochstein said, "We need to consider consuming countries, too. I think that when prices are where they are today, it's an opportunity for governments to diversify their energy mixes and suppliers. Some countries in Latin America like Jamaica are looking at their energy sources. Mexico is sticking with its reforms, and is continuing with bid rounds to attract investments in the deeper offshore.

"My main concern is that a producing country has stability and a plan in case prices don't go back up," he said. "What's a problem for producers could be an opportunity for consumers. Lower prices not only provide a good opportunity to reduce subsidies, but also make it necessary. The problem is going to the people and saying subsidies are being cut but services aren't being increased."

More support for alternative and renewable energy also will be crucial, the DOS official said. "The reason the US is an energy superpower is not simply because of its oil and gas, but because we check all the boxes," he said. "Washington is a city where we still talk about renewable energy as politics. It's not. It's an investment that's cost-effective, creates jobs, and supports diversification. It's a business issue…. If you want to support real energy diversification, the determinant will be how much renewable energy is in there." OGJ

Methane emissions curbs costlier than earlier estimates, study says

Nick Snow
Washington Editor

The cost to reduce methane emissions from natural gas systems is nearly five times greater than previous estimates suggest, according to a study commissioned by ONE Future, a coalition of six US gas industry firms. The ICF International Study concluded that curbing methane emissions from US gas systems would cost an estimated $3.35/Mcf of methane reduced, the group said on June 2.

An official for the Environmental Defense Fund, whose 2014 study provided a marginal abatement cost (MAC) curve model for the new analysis, said the study ONE Future commissioned applied its own set of assumptions. "We always welcome new points of view, but it's important to note the new calculations change key variables in ways that boost the cost of reducing methane emissions while significantly understating benefits of these reductions," said Mark Brownstein, a vice-president in EDF's climate and energy program.

ONE Future—the trade name for Our Nation's Energy Future Coalition Inc.—focuses on finding policy and technical solutions that yield continually improved methane emissions associated with the production, processing, transmission and distribution of natural gas, information at its web site said. Its members are AGL Resources Inc., Apache Corp., BHP Billiton, Columbia Pipeline Group, Hess Corp., Kinder Morgan Inc., National Grid PLC, and Southwestern Energy Co.

In the new analysis, ICF evaluated methane recovery economics at a $3/Mcf gas cost, ONE Future said. It also used data from the US Environmental Protection Agency's 2012 emissions inventory as well as updated cost and emission reduction data that was based on ONE Future member companies' direct experiences, the group added.

"This new study provides cost estimates of methane abatement technologies that are more consistent with current market realities," ONE Future Interim Executive Director Richard Hyde said. "These findings will assist ONE Future member companies in our shared efforts to reduce methane emissions to less than 1% of total gas production."

ONE Future said the new analysis updated the list of known emission abatement technologies and provided revised cost estimates for each one. It also provides estimates of the total methane emission abatement potential associated with the various gas industry segments. "At its core, the study incorporates new information on the cost of methane control technologies and practices and the ability of industry to monetize recovered gas," the group said.

Used companies' data

ICF updated mitigation technologies' costs by taking into account data ONE Future member companies provided, the group said. The higher than previously estimated methane reduction costs was due largely to higher assumed costs for leak detection and repair (LDAR) and revised assumptions regarding the ability of midstream segments to monetize the value of recovered gas, it indicated.

"This in-depth analysis—which incorporated field data and extensive consultation with gas producers, midstream operators, and distribution companies—confirms ONE Future's position that combining a performance target with a flexible pathway toward meeting the shared goal of further reducing emissions, gives companies the right tools to meet

NICK SNOW
Washington Editor | Blog at www.ogj.com

Climate change and free speech

Environmental activists who allege ExxonMobil Corp. tried to suppress climate research for decades came under pressure themselves from Republicans on the US House Science, Space, and Technology Committee.

Twenty state attorneys general—the so-called Green 20—announced on Mar. 29 "that they were cooperating on an unprecedented effort against those who have questioned the causes, magnitude, or best ways to address climate change," Chairman LaMar Smith (Tex.) and 12 other committee Republicans said in May 18 letters to officials at the Union of Concerned Scientists, 350.org, Greenpeace, and five other groups.

"The committee is concerned that these efforts to silence speech are based not on sound science, but rather on a long-term strategy developed by political activist organizations," the federal lawmakers said.

They said efforts to instigate an investigation such as the one announced at the end of March date back at least to October 2012 when the Climate Accountability Institute and UCS convened a workshop to develop "a strategy to fight industry in the courts."

A necessary component was to bring "internal industry documents to light," the letters said. Lawyers at the workshop said that lawsuits were not the only way to secure these documents, but state attorneys general also could subpoena them, and "even grand juries convened by a district attorney could result in significant document discovery."

The sequence of events from then to the Green 20's Mar. 29 announcement "raises serious questions about the impartiality and independence of the investigations," the committee Republicans said. "Their actions appear to be the result of a long-standing, coordinated effort by activist groups such as UCS to target industrial, nonprofit, and scientific organizations and individuals who question the activist groups' conclusions."

'I'm not surprised'

Officials in the organizations responded quickly. "We weren't expecting them to come after us quite like this, but I'm not surprised they're fighting back," 350.org Executive Director May Boeve said. "The climate movement has been hitting fossil fuel companies like Exxon hard—from stopping pipelines to blockading oil trains to explicitly calling out their lies. Unleashing their allies in Congress is a counterattack of the most desperate kind."

Smith's letter made no claim that UCS violated any law or regulation, but seeks government oversight of the group's right to petition the government to address climate change, the group's Pres. Ken Kimmel said on June 1.

"This kind of open-ended investigation is an abuse of power, and we are standing up to it to avoid setting a precedent that could have a chilling effect on scientists, or anyone else, exercising their right to speak out about any vital issue," Kimmel said. OGJ

methane emissions reduction targets," Hyde said.

But Brownstein said in his June 3 blog that ICF's study for ONE Future used 2012 oil and gas figures from EPA's 2014 GHG inventory, which has been updated twice. "In the inventory published in April 2016, current emissions are about 27% higher than the figures used by ONE Future," he said.

"Even if you keep all the other assumptions in the report, we estimate that using updated inventory figures would result in a roughly 45% reduction in oil and gas sector methane emissions for a cost of approximately 1¢/Mcf of gas produced, which is squarely in line with estimates in the original ICF analysis commissioned by EDF," Brownstein said.

The new report also exaggerated compliance costs, particularly for the core process of LDAR, he continued. "This includes excessively high capital costs for equipment like high flow samplers and remote methane leak detectors that are not actually required for regulatory compliance, as well as inflated labor costs and survey times," Brownstein said. OGJ

Center's director responds to NAS report on improving offshore safety

Nick Snow
Washington Editor

The Center for Offshore Safety (COS) already has implemented several programs recommended in a report that the National Academies of Science, Engineering, and Medicine issued on May 25, and has made important new technology and practices available to member and nonmember companies, its director said.

"We'd love for everybody to be a member. Our membership already covers a significant amount of capital

spent and staff hours offshore," Charlie Williams told OGJ in a May 27 interview. "But I also think everyone has been able to use the tools and techniques that we have."

The report called on the US oil and gas industry to establish an independent organization dedicated to offshore safety and environmental protection, with no advocacy role. It suggested that COS, which the American Petroleum Institute and other industry groups formed following the April 2010 Macondo deepwater well blowout and oil spill, could fill this role, with membership required for companies working in the Gulf of Mexico.

"The report took about 2 years to prepare, and we're 6 years into introducing improvements to respond to Macondo," Williams said. "The Center identified all these areas as places to work in, and the report mentions work we have done. We've made progress in all these areas. Many programs are up and functioning."

COS's main purpose is to help the offshore oil and gas industry improve its safety practices, he noted. "We've always had our safety management and audit documents available online for free."

The Center accredits providers that do the Safety and Environmental Management Systems (SEMS) audits that companies have to turn in to the US Bureau of Safety and Environmental Enforcement, he said. "Essentially, every SEMS audit has used our tools and methodology," Williams said. "The fact a company wasn't a member doesn't mean it didn't have access to this information."

More tools, information

Companies working offshore have moved through the first round of BSEE audits, and a second round is under way, Williams said. "We're issuing a new set of audit tools based on the previous round, and are collecting other information, including continuous data to issue an annual safety performance indicators report and data from incidents and near-incidents' human behavior components," he said. "It's the kind of data people say we needed."

Williams said COS and its leaders also believe that it's important to have a central place to share knowledge and improve safety management, and that is a good place to do it. The group has a forum each year during the Offshore Technology Conference that anyone can attend. "We've spent a lot of time at the Center working on safety culture, and are working on a maturity tool where companies can self-assess their maturity in the safety management process," Williams said.

COS also is branching out, and recently signed a memorandum of understanding with Agencia de Seguridad Energia y Ambiente (ASEA), Mexico's new offshore oil and gas safety and environmental regulator, he said.

"There's a great interest in taking safety management practices the same across the entire Gulf of Mexico," he said. "We've been working hard on all of those, and we don't plan to stop. We've had a lot of interaction with [ASEA], as has BSEE. We should manage safety and have the same goals regardless of where companies are working in the gulf."

Responding quickly and well

Williams said he considers safety management something that needs to be thought about and done well. "Safety management systems begin with rules. But with complex operations involve managing change, which can't be predicted," he said. "You have to build systems to give people the capacity and dedication to respond to sudden changes. You have to build an environment when people go beyond just following the rules, and learn to think and respond quickly and well."

The safety culture is one key, but leadership also is important, he told OGJ. "A good effective safety management system is a starting point, but you have to have a workforce that can manage change skillfully," Williams said. "If you have a good system and use it well every day, you end up with a good safety culture. Employees and contractors see the leadership and dedication at a company, and begin to care about it too.

"Different companies are at different places on the journey. The task for all of us—BSEE, the Center, and the companies—is to get everybody into the same place," he said. "There are special challenges if a company is smaller, but actually some small companies have good safety management already. People have to think about their respective challenges, but I think one of the key goals is to get everyone to the same place. There are different levels of maturity right now."

Williams said the report contained some good ideas, but also basically approved of what COS has been doing and suggested ways to make its programs better and more effective. "We identified those action areas right after Macondo, and those are what we've been doing at COS and focus on getting more data. I think the report showed where we've made great progress, as well as areas where we can make more," he said. OGJ

TAEP: Depressed drilling, job activity to continue in Texas for near term

A recent increase in crude oil prices to roughly twice their February level has provided some optimism for the Texas upstream industry, but economist Karr Ingham warns the residual suffering will continue.

"It appears increasingly likely that we have seen the bottom, and that is certainly cause for some celebration and cautious optimism about where we are headed at this point,"

said Ingham, creator of the Texas Alliance of Energy Producers' Texas Petro Index.

"But just as other indicators of upstream oil field activity in Texas continued to increase for several months after prices began to fall in 2014, these same indicators will continue to decline for several months following a change for the better in crude oil prices," Ingham explained.

A composite index based upon a comprehensive group of upstream economic indicators, the TPI in April was 164.5, down 40.3% compared with its level in April 2015.

Before the current economic downturn, the TPI peaked at a record 313.3 in October and November 2014, which marked the zenith of an economic expansion that began in December 2009 when the TPI stood at 187.4.

Rig, job counts falling

TAEP notes the state's monthly rig-count average in April declined to fewer than 200 for the first time since June 1999. The 173-unit count in the last 2 weeks of May was 81% lower than the weekly count in November 2014 just prior to the onset of the rig count dive (OGJ Online, May 27, 2016).

The number of original drilling permits issued in April was down 20% year-over-year. The number of permits issued this year through April was down 40% compared with the average of the first 4 months of 2015, and was the lowest January-April total in the history of the TPI analysis.

With drilling activity in Texas falling more than 80%, Ingham described it as a "minor miracle" that just 32% of jobs have been cut since upstream petroleum industry employment peaked at more than 306,000 jobs in December 2014.

According to the TPI, another 6,300 jobs were eliminated in April, leaving upstream petroleum employment at an estimated 207,100, suggesting the loss of nearly 99,000 jobs thus far. "Job losses will continue in the coming months, even assuming we've seen the bottom in the price of crude oil," he said.

The April tally of upstream petroleum jobs is down 22.4% year-over-year and down 32% from a high of about 306,020 in December 2014. TPI estimates the trough in upstream oil and gas industry employment in Texas before the expansion ending December 2014 was 184,640 in October 2009. During the previous growth cycle, industry employment peaked at 225,965 in October 2008.

Crude oil production in Texas totaled an estimated 105 million bbl, down 2.5% from the April 2015 level. With oil prices in April averaging $37.51/bbl, the value of Texas-produced crude totaled about $3.94 billion, a decline of 27.7% from the April 2015 level.

Estimated Texas natural gas output was about 710.3 bcf, a year-over-year monthly decline of about 2.6%. With natural gas prices in April averaging $1.76/Mcf, the value of Texas-produced gas declined 31.2% to about $1.25 billion. OGJ

Shell advances Appalachian petrochemical project

Robert Brelsford
Downstream Technology Editor

Royal Dutch Shell PLC subsidiary Shell Chemical Appalachia LLC has taken final investment decision to build a grassroots petrochemical complex about 30 miles northwest of Pittsburgh that will produce ethylene and polyethylene (PE) from low-cost Marcellus and Utica shale ethane (OGJ Online, Nov. 7, 2014).

Main construction on the complex will begin in about 18 months, with commercial production scheduled for startup early in the next decade, Shell said.

To be located on the banks of the Ohio River in Potter Township, Beaver County, Pa., the complex's close proximity to gas feedstock will enable shorter and more dependable supply chains vs. supplies from the US Gulf Coast to North American PE customers, more than 70% of which are located within a 700-mile radius of Pittsburgh, Shell said.

The company did not disclose details regarding its proposed investment for the project.

FID on the project follows Pennsylvania's Department of Environmental Protection's approval last year of an air quality plan permit that allows Shell to build and temporarily operate the petrochemical complex until June 18, 2019 (OGJ Online, June 23, 2015).

First announced in 2011 (OGJ Online, June 6, 2011), Shell's Appalachian petrochemical complex will include an ethane cracker with an average ethylene production capacity of about 1.5 million tonnes/year, three PE units with a combined production of 1.6 million tpy, as well as associated installations for power and steam generation, storage, logistics, cooling water and water treatment, emergency flare, and offices.

The Appalachian petrochemical complex will be the third major project Shell recently has advanced to expand and strengthen its chemicals business.

Earlier this year Shell Chemical LP started construction on a $717-million project to increase alpha olefins (AO) production at its Geismar, La., chemical manufacturing plant by 425,000 tpy to an overall 1.3 million tpy by early 2018 (OGJ Online, Feb. 16, 2016; Nov. 30, 2015).

Shell subsidiary Shell Nanhai BV and partner China National Offshore Oil Corp. (CNOOC) also recently reached FID on a plan to expand capacity at their 50-50 joint venture CNOOC & Shell Petrochemicals Co. Ltd.'s petrochemical complex in the Daya Bay Economic and Technological Development Zone, Huizhou, Guangdong Province, China

(OGJ Online, Mar. 22, 2016; Dec. 15, 2015).

Alongside continuing construction of an ethylene cracker and ethylene derivatives units that will increase ethylene capacity by more than 1 million tpy, or about double the complex's current capacity (OGJ Online, Dec. 20, 2013), the expansion also includes construction of what will be China's largest styrene monomer and propylene oxide (SMPO) plant.

This artist's rendering shows Shell Chemical Appalachia LLC's plan for a petrochemical complex to be built northwest of Pittsburgh that will produce ethylene and polyethylene from Marcellus and Utica shale ethane. Image from Shell.

The expanded Chinese complex, once completed, will use Shell's proprietary OMEGA, SMPO, and Polyols technologies for the first time in China to produce the following: ethylene oxide, 150,000 tpy; ethylene glycol, 480,000 tpy; and high-quality polyols, 600,000 tpy. OGJ

Sasol updates progress on Louisiana petrochemical complex project

Robert Brelsford
Downstream Technology Editor

Costs have risen and startup schedules have been extended for Sasol Ltd.'s integrated ethane cracker and downstream derivatives complex under construction in Westlake, La., near Lake Charles (OGJ Online, July 15, 2013).

Preliminary findings from a detailed review of the Lake Charles Chemicals Project (LCCP) that began in March indicate total capital expenditures for the project, including site infrastructure and utility improvements, could increase to as much as $11 billion from a previous estimate of $8.9 billion, Sasol said.

The company attributed rising capex for LCCP to the interplay of several factors, including:

- Construction delays caused by higher-than-expected rainfall in the region.
- Higher labor costs.
- Increased prices under certain lump-sum contract bids.
- Bulk material requirements in excess of those included in original project estimates.

A policy to decelerate capital spending until June 2018 as part of Sasol's low oil-price response plan (OGJ Online, Mar. 9, 2015) also has contributed to further project cost increases as well as resulted in an extended project schedule for LCCP, the company said.

While improved phasing of engineering and construction activities have helped to partially offset some of these higher costs, Sasol said changes in long-term price assumptions and higher capital estimates have weighed on anticipated returns for the project compared with the company's projected returns upon reaching final investment decision for LCCP in October 2014 (OGJ Online, Oct. 27, 2014).

Despite cost overruns and extended deadlines, however, the company said it has not altered the scope of its originally proposed project.

As of Apr. 30, Sasol's capex to date on LCCP is $4.5 billion, with the overall project now more than 40% completed.

Currently, Sasol said it expects LCCP's 1.5 million-tonne/year ethane cracker will achieve beneficial operation during second-half 2018, which will enable about 80% total output from LCCP to reach beneficial operation later in 2018 and early 2019.

Additional production from LCCP's other derivative units will reach beneficial operation by second-half 2019, the company said.

Still ongoing, Sasol's detailed review of LCCP is due to be completed during this year's third quarter.

Sasol said it will release further details regarding the review with the company's annual results announcement on Sept. 12.

Alongside the grassroots ethane cracker (OGJ Online, Nov. 3, 2014; Oct. 16, 2013), LCCP will include six downstream chemical plants, including two large polymers plants for production of low-density and linear low-density polyethylene (OGJ Online, Oct. 15, 2015; Dec. 4, 2014) as well as an ethylene oxide-ethylene glycol plant that, together, will use about two thirds of ethylene produced by the cracker as feedstock.

The complex also will house three smaller, higher-value derivative plants to produce specialty alcohols, ethoxylates, and other products. OGJ

Oregon town lifts water restrictions as derailment cleanup continues

Nick Snow
Washington Editor

An Oregon community ended water use restrictions as cleanup continued of an estimated 1,000 bbl of Bakken crude that leaked from tank cars of a Union Pacific train that derailed on June 3 (OGJ Online, June 5, 2016). But the Mosier City Council and the town's mayor objected on June 6 to the railroad's plans to resume running trains along the affected track before the accident's investigation and the cleanup are complete.

"Restarting trains before the high-risk carnage of their last accident is even cleared is telling Mosier they're going to play a second round of Russian roulette…. It's totally unacceptable," Mayor Arlene Burns said.

"Everyone wants to see train traffic restarted, but we are very concerned about the safety of our town," added Mosier City Council Pres. Emily Reed. "The new tracks will be no safer than before the derailment, and now we have tens of thousands of gallons of oil sitting in damaged tankers just feet away from the proposed new active tank."

A UP spokesman confirmed that freight trains are running again along new track where the accident occurred, but at a 10 mph speed limit. None carrying crude oil will use the stretch until the cleanup and investigation are concluded, he told OGJ on June 7.

More than half the crude in the derailed cars had been loaded onto tanker trucks by that morning for transfer to The Dalles, Wasco County's seat, where it will be staged for rail transportation to Tacoma, Wash., its original destination, the derailment's unified command said in a June 7 update.

"Union Pacific has identified a preliminary cause of the crash, saying a bolt that fastens the rail to the railroad ties may have been at fault," it added. "But the final determination of the cause has not been made."

An estimated 10,000 gal of crude was removed from Mosier's wastewater system following the derailment, with the remaining 32,000 gal either burned off and vaporized, captured by booms in the Columbia River, or absorbed by soil, the unified command said.

"Booms remain in place as a precautionary measure but no new signs of oil sheen have been seen on the river or other waterways. Environmental crews believe the source of the sheen has been controlled," it said. OGJ

Gazprom Neft lets contract for Moscow refinery

Robert Brelsford
Downstream Technology Editor

Russia's PJSC Gazprom Neft, St. Petersburg, has let a contract to NIPIgazpererabotka (Nipigaz) to serve as general contractor for a Euro+ combined refining unit (CRU) to be built as part of the ongoing modernization and upgrade of its 12.15 million-tonne/year Moscow refinery (OGJ Online, Oct. 30, 2015; Dec. 3, 2014; July 19, 2013; May 7, 2013).

As general contractor, Nipigaz will provide extensive construction and installation works related to commissioning of a Euro+ CRU, Gazprom Neft said.

Gazprom Neft's 12.15 million-tpy Moscow refinery will undergo a modernization and upgrade project with the addition of a Euro+ combined refining unit. Photo from Gazprom Neft.e.

Initially valued at 21 billion rubles, a final value of the contract will be confirmed following Nipigaz's presentation of full project documentation, Gazprom Neft said.

With JSC AEM-Technology, the machine-building division of Russian state enterprise Rosatom, already at work on a major plant to be included in the Euro+ CRU, the unit is due to be commissioned in 2018, the company said.

A key project in the second phase of Gazprom Neft's full modernization of the Moscow refinery, the Euro+ CRU will be used for primary oil refining as well as for production of high-octane Euro-5 fuels and vacuum gas oil.

Following startup of the unit, Gazprom Neft said it will be able to decommission several obsolete installations at the refinery and increase scheduled maintenance events to every 4 years instead of the current 2-year maintenance cycle.

The Russian operator said it expects commissioning of the Euro+ CRU to increase the Moscow refinery's crude processing capacity 12 million tpy from the 11 million tpy processed at the plant in 2015, according to a Jan. 19 release from the company.

In addition to improving efficiency and reducing environmental impacts at the Moscow operations, the modernization and upgrading project, once fully completed, aims to raise the refinery's overall design capacity for crude processing to 18.15 million tpy (OGJ Online, Aug. 26, 2014). OGJ

IEA: Global LNG oversupply to impact trade patterns, keep prices low

New LNG supplies are coming online just as demand growth in some major markets are weakening, leading to major shifts in global natural gas trade patterns over the next 5 years, the International Energy Agency said in its 2016 Medium-Term Gas Market Report. IEA's report assesses global gas trends and provides a detailed analysis of global gas demand supply and trade development through to 2021.

"We see massive quantities of LNG exports coming online while, despite lower gas prices, demand continues to soften in traditional markets. These contradictory trends will both impact trade and keep spot gas prices under pressure." said Fatih Birol, EIA executive director. The combined factors of cheaper coal and continued strong renewables growth were blocking gas from expanding more rapidly in the power sector, Birol added.

The slowdown in Asian gas demand has intensified, prompting a rare decline in the region's LNG imports. As imports from Japan and South Korea—the world's top two LNG buyers—are set to decline, the rebalancing of global markets will depend on the rate of expansion in China, India, and other countries in developing Asia.

The annual IEA report forecasts global demand rising by 1.5%/year by the end of the forecast period compared with 2%/year projected in last year's outlook.

Slower primary energy demand growth and the decline in the energy intensity of the world's economy are lessening demand growth for all fossil fuels, including gas. However, as demand growth for coal and oil also weakens, the share of gas in the energy mix is still expected to increase—albeit modestly—by 2021.

While gas demand is projected to remain weak, global LNG exports will increase substantially. Between 2015 and 2021, liquefaction capacity will increase by 45%, mostly from the US and Australia. New projects in both countries have commenced ramping up production. Several others are at an advanced stage of development. By 2021, Australia will rival Qatar as the world's largest LNG exporter and the US will not be far behind.

Spot gas prices across the globe will remain under pressure due to oversupply in the market over the forecast horizon of this report.

"Unwanted" LNG supplies will look for a home in Europe, due to the flexibility of its gas system and well-developed spot markets. As a result, intense competition will develop among producers to retain or gain access to European customers. "We are at the start of a new chapter in European gas markets" Birol said.

Weaker-than-expected demand in Asia is leaving several large LNG buyers in the region over-contracted. This should help accelerate a transition towards more flexible contractual structures.

Moreover, with oil markets expected to rebalance before gas markets do, renewed pressure to move towards hub pricing and reduce oil exposure in long-term contracts will likely reemerge before the end of the decade.

Birol warned that today's oversupply could foreshadow a number of supply-side challenges and security risks down the road, noting that a growing level of LNG export capacity had gone offline during the past 5 years due to technical and security issues and that such problems could get worse with low oil and gas prices.

As producers slash investments to refocus on cost reductions and budget savings, he said that such efforts may be too late for global gas markets to rebalance during this decade, but could sow the seeds for tighter markets into the next decade. OGJ

THE EDITOR'S PERSPECTIVE

Official: Ontario is 'not, not, not' phasing out gas

by **Bob Tippee**, Editor

"Ontario is not, not, not going to phase out natural gas."

Member of Parliament Bob Delaney resorted to repetitive negatives to assure officials of Kincardine that the provincial government doesn't really plan to block the start of gas service in their municipality on Lake Huron.

"Reports of Ontario moving away from natural gas are nonsense," said Delaney, the minister of energy's parliamentary assistant, according to the Owen Sound Sun Times.

He referred to a May 16 Globe and Mail report about a climate-change action plan due sometime this month. The newspaper obtained a draft debated by Liberal Party Premier Kathleen Wynn's cabinet.

Targeting cuts in greenhouse gas reductions from 1990 levels of 15% by 2020, 37% by 2030, and 80% by 2025, the draft said homes built after 2030 would have to be heated without fossil fuels.

It called for spending by the province of more than $7 billion (Can.) during 4 years on climate mitigation and set targets for deployment of 1.7 million electric or hybrid cars by 2024 and a 5% cut in emissions from gasoline and diesel vehicles.

The spending would be funded by revenue from a cap-and-trade system.

News that the province might phase out natural gas provoked fierce opposition. Thanks to earlier Liberal energy initiatives, Ontarians are edgy.

The government proudly claims to be the first jurisdiction in North America to have eliminated coal from power generation and thus to have met a 2014 target for GHG emission cuts—6% against the 1990 baseline.

But electricity prices have soared, devastating businesses and raising heating bills painfully for citizens lacking gas service.

According to the Canadian Energy Research Institute, 76% of homes in Ontario rely on gas for space and water heating in a province where the cost of the light hydrocarbon now is less than a third that of electricity.

The government doesn't want anyone to worry, though. Any suggestion that it might ban gas use is a big misunderstanding.

Or not, not, not.

(From the subscription area of www.ogj.com, posted June 3, 2016; author's e-mail: bobt@ogjonline.com)

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OIL&GAS JOURNAL online research center. PennEnergy research

IMPORTS OF CRUDE AND PRODUCTS

	Districts 1-4		District 5		Total US		
	5-27 2016	5-20 2016	5-27 2016	5-20 2016	5-27 2016	5-20 2016	5-29* 2015
	1,000 b/d						
Total motor gasoline	907	911	13	23	920	934	692
Mo. gas. blending comp.	859	849	13	17	872	866	597
Distillate	69	173	0	20	69	193	64
Residual	25	146	39	68	64	214	186
Jet fuel-kerosine	38	43	165	87	203	130	177
Propane-propylene	61	63	18	20	79	83	63
Other	660	962	65	113	724	1,075	550
Total products	**1,760**	**2,298**	**300**	**331**	**2,059**	**2,629**	**1,732**
Total crude	**6,380**	**6,048**	**1,459**	**1,267**	**7,839**	**7,315**	**7,372**
Total imports	**8,140**	**8,346**	**1,759**	**1,598**	**9,899**	**9,944**	**9,104**

*Revised.
Source: US Energy Information Administration
Data available at PennEnergy Research Center.

EXPORTS OF CRUDE AND PRODUCTS

	Total US		
	5-27-16	5-20-16	*5-29-15
	1,000 b/d		
Finished motor gasoline	374	413	426
Jet fuel-kerosine	152	170	160
Distillate	1,178	949	1,025
Residual	366	376	380
Propane/propylene	649	699	449
Other oils	1,010	1,001	913
Total products	**3,729**	**3,608**	**3,353**
Total crude	**489**	**390**	**441**
Total exports	**4,218**	**3,998**	**3,794**
NET IMPORTS			
Total	5,680	5,946	5,311
Products	(1,670)	(979)	(1,621)
Crude	7,350	6,925	6,932

*Revised.
Source: Oil & Gas Journal
Data available at PennEnergy Research Center.

OGJ CRACK SPREAD

	6-3-16*	6-5-15*	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	64.15	79.49	(15.34)	(19.30)
Brent crude	48.91	61.90	(13.00)	(20.99)
Crack spread	15.24	17.60	(2.35)	(13.36)
FUTURES MARKET PRICES				
One month				
Product value	66.21	83.06	(16.86)	(20.30)
Light sweet crude	49.11	59.65	(10.54)	(17.67)
Crack spread	17.09	23.42	(6.33)	(27.01)
Six month				
Product value	61.78	76.60	(14.81)	(19.34)
Light sweet crude	50.80	60.95	(10.16)	(16.66)
Crack spread	10.99	15.65	(4.66)	(29.78)

*Average for week ending.
Source: Oil & Gas Journal
Data available at PennEnergy Research Center.

CRUDE AND PRODUCT STOCKS

District	Crude oil	Motor gasoline: Total	Motor gasoline: Blending comp.	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 bbl						
PADD 1	18,154	67,636	63,499	11,342	54,875	9,605	3,431
PADD 2	156,297	52,298	46,441	6,280	30,940	1,602	20,766
PADD 3	277,881	81,826	72,625	14,659	48,005	24,376	48,798
PADD 4	24,833	7,406	5,382	635	3,247	174	[1]2,386
PADD 5	58,536	29,454	27,216	9,420	12,558	5,272	—
May 27, 2016	**535,701**	**238,620**	**215,163**	**42,336**	**149,625**	**41,029**	**75,381**
May 20, 2016	**537,069**	**240,110**	**215,770**	**43,138**	**150,877**	**41,773**	**74,129**
May 29, 2015[2]	**477,415**	**220,292**	**194,512**	**38,445**	**132,612**	**41,037**	**77,047**

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available at PennEnergy Research Center.

REFINERY REPORT—MAY 27, 2016

District	REFINERY OPERATIONS: Gross inputs	REFINERY OPERATIONS: Crude oil inputs	REFINERY OUTPUT: Total motor gasoline	REFINERY OUTPUT: Jet fuel, kerosine	REFINERY OUTPUT: Fuel oils: Distillate	REFINERY OUTPUT: Fuel oils: Residual	REFINERY OUTPUT: Propane-propylene
	1,000 b/d						
PADD 1	1,146	1,155	3,296	86	350	43	157
PADD 2	3,586	3,583	2,612	257	919	49	404
PADD 3	8,642	8,535	2,092	852	2,751	229	958
PADD 4	607	607	327	33	168	8	[1]189
PADD 5	2,461	2,327	1,664	381	569	142	—
May 27, 2016	**16,442**	**16,207**	**9,991**	**1,609**	**4,757**	**471**	**1,708**
May 20, 2016	**16,433**	**16,278**	**9,905**	**1,571**	**4,661**	**460**	**1,759**
May 29, 2015[2]	**16,662**	**16,407**	**9,693**	**1,710**	**5,023**	**425**	**1,635**
	18,317	**Operable capacity**	**89.8**	**utilization rate**			

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available at PennEnergy Research Center.

STATISTICS

OGJ GASOLINE PRICES

	Price ex tax 6-1-16	Pump price* 6-1-16	Pump price 6-3-15
		¢/gal	
(Approx. prices for self-service unleaded gasoline)			
Atlanta	162.5	211.9	256.3
Baltimore	173.9	224.9	260.3
Boston	171.3	216.2	263.3
Buffalo	165.6	226.6	273.3
Miami	160.7	215.6	266.3
Newark	170.7	203.6	251.3
New York	187.8	248.9	292.3
Norfolk	205.1	245.9	242.3
Philadelphia	155.5	224.3	286.3
Pittsburgh	173.1	241.9	283.3
Wash., DC	198.3	240.2	273.3
PAD I avg	175.0	227.3	268.0
Chicago	235.5	284.1	303.7
Cleveland	183.0	229.4	267.0
Des Moines	185.4	235.8	269.6
Detroit	184.5	233.4	267.0
Indianapolis	187.8	236.1	258.3
Kansas City	185.1	220.8	247.3
Louisville	188.0	232.4	288.6
Memphis	194.7	234.5	250.3
Milwaukee	173.5	224.8	274.3
Minn.-St. Paul	179.4	226.4	267.0
Oklahoma City	179.1	214.5	252.0
Omaha	187.4	233.5	260.1
St. Louis	180.8	216.5	267.9
Tulsa	180.1	215.5	249.0
Wichita	177.7	220.2	251.0
PAD II avg	186.8	230.5	264.9
Albuquerque	172.5	209.8	252.7
Birmingham	167.5	206.8	244.0
Dallas-Fort Worth	167.9	206.3	251.2
Houston	166.8	205.2	243.2
Little Rock	170.6	210.8	245.3
New Orleans	166.0	204.4	243.2
San Antonio	167.5	205.9	242.2
PAD III avg	168.4	207.0	246.0
Cheyenne	182.3	224.7	258.5
Denver	194.1	234.5	263.6
Salt Lake City	188.6	236.4	294.0
PAD IV avg	188.3	231.9	272.0
Los Angeles	254.9	313.9	391.4
Phoenix	182.5	219.9	282.2
Portland	178.4	227.9	303.3
San Diego	219.0	278.0	381.3
San Francisco	228.9	287.9	391.3
Seattle	198.0	260.9	314.8
PAD V avg	210.3	264.8	344.0
Week's avg.	**184.1**	**230.7**	**274.4**
May avg.	**176.1**	**222.8**	**267.0**
Apr. avg.	**161.9**	**208.6**	**245.7**
2016 to date	**151.8**	**198.6**	—
2015 to date	**192.1**	**239.5**	—

*Includes state and federal motor fuel taxes and state sales tax. Local governments may impose additional taxes.
Source: Oil & Gas Journal.
Data available at PennEnergy Research Center.

BAKER HUGHES RIG COUNT

	6-3-16	6-5-15
Alabama	1	1
Alaska	8	10
Arkansas	—	5
California	5	11
Land	5	11
Offshore	—	—
Colorado	16	39
Florida	—	1
Illinois	1	3
Indiana	1	—
Kansas	2	14
Kentucky	3	—
Louisiana	47	70
N. Land	16	27
S. Inland waters	4	4
S. Land	7	12
Offshore	20	27
Maryland	—	—
Michigan	—	—
Mississippi	3	2
Montana	—	—
Nebraska	—	2
New Mexico	20	46
New York	—	—
North Dakota	22	76
Ohio	11	22
Oklahoma	57	106
Pennsylvania	14	46
South Dakota	—	—
Texas	176	364
Offshore	—	—
Inland waters	—	—
Dist. 1	14	50
Dist. 2	12	40
Dist. 3	6	18
Dist. 4	7	21
Dist. 5	1	5
Dist. 6	6	18
Dist. 7B	1	2
Dist. 7C	20	31
Dist. 8	94	146
Dist. 8A	9	13
Dist. 9	2	3
Dist. 10	4	17
Utah	3	7
West Virginia	10	20
Wyoming	7	22
Others HI-1	1	1
Total US	**408**	**868**
Total Canada	**41**	**116**
Grand total	**449**	**984**
US oil rigs	325	642
US gas rigs	82	222
Total US offshore	21	27
Total US cum. avg. YTD	**501**	**1,194**

Rotary rigs from spudding in to total depth.
Definitions, see OGJ Sept. 18, 2006, p. 46.
Source: Baker Hughes Inc.
Data available at PennEnergy Research Center.

OGJ PRODUCTION REPORT

	[1]6-3-16	[2]6-5-15
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	20	29
Alaska	508	482
California	544	603
Colorado	305	317
Florida	5	6
Illinois	19	24
Kansas	99	130
Louisiana	1,318	1,356
Michigan	13	19
Mississippi	54	70
Montana	62	85
New Mexico	365	405
North Dakota	1,067	1,177
Ohio	69	62
Oklahoma	347	365
Pennsylvania	15	21
Texas	3,584	3,748
Utah	84	108
West Virginia	18	26
Wyoming	204	242
Other states	50	59
Total	**8,750**	**9,334**

[1]OGJ estimate. [2]Revised. Source: Oil & Gas Journal.
Data available at PennEnergy Research Center.

US CRUDE PRICES

	6-3-16 $/bbl*
Alaska-North Slope 27°	24.29
Light Louisiana Sweet	43.99
California-Midway Sunset 13°	38.65
California Buena Vista Hills 26°	46.37
Wyoming Sweet	44.87
East Texas Sweet	43.00
West Texas Sour 34°	40.00
West Texas Intermediate	45.00
Oklahoma Sweet	45.00
Texas Upper Gulf Coast	38.75
Michigan Sour	37.00
Kansas Common	44.00
North Dakota Sweet	38.25

*Current major refiner's posted prices except N. Slope lags 2 months. 40° gravity crude unless differing gravity is shown. Source: Oil & Gas Journal. Data available at PennEnergy Research Center.

WORLD CRUDE PRICES

OPEC reference basket	Wkly. avg. 6-3-16	$/bbl 45.29
	Mo. avg., Mar.-16	$/bbl — Apr.-16
OPEC reference basket	34.65	37.86
Arab light-Saudi Arabia	34.74	38.22
Basrah light-Iraq	33.39	36.62
Bonny light 37°-Nigeria	38.53	41.51
Es Sider-Libya	37.51	40.48
Girassol-Angola	38.42	41.25
Iran heavy-Iran	33.23	36.65
Kuwait export-Kuwait	32.99	36.33
Marine-Qatar	35.49	38.97
Merey-Venezuela	25.83	28.84
Minas 34°-Indonesia	34.62	38.52
Murban-UAE	40.01	42.47
Oriente-Ecuador	31.45	35.04
Saharan blend 44°-Algeria	39.41	42.33
Other crudes		
Fateh 32°-Dubai	35.15	39.00
Isthmus 33°-Mexico	35.45	38.14
Brent 38°-UK	38.51	41.48
Urals-Russia	36.87	39.89
Differentials		
WTI/Brent	(0.74)	(0.53)
Brent/Dubai	3.36	2.48

Source: OPEC Monthly Oil Market Report.
Data available at PennEnergy Research Center.

REFINED PRODUCT PRICES

	5-27-16 ¢/gal		5-27-16 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		No. 2 Distillate Low sulfur diesel fuel	
New York Harbor	163.70	New York Harbor	149.20
Gulf Coast	151.20	Gulf Coast	145.00
		Los Angeles	155.60
Motor gasoline (RBOB-regular)		Kerosine jet fuel	
New York Harbor	163.60	Gulf Coast	137.00
No. 2 heating oil		Propane	
New York Harbor	142.20	Mont Belvieu	52.70

Source: EIA Weekly Petroleum Status Report.
Data available at PennEnergy Research Center.

IHS PETRODATA RIG COUNT

JUNE 3, 2016

	Total supply of rigs	Marketed supply of rigs	Marketed contracted	Marketed utilization rate (%)
US Gulf of Mexico	112	62	40	64.5
South America	59	55	46	83.6
Northwest Europe	105	86	70	81.4
West Africa	66	54	28	51.9
Middle East	166	157	121	77.1
Southeast Asia	92	78	39	50.0
Worldwide	831	705	504	71.5

Source: IHS Petrodata
Data available in PennEnergy Research Center

US NATURAL GAS STORAGE[1]

	5-27-16	5-20-16 bcf	5-27-15	Change, %
East	537	511	430	24.9
Midwest	655	629	421	55.6
Mountain	178	171	134	32.8
Pacific	304	298	313	(2.9)
South Central	1,233	1,216	897	37.5
Salt	370	372	272	36.0
Nonsalt	863	844	625	38.1
Total US	**2,907**	**2,825**	**2,195**	**32.4**
	Mar.-16	Mar.-15	Change, %	
Total US[2]	**2,492**	**1,483**	**68.0**	

[1]Working gas. [2]At end of period.
Source: Energy Information Administration
Data available at PennEnergy Research Center.

WORLDWIDE CRUDE OIL AND GAS PRODUCTION

	Mar. 2016	Feb. 2016	3 month average production 2016	3 month average production 2015	Change vs. previous year Volume	Change vs. previous year %	Mar. 2016	Feb. 2016	Cum. 2016
	Crude, 1,000 b/d						Gas, bcf		
Argentina	521	518	519	531	(12)	(2.2)	108.2	99.4	312.63
Bolivia	50	50	50	50	—	(0.3)	65.0	65.0	195.00
Brazil	2,267	2,338	2,321	2,438	(117)	(4.8)	102.0	80.0	262.02
Canada	3,900	3,935	3,903	3,849	54	1.4	485.0	485.0	1,453.73
Colombia	940	1,010	980	1,010	(30)	(2.9)	30.0	30.0	90.00
Ecuador[1]	550	550	543	547	(3)	(0.6)	1.0	1.0	3.00
Mexico	2,218	2,214	2,230	2,301	(70)	(3.1)	186.9	189.8	567.73
Peru	46	47	48	62	(14)	(23.2)	40.2	30.8	102.02
Trinidad	74	75	75	83	(8)	(10.0)	108.8	96.9	324.08
United States	9,127	9,133	9,150	9,396	(246)	(2.6)	2,451.0	2,322.0	7,222.84
Venezuela[1]	2,350	2,370	2,357	2,393	(37)	(1.5)	68.0	68.0	204.00
Other Latin America	86	85	86	89	(2)	(2.6)	4.5	4.5	13.84
Western Hemisphere	**22,129**	**22,409**	**22,262**	**22,748**	**(485)**	**(2.1)**	**3,650.7**	**3,472.4**	**10,750.90**
Austria	17	15	16	17	(1)	(4.0)	3.5	3.5	10.98
Denmark	149	110	132	157	(25)	(16.2)	14.7	9.1	35.53
France	17	17	17	16	1	6.3	0.1	0.1	0.32
Germany	47	47	47	46	—	0.7	23.8	23.8	71.90
Italy	92	80	92	93	(2)	(1.8)	18.7	17.3	55.48
Netherlands	20	21	21	32	(10)	(32.6)	202.0	202.0	605.22
Norway	1,630	1,650	1,645	1,589	56	3.5	395.5	374.3	1,161.83
Turkey	49	49	49	47	1	2.8	1.2	1.1	3.60
United Kingdom	1,010	976	964	852	112	13.2	130.6	121.8	372.96
Other Western Europe	5	5	5	8	(3)	(34.8)	3.2	3.2	9.53
Western Europe	**3,041**	**2,975**	**2,987**	**2,857**	**130**	**4.5**	**793.3**	**756.2**	**2,327.35**
Azerbaijan	790	792	787	819	(32)	(4.0)	56.0	54.8	167.38
Croatia	13	14	13	12	1	11.1	5.4	5.2	16.28
Hungary	13	14	14	12	2	13.9	5.8	5.3	16.49
Kazakhstan	1,350	1,360	1,357	1,375	(18)	(1.3)	145.0	145.0	434.79
Romania	77	77	76	80	(4)	(5.0)	33.8	32.7	102.20
Russia	10,608	10,476	10,437	10,121	316	3.1	1,924.9	1,826.0	5,946.28
Other FSU	400	400	399	438	(39)	(8.8)	516.0	516.0	1,547.23
Other Eastern Europe	62	61	62	59	3	4.5	26.7	25.8	79.38
Eastern Europe and FSU	**13,313**	**13,194**	**13,145**	**12,917**	**228**	**1.8**	**2,713.5**	**2,610.8**	**8,310.02**
Algeria[1]	1,110	1,100	1,103	1,107	(3)	(0.3)	230.0	230.0	690.00
Angola[1]	1,800	1,760	1,770	1,773	(3)	(0.2)	4.0	4.0	12.00
Cameroon	82	82	82	82	—	—	2.0	2.0	6.00
Congo (former Zaire)	28	28	28	28	—	—	—	—	—
Congo (Brazzaville)	290	290	290	290	—	—	—	—	—
Egypt	684	684	684	691	(7)	(1.0)	127.0	127.0	381.00
Equatorial Guinea	248	248	248	248	—	—	0.1	0.1	0.18
Gabon	260	260	260	260	—	—	0.3	0.3	0.90
Libya[1]	340	370	363	363	—	—	45.0	45.0	135.00
Nigeria[1]	1,680	1,760	1,770	1,830	(60)	(3.3)	70.0	70.0	210.00
Sudan	258	258	258	258	—	—	—	—	—
Tunisia	46	46	46	53	(7)	(13.2)	7.5	7.5	22.52
Other Africa	285	285	285	285	—	—	7.8	7.8	23.32
Africa	**7,111**	**7,171**	**7,188**	**7,268**	**(81)**	**(1.1)**	**493.6**	**493.6**	**1,480.92**
Bahrain	51	49	50	49	1	2.7	32.0	32.0	96.00
Iran[1]	3,260	3,220	3,160	2,817	343	12.2	465.0	465.0	1,395.00
Iraq[1]	4,190	4,220	4,280	3,487	793	22.8	82.0	82.0	251.37
Kuwait[1,2]	2,830	2,830	2,823	2,800	23	0.8	52.1	48.1	149.48
Oman	1,019	1,019	1,017	970	47	4.8	86.0	86.0	258.00
Qatar[1]	670	670	660	673	(13)	(2.0)	550.0	550.0	1,650.00
Saudi Arabia[1,2]	10,190	10,200	10,193	9,863	330	3.3	250.0	250.0	750.00
Syria	30	30	30	30	—	—	14.0	14.0	42.00
United Arab Emirates[1]	2,730	2,780	2,813	2,840	(27)	(0.9)	165.0	165.0	495.00
Yemen	160	160	160	160	—	—	—	—	—
Other Middle East	1	1	1	1	—	—	26.5	26.5	79.50
Middle East	**25,132**	**25,179**	**25,188**	**23,690**	**1,498**	**6.3**	**1,722.6**	**1,718.6**	**5,166.35**
Australia	292	299	300	296	4	1.4	166.4	153.0	473.77
Brunei	113	123	122	113	9	8.3	40.7	36.7	118.76
China	4,102	4,310	4,233	4,254	(21)	(0.5)	433.2	420.1	1,318.41
India	735	743	736	768	(32)	(4.2)	89.7	90.6	266.72
Indonesia[1]	730	710	745	794	(49)	(6.2)	213.0	213.0	639.00
Japan	11	11	11	11	—	—	14.7	13.5	43.08
Malaysia	627	602	619	600	19	3.2	195.7	185.0	565.67
New Zealand	33	38	37	35	2	6.2	13.7	14.2	43.12
Pakistan	86	87	87	95	(8)	(8.7)	119.3	113.5	358.40
Papua New Guinea	30	30	30	30	—	—	0.5	0.5	1.50
Thailand	265	271	270	240	29	12.2	116.4	113.1	352.36
Vietnam	300	300	300	300	—	—	33.0	33.0	99.00
Other Asia–Pacific	30	30	27	34	(7)	(22.0)	114.5	113.2	341.48
Asia–Pacific	**7,372**	**7,554**	**7,515**	**7,570**	**(54)**	**(0.7)**	**1,550.8**	**1,499.4**	**4,621.28**
TOTAL WORLD	**78,099**	**78,483**	**78,285**	**77,050**	**1,235**	**1.6**	**10,924.6**	**10,551.0**	**32,656.83**
OPEC	32,430	32,540	32,581	31,287	1,294	4.1	1,982.1	1,978.1	5,944.85
Offshore Europe	2,816	2,763	2,768	2,625	142	5.4	540.8	565.8	1,691.08

[1]OPEC member. [2]Kuwait and Saudi Arabia production each include half of Neutral Zone. Totals may not add due to rounding.
Source: Oil & Gas Journal. Data available at PennEnergy Research Center.

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