Week of Mar. 1, 2010/US$10.00

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Capital Spending Outlook

Chesapeake cements position in six US onshore plays
Developing Khurais required optimized technologies
Neural network predicts pipeline energy use
Barclays: 2010 to bring change to global LNG trade

OIL&GAS JOURNAL®

Mar. 1, 2010
Volume 108.8

CAPITAL SPENDING OUTLOOK

REGULAR FEATURES

COVER

Devon Energy Corp.'s Bridgeport natural gas processing plant is one of the largest in the US, serving hundreds of gas wells in the rapidly expanding Barnett shale in North Texas. Gas production from the Barnett shale will help boost US output for years to come. OGJ's Capital Spending Outlook, beginning on p. 24, forecasts this year's upstream, midstream, downstream, and other expenditures for the oil and gas industry in the US and Canada. Photo courtesy of Devon Energy.

General Interest

Exploration & Development

Technology

 Oil & Gas Journal (ISSN 0030-1388) is published 46 times per year by PennWell Corporation, 1421 S. Sheridan Rd., Tulsa, Okla., Box 1260, 74101. Periodicals postage paid at Tulsa, Okla., and at additional mailing offices. Oil & Gas Journal and OGJ are registered trademarks of PennWell Corporation. **POSTMASTER:** send address changes, letters about subscription service, or subscription orders to P.O. Box 3497, Northbrook, IL 60065, or telephone (800) 633-1656. Change of address notices should be sent promptly with old as well as new address and with ZIP code or postal zone. Allow 30 days for change of address. Oil & Gas Journal is available for electronic retrieval on Oil & Gas Journal Online (www.ogjonline.com) or the NEXIS® Service, Box 933, Dayton, Ohio 45401, (937) 865-6800. **SUBSCRIPTION RATES** in the US: 1 yr. $89; Latin America and Canada: 1 yr. $94; Russia and republics of the former USSR, 1 yr. 2,200 rubles; all other countries: 1 yr. $129, 1 yr. premium digital $59 worldwide. These rates apply only to individuals holding responsible positions in the petroleum industry. Single copies are $10 each except for 100th Anniversary issue which is $20. Publisher reserves the right to refuse non-qualified subscriptions. Oil & Gas Journal is available on the Internet at http://www.ogjonline.com. (Vol. 108, No. 8) Printed in the US. GST No. 126813153. Publications Mail Agreement Number 602914. Return Undeliverable Canadian Addresses to: P.O. Box 1632, Windsor, ON N9A 7C9.

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General Interest — Quick Takes

NARUC cites need to retain access to OTC markets

Financial reform legislation should ensure natural gas and electric power utilities have continued access to over-the-counter risk-management products to keep prices more predictable and less volatile, the National Association of Regulatory Utility Commission (NARUC) said during its 2010 winter meeting.

Proposed federal legislation would give the US Commodity Futures Trading Commission oversight of all OTC products, including mandatory centralized clearing and exchange trading for all OTC products, according to the resolution. This would increase hedging costs and, ultimately, consumer prices because margin requirements would be increased, it warned.

Any new legislation addressing OTC risk management products should exempt legitimate gas and electric hedging activity from mandatory clearing requirements, it recommended. The exemption should be narrowly tailored to prevent excessive speculation in gas and electricity markets, the resolution continued.

Independent oil and gas producers have also said that higher margin requirements required by regulated exchanges would severely restrict their ability to manage cash flow and obtain financing. The resolution which NARUC directors approved during the Feb. 14-17 meeting noted that a report by the Joint Association of End-Users found that such requirements would make less money available for utility infrastructure and for exploration and production.

"The laudable goals of reform that ensure market transparency and adequate regulatory oversight can be accomplished by means other than mandatory clearing of OTC risk management contracts and the anticipated extra expense," it continued. Requiring gas and electric market participants using legitimate OTC hedges to report them to the CFTC would make markets sufficiently transparent without additional costs associated with mandatory clearing, for example, NARUC's resolution said.

MMS will increase staff as part of audit strategy

The US Minerals Management Service will add 19 new auditors and continue to target leaseholders that have been identified as high-risk, MMS Director S. Elizabeth Birnbaum said as the US Department of the Interior agency announced its auditing plan for 2010 on Feb. 17.

"MMS auditors will also be taking a closer look at smaller energy producers that may not have been audited as frequently in the past," she said. Audits and other compliance activities which the agency performs can range from limited scope reviews that examine one or more specific areas to full-scale audits that review all aspects of a company's reports and payments over several years, she noted.

The agency, which manages federal land on the US Outer Continental Shelf and is responsible for oil and gas leasing there, collects royalties from mineral and energy producers with onshore leases on federal and American Indian lands as well as operations offshore on the OCS.

MMS said it receives monthly royalty payments from 2,000 companies and individuals covering nearly 30,000 producing leases. It uses specific criteria to identify leaseholders and properties which are more likely not to be in compliance. Properties may range from a single lease to a unit including numerous leases, the agency said.

During fiscal 2008 and 2009, MMS audited or reviewed more than 900 companies and more than 6,300 producing federal properties, it added. In 2009, it collected more than $157 of additional royalties, interest, and civil penalties, including $65 million in audit and other enforcement activities; $34 million through sophisticated automated detection systems, including interest due on late payments, and $54 million through follow-up enforcement actions including civil penalties and negotiated settlements.

"Our goal for 2010 is to cover 86% of high-risk companies and 43% of high-risk mineral producing properties," Birnbaum said. By comparison, the US Internal Revenue Service generally audits 1-5% of individual income tax returns, based on income, and 11-27% of larger companies and corporations, depending on company assets, she noted. ✦

Exploration & Development — Quick Takes

Range Resources plots expansion in Marcellus

Range Resources Corp., Fort Worth, plans to exit 2010 at a net 180-200 MMcfd of gas equivalent from the Marcellus shale and 2011 at 360-400 MMcfed compared with just above 115 MMcfed at present.

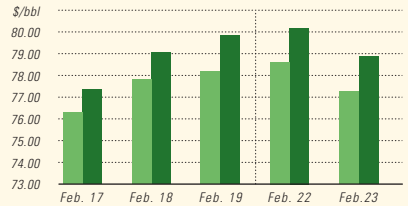
The company looks to add three Marcellus rigs in the last quarter of 2010 to the 13 it will keep busy from now until then, drilling and casing 150 horizontal wells this year. The end-2011 rig count will be 24.

Range drilled and completed its first two horizontal wells in the northeast part of the play in Lycoming County, Pa., in the 2009 fourth quarter. Average 7-day test rates were 13.3 MMcfed and 13.6 MMcfed. Hookup will take until late 2010 and early 2011, respectively.

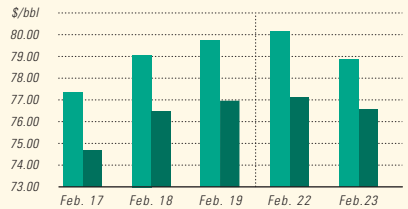
The company is testing its first horizontal Upper Devonian shale well and its first horizontal Utica shale well awaits completion.

Industry Scoreboard

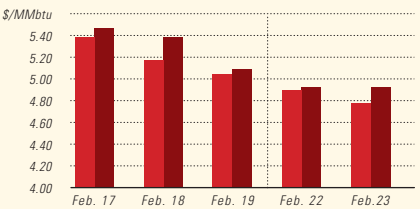
IPE BRENT / NYMEX LIGHT SWEET CRUDE



WTI CUSHING / BRENT SPOT



NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



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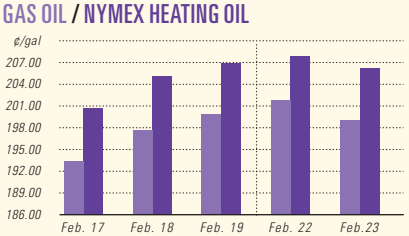
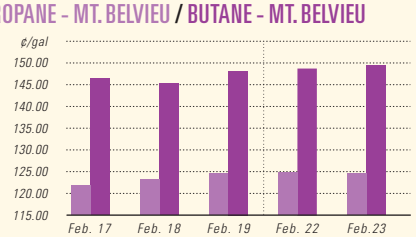
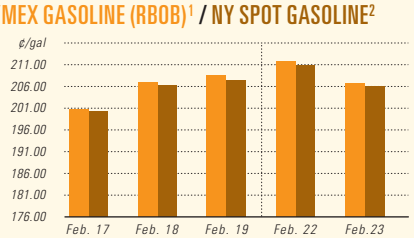


PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



NYMEX GASOLINE (RBOB)[1] / NY SPOT GASOLINE[2]



[1]Reformulated gasoline blendstock for oxygen blending
[2]Nonoxygenated regular unleaded

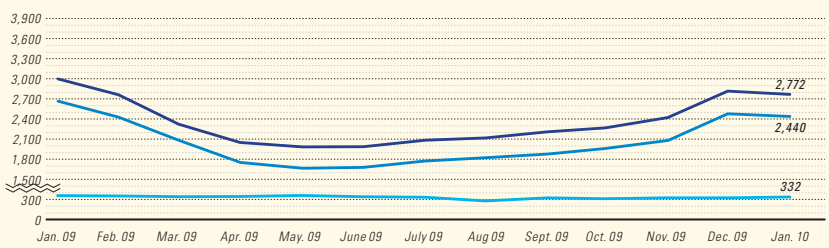
US INDUSTRY SCOREBOARD — 3/1

Latest week 2/12	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	8,630	8,740	–1.3	8,657	8,753	–1.1
Distillate	3,717	4,012	–7.4	3,693	3,995	–7.6
Jet fuel	1,370	1,351	1.4	1,371	1,349	1.6
Residual	647	624	3.7	564	603	–6.5
Other products	4,631	4,234	9.4	4,587	4,216	8.8
TOTAL DEMAND	18,995	18,961	0.2	18,873	18,916	–0.2
Supply, 1,000 b/d						
Crude production	5,445	5,225	4.2	5,455	5,252	3.9
NGL production[2]	2,098	1,817	15.5	2,059	1,821	13.0
Crude imports	8,296	9,598	–13.6	8,425	9,545	–11.7
Product imports	2,891	3,190	–9.4	2,786	3,162	–11.9
Other supply[3]	1,756	1,632	7.6	1,740	981	77.3
TOTAL SUPPLY	20,486	21,462	–4.5	20,465	20,761	–1.4
Refining, 1,000 b/d						
Crude runs to stills	13,612	13,711	–0.7	13,724	14,114	–2.8
Input to crude stills	13,927	14,458	–3.7	14,009	14,451	–3.1
% utilization	78.8	81.8	—	79.2	81.8	—

Latest week 2/12	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	334,503	331,418	3,085	350,630	–16,127	–4.6
Motor gasoline	232,065	230,445	1,620	218,664	13,401	6.1
Distillate	153,255	156,192	–2,937	140,752	12,503	8.9
Jet fuel–kerosine	42,676	42,374	302	40,957	1,719	4.2
Residual	37,851	39,431	–1,580	36,320	1,531	4.2
Stock cover (days)[4]			Change, %		Change, %	
Crude	24.6	24.3	1.2	24.7	–0.4	
Motor gasoline	26.9	26.6	1.1	24.6	9.3	
Distillate	41.2	41.9	–1.7	33.2	24.1	
Propane	19.6	20.4	–3.9	24.2	–19.0	
Futures prices[5] **2/19**			**Change**		**Change**	**%**
Light sweet crude ($/bbl)	78.30	73.91	4.39	36.91	41.39	112.1
Natural gas, $/MMbtu	5.23	5.37	–0.14	4.56	0.66	14.5

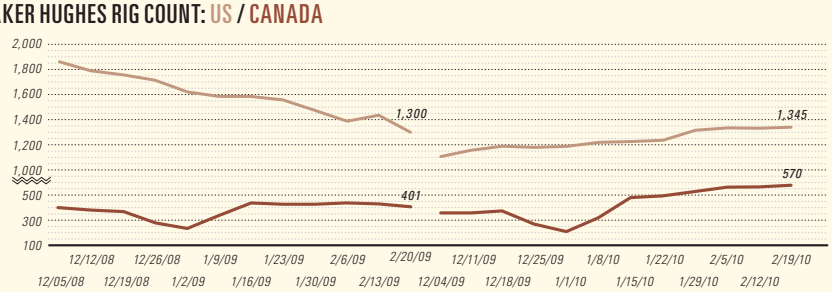
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average of daily closing futures prices.
Sources: 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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In the northeast part of the play, the company has drilled 31 horizontal wells, of which 26 await completion and five await hookup.

Most of the company's wells are in the play's southwest portion, where Range has been accumulating data for 2.5 years. The company said estimated ultimate recovery for a Marcellus horizontal well there averages 4.4 bcfe.

Before August 2009, a typical Range Marcellus well had a 2,200-2,800-ft lateral and eight frac stages. Since then laterals are 2,900-5,000 ft with 9-17 fracs, the company said.

"As has been demonstrated in other shale plays, it appears that the longer laterals result in higher initial production rates, higher EURs and improved economics," Range said.

Range has aggregated 900,000 net acres in the high-quality part of the Marcellus play, and a considerable share of the company's $190 million leasehold budget for 2010 will go to block up its Marcellus acreage position.

As of yearend 2009, for each of its proved developed wells in the Marcellus shale play, Range recorded on average 1.2 offset drilling locations as proved undeveloped reserves under new federal rules.

ExxonMobil, MOL to quit Hungary's Mako area

ExxonMobil Corp. and MOL Hungarian Oil & Gas PLC sent written notices to Falcon Oil & Gas Ltd., Denver, that neither will proceed to the appraisal stage of the joint production and development project in Hungary's Mako Trough.

In accordance with the production and development agreement, ExxonMobil's and MOL's respective participating interests in the contract lands, the Foldeak-1 well, and all other interests will revert to Falcon.

The two exiting companies obtained disappointing gas flow rates from alternating shales and sands in the Tertiary Szolnok formation in a basin centered gas accumulation (OGJ Online, Oct. 8, 2009).

Falcon, which becomes operator of the contract area, is seeking alternative strategic partners and is in active discussions with multiple parties to continue evaluation of its 247,000 acres under the long-term production license.

McCully propane frac wells decline, AVO tried

Gas production at two wells in McCully field in southern New Brunswick have declined after encouraging initial rates, and separately the operator is evaluating the amplitude variation with offset technique to identify areas for infill drilling.

The $28.6 million 2010 capital budget of Corridor Resources Inc., Halifax, NS, includes funds for drilling two McCully Hiram Brook wells and is based in part on field output averaging 19.5 MMscfd versus the 23 MMscfd previously estimated. This is because the McCully L-38 and P-47 wells appear to be on hyperbolic decline trajectories and have fallen to 1 MMscfd/well from test rates of 5 MMscfd in the fall of 2009.

Corridor theorizes that the reservoirs may be smaller than indicated by formation thickness, that abundant pyrobitumen reduces reservoir size, or that wax found on wellheads and downhole tools may indicate that rapid pressure drawdown during initial high-rate testing may have led to wax deposition near the well bore.

Early results of a xylene soak-squeeze in the L-38 well indicate the treatment may not be effective, and Corridor is considering restricting flow rates to stem wax deposition in this part of the field.

Corridor also plans to drill the L-37 horizontal well using an oil base mud to minimize formation damage. The company expects that a horizontal well in this part of the reservoir may be free of bitumen and productive without hydraulic fracs. It also may not experience decline rates similar to those at L-38 and P-47. The company will defer the second 2010 McCully well fracs are necessary.

Corridor is building a detailed reservoir model using data from the field's 30 wells to assess fluid drainage patterns and select infill locations.

The 2010 budget includes funds to drill the Sally's Brook Hiram Brook prospect 17 km north of McCully field, Corridor's share of four wells to be drilled on Anticosti Island in the Gulf of St. Lawrence, and performing a site survey for a proposed drilling location on the Newfoundland side of the giant Old Harry structure in the gulf east of Prince Edward Island (see seismic section, OGJ, Sept. 28, 1998, p. 108).

Corridor is seeking a floating rig to drill within 2 years to 4,000-6,000 ft in 1,400 ft of water at Old Harry, where it estimates the potential at 2 billion bbl of oil or 5 tcf of gas recoverable.

Quebec Utica shale gas flow rates encouraging

A horizontal exploration well in Ordovician Utica shale in Quebec's St. Lawrence Lowlands is flowing gas at 5 MMcfd of gas about 3 weeks after its initial rate of more than 12 MMcfd.

The Talisman Energy Inc. St. Edouard-1A well has a 1,000-m lateral with eight frac stages in Middle Utica. Clean-up and flow back began Jan. 29 at more than 12 MMcfd, and the well averaged more than 6 MMcfd during the test, said partner Questerre Energy Corp., Calgary.

The 5 MMcfd rate is at 640 psi flowing tubing pressure on a 5/8-in. choke. The extended production test continues.

During completion, microseismic data were recorded using the St. Edouard-1 vertical hole as a monitoring well. Preliminary analysis indicates the fracs were successful in stimulating sufficient rock volume in the entire Utica sequence, Questerre said.

The initial rates from St. Edouard exceed Questerre's internal threshold for commercial production on a per well basis based on targeted development costs, the company said. Talisman and Questerre are evaluating pipeline options to tie in the well.

Egypt Western Desert concessions extended

Egypt's Ministry of Petroleum extended Apache Corp.'s Khalda Offset and East Bahariya concessions in the Western Desert through July 2016 and July 2012, respectively.

Apache committed to drill at least 10 wells on Khalda Offset with a minimum $45 million capital outlay and $35 million signature bonus. The concession covers 908,900 acres. It committed to drill at least 3 wells on East Bahariya with a minimum $10 million in spending and $4 million signature bonus. The concession covers 673,800 acres.

Based on 2009 exploration success in and around the newly extended concessions, Apache has accelerated 3D seismic surveying and planned a full slate of exploratory drilling.

The most recent discovery, West Kanayes E-1X in the Matruh basin on a concession adjacent to Khalda Offset, tested a combined 17 MMcfd of gas and 1,960 b/d of condensate from 80 ft of net pay in three zones in the Jurassic Alam el Buieb (AEB-6) formation.

The discovery extends AEB production eastward about 4 miles from production in Khalda Offset and into the sparsely drilled West Kanayes concession, said Tom Voytovich, vice-president of Apache's Egypt region.

"With the high oil rate encountered in the upper zone, this well will be produced to maximize liquids production during the time when our gas-handling capacity is facilities-constrained," Voytovich said.

Apache, operator of West Kanayes with 100% contractor interest, plans two more exploratory wells in 2010.

Khalda Offset and East Bahariya are among 22 concessions operated by Apache in joint ventures with Egyptian General Petroleum Corp. Apache, the largest producer and most active explorer in the Western Desert, had gross production of 175,000 b/d of oil and 752 MMcfd of gas in the last quarter of 2009. Net production was 96,000 b/d and 383 MMcfd. ✦

Drilling & Production — *Quick Takes*

ADCO lets contract to boost Bab oil flow

Abu Dhabi Co. for Onshore Operations (ADCO) has let contract to National Petroleum Construction Co. (NPCC) of Abu Dhabi for work that will increase oil production from onshore Northeast Bab field by 80,000 b/d.

The $683 million engineering, procurement, and construction contract covers development of Lower Cretaceous Habshan-2 and Thamama G zones. Bab field, on production since the 1960s and an important source of natural gas, is 150 km southwest of Abu Dhabi city (see map, OGJ, Aug. 3, 2009, p. 32).

Expansion of Bab oil production is part of an effort by ADCO to raise its output to 1.8 million b/d of oil from 1.4 million b/d. Abu Dhabi accounts for nearly all production by the United Arab Emirates of about 2.27 million b/d.

ADCO also plans to start production from Bida Al Qemzan and Qusahwira fields and from elsewhere in Bab.

NPCC's work will include well tie-ins and flowlines connecting production wells to four new remote degassing stations, tie-ins of 54 water injection wells, pipelines totaling about 950 km, and associated equipment.

Repsol to develop satellite fields off Spain

Repsol Investigaciones Petroliferas SA has let a lump-sum contract to Technip for subsea work to develop two Casablanca satellite oil fields 50 km off the eastern coast of Spain in the Mediterranean Sea, Technip reported.

A Repsol group made the Montanazo D-5 and Lubina-1 discoveries northeast of Casablanca and off Tarragona in mid-2009.

Montanazo, drilled to 2,354 m in 736 m of water, tested at 3,800 b/d of 32° gravity oil. Lubina, drilled to 2,439 m in 663 m of water 4 km north of Montanazo, made 3,700 b/d of 31.5° gravity oil. Repsol said each could produce 5-7 years, quadrupling Spain's then-existing 2,000 b/d of oil production.

Technip's scope includes engineering, supply, installation, and precommissioning of an 11-km flexible pipeline system to connect two production wells to the Casablanca platform, installed in 1981, which already handles oil from Boqueron, Rodaballo, Chipiron, and Casablanca fields.

Offshore installation is scheduled for first-half 2011 using the Deep Constructor, a Technip deepwater construction vessels.

This pipeline system will include a riser, a flowline, and two short sections of pipe to connect subsea structures.

In addition, Technip will install a pumping manifold and umbilicals. The flexible pipelines and umbilicals will be trenched to protect fishing lines, Technip said.

All flexible pipelines will be fabricated at Technip's plant in Le Trait, France.

BPZ updates Peru Corvina, Albacora operations

BPZ Resources Inc., Houston, placed on long-term test its seventh oil well in Corvina field on Block Z-1 off Peru as it worked toward a transition to commercial production around May 31.

The company also received approval to restart long-term tests at the A-14XD well in Albacora field, in Peru near the marine boundary with Ecuador 16 miles north of Corvina field, and resumed drilling the A-15D well, expected on line by the end of April.

The CX11-17D well in Corvina was making an initial 2,000 b/d of oil with normal gas-oil ratio and no formation water.

BPZ perforated 80 ft in two sets of sands within the well's 225 ft of estimated net oil pay. It first opened lower sands that had not been tested before in prior wells before adding the second set of sands, thus allowing the company to gather data to update its geologic and reservoir models.

The company is collecting data to determine the field's drive mechanism and has ordered equipment to reinject produced gas and water.

BPZ has spud the CX11-22D, projected to 10,000 ft measured depth, and expects to place it on line near the end of April.

The clearance to resume tests at A-14XD, BPZ's first well in Albacora, came as it positioned extended well test equipment at the Albacora platform. BPZ hasn't determined what production declines may occur at Albacora.

ERCB reports on Joslyn Creek steam release

The Energy Resources Conservation Board of Alberta (ERCB) released an incident report on the May 18, 2006, steam release at Total E&P Canada Ltd.'s Joslyn Creek steam-assisted gravity drainage (SAGD) oil sands project as well as Total's report on the incident to ERCB.

ERCB's report notes that the Joslyn Creek project, 60 km north of Fort McMurray, was the shallowest SAGD development in Alberta, with horizontal steam injection wells at less than a 100-m depth.

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E1077 Current E1077C Historical, 1980 to current

Enhanced Oil Recovery Survey — Covers active, planned and terminated projects worldwide. Updated biennially in March.
E1048 Current E1148C Historical, 1986 to current

Worldwide Gas Processing Survey — Gas processing plants worldwide with details.
E1209 Current E1219C Historical, 1985 to current

International Ethylene Survey — Information on country, company, location, capacity, etc.
E1309 Current E1309C Historical, 1994 to current

LNG Worldwide — Facilities, Construction Projects, Statistics
LNGINFO

Worldwide Construction Projects — List of planned construction products updated in May and November each year.

	Current	Historical 1996–Current
Refinery	E1340	E1340C
Pipeline	E1342	E1342C
Petrochemical	E1341	E1341C
Gas Processing	E1344	E1344C

U.S. Pipeline Study — There are 14 categories of operating and financial data on the liquids pipeline worksheet and 13 on the natural gas pipeline worksheet.
E1040

Worldwide Survey of Line Pipe Mills — Detailed data on line pipe mills throughout the world, process, capacity, dimensions, etc.
PIPEMILL

OGJ 200/100 International Company Survey — Lists valuable financial and operating data for the largest 200 publicly traded oil and gas companies.
E1345 Current E1145C Historical 1989 to current

Oil Sands Projects — Planned Canadian projects in four Excel worksheets. Includes mining, upgrading, in situ projects, and historical table with wells drilled back to 1985.
OILSANDPRJ

Production Projects Worldwide — List of planned production mega-projects.
PRODPROJ

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The report said the steam release breached the caprock and affected a 125 m by 75 m surface area. The release caused rock projectiles to travel up to 300 m from the main crater and produced a 1-km dust plume. The report notes that there was no loss of life or injury and the incident did not emit any harmful gas.

After the incident, ERCB imposed pressure restrictions on steam injection for the project and in June 12, 2009, approved the suspension of the project. Recently Total has submitted an application for abandoning the project.

ERCB concluded that Total was noncompliant with its approved development scheme by operating at bottomhole pressures higher than the 1,400 kPa (absolute) proposed in its application and by failing to shut-in wells that exceeded a 1,800 kPa (absolute) bottomhole pressure.

The Joslyn Creek incident is the only time that a SAGD operation in Alberta has had a caprock breach that released steam to surface, ERCB said.

ERCB also said it began to implement changes in March 2007 in its application processes. The changes require thermal project applications to provide more detailed geological information for determining the caprock competency as wells as provide an outline for monitoring caprock integrity during steam injection. ✦

Processing — *Quick Takes*

ExxonMobil to use NRU in Texas field work

ExxonMobil Corp. will employ nitrogen recovery and cryogenic gas processing equipment from Air Products, Lehigh Valley, Pa., for work to extend the producing life of Hawkins field in northeast Texas.

Air Products will deliver the NRU plant equipment later this year.

ExxonMobil will operate the new NRU plant to process about 140 MMscfd of natural gas, said the company in an announcement last month (OGJ, Jan. 18, 2010, p. 10). Recovered nitrogen will be reinjected into the field for reservoir stimulation. The company expects to recover an additional 40 million boe at Hawkins field.

Construction was to begin this quarter with project start-up expected in late 2011, said an ExxonMobil statement in January. The project will extend by 25 years the life of the field, which was discovered in 1940.

Hawkins field lies in Wood County, Tex., about 100 miles east of Dallas. The company said that over 70 years it has produced more than 800 million bbl and is one of the largest ever discovered in the state. ✦

Transportation — *Quick Takes*

RasGas 3 starts up LNG Train 7

Ras Laffan LNG Co. Ltd. 3 (RasGas 3) has started up its 7.8-million-tonnes/year Train 7 at Ras Laffan Industrial City, Qatar.

Plant capacity matches that of RasGas Train 6, inaugurated last year (OGJ Online, Aug. 12, 2009), and expands total LNG production from the site to more than 60 million tpy, according to OGJ figures. Qatar's North field, estimated to hold more than 900 tcf, supplies all trains.

The announcement from ExxonMobil Corp. said RasGas 3 Train 7 is the fourth 7.8-million-tpy LNG plant brought online in the past 12 months by its joint venture with Qatar Petroleum. "These mega facilities have sufficient scale to competitively reach markets around the globe," it said.

RasGas 3 is part of an investment in natural gas production and liquefaction by affiliates of QP and ExxonMobil that includes 12 new, 210,000-cu m Q-Flex LNG vessels and one 260,000-cu m Q-Max LNG vessel, said ExxonMobil. The final component of the investment is the Golden Pass LNG terminal, under construction near Sabine Pass, Tex. It will be able to regasify 15.6 million tpy when it starts up later this year.

El Paso to sell Mexican pipeline assets to Sempra

El Paso Corp. agreed to sell its interest in Mexican pipeline and compression assets to Sempra Pipelines & Storage, a unit of Sempra Energy. The sale includes El Paso's 50% interest in a joint venture with Mexico's state owned Petroleos Mexicanos consisting of the 15,000-hp Gloria a Dios compression station, the 23.4-mile Samalayuca pipeline, the 70.8-mile San Fernando pipeline (and 75,000 hp of accompanying compression), and the 117.4-mile Burgos LPG pipeline (with 1,200 hp of pumping), all near the Mexico-Texas border. The 12.75-in. OD, 30,000 b/d Burgos LPG pipeline extends from Pemex's Burgos gas processing center to Monterrey, Nuevo Leon, Mexico.

The sale also includes El Paso's wholly owned 14,000-hp Naco compression station and 7.8-mile Agua Prieta pipeline, originating at the Arizona border. El Paso expects the $300 million transaction to close in the second quarter.

The sale did not include El Paso's interest in the proposed 1.3-bcfd Sonora LNG terminal, covered by a separate joint venture with Houston's DKRW Energy LLC. Sonora Terminal and Pipeline would deliver natural gas to northern Mexico and the southwestern US from the terminal site in Puerto Libertad, Sonora, Mexico.

El Paso says the project has received permits to develop the terminal and associated pipelines but is still in the process of securing Pacific Rim LNG supplies. It anticipates commercial operations by 2014-15, pending supplier agreements. ✦

Correction

The headline "NARUC study lists adverse impacts for ongoing OCS ban" (OGJ, Feb. 22, 2010, p. 26) incorrectly suggests that the National Association of Regulatory Utility Commissioners conducted the study. NARUC authorized the study and hired Science Applications International Corp. to conduct it. The same article also erroneously identified O'Neal Hamilton as a former NARUC chairman. He formerly chaired South Carolina's Public Service Commission and currently chairs NARUC's committee on gas.

Calendar

✦ Denotes new listing or a change in previously published information.

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Additional information on upcoming seminars and conferences is available through OGJ Online, Oil & Gas Journal's Internet-based electronic information source at http://www.ogjonline.com.

2010

MARCH

Annual Arctic Gas Symposium, Calgary, Alta., (877) 927-7936, website: www.arcticgassymposium.com. 2-3.

APPEX Conference, London, +44 0 20 74341399, +44 0 20 74341386 (fax) website: www.appexlondon.com. 2-4.

Subsea Tieback Forum & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.subseatiebackforum.com. 2-4.

Middle East Geosciences Conference and Exhibition, Manama, +973 17 550033, +973 17 553288 (fax), e-mail: fawzi@aeminfo.com.bh, website: www.aeminfo.com.bh/geo2010. 7-10.

Middle East Geosciences Conference and Exhibition, Manama, +973 17 550033, +973 17 553288 (fax), e-mail: fawzi@aeminfo.com.bh, website: www.geobahrain.org. 7-10.

SPE Hydrocarbon Economics and Evaluation Symposium, Dallas, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-9.

Purvin & Gertz LPG Seminar, The Woodlands, Tex., (713) 331-4000, (713) 236-8490 (fax), website: www.purvingertz.com. 8-11.

CERA Week, Houston, (617) 866-5992, e-mail: info@cera.com, website: www.cera.com. 8-12.

NPRA Security Conference & Exhibition, The Woodlands, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 9-10.

Offshore West Africa Conference & Exhibition, Accra, Ghana, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshorewestafrica.com. 9-11.

Annual European Fuels Conference, Paris, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 9-12.

SPE European San Management Forum, Aberdeen, +44 1224 495051, e-mail: Alexandra.stacey@hulse-rodger.com, website: www.spe-uk.org. 10-11.

NACE International Corrosion Conference & Expo, San Antonio, (281) 228-6200, (281) 228-6300 (fax), e-mail: firstservice@nace.org, website: www.nace.org. 14-18.

International Pump Users Symposium, Houston, (979) 845-7417, (979) 845-1835 (fax), e-mail: inquiry@turbo-lab.tamu.edu, website: http://turbolab.tamu.edu. 15-18.

API Spring Committee on Petroleum Measurement Standards Meeting, Dallas, (202)

682-8000, (202) 682-8222 (fax), website: www.api.org. 15-18.

Gas Asia, Kuala Lumpur, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 16-18.

Oil and Gas Africa Exhibition & Conference, Cape Town, SA, +27 21 713 3360, +27 21 713 3366 (fax), e-mail: events@fairconsultants.com, website: www.fairconsultants.com. 16-18.

Offshore Asia Conference & Exhibition, Kuala Lumpur, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoreasiaevent.com. 16-18.

Turkish International Oil & Gas Conference & Showcase (TUROGE), Ankara, Turkey, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 16-18.

Electric Light & Power Executive Conference, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.elpconference.com. 21-22.

NPRA Annual Meeting, Phoenix, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 21-23.

GPA Annual Convention, Austin, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gpaglobal.org, website: www.GPAglobal.org. 21-24.

✦ACS Spring National Meeting & Exposition, San Francisco, (202) 876-4600, e-mail: help@acs.org, website: http://portal.acs.org. 21-25.

AIChE Spring National Meeting & Global Congress on Process Safety, San Antonio, (203) 702-7660, (203) 775-5177 (fax), website: www.aiche.org. 21-25.

Howard Weil Energy Conference, New Orleans, (504) 582-2500, website: www.howardweil.com/energy-conference.aspx. 21-25.

Gas Turbine Users International (GTUI) Annual Conference, Calgary, Alta., +9714 804 7738, +9714 804 7764 (fax), e-mail: info@gtui.org, website: www.gtui.org. 21-26.

Middle East Downstream Week & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 22-25.

IADC Drilling HSE Asia Pacific Conference & Exhibition, Singapore, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 23-24.

SPE/ICoTA Coiled Tubing & Well Intervention Conference & Exhibition, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 23-24.

Middle East Refining Conference & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 23-24.

Base Oils and Lubricants in Russia and CIS & Annual Meeting, Moscow, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 23-25.

SPE Intelligent Energy Conference and Exhibition, Utrecht, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.intelligentenergyevent.com/conferenceOGJ. 23-25.

Utility Products Conference & Exposition, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.utilityproductsexpo.com. 23-25.

DistribuTECH Confernece & Exhibition, Tampa, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.distributech.com. 23-25.

Georgian International Oil, Gas, Energy and Infrastructure Conference & Showcase (GIOGIE), Tbilisi, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com,

Calendar

website: www.oilgas-events.com. 24-25.

NPRA International Petrochemical Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 28-30.

APRIL

ATYRAU North Caspian Regional Oil, Gas and Infrastructure Exhibition, Atyrau, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 6-8.

Rocky Mountain Unconventional Resources Conference & Exhibition, Denver, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.RMURconference.com. 6-8.

Oil & Gas WestAsia Exhibition in conjunction with SPE EOR Conference, Muscat, +968 24660124, +968 24660125 (fax), e-mail: omanexpo@omantel.net.om, website: www.ogwaexpo.com 11-13.

SPE EOR Conference at Oil & Gas West Asia, Muscat, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 11-13.

AAPG Annual Convention and Exhibition, New Orleans, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org 11-14.

Annual Asian Petcoke Conference, Panaji, Goa, India, (832) 351-7828, e-mail: petcoke.conference@jacobs.com, website: www.petcokes.com. 12-14.

IPAA OGIS, New York City, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 12-14.

SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production, Rio de Janeiro, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 12-14.

IADC Well Control Europe Conference & Exhibition, Aberdeen, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 13-14.

GPA Mid-continent Annual Meeting, Oklahoma City, (918) 493-3872, (918) 493-3875 (fax), e-mail: gpa@gasprocessors.com, website: www.gasprocessors.com. 15.

International Liquefied Natural Gas Conference and Exhibition, Oran, +44 (0) 20 7596 5000, +44 (0) 20 7596 5111 (fax), website: www.lng16.org. 18-21.

Oil & Gas WestAsia Conference, Muscat, +968 24660124, +968 24660125 (fax), e-mail: omanexpo@omantel.net.om, website: www.ogwaexpo.com. 19-21.

Hannover Messe Pipeline Technology Trade Show, Hannover, +49 0 511 89 0, +49 0 511 89 32626 (fax), website: www.hannovermesse.de. 19-23.

Texas Alliance Annual Meeting and Expo, Wichita Falls, (940) 723-4131, (940) 723-4132 (fax), e-mail: texasalliance@texasalliance.org, website: www.texasalliance.org. 20-21.

API Pipeline Conference and Cybernetics Symposium, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 20-22.

SPE Improved Oil Recovery Symposium, Tulsa, (918) 366-7033, (918) 366-7064 (fax), e-mail: IOR@SPEIOR.ORG, Website: www.speior.org. 26-28.

Middle East Fertilizer Symposium & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 26-28.

API Spring Refining and Equipment Standards Meeting, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 26-28.

API/NPRA Spring Operating Practices Symposium, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 27.

MAY

Offshore Technology Conference (OTC), Houston, (972) 952-9494, (972) 952-9435 (fax), e-mail: service@otcnet.org, website: www.otcnet.org/2010. 3-6.

GPA Permian Basin Annual Meeting, Midland, Tex., (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 4.

Asian Biofuels, New Feedstocks and Technology Roundtable, Singapore, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 4-6.

OGU/Uzbekistan International Oil & Gas Exhibition & Conference, Tashkent, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 11-13.

International School of Hydrocarbon Measurement, Norman, Okla., (405) 325-1217, (405) 325-1388 (fax), e-mail: lcrowley@ou.edu. Website: www.ishm.info. 11-13.

APPEA Conference & Exhibition, Brisbane, 07 3229 6999, 07 3220 2811 (fax), e-mail: jhood@appea.com.au. website: www.appea.com.au. 16-19.

Mediterranean Offshore Conference & Exhibition, Alexandria, Egypt, +20 2 27065210, +20 2 25184980 (fax), e-mail: conference@omc.it, website: www.moc2006.com. 18-20.

NPRA National Safety Conference & Exhibition, San Antonio, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 19-20.

IADC Drilling Onshore Conference & Exhibition, Houston, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 20.

SPE International Conference on Oilfield Corrosion, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 24-25.

ILTA Annual International Operating Conference & Trade Show, Houston, (202) 842-9200. (202) 326-8660, e-mail: info@ilta.org, website: www.ilta.org. 24-26.

Petrotech Middle East Refining and Petrochemicals Exhibition & Conference, Manama, +973 1755 0033, +973 1755 3288 (fax), e-mail: fawzi@aeminfo.com.bh, website: www.mepetrotech.com. 24-26.

NPRA Reliability and Maintenance Conference and Exhibition, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. May 25-28.

SPE International Conference on Oilfield Scale, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-27.

SPE Western North America Regional Meeting, Anaheim, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-30.

JUNE

Caspian International Oil & Gas/Refining & Petrochemicals Exhibition & Conference, Baku, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 1-4.

AchemAsia, Beijing, 0049 69 75 64 0, 0049 69 75 64 201 (fax), website: www.achemasia.de. 1-4.

ASME Annual Meeting, Pittsburgh, (800) 843-2763, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 4-9.

Society of Petroleum Evaluation Engineers (SPEE) Annual Meeting, Victoria, BC, (713) 651-1639, (713) 951-9659 (fax), website: www.spee.org. 5-8.

Asia Oil & Gas Conference, Kuala Lumpur, 65 6338 0064, 65 6338 4090 (fax), e-mail: info@cconnection.org, website: www.cconnection.org. 6-8.

IAEE International Conference, Rio de Janeiro, (216) 464-5365, (216) 464-2737 (fax), e-mail: iaee@iaee.org, website: www.usaee.org. 6-9.

PIRA Canadian Energy Conference, Calgary, Alta., (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8.

SPE International Oil & Gas Conference and Exhibition, Beijing, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-10.

SUBSEA Asia Conference, Kuala Lumpur, +65 6233 6777, +65 6233 6768 (fax), e-mail: gerald@iemallworld.com, website: www.subseaasia.org. 9-11.IPAA OGIS London, London, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 10.

PIRA Scenario Planning Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 14.

PIRA London Energy Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 14-15.

EAGE Conference and Exhibition/SPE EUROPEC, Barcelona, Spain, +31 88 995 5055, +31 30 634 3524 (fax), e-mail: eage@eage.org, website: www.eage.org. 14-17.

ASME Turbo Expo, Glasgow, Scotland, (800) 843-2763, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 14-18.

GTI Global Unconventional Gas Conference, Amsterdam, (847) 768-0783, website: www.gastechnology.org/guq2010. 15-17.

IADC World Drilling Conference & Exhibition, Budapest, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 16-17.

PIRA Understanding Global Oil Markets Conference, London, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 16-17.

AAPL Annual Meeting, Vail, Colo., (817) 847-7700, (817) 847-7704 (fax). e-mail: aapl@landman.org, website: www.landman.org. 16-19.

IPAA Midyear Meeting, Colorado Springs, Colo., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 17-18.

Society of Professional Well Log Analysts Annual Symposium (SPWLA), Perth, (713) 947-8727, (713) 947-7181 (fax), e-mail: webmaster@spwla.org, website: www.spwla.org. 19-23.

International Offshore and Polar Engineering Conference (ISOPE), Beijing, (650)

Calendar

254-1871, (650) 254-2038 (fax), e-mail: meetings@isope.org, website: www.isope.org. 20-26.

Purvin & Gertz LPG Seminar, Singapore, (713) 331-4000, (713) 236-8490 (fax), website: www.purvingertz.com. 21-24.

NEFTEGAZ International Exhibition for Equipment and Technologies for the Oil and Gas Industries, Moscow, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 21-25.

PIRA Scenario Planning Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 22.

Atlantic Canada Petroleum Show, St. John's, Newf., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 22-23.

PIRA Understanding Global Oil Markets Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 23-24.

API Tanker Conference, San Diego, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 28-29.

API Exploration & Production Standards Conference on Oilfield Equipment and Materials, Wash., DC, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. June 28-July 3.

JULY

COGA Rocky Mountain Energy Epicenter Conference, Denver, (303) 861-0362, (303) 861-0373 (fax), e-mail: conference@coga.org, website: www.coga.org. 7-9.

IADC Lifting & Mechanical Handling Conference & Exhibition, Houston, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 13-14.

Oil Sands and Heavy Oil Technologies Conference & Exhibition, Calgary, Alta., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilsandstechnologies.com. 20-22.

AUGUST

SPE Nigerian Annual Conference and Exhibition, Abuja, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 3-5.

Summer NAPE Expo, Houston, (817) 306-7171, (817) 847-7703 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 19-20.

✦ACS Fall National Meeting & Exposition, Boston, (202) 876-4600, e-mail: help@acs.org, website: http://portal.acs.org. 22-26.

ASEG/PESA Conference & Exhibition, Sydney, +08 9427 0838, +08 9427 0839 (fax), e-mail: secretary@aseg.org.au, website: www.aseg.org.au. 22-26.

The Oil & Gas Conference, Denver, (303) 296-8834, (303) 293-9904 (fax), e-mail: kgrover@enercominc.com, website: www.theoilandgasconference.com. 22-26.

NPRA Cat Cracker Seminar, Houston, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 24-25.

Offshore Northern Seas (ONS) Conference, Stavanger, +47 51 84 90 40, e-mail: info@ons.no, website: www.ons.no. 24-27.

IAEE European Conference, Vilnius, Lithuania, +370 37 401 952, +370 37 351 271 (fax), e-mail: iaee2010@mail.lei.lt, website: www.iaee2010.org. 25-28.

OGMT Maintenance Technology North America Conference, New Orleans, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.ogmtna.com. Aug. 31-Sept. 2.

SEPTEMBER

World Energy Congress, Montreal, (514) 397-1474, (514) 397-9114 (fax), e-mail: info@wecmontreal2010.ca, website: www.wecmontreal2010exhibit.com. 12-16.

Rio Oil & Gas Expo and Conference, Rio de Janeiro, +31 0 79 341 1981, e-mail: stoutjesdijk@iro.nl, website: www.iro.nl/Programme/Rio-Oil—Gas.aspx?mld=9736&rld=145. 13-16.

New Zealand Petroleum Conference, Auckland, +64 3 962 6179, +64 4 471 0187 (fax), e-mail: Helen.moriarty@med.govt.nz, website: www.crownminerals.govt.nz/cms/petroleum/conferences. 19-22.

SPE Annual Technical Conference and Exhibition, Florence, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 19-22.

NPRA Environmental Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 20-21.

Herold Pacesetters Energy Conference, Greenwich Conn., (203) 847-3344, (203) 847-5566 (fax), website: www.herold.com. 20-23.

IPLOCA Conference, Venice, +41 22 306 02 30, +41 22 306 02 39 (fax), e-mail: info@iploca.com, website: www.iploca.com. Sept. 27-Oct. 1.

IADC Drilling HSE Europe Conference & Exhibition, Amsterdam, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 29-30.

OCTOBER

SPE Middle East Health, Safety, Security, and Environment Conference, Manama, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-6.

API Fall Committee on Petroleum Measurement Standards Meeting, Westminster, Colo., (202) 682-8000, (202)

682-8222 (fax), website: www.api.org. 4-7.

Unconventional Gas International Conference & Exhibition, Fort Worth, Tex. (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.unconventionalgas.net.5-7.

Kazakhstan International Oil & Gas Exhibition & Conference (KIOGE), Almaty, +44 (0) 207 596 5000, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 5-8.

NPRA Q&A and Technology Forum, Baltimore, (202) 457-0480, (202) 457-0486 (fax), website: www.npra.org. 10-13.

Petchem Arabia Annual Meeting, Manama, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 11-14.

IPAA OGIS San Francisco, San Francisco, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 12-14.

Offshore Middle East Conference & Exhibition, Dohar, Qatar (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoremiddleeast.com. 12-14.

IADC Contracts & Risk Management Conference, Houston, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 13-14.

Materials Science and Technology Conference and Exposition, Houston, (281) 228-6200, (281) 228-6300 (fax), e-mail: firstservice@nace.org, website: www.nace.org. 15-18.

SPE Asia Pacific Oil and Gas Conference & Exhibition, Brisbane, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 17-20.

SEG International Exposition and Annual Meeting, Denver, Colo., (918) 497-5500, (918) 497-5557 (fax), e-mail: register@seg.org, website: www.seg.org. 17-22.

Permian Basin International Oil Show, Odessa, Tex., (432) 367-1112, (432) 367-1113 (fax), e-mail: pbioilshow@pbioilshow.org, website: www.pbioilshow.org. 19-21.

ISA EXPO, Houston, (919) 549-8411, (919) 549-8288 (fax), e-mail: info@isa.org, website: www.isa.org. 19-21.

IADC Drilling Africa Conference & Exhibition, London, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 20-21.

PIRA New York Annual Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 21-22.

GITA's GIS Annual Oil & Gas Conference, Houston, (303) 337-0513, (303) 337-1001 (fax), e-mail: info@gita.org, website: www.gita.org. 24-27.

SPE Russian Oil and Gas Technical Conference and Exhibition, Moscow, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-28.

GSA Annual Meeting, Denver, (303) 357-1000, (303) 357-1070 (fax), e-mail: meetings@geosociety.org, website: www.geosociety.org Oct. 31–Nov. 3.

NOVEMBER

IADC/SPE Asia Pacific Drilling Conference & Exhibition, Ho Chi Minh City, (713) 292 1945, (713) 292 1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 1-3.

Power-Gen Middle East Conference, Doha, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.power-gen-middleeast.com. 1-3.

Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), Abu Dhabi, +971 2 4444 909, +971 2 4444 383 (fax), e-mail: info@adipec.com, website: www.adipec.com. 1-4.

Deepwater Operations Conference & Exhibition, Galveston, TX (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 2-4.

Journally Speaking

'Climategate' revisited

Sam Fletcher
Senior Writer

Peabody Energy Co. has petitioned the US Environmental Protection Agency to reconsider its endangerment finding on greenhouse gases because of recent evidence of faulty scientific research and review in the "Climategate" scandal involving the University of East Anglia Climatic Research Unit (CRU). The Texas government, the US Chamber of Commerce, and a coalition of eight trade associations are mounting legal challenges on the same grounds (OGJ Online, Feb. 17, 2010).

New evidence in the wake of that scandal "undermines a number of the central pillars" on which EPA based its finding that an atmospheric mix of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride constitutes "air pollution" that threatens public health and welfare via climate change.

"Given the seriousness of the flaws that the CRU material reveals in the development of the IPCC [Intergovernmental Panel on Climate Change] reports, and given EPA's extensive reliance on those reports, the agency has no legal option but to reexamine the endangerment finding in light of this new information. Indeed, the analytical process in which EPA engaged in reaching its endangerment finding is so tainted by the flaws now revealed in the IPCC reports that the agency must take the unusual step of convening full evidentiary hearings in order to provide an open and fair reconsideration process," said Peabody.

Skewed data

The company provided EPA with a computer disk of Climategate material indicating CRU scientists skewed their supporting data while effectively shutting out opposing viewpoints. That represents "new material that was not available during the comment period and which is central to the outcome that EPA reached in promulgating its endangerment finding," said company officials.

Peabody further accused EPA of failing "to properly exercise its judgment as required by the Clean Air Act" and acting "in an arbitrary and capricious fashion by relying almost exclusively on flawed reports of the IPCC in attributing climate change to anthropogenic GHG emissions." The IPCC reports have since been shown to be "not the product of a rigorous, transparent, and neutral scientific process," Peabody said.

Peabody claimed that EPA "largely ceded its obligation" to determine GHG risks "to the IPCC, an international body that is not subject to US data quality and transparency standards and whose reports were prepared in direct disregard of those standards."

EPA therefore should reconsider its endangerment finding "in light of the recently discovered defects" in the IPCC's procedures and convene full evidentiary hearings "to provide an open and fair reconsideration process," they said.

In December, EPA published its landmark GHG endangerment finding, claiming "scientific evidence is compelling that elevated concentrations of heat-trapping gases are the root cause of recently observed climate change." EPA also claimed a 90-99% probability that most of the observed increase in global average temperatures since the mid-20th century is due to an increase in anthropogenic GHG concentrations and is already detrimental to US health and safety and is likely to get worse.

Science vs. advocacy

Yet just weeks before EPA issued its finding, someone hacked into the CRU files and flooded the internet with secret e-mails revealing many of the principal scientists who authored key chapters of the IPCC scientific assessments were driven by a policy agenda that caused them to cross the line from neutral science to advocacy. Peabody officials said, "Indeed, they went far beyond even what is acceptable as advocacy, as they actively suppressed information that was contrary to the 'nice, tidy story' that they wished to present."

Officials said, "EPA believes that it has broad discretion in making its endangerment finding. Although the extent of EPA's discretion is debatable, what is not debatable is EPA's obligation to justify the particular choices it made in exercising that discretion." Based on faulty data from the IPCC, they said, "EPA decided that such emissions were almost certainly already causing dangerous climate effects, with the danger almost certainly likely to worsen in the future. This is an important distinction because obviously the degree of endangerment that EPA finds will guide the nature and extent of regulation that EPA will now promulgate."

Given the seriousness of the flaws that the CRU material and other information reveal in the development of the IPCC reports, EPA now "has no choice but to conclude that the endangerment finding itself is now tainted and must be reconsidered," they charged. Since 85% of all US energy comes from fossil fuels, EPA should also consider the economic benefits along with the environmental risks, they said. ✦

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Editorial

Addressing budget blunders

Under rhetorical assault from a government hunting taxable prey, the oil and gas industry must sharpen its arguments for stability of the US fiscal regime.

While introducing his budget proposal for fiscal 2011, President Barack Obama declared, "We will not continue costly tax cuts for oil companies, investment fund managers, and those making over $250,000 a year. We just can't afford it." The budget itself attacks a series of important tax preferences in a section labeled, "Other Revenue Changes and Loophole Closers."

The propaganda tricks at work here make two politically potent implications. One is that the industry enjoys great relief in its overall tax burden. The other is that relief principally benefits large oil companies, in the scorned class of investment fund managers and wealthy individuals. Both implications link to small truths but deceptively ignore larger contexts.

More taxes

If the oil and gas industry enjoyed special tax relief, it wouldn't pay more taxes than others. But it does. According to a 2009 US Chamber of Commerce study using Energy Information Administration data, income taxes as a share of net income before income taxation in 2007 amounted to 40.4% for the oil and gas industry and 26.7% for all manufacturing companies.

Furthermore, most of the provisions targeted by Obama are timing preferences, not "breaks" depriving the government of large sums of money over multiple years. The expensing of intangible drilling costs (IDCs), for example, enables a producer to write off in the year of occurrence outlays for items with no salvage value. The alternative is to book the costs in an asset account to be written down incrementally over lives of related revenue streams. With expensing, the producer receives an immediate reduction in tax liability. But the reduction isn't available for the affected property in future years. Current-year expensing defers, not eliminates, tax liability.

Congress implemented preferences like IDC expensing to encourage drilling investment, recognizing that resource development generates wealth, enlarges the tax base, and expands energy supply. Comparable provisions motivated by those aims but now under threat include percentage depletion and accelerated amortization of geological and geophysical (G&G) costs. With minor exceptions, they, like IDC expensing, only defer tax liability.

Percentage depletion can result in a true reduction in tax liability over the life of a property. This happens when accumulated charges to depletion exceed the total investment in a property. Percentage depletion is so limited, however, that the amount of reduced tax liability overall is small. The same can be said for another so-called loophole under fire: the deduction for tertiary-recovery injectants.

In fact, the limits on percentage depletion refute Obama's implication that he's cutting tax breaks for fat cats. Only small independent producers can use percentage depletion, subject to income and production limits. Similarly, only independent producers can make full use of IDC expensing. And the proposed G&G provisions would apply to independents an extended amortization period already in effect for major producers. Several other provisions identified for repeal are important primarily to independent producers, not major oil companies.

But majors don't escape harm. The industry-specific "loophole" closers would deny oil and gas companies use of the manufacturer's tax credit, adopted in 2004 to help US industries compete internationally. Other provisions of the proposed budget would hurt large oil and gas companies along with counterparts in other businesses.

Complicated arguments

These are complicated arguments. Attracting attention to them is difficult. A place to start is the president's flawed pair of assertions. His budget's effect would be less to eliminate "breaks" than to raise taxes on one large and important industry. And the burden would fall more heavily on independent producers, which drill most US wells and which respond to fiscal distress by curtailing operations, than on big companies, which have opportunities elsewhere.

Adoption of the budget would slash US oil and gas drilling, suppress domestic energy supply, and chase capital and jobs out of the country. Obama should consider consequences like these before he makes politically motivated and economically indefensible proclamations about what the US can't afford. ✦

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E&P in sharper focus for 2010 capital expenditures

Marilyn Radler
Senior Editor-Economics

OGJ's annual capital spending report shows that capital spending for all oil and gas projects in the US will decline 5% this year to $220 billion. Greater efficiency, slightly lower costs, and a rationalization of refining capacity will drive this decline.

Upstream spending will dominate all outlays this year, but by a larger margin than is typical. Many integrated companies plan to shrink their downstream spending from 2009, while some plan to increase their exploration and production expenditures.

Total spending for projects in Canada will climb 10% to $44 billion (Can.) this year. In Mexico, spending is set to increase about 5% from last year. Capital spending for oil and gas projects outside North America will grow this year as well.

US upstream spending

Spending in the US for upstream projects this year will total $195.667 billion, up from $193.5 billion a year ago. Included in this total are outlays for exploration, drilling, production, and offshore lease payments to the US Minerals Management Service.

Upstream costs peaked in 2008, driven by strong worldwide demand for commodities like steel and copper, as well as strong demand for skilled workers. As demand for these inputs declined as the global economic slowdown took hold, the costs of inputs eased, reducing the cost per oil and gas well drilled in 2009. OGJ forecasts that the cost per well drilled in the US will slide by a small margin this year, leading to a minimal hike in upstream spending for 2010.

Also, in shale plays and in nonshale plays, the number of days it takes some independent producers to drill a well has fallen dramatically, thereby reducing their costs per well and their total capital expenditures.

In the Bakken shale in North Dakota, for example, Enid, Okla.-based independent Continental Resources Inc. reduced its time to drill each well to 28 days in the first half of 2009 from 45 days in 2008. This led to a savings in cost per well since many input costs are leased by the day. Continental said that its drilling efficiency further improved for the second half of 2009, averaging about 24 days from spud to rig release.

OGJ's upstream spending outlook is based on its annual drilling forecast. The most recent drilling forecast called this year's US well completions to total 38,238 (OGJ, Jan. 18, 2010, p. 30). The number of well completions for 2009 was estimated at 37,062, down sharply

Integrated firms' budgets targeting upstream projects

Marilyn Radler
Senior Editor-Economics

US-based integrated firms are shifting more of their capital spending dollars toward upstream projects and away from their downstream operations that manufacture, transport, and market refined products.

Marathon Oil Corp. announced that while its 2010 capital budget of $5.1 billion is down 17% from last year's outlays, downstream spending will contract by 53%.

Marathon plans to spend $1.1 billion this year on refining, marketing, and transportation.

Meanwhile, Marathon's worldwide exploration and production budget is set to jump 24% from a year ago. In the US, the firm's plans call for $1.656 billion in upstream outlays. This compares to a preliminary estimate of $1.488 billion in US E&P spending last year. Outside the US, Marathon's upstream spending for 2010 is set to total $1.2 billion vs. $821 million a year ago.

Marathon reported that its plans call for $668 million in spending for oil sands mining this year, down from $987 million last year, as expansion of its Athabasca oil sands project nears completion. This project is on track to begin mining operations in this year's second half.

ConocoPhillip's capital budget calls for an overall 10% reduction from 2009 to $11.2 billion. About 86% of this will target E&P operations, and 12% will be spent on the company's refining and marketing segment.

Meanwhile, Chevron Corp. has announced that its 2010 capital and exploratory spending program will total $21.6 billion, a 5% decline from its 2009 outlays. About 80% of this year's budget is planned for upstream projects, and 16% is set for downstream projects.

ExxonMobil Corp. reported that its 2009 capital and exploration expenditures climbed for worldwide upstream operations and for its non-US chemical business, but that the company's worldwide downstream capital spending declined from 2008.

Last December, ExxonMobil announced that it agreed to buy XTO Energy Inc. as part of its strengthened focus on unconventional resources (OGJ Online, Dec. 14, 2009). Founded in 1986, XTO holds large interests in major US shale, tight gas, and coalbed methane plays as well as the Bakken oil shale.

After the transaction closes, ExxonMobil plans to create an upstream organization to manage global development and production of unconventional resources. Outside the US, the company holds interests in unconventional resources in Canada, Germany, Poland, Hungary, and Argentina.

from 2008, when the number of well completions was 52,097.

Based on a lower cost structure but greater number of well completions, drilling and exploration capital expenditures in the US this year are forecast to climb by almost 1% to $162.7 billion. Capital outlays for oil and gas production are forecast to increase at the same rate, totaling $30.9 billion.

Bonus payments that the MMS collects from lease sales for tracts on the Outer Continental Shelf comprise the third and final component of US upstream spending. OGJ projects that the total bonus on leased tracts this year will be $2 billion. Two Gulf of Mexico sales during 2009 generated $801 million in bonus payments, while four sales in 2008 generated $6.9 billion in payments to the MMS.

As of press time, the MMS has four lease sales scheduled for 2010. Two of these will offer tracts in the Gulf of Mexico. A sale on Mar. 17 will offer tracts in the central gulf, and a planned sale on Aug. 18 will offer tracts in the western gulf. The other two sales planned this year are for Alaska's Chukchi and Beaufort seas.

US downstream spending

Year-on-year changes in downstream spending will be mixed in 2010. OGJ forecasts that capital expenditures at US refineries will decline to $5.3 billion from $10.1 billion a year ago but that petrochemical outlays will climb to $80 million from $50 million.

Refining and petrochemical operations in the US have contracted along with widespread weakness in demand for transportation fuels and other petroleum products since the beginning of the recent recession, resulting is excess spare refining capacity. Since 2008, refining capacity has been reduced through closures in North America, Japan, Europe, and Aruba.

Philadelphia refiner Sunoco Inc. permanently closed its Eagle Point plant in New Jersey, citing weak demand for refined products and unfavorable market conditions. Sunoco idled Eagle Point in October 2009. And in February, Sunoco reached an agreement to sell its chemical operations to Brazilian petrochemical and resin producer Braskem SA.

Valero Energy Corp., San Antonio, announced in November 2009 that it would permanently shut down its 190,000 b/d Delaware City refinery due to financial losses caused by very poor economic conditions, significant capital spending requirements, and high operating costs.

Meanwhile, Calgary-based Husky Energy Inc. announced that its 2010 downstream capital program, set at

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Table 1

	2010, million $	Change 2010-2009, %	2009, million $	Change 2009-2008, %	2008, million $
Exploration-production					
Drilling-exploration	162,703	0.5	161,961	–32.4	239,646
Production	30,914	0.5	30,773	–32.4	45,533
OCS lease bonus	2,050	155.9	801	–88.4	6,882
Subtotal	**195,667**	**1.1**	**193,535**	**–33.7**	**292,061**
Other					
Refining	5,300	–47.7	10,140	–22.0	13,000
Petrochemicals	80	60.0	50	–95.0	1,000
Marketing	2,730	40.0	1,950	–35.0	3,000
Crude and products pipelines	7,724	–15.2	9,104	105.5	4,431
Natural gas pipelines	2,584	–78.3	11,907	87.7	6,343
Other transportation	950	13.1	840	–30.0	1,200
Mining, other energy	1,000	11.1	900	–25.0	1,200
Miscellaneous	4,000	6.7	3,750	–25.0	5,000
Subtotal	**24,368**	**–36.9**	**38,641**	**9.9**	**35,174**
TOTAL	**220,035**	**–5.2**	**232,176**	**–29.0**	**327,235**

CANADIAN SPENDING PLANS

Table 2

	2010, million $ (Can.)	Change 2010-2009, %	2009, million $ (Can.)	Change 2009-2008, %	2008, million $ (Can.)
Exploration-production					
Drilling-exploration	17,765	8.0	16,450	–39.0	26,970
Production	6,165	8.0	5,710	–39.0	9,356
Subtotal	**23,930**	**8.0**	**22,160**	**–39.0**	**36,326**
Oil sands*	**16,500**	**10.0**	**15,000**	**–17.2**	**18,113**
Other					
Refining	500	–66.7	1,500	–25.0	2,000
Petrochemicals	40	300.0	10	–95.0	200
Marketing	500	25.0	400	–27.3	550
Crude and products pipelines	365	–40.4	612	84.9	331
Natural gas pipelines	1,669	5005.1	33	–90.3	338
Other transportation	250	11.1	225	–25.0	300
Miscellaneous	600	9.1	550	–15.4	650
Subtotal	**3,924**	**17.9**	**3,329**	**–23.8**	**4,369**
TOTAL	**44,354**	**9.5**	**40,489**	**–31.2**	**58,808**

*In situ, mining, and upgrading.

$450 million (Can.), will focus on engineering and maintenance work at its refineries in Lima, Ohio, and the BP PLC-Husky refinery in Toledo, Ohio. Husky also said that some of this amount will go toward continuous improvement and maintenance work that has been planned for its ethanol, refining, and retail operations in Canada.

Pipelines, other US outlays

Capital spending for pipelines and compressor stations in the US is set to drop this year following an increase in 2009. Pipeline construction will contract for both crude and products lines and gas lines, according to OGJ's most recent Worldwide Pipeline Construction report (OGJ, Feb. 15, 2010, p. 39).

This report revealed that plans call for a total of 926 miles of natural gas pipelines to be completed in the US this year, down from 4,000 miles of construction completed last year. OGJ estimates that capital spending for this year's gas lines will total $2.58 billion.

Plans also call for a total of almost 2,600 miles of crude and products pipelines to be completed during 2010, compared to last year's 3,045 miles. Spending for the lines this year will decline 15% to $7.7 billion.

Capital expenditures this year for other transportation projects in the US will rebound 13% after dropping 30% last year. Marketing outlays also will climb following a down year in 2009. LNG project spending will be little changed from last year.

E&P, Canadian oil sands

Much of the growth in capital expenditures in Canada this year will be in outlays for oil sands, although upstream and downstream spending also will climb from last year.

Capital outlays for conventional oil and gas exploration, drilling, and production in Canada will increase 8% this year. OGJ's drilling forecast calls for a total of 8,618 oil and gas wells to be completed this year in Canada.

This follows a 39% contraction in spending a year ago, as the number of well completions sank to just fewer than 8,000. This was down sharply from 2008 when the number of well completions totaled 13,118, according to the Canadian Association of Petroleum Producers.

OGJ forecasts that oil sands capital expenditures, including outlays for in-situ, mining, and upgrading, will increase by 10%, rebounding from last year's 17% decline. The most recent figures from CAPP reported that oil sands spending in 2008 totaled $18.113 billion (Can.).

After last year's pullback, a handful of large oil sands projects are getting the go-ahead this year. Alberta's Energy Resources and Conservation Board has approved the Husky-BP Sunrise oil sands project. Also, ConocoPhillips will start construction this year of the second phase of its steam-assisted gravity drainage Surmont project.

Canadian Natural Resources Ltd., Calgary, announced that its total 2010 capital budget will increase 26% over 2009, with more than 80% allocated to the development of its crude oil assets. Spending at CNR's Horizon Oil Sands project for the coming year is focused

on Tranche 2 of the second and third phases and includes spending to develop a detailed cost estimate for future expansions.

Nexen Inc., Calgary, reported that most of its capital spending this year—$1.8 billion (Can.)—is allocated toward the development of conventional resources, while $400 million (Can.) is budgeted for oil sands. Another $200 million (Can.) is set to be spent on shale gas projects.

Nexen's $2.5 billion (Can.) capital spending budget for 2010 assumes a $70/bbl average price of West Texas Intermediate crude and an average New York Mercantile Exchange gas price of $5.50/MMbtu.

Suncor Energy Inc., Calgary, plans $5.5 billion (Can.) in capital spending this year. About $1.5 billion (Can.) will be directed toward growth-project funding, mostly for the Firebag Stage 3 in-situ oil sands expansion.

Other outlays in Canada

Natural gas pipeline and compressor station spending in Canada will swell this year to $1.67 billion from $33 million last year. But expenditures for new crude and products pipelines and compressor stations will shrink 40% as projects are completed.

OGJ's most recent Worldwide Pipeline Construction report shows that 627 miles of gas pipelines are due to be completed this year in Canada vs. just 34 miles of construction last year. Plans also call for the construction of 409 miles of crude and products lines this year compared to 504 miles a year ago in Canada.

Enbridge Inc., Calgary, made an announcement on Feb. 3 about its liquids pipelines, saying that the company will move its two largest ever projects into day-to-day operations this year, as the Canadian and US segments of the Alberta Clipper expansion project are expected to be placed in service on Apr. 1. Also, Enbridge's Southern Lights line is on budget and on schedule to be in service in this year's second half.

As in the US, capital spending in Canada at refineries will decline this year, while spending for petrochemicals rebounds a bit. Capital budgets also call for an increase in marketing and all other categories this year following an especially weak 2009.

Spending elsewhere

Spending in Mexico for oil and gas projects will climb this year, according to figures released last December by Petroleos Mexicanos. The company estimates that this year's investment budget will total $19.1 billion, up from $18.1 billion last year.

Pemex said that 84% of this year's expenditures will be directed toward upstream operations, while 12% will be spent in refining projects. The remainder will be directed toward petrochemical and other projects.

Upstream spending outside North America will climb to $337 billion this year from $305 billion, according to the most recent Barclays Capital Original E&P Spending Survey, released Dec. 16, 2009.

Projects to advance the production of petrochemicals and fuels will dominate downstream capital spending in the near term outside North America, with a slate of refineries planned for construction in Asia. And work continues on Royal Dutch Shell PLC's Pearl gas-to-liquids plant in Qatar's Ras Laffan Industrial City. This project launched in July 2006.

Also, Qatar Petroleum and Exxon-Mobil Chemical Qatar Ltd. have agreed to move forward on the development of a petrochemical complex at Ras Laffan that would include the world's largest steam cracker (OGJ Online, Jan. 7, 2010).

The proposed complex, which would include a 1.6 million-tonne/year steam cracker, two 650,000-tpy gas-phase polyethylene plants, and a 700,000-tpy ethylene glycol plant, would start up in late 2015. ✦

Congressmen query service firms about frac fluid contents

Nick Snow
Washington Editor

US House Energy and Commerce Committee Chairman Henry A. Waxman (D-Calif.) and Energy and Environment Subcommittee Chairman Edward J. Markey (D-Mass.) sent letters to eight oil field service companies requesting information about chemicals used in hydraulic fracturing fluids on Feb. 18.

"Hydraulic fracturing could help us unlock vast domestic natural gas reserves once though unattainable, strengthening America's energy independence and reducing carbon emissions," Waxman said. "As we use this technology in more parts of the country on a much larger scale, we must ensure that we are not creating new environmental and public health problems."

Markey noted, "Gas can play a very important role in our clean energy future, provided that it is produced in a safe and sustainable way. By getting more information from the industry about hydraulic fracturing practices, Congress can help ensure that development of this important resource moves forward in a manner that does not harm the environment."

An oil and gas lobbyist, meanwhile, told OGJ, "We're aware of the request. The technology is proven and it's safe. I'm aware that [US Environmental Protection Agency] officials have even said so recently. States have done a very good job regulating this since its first use. We'll work and review the request from Mr. Waxman and Mr. Markey and respond as best as we can."

Fracing fluid is more than 98% water and sand, the lobbyist noted. Since 2003, under a voluntary agreement with EPA, companies have not used diesel fuel as a carrier fluid when working with coalbed methane wells in association with underground drinking water sources, he said.

'Continuing effort'

"It's difficult to know exactly where they're going," said Lee O. Fuller, vice-president of government relations at the Independent Petroleum Association of America. "I think it shows a continuing effort to respond to antidevelopment groups who want to make chemicals an issue, whether used in fracing or other aspects of production."

States have regulated casing and well bores for decades to protect drinking water supplies before fracing became practical, Fuller pointed out. "Raising a chemicals issue in connection with fracing is an effort to create anxiety among people around production areas that is not founded in fact," Fuller told OGJ.

Waxman noted that when he chaired the Oversight and Government Reform Committee in the 110th Congress, he requested and received information from BJ Services Co., Halliburton Co., and Schlumberger Ltd.—the three largest well-stimulation companies—on chemicals they used in their fluids.

He said data provided by the companies showed that two of them used diesel in their fluids during 2005-07, potentially violating the voluntary agreement with EPA. Halliburton reported using more than 870,000 gal of seven diesel-based fluids, while BJ Services said that it used 2,500 gal of diesel-based fluids in several frac jobs, he said. The two companies also indicated that they used chemicals such as benzene, toluene, ethylbenzene, and xylene, which Waxman said could pose environmental risks in their fracing fluids.

"The information provided to the Oversight Committee did not specify whether these fluids were injected in or near underground sources of drinking water," Waxman and Markey said in a Feb. 18 memorandum to Energy and Environment Subcommittee members. "This is an important issue because injecting the chemicals in or near sources of drinking water could create contamination risks."

Other questions

The congressmen added that the Safe Drinking Water Act could have been violated if the fluids contained diesel. The responses also did not address how the companies dispose of fracing fluids and whether it was done in an environmentally safe manner, they said.

"Another set of questions involves the practices of smaller companies," the memorandum continued. "When Halliburton, BJ Services, and Schlumberger signed the diesel [memorandum of agreement] in 2003, the three companies performed 95% of the hydraulic fracturing jobs in the United States each year. Since that time, smaller companies have increased their market share.... Little is known about [their] practices."

To answer these questions, Waxman and Markey said they sent letters on Feb. 18 not only to Halliburton, BJ Services, and Schlumberger, but also to Frac Tech Services in Cisco, Tex.; Superior Well Services in Indiana, Pa., Universal Well Services in Meadville, Pa.; and Sanjel Corp. and Calfrac Well Services in Calgary. The eight companies have until Mar. 5 to supply the information.

Concerns also have been raised about how producers and service companies dispose of fracing fluid and produced water extracted from wells, the memorandum continued. The Oversight Committee did not request this information at the time. Waxman and Markey said more information is needed to assess the wastes' chemical contents and determine how it can be disposed of in an environmentally safe manner.

Congress passed funding for EPA to study fracing, and the agency apparently is looking hard at how water will be handled in New York and Pennsylvania where geologic formations favorable for underground disposal are not readily available. "We as an industry are stepping up and trying to deal with this, looking at ways to handle surface impoundment and storage," the oil and gas lobbyist said. "I'm sure we can deal with it." ✦

EPA may raise GHG control threshold, Jackson says

Nick Snow
Washington Editor

The US Environmental Protection Agency is considering raising the threshold at which refineries and other large industrial plants would be required to control greenhouse gases (GHGs) beyond the 25,000 tons/year originally proposed.

Responding to a Feb. 19 letter from John D. Rockefeller IV (W.Va.) and seven other Senate Democrats, EPA Administrator Lisa P. Jackson did not specify what the new threshold might be. She said she expects EPA to begin regulating GHG emissions at refineries, chemical plants, and other large industrial facilities next year under the Clean Air Act. No regulations are planned for 2010.

"In the first half of 2011, only those facilities that must apply for [CAA] permits as a result of their non-greenhouse gas emissions will need to address their [GHG] emissions in their permit applications," Jackson said, adding that she expects EPA to begin regulating GHGs from other large industrial sites during next year's final six months.

"Between the latter half of 2011 and 2013, I expect that the threshold for permitting will be substantially higher than the 25,000-ton limit that EPA originally proposed," Jackson said. "In any event, EPA does not intend to subject the smallest sources to [CAA] permitting for [GHG] emissions any sooner than 2016."

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Blog at www.ogjonline.com

When tax 'reform' turns personal

It has become a rite of Washington's spring. As the snow and ice begin to melt (with the piles particularly high this year following two major snowstorms within a week in mid-February), independent producers descend on the nation's capital to explain why administration tax proposals would be so devastating.

What the White House Office of Management and Budget considers outdated federal tax loopholes needing to be closed are lifelines that independents say are needed to continue operating. The Independent Petroleum Association of America and several regional groups are coordinating these "member call-ups" to discuss other issues as well. But OMB's punitive tax proposals lead the list of grievances.

Trade associations effectively explain contributions a healthy independent oil and gas community makes to national, regional, and local economies. They draw attention to the domestic production that would be lost if, for example, operators of wells producing less than 15 b/d lost their federal tax exemption.

The numbers add up. They also might obscure the fact that many who would be hurt are small businesses.

Readers speak out

Fortunately, OGJ readers aren't bashful. When several sent e-mails after the White House released its proposed fiscal 2011 federal budget, I asked two of them how the oil tax proposals might affect them.

E.P. Reddy, who has operated Reddy Oil & Gas Co. in Tulsa since 1987, was concise. He said his company has five employees and is a secondary producer that would not remain profitable if Congress approves the proposed oil tax changes.

Terry Sternbridge, who founded SW Operating Inc. in Kilgore, Tex., in 1983, was more specific. "Not to be able to have intangible drilling expensed in the current year would make it virtually impossible to amass capital to drill risk-laden wells, which are the lifeblood of small exploration companies like mine," he said.

A heavy load

The percentage depletion allowance "at least offers some relief" to already heavy oil and gas taxes, Sternbridge said. These include state and local severance and ad valorem taxes, federal and some state income taxes, fees for permits, and taxes on well equipment.

He said SW Operating directly employs four other people, but creates jobs for others "every time I drill or participate in a well." He said, "I probably have interests in 50 or more wells, most small to moderate producers, some that would not be economical with more taxes and regulations."

He wondered how he would stay in business as he examined the changes OMB proposed. "To have someone in the administration who knows absolutely nothing about oil and gas demonize energy companies and insist on all but confiscating the fruits of labor and hard-earned capital is simply unjust and not very smart. The president needs to encourage us," he maintained.

And that's why independents, once again, are on their way to Washington. ✦

EPA proposed regulating GHGs under the CAA in response to a 2007 US Supreme Court ruling that GHGs are air pollution and subject to regulation under the CAA if EPA determined that emissions of them endanger public health. The agency issued such a finding on Dec. 7.

The endangerment finding obligates the agency to regulate GHG emissions from motor vehicles, Jackson said. EPA will begin that process in late March when it issues GHG emission standards for 2012-16 model year light-duty vehicles. Simultaneously, the US Department of Transportation will issue a rule raising fuel economy standards for those vehicles.

Senate approval of a resolution by Lisa Murkowski (R-Alas.) expressing disapproval of EPA's GHG endangerment finding would keep EPA from issuing GHG standards for light-duty vehicles while undoing what Jackson termed "an historic agreement among states, automakers, and other stakeholders" and leave automakers "without the explicit nationwide uniformity" they consider vital to their business, the letter said.

"Moreover, a vote to vitiate the [GHG] endangerment finding would be a vote to reject the work of the 13 US government departments that contribute to the US Global Change Research Program," it continued. "It also would be viewed by many as a vote to move the United States to a position behind that of China on the issue of climate change, and more in line with that of Saudi Arabia." ✦

EXCO-BG ramps up Haynesville gas output

EXCO Resources Inc. has hiked gross production to 340 MMcfd in its Haynesville shale 50-50 joint venture with BG Group PLC and has begun horizontal drilling in the Marcellus shale.

The Haynesville output, tallied on Feb. 7, came from 34 operated wells drilled with an average of seven operated rigs and compared with 7 MMcfd in the 2008 fourth quarter. EXCO-BG holds 107,800 net acres, up 22,800 net core area acres since forming the joint venture.

Net Haynesville production was 96 MMcfd as of Feb. 7 compared with 47 MMcfd in the fourth quarter of 2009 and 6 MMcfd in the fourth quarter of 2008.

Capital spending for 2010 is budgeted at $255 million net to EXCO to drill 115 operated and 23 nonoperated wells. The operated wells include 95 Haynesville shale horizontals, seven Bossier shale horizontals, six Cotton Valley horizontals, and seven wells in the Vernon, La., area. In the EXCO-BG area of mutual interest, spending will total $741 million net to the joint venture.

TGGT Holdings LLC, a 50-50 joint venture with a BG Group affiliate, had averaged throughput of more than 850 MMcfd. In the 2009 fourth quarter TGGT completed the first of four stages of a 29-mile, 36-in. header system through the Holly field area to gather and deliver the companies' Haynesville gas to interstate pipelines.

Operations began Nov. 30, 2009, on the system, which will eventually have a capacity of 1.5 bcfd. TGGT averaged 474 MMcfd in 2009, and throughput now exceeds 850 MMcfd.

EXCO-BG increased the operated horizontal rig count to 13 in the Haynesville and plans to raise that to at least 14 for the rest of the year. It also plans to run at least one operated horizontal rig in Appalachia throughout 2010. Current companywide rig counts are 17 operated and four nonoperated.

As EXCO sold assets and reorganized around the shale plays in 2009, it added 242 bcf of gas equivalent (bcfe) of proved reserves through the drill bit and produced 128 bcfe. The majority of the new reserves resulted from 2009 Haynesville horizontal development where the company ran an average of six operated rigs for the year and completed 25 operated wells.

EXCO cut the average gross cost of an operated Haynesville horizontal well 25% to $9.5 million in 2009 and expects 2010 well costs to continue at or below that level. Drilling days were cut nearly in half from 72 days for the early wells.

Under new Securities and Exchange Commission rules, EXCO added an average of 2.5 offsetting proved undeveloped locations with average gross reserves of 6.6 bcf for each producing well drilled. Under the former rules, it would have added an average of 1.6 offsetting proved undeveloped locations.

EXCO-BG is investing in two major water projects. One will enable it to use discharge water from an industrial plant as a key water source for hydraulic fracturing. This will lessen the impact on local water supplies, reduce truck traffic, and provide an environmentally safe option for water procurement.

The joint venture also has a salt water management project to transport service water and gather produced water across its acreage, reducing truck traffic and handling water much more efficiently and more cost effectively.

EXCO-BG's first horizontal Haynesville well, Oden-30H6 in DeSoto Parish, La., has sold 3.2 bcf in its first year on production. The JV's average operated well IP in the DeSoto area is 22.8 MMcfd.

EXCO is encouraged by Bossier test results in four vertical Haynesville wells from 2008 and is drilling its first horizontal Bossier well with seven Bossier horizontals planned in East Texas and North Louisiana in 2010.

It has greatly reduced activity in the Cotton Valley, Hosston, Travis Peak, and Pettet conventional horizons but does plan a six-well horizontal testing program in Cotton Valley in DeSoto and Caddo parishes to check the feasibility of a larger program in 2011 and beyond. It plans 28 mainly Hosston recompletions in DeSoto.

EXCO holds more than 654,000 net acres in Pennsylvania and West Virginia, of which 343,000 are believed prospective for Marcellus and Huron shale gas and 186,000 are in the overpressured Marcellus fairway. Negotiations are under way for a further 42,000 net acres.

The 2010 capital budget is $154 million for drilling, land, seismic, midstream expansion, and operations. About 70% of the fairway acreage is held by shallower production in Clinton-Medina and stacked Devonian sandstone, Devonian shale, Berea shale, and other horizons. ✦

Obama reaffirms pledge of 'tough decisions' on new OCS areas

Nick Snow
Washington Editor

Repeating a point that he made in his State of the Union address on Jan. 27, US President Barack Obama told business executives that his administration is willing to make tough decisions on opening new offshore areas for oil and gas development.

"A competitive America is also America that finally has a smart energy

policy," the president said in a Feb. 24 address to the Business Roundtable in Washington. "We know there's no silver bullet here. We understand that to reduce our dependence on oil and the damage caused by climate change, we're going to need more production in the short term, we're going to need more efficiency, and we need more incentives for clean energy."

He said that funding under the 2009 Economic Recovery Act already has helped jump-start the US clean energy industry with an investment which will lead to 720,000 jobs in that business by 2012. He also cited administration efforts to make homes and businesses more energy-efficient, loan guarantees to construct the first new US nuclear power plant in decades, and support for three of the world's largest solar plants.

"And I've said that we're willing to make tough decisions about opening up new offshore areas for oil and gas development," Obama continued. "So what we're looking at is a comprehensive strategy, not an either/or strategy but a both/and strategy, when it comes to energy." But to actually make the transition to a clean energy economy, it will be necessary to put a price on carbon pollution, he added.

Bills including imposition of a cap-and-trade system which passed the full US House and the US Senate Environment and Public Works Committee in 2009 have drawn criticism for their treatment of oil refiners, chemical plants, and other large industries, which Obama acknowledged. "I am sympathetic to those companies that face significant potential transition costs, and I want to work with this organization and others like this to help with those costs and to get our policies right," he said.

"What we can't do is stand still," the president maintained. "The only certainty of the status quo is that the price and supply of oil will become increasingly volatile, [and] that the use of fossil fuels will wreak havoc on weather patterns and air quality. But if we decide now that we're putting a price on this pollution in a few years, it will give businesses the certainty of knowing they have the time to plan for the transition." ✦

Va. lawmakers earmark future offshore energy revenue

Nick Snow
Washington Editor

Approval by Virginia's senate and house of a bill allocating future offshore energy royalties and revenues to transportation and alternative energy research signals that the state is ready for environmentally responsible development off its coast, Gov. Robert F. McDonnell said.

"There is bipartisan consensus on this issue," the governor said on Feb. 22 after the Senate, by 21 to 19 votes, approved a proposal by Del. Chris Stolle (R-Virginia Beach) which passed the state's house of delegates on Feb. 8. "Offshore energy development has the support of this administration, the Democratic state senate, the Republican house of delegates, and US Sens. Mark Warner (D) and Jim Webb (D)."

The measure's approval was more symbolic than substantive because it would be years before Virginia began to receive a share of revenue and royalties from new federal offshore energy development. McDonnell, who campaigned for election in 2008 on a platform that supported developing Virginia's offshore energy resources to create jobs, said that the bill nevertheless ensures that the money will be directed to two crucial areas.

Stolle's bill earmarks 70% of those revenues and royalties to the state's road and rail fund, 10% to local transportation projects, and 20% to the Virginia Coastal Energy Research Consortium, which McDonnell said studies and develops renewable energy solutions.

"When we move forward in the years ahead, we will create thousands of new jobs for our citizens, produce hundreds of millions of dollars in new state revenue, and spur billions in investment in our commonwealth," the governor said. "Virginia is ready to take the lead in helping move our nation closer toward energy independence while creating new, good-paying jobs for our citizens."

The National Ocean Industries Association also applauded the Virginia state senate's action. "The vote, backed by Gov. McDonnell, demonstrates a strong bipartisan commitment to allow OCS exploration off its coast and actively work with Congress and the Obama administration to move forward with [Outer Continental Shelf] Lease Sale 220," NOIA Pres. Tom Fry said on Feb. 23. ✦

Purchasers lining up for Russia's new ESPO blend

Eric Watkins
Oil Diplomacy Editor

ExxonMobil Corp. and Mitsui & Co.—each said to be buying 730,000 bbl—are the latest in a growing list of purchasers of crude oil delivered by Russia's Eastern Siberia-Pacific Ocean (ESPO) pipeline.

The two firms join other oil companies in Japan and South Korea, including GS Caltex and SK Energy, which have already bought supplies of the new crude, which started flowing from

Eastern Siberia in late December.

This week's purchase will arrive in Japan in early March and be processed at two ExxonMobil-affiliated refineries after being carried along the ESPO line to Skovorodino and then by rail to Russia's Pacific Coast port of Kozmino.

According to industry observers, the supplies of East Siberian crude oil will aid Japan in reducing its heavy dependence on Middle Eastern oil, which currently stands at 90%.

Russian crude costs less to transport than oil from the Mideast nations, taking just 3-4 days sailing time to reach Japan, compared with 20 days from the Middle East.

Apart from quicker shipping and lower transport costs, East Siberian crude also has a lower specific gravity than oil from the Middle East, which enables production of more gasoline and kerosine.

Last October, officials at Russia's energy ministry said the new ESPO-brand crude would be light and medium-sour, superior to Urals export blend but inferior to Siberian Light (OGJ Online, Oct. 12, 2009).

As a result, other Japanese oil distributors, such as Nippon Oil Corp., are considering the idea of sourcing supplies of the ESPO blend.

Japanese and Korean firms are not alone in seeking the new Russian oil as the Asia-Pacific crude market last week saw the first sale of ESPO to a Chinese buyer, a move analysts said may set a new phase in trading of the new Russian stream.

The purchase was made by Unipec, which bought a 730,000-bbl cargo of ESPO crude from Rosneft. The oil will be shipped out of the Kozmino terminal on Mar. 17-18.

Increasing demand in Asia for the new Russian blend confirms Moscow's vision of the long-awaited ESPO pipeline.

"It is a strategic project, which enables us to enter the growing markets of the Asia-Pacific region," said Russian Prime Minister Vladimir Putin in a ceremony to launch the new line at the port of Kozmino (OGJ Online, Dec. 29, 2009). ✦

The crude/diesel pump around exchanger module, left, and crude unit pump module await shipment to northern Iraq at the Pasadena, Tex., yard of Ventech Engineers Inc.

Skid-mounted units doubling capacity of Kurdish refinery

Ventech Engineers Inc. has completed the delivery to northern Iraq of a 20,000 b/d, skid-mounted refinery that it fabricated at its Pasadena, Tex., plant and shipped in modules.

The equipment doubles capacity of and upgrades the KAR Oil Refining Ltd. refinery at Erbil, in Iraq's Kurdistan region. The original refinery started up in July 2009, processing 36° gravity crude oil from Khurmala Dome oil field about 40 km away and yielding kerosine, diesel, and naphtha (OGJ, July 27, 2009, Newsletter).

For the expansion, Ventech engineered, designed, and fabricated a 20,000 b/d distillation unit, 9,000 b/d naphtha hydrotreater, 6,000 b/d semiregenerative catalytic reformer, 2,500 b/d isomerization unit, 4,000 b/d diesel demercaptanization unit, 2,500 b/d kerosine demercaptanization unit, gas plant, and supporting utilities.

Ventech assembled the units in 26 process modules, which it shipped to Erbil between August 2009 and January. The units landed at the Port of Mersin, Turkey, for overland transport to northern Iraq.

"This is an all-new refinery that had a significantly shortened schedule due to the modularization of the plant,"

The naphtha hydrotreater module, left, and other modules, right, were assembled in Pasadena.

Ventech Engineers shipped the 20,000 b/d refinery it designed and fabricated for KAR Oil Refining Ltd. to Erbil, northern Iraq, in 26 modules like these between August 2009 and January.

Kevin Stanley, Ventech chief executive officer, told OGJ. "We effectively transferred much of the work that traditionally would be done at the site to our covered Pasadena shops."

Stanley said movement of the modules encountered no problems in the Kurdish region of Iraq, where security is tight.

KAR Oil plans to start the new distillation unit and related facilities during the summer and the naphtha train—including the hydrotreater, reformer, and isomerization unit—in the fall.

It plans another expansion to 75,000 b/d, with a target date of late 2010 or early 2011. Ventech also is assisting with that project.

Original refinery

Construction of the original Erbil refinery, which has two 10,000 b/d distillation units, began in 2005 under

The sour water stripper column, left, and various modules, right, await transport to the Kurdistan region of Iraq.

WATCHING THE WORLD

Eric Watkins, Oil Diplomacy Editor

Blog at www.ogjonline.com

Chavez advises the queen

The oil and gas industry is well aware of Venezuela's President Hugo Chavez and his antics. Now, the Latin American dictator has become an advisor of sorts to Britain's Queen Elizabeth II.

"Queen of England, I'm talking to you," Chavez said in a recent radio broadcast. "The time for empires is over, haven't you noticed? Return the Malvinas to the Argentine people."

Las Malvinas, of course, is the name used throughout Latin America for the Falkland Islands—a name which actually derives from the French, who called the archipelago Les îles Malouines, after early settlers from the French port of Saint Malo.

So, returning the islands to Argentina might be more difficult than Chavez imagines, even if the queen had the power to meet the Venezuelan dictator's demands. But what's Chavez really up to here?

Argentina threatened

"The English are still threatening Argentina. Things have changed," said Chavez, still addressing the queen. "We are no longer in 1982. If conflict breaks out, be sure Argentina will not be alone like it was back then."

Oh, okay, so what does this mean? You don't have to be a political scientist to recognize Chavez's usual gambit: rallying popular opinion to consolidate his own self-proclaimed position as the defender of Latin America.

Are we to imagine that Chavez plans anything more than a campaign of words? Do we really expect to see the Venezuelan navy steaming southward to defend Argentina's alleged interest in the Falklands?

To be sure, the dispute with Buenos Aires over sovereignty is expected to make exploitation of any oil found more expensive than otherwise since supplies and equipment cannot be imported from Argentina, which recently imposed its own restrictions (OGJ Online, Feb. 17, 2010).

The spat also means any gas discoveries will need to be very large to be commercially viable as the island's population of around 2,500 is a limited market and the gas cannot be piped to the mainland.

Investors undaunted

"Only if a gas discovery was very large would it justify the construction of an LNG terminal from which the gas could be exported," one analyst said, noting: "LNG facilities cost billions of dollars to build."

Undaunted, British investors clearly are backing the effort to find oil and gas in the region. Desire Petroleum PLC saw its shares spike more than 10% after its Ocean Guardian rig arrived off the islands last week to start drilling.

Meanwhile, Argentina is going full tilt on the diplomatic front.

"Argentina has made significant diplomatic advances among the 33 foreign ministers of Latin America and the Caribbean that strengthen our country" in the dispute, said Argentina's Foreign Minister Jorge Taiana.

Taiana said he hoped the group would issue a statement condemning the British intent to drill around the islands. Meanwhile, the queen is doubtlessly giving as much consideration to Chavez's advice as she would that of a paper tiger. ✦

The crude oil distillation tower moves into place at the KAR Oil Refining Ltd. refinery in Iraq.

a contract between the Iraqi Ministry of Oil and Iraqi Ministry of Industry and Minerals.

By late 2008 it was only 60% complete. The Kurdistan Regional then privatized the refinery and transferred the construction project to KAR Oil, a unit of the Kurdish KAR Group, with a target to commission the facility by last July.

KAR Oil calls the Erbil facility the first major refinery in Kurdistan and the first private-sector refinery in Iraq.

Khurmala Dome, covering an area of 20 km by 8 km, is on the northern end of giant Kirkuk oil field. Its development to supply the Erbil refinery is covered by a November 2008 agreement between the Kurdistan Regional Government and Iraqi oil ministry.

KAR Oil has worked on Khurmala Dome development since 2004. Last year it installed a 200,000-sq-m central process facility and is building production capacity to 150,000 b/d of oil and 100 MMscfd of natural gas.

A 20-in. diameter pipeline carries crude to the Erbil refinery. ✦

Chesapeake cements position in six onshore US gas plays

Chesapeake Energy Corp., Oklahoma City, said its fourth quarter 2009 production averaged 2.44 bcfd of natural gas and 29,750 b/d of oil and natural gas liquids as the company cemented its position in six US gas plays, four of them shale plays.

The company averaged 104 operated and 60 nonoperated rigs in 2009 and drilled 1,148 gross operated and 1,126 gross nonoperated wells.

Chesapeake plans to average 32 rigs in 2010 to drill 175 wells in the Marcellus shale, where it ran 24 operated rigs as of mid-February. Land position is 1.6 million net acres in West Virginia, Pennsylvania, and New York for Chesapeake and a further 590,000 net acres for its partner, Statoil ASA.

Chesapeake has drilled and completed 56 operated horizontal Marcellus wells since Jan. 1, 2008, and its net production averaged 45 MMcfd of gas equivalent (MMcfed) in the 2009 fourth quarter. It plans to exit 2010 at 270 MMcfed (515 MMcfed gross operated) and 2011 at 450 MMcfed (855 MMcfed gross operated).

Chesapeake holds 535,000 net acres and its partner Plains Exploration & Production Co. owns a further 110,000 net acres in the Haynesville shale play, where the two have drilled and completed 150 Chesapeake-operated horizontal wells.

Chesapeake's net Haynesville production is 375 MMcfed. The company operated 38 rigs in mid-February and expects to average 41 rigs in 2010 to drill 200 net wells. Chesapeake expects to exit 2010 at 640 MMcfed (970 MMcfed gross operated) and 2011 at 810 MMcfed (1.23 bcfd of gas equivalent [bcfed] gross operated).

Chesapeake produces 340 MMcfed net in the Fayetteville shale play and expects to maintain 320 MMcfed (460 MMcfed gross operated) through the end of 2011.

It holds 455,000 net acres in the Fayetteville core area and expects to average 12 operated rigs in 2010 to drill 110 net wells with its partner, BP America Inc.

Chesapeake produces 515 MMcfed net (950 MMcfed gross operated) in the Fort Worth basin Barnett shale play and expects to end 2010 at 590 MMcfed net (1.12 bcfed gross operated) and 2011 at 665 MMcfed (1.26 bcfed gross operated).

Chesapeake plans to operate 28 rigs to drill 300 net Barnett wells in 2010 on its 220,000 net acres with its partner, Total E&P USA Inc.

Chesapeake holds 120,000 net acres and produces 110 MMcfed net (200 MMcfed gross operated) in the Anadarko basin Colony Granite Wash play in Custer and Washita counties, Okla.

It plans to average seven rigs to drill 40 net wells this year and exit 2010 at 190 MMcfed net (350 MMcfed gross operated) and 2011 at 230 MMcfed net (420 MMcfed gross operated). Colony's high oil and NGL content makes it the company's second highest rate-of-return play.

The Texas Panhandle and Oklahoma Granite Wash plays are Chesapeake's highest and second highest rate-of-return plays due to high oil and natural gas liquids content.

The company holds 70,000 net acres in the Anadarko basin Texas Panhandle Granite Wash play in Hemphill, Wheeler, and Roberts counties in Texas. It plans to operate four rigs to drill 30 net wells and exit 2010 at 125 MMcfed net (180 MMcfed gross operated) and 2011 at 130 MMcfed net (185 MMcfed gross operated). This is the company's highest rate-of-return play due to high oil and NGL content.

The company has used and devel-

oped reliable geologic and engineering technology to book proved undeveloped reserves more than one location from production in the Barnett and Fayetteville shales, as permitted by new federal regulations, but has booked only direct offset locations in all other asset areas. ✦

Marcellus E&P, transportation programs ramp up

Focus on the Appalachian basin Marcellus shale gas play deepens.

Ultra Petroleum Corp., Houston, plans to drill more than 110 Marcellus wells in 2010 compared with 37 gross (22.5 net) wells in 2009.

Mitsui E&P USA LLC will earn a 32.5% interest in 100,000 net acres held by Anadarko Petroleum Corp. in the play in north-central Pennsylvania for $1.4 billion.

And Tennessee Gas Pipeline Co., a wholly owned unit of El Paso Corp., Houston, executed binding, 20-year term agreements with Chesapeake Energy Marketing Inc. and Statoil Natural Gas LLC for 100% capacity on its Northeast Upgrade Project in the Marcellus shale.

Ultra Marcellus outlook

Ultra had placed 13 wells on production by the end of 2009 at rates averaging 7.5 MMcfd. Laterals at those wells average slightly more than 3,800 ft.

Initial production rates at the horizontal wells completed so far have ranged from more than 3.4 MMcfd to 10.4 MMcfd, including two wells that are exceeding 7.5 MMcfd after 30 days.

First 30 days' production averaged more than 3 MMcfd at the company's first six wells and more than 5.7 MMcfd at its next seven wells. The company's first production in the Marcellus program began in July 2009.

Preliminary estimated ultimate recoveries affirm Ultra's 3.75 bcf of gas equivalent type-curve, and some preliminary EURs exceed 6 bcf of gad equivalent. The cost to drill and complete a horizontal Marcellus well in 2009 was $3.5 million.

Ultra's four interconnects to major interstate pipelines remain well ahead of the drilling campaign. By midyear 2010, capacity is expected to exceed 560 MMcfd.

The company began 2009 with 288,000 gross (152,000 net) acres in the Marcellus. Through a combination of land acquisitions, trades, and swaps, Ultra increased its holdings to 326,000 gross (169,000 net) acres by yearend 2009.

An acquisition announced in late 2009 and to have been completed in late February will expand its holdings to 486,000 gross (249,000 net) acres. To its core position in Tioga, Bradford, Lycoming, and Potter counties in north-central Pennsylvania, Ultra will add acreage in Lycoming, Clinton, and Centre counties.

Mitsui joins Anadarko

Mitsui will earn the interest by funding all of Anadarko's share of Marcellus development costs in 2010 and 90% of costs after that, completing its funding obligation by about 2013. The agreement, subject to regulatory approvals, is to close on Mar. 15 and is effective Jan. 1.

Mitsui will also have the option to buy 32.5% of Anadarko's existing wells and additional acreage acquisitions by reimbursing a proportionate share of Anadarko's prior expenditures, currently estimated at $100 million.

Anadarko said its fairway position in the Marcellus has a gross unrisked resource potential of more than 30 tcf and spans more than 715,000 gross acres. The companies said more than 4,500 wells are likely to be drilled within 10 years.

Mitsui projected net peak production at 360-460 MMcfd, $3-4 billion in project costs, and a 60-year production life.

Anadarko's acreage extends from Bradford and Sullivan counties on the northeast across Tioga, Lycoming, Potter, Clinton, Centre, and Clearfield counties to the southwest.

Pipeline expansion

The Tennessee gas project will provide 636 MMcfd of incremental firm transportation capacity from TGP's 300 Line in Pennsylvania to an interconnect in New Jersey for shipment to Northeast markets.

El Paso expects to file its Northeast Upgrade plans with the US Federal Energy Regulatory Commission in spring 2011 to meet a scheduled Nov. 1, 2013, in-service date. El Paso held an open season in February to gauge additional shipper interest with final capacity to be awarded in March 2010.

The project will cost about $400 million.

Williams Cos. Inc. entered joint ventures in 2009 with both Rex Energy Corp. and Atlas Pipeline Partners LP fortifying its position in the Marcellus shale (OGJ Online July 9, 2009 and Apr. 2, 2009). ✦

IGas to exploit shale gas resource off Wales

IGas Energy PLC said it has identified a "significant" shale resource as potentially extending beneath more than 1,195 sq km of its acreage in northwest England with an expected average thickness of 250 m.

"These shales are understood to be hydrocarbon-bearing as they have been locally demonstrated to be the source rock for hydrocarbons in the Liverpool

Bay area," IGas said.

The firm said that total organic carbon in the Holywell shales of Namurian age has been measured to range from below 0.7% to more than 5% with an average of around 2.1%.

IGas has identified independent consultants to review the hydrocarbon potential of the shales and their potential to produce gas. It said the consultants will be reporting on the results "once this work is complete."

Meanwhile, IGas Chief Executive Officer Andrew Austin said the continuing work on understanding the full potential of the acreage to deliver gas once again gives the firm "greater confidence" in the resources it holds.

"The potential of delivering shale gas is particularly exciting, as this sector has seen significant growth in North America and increased interest across continental Europe," Austin said.

The UK is one of several countries in Europe where exploration for shale gas is being carried out by international oil and gas companies. Others include Sweden, France, Germany, Austria, Poland, and Hungary.

In addition to work by Royal Dutch Shell PLC in Sweden, ExxonMobil Corp. is exploring Lower Saxony, while OMV AG is testing formations near Vienna. By yearend, ConocoPhillips and 3 Legs Resources are expected to have test results from northern Poland (OGJ Online, Sept. 21, 2009).

IGas's latest announcement coincided with reports that IGas increased its estimates of gas at its Point Of Ayr project by 7.5% to 3,823 bcf. IGas is operator with 75% interest and Nexen Inc. has 25% in four licenses mostly offshore near Prestatyn on Wales's north coast on the eastern margin of the East Irish Sea basin.

According to recent reports, IGas currently has enough reserves to power about 7% of Britain's homes for the next 15 years and is targeting net production of 8,000 boe/d by the end of 2014 on 20-50 sites. ✦

Shell, HP seek high-res wireless land seismic

Royal Dutch Shell PLC and Hewlett-Packard Development Co. LP plan to develop a wireless sensing system to acquire extremely high-resolution seismic data on land.

The new system promises to vastly improve the quality of land seismic data by delivering a much higher channel count and a broader sensor frequency range than are currently available, the companies said.

One key to the system is a digital fluidic microelectromechanical systems accelerometer that is up to 1,000 times more sensitive than high-volume products currently available, HP said. The accelerometer, which measures vibration, shock, or change in velocity, is considered a breakthrough in nanosensing research.

Sensors based on this technology can achieve noise density performance in the sub-100 nano-g per square root Hz range, HP said.

Shell and HP will use their complementary knowledge and experience to produce a groundbreaking solution to sense, collect, and store geophysical data. The system is designed to integrate seamlessly with Shell's high-performance computing and seismic imaging environment and to be deployed safely and more cost-effectively than current systems, they said.

Gerald Schotman, Shell executive vice-president, innovation/research and development, said, "We think this will represent a leap forward in seismic data quality that will provide Shell with a competitive advantage in exploring difficult oil and gas reservoirs, such as subsalt plays in the Middle East or unconventional gas in North America. As a result of this exciting collaboration, we expect to fully realize the potential of Shell's processing and imaging technology on land." ✦

Kenya

Platform Resources Inc., a subsidiary of Alberta Oilsands Inc., agreed to assign a 100% interest in Kenya blocks 12A and 13T to Africa Oil Corp., Vancouver, BC, in return for Africa Oil stock and warrants, subject to regulatory approvals.

The contract areas are next to Africa Oil's Block 10BB, where the 2009 Loperot-1 discovery is judged to have a best estimate of 15 million bbl of oil in place (OGJ Online, Sept. 15, 2009). The block has at least five other prospects and 17 leads.

Existing gravity data on blocks 12A and 13T suggest that the proven Lokichar basin and other prospective subbasins and known strong leads in Block 10BB may extend onto blocks 12A and 13T. Africa Oil plans to shoot seismic on the new blocks within months.

The PSCs on blocks 12A and 13T are for 3 years from September 2008. Initial minimum exploration expenditures are $3.65 million on 13T and $3.6 million on 12A. The initial exploration work program includes 500 line-km of 2D seismic or 100 sq km of 3D seismic on each block or a combination thereof.

Sao Tome & Principe

Sao Tome & Principe's National Petroleum Agency confirmed the award to ERHC Energy Inc., Houston, of 100% working interests in blocks 4 and 11 of the Sao Tome & Principe Exclusive Economic Zone in the Gulf of Guinea.

The confirmation follows ERHC's exercise of rights arising from prior agreements between ERHC and STP. The agency indicated that it expects to invite ERHC to negotiate production sharing contracts on the blocks.

The EEZ covers 160,000 sq km south and east of the Nigeria-Sao Tome & Principe Joint Development Zone. Block 4 is east of Principe, and Block 11 is east of Sao Tome.

ERHC also has rights to acquire up to a 15% paid working interest in two more blocks of its choice in the EEZ.

KHURAIS COMPLEX—Conclusion

Developing the fields required various optimized technologies

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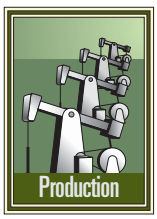
Mahdi A. Al-Shehab
Tony R. Pham
Saudi Aramco
Dhahran

Development of the Khurais complex required optimization of various technologies such horizontal laterals, downhole pumps, and smart completion equipment.



This concluding part of a two-part series discusses methods used for designing optimum well completions. The first part (OGJ, Feb. 22, 2010, p. 37) covered methods for determining the geologic and reservoir characteristics of the fields.

Horizontal laterals

After determination of the withdrawal rate allocations and required well number, as discussed in Part 1, the next step in optimizing the field development was to evaluate well attributes, such as well length, placement, and horizontal lateral orientation. This involved numerous studies for assessing the type of wells and configurations, surface facilities, and processing requirements to minimize the development cost.

Horizontal wells proved more advantageous than vertical wells in terms of productivity, sweep, and recovery. They also maintained an edge in cost-effectiveness.

The two criteria used for determining horizontal length were the productivity index (PI), which determined the well rate, and pressure drawdown.

As discussed in Part 1, multiobjective function and experimental design simulation models determined the desired production rate for each area and each well. Knowing the PI relationship of vertical to horizontal well performance made possible the calculation of the length of the lateral.

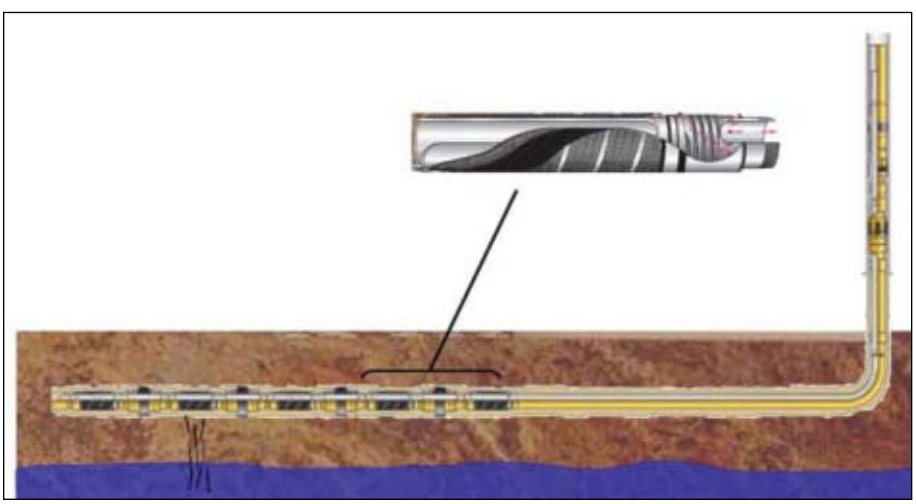
This length was in turn optimized by making sure it is long enough to provide a drawdown that inhibits coning either through the matrix or through heterogeneities, such as fractures or high permeability thief zones connected to fractures.

After the determination of the horizontal length, the next step determined the placement of this lateral. For this both analogy and simulation modeling played major roles in the decision.

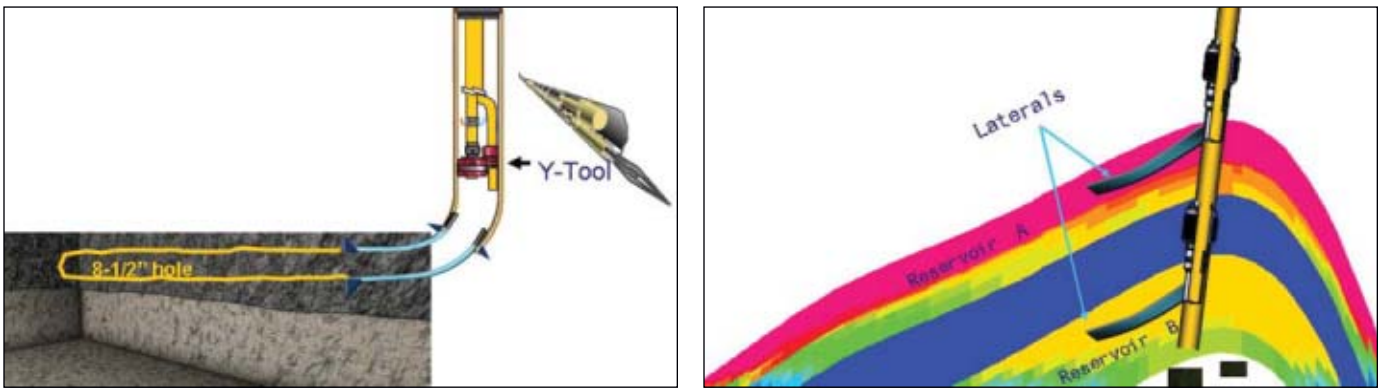
A neighboring field with reservoir fluid, rock properties, and depositional, as well as migration settings similar to Khurais has a bottoms-up reservoir sweep. This sweep pattern was reproduced in the Khurais dual porosity-permeability reservoir simulation models and provided the basis for placing the horizontal laterals in the top pay interval of Khurais reservoirs. Real-time geosteering made sure that the horizontal laterals went through the best pay possible.

The design optimized the orientation of the azimuth of the horizontal laterals along the maximum stress direction of North 80° East. This is the optimum orientation to avoid the majority of the open fractures as observed in both production performance (in terms of PI and well rates), and in numerous image log runs in neighboring fields.

Because well rates can be met from the reservoir's excellent matrix permeability, the avoidance of open



Selected wells have passive flow control installed for mitigating premature water breakthrough into wellbores (Fig. 1).



In anticipation of water encroachment, wells have a large borehole (left photo) equipped with an electric submersible pump and Y-tools for accommodating smart completions and wellbore accessibility (Fig. 2). A long-term test (right photo) will determine the effectiveness of dual-reservoir production with a smart completion (Fig. 3).

fractures mitigates the premature water breakthrough into the wellbore.

Technology applications

The technology applications started with mud design, for which the company's research and development center formulated a special mix of oil-based mud to minimize formation damage for improving the productivity without resorting to acid treatment if water-based mud was used.

Because the wells did not need stimulation, this reduced rig times, which helped further lower the development cost. This strategy was because PI tests in newly drilled wells indicated excellent productivities without the need for stimulation treatments.

Another feature of the technology applications was the running of resistivity image logs routinely every time the horizontal wells experienced lost circulation. These images were usually run in combination with acoustic logs to enhance the resolution in identifying fracture swarms. Location of the fracture swarms was needed for the design of passive inflow control with internal control devices (ICDs) in some wells as a preventive mode to mitigate future premature water breakthrough into the wellbores (Fig. 1).

The technologies discussed so far reflect fit-for-purpose short-term necessity in development of this complex; however, technology applications in Khurais also will support the long-term vision, which prescribes a strategy that combines the well architecture together with the rapidly evolving downhole technologies. Because the field is in the initial stage of production, when most if not all wells produce without water, the wells currently do not need downhole production control.

In anticipating water encroachment years in the future, the well design includes large 8½-in. wellbores (Fig. 2) completed with Y-tools for wellbore accessibility. The large wellbores will accommodate the installation of the next-generation of smart completions (SCs) with internal control valves (ICVs), or passive inflow control with ICD completions together with futuristic, highly efficient coiled-tubing deployed electrical submersible pumps (ESPs).

The next-generation downhole equipment will have a fit-for-purpose design, with the tactical need in collaboration with the exploration and petroleum engineering center, advanced research center at Saudi Aramco, service companies, and-or joint-venture industry institutions.

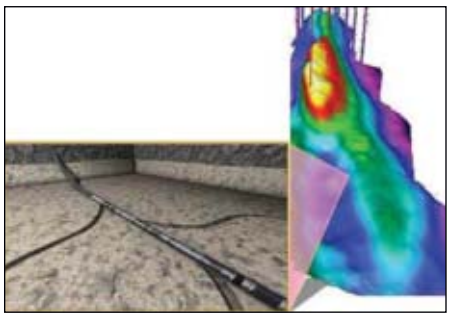
In support of the future design, the wells will have additional downhole logs, such as image and nuclear magnetic resonance, as well as horizontal well multiphase flowmeters to assist in the understanding of the reservoir behavior and in improving the technology application requirements to maximize the well productivity, minimize the cost, and enhance oil recovery.

In the case of multilateral maximum reservoir contact (MRC) wells[1] and dual-reservoir (Arab-D and Hanifa) commingled production, Saudi Aramco is field testing a technology application of SC with wet-connect ESPs for long-term performance in a well that had a successful initial completion and installation.

While Saudi Aramco completed most wells as smart-ready for the application of this technology, as needed, field tests continue for the purpose of future optimization.

In the case of dual-reservoir commingled production, a field test is under way of a horizontal well for long-term performance. The well already had a successful initial completion and installation with individual laterals placed in each reservoir (Fig. 3). The well has ESPs and smart control in each lateral to provide the means to balance flow contribution from individual reservoirs and avoid interreservoir cross flow.

As discussed extensively in Reference 2, the new completion is different from other systems used previously in the industry. It uses a redesigned hydraulic disconnect tool (wet-connect) to make the connection between the upper completion with the ESP and the lower completion that has the SC. This system ensures that routine ESP repair can be made without retrieval of the SC.



Multilaterals with maximum reservoir contact provide the required production rates in lower productive areas such as the south dome of Khurais (Fig.4).

This integrated system enables commingling of the two producing reservoirs and provides flexibility to control and alter withdrawal rates from each reservoir when the producing strategy requires different withdrawal options.

In the far-south Khurais south dome area, the reservoir has a lower PI and flatter structural relief with underlying water. In this area, multilateral MRC wells (Fig. 4) provide the necessary production rates with low-pressure drawdown, mitigating any water coning, either through the matrix or heterogeneities.

The area also has a smart-completion field test. The other MRC wells have the mother bores completed in smart-ready mode with in-place 7-in. liners to ensure the wellbore configurations are adequate for next-generation smart equipment with wet-connects.

Intelligent field initiative

All technology applications in the Khurais complex that satisfy both immediate needs or long-term visions operate in the intelligent field (I-Field) mode with all producing wells either equipped with smart sensors as part of the SC or as part of downhole smart ESP.

A central operating command center houses all of the controls for these producing wells, as well as injection wells. The center regulates oil withdrawals and water injection rates in real time.

For mitigating water coning or cusping in producing wells, it is important to monitor and control through the variable-speed ESP the pressure drawdown for individual wells.

For an injection well, it is vital that injection rates be distributed to ensure the flood front conformance through proper injection-production allocation.

Monitoring reservoir behavior through an I-Field is not only through the producers and injectors, but also through a network of dedicated observation wells as part of a master surveillance plan. These wells are placed strategically to yield vital information in real time, needed for quick response as part of the production-injection strategy.

The master surveillance system, as its name implies, is proving its worth before the commissioning of the field production facilities because the system provides in real time, at the time of this article, information on the reservoir behavior during the field-wide interference tests. These tests provide a once-in-a-lifetime opportunity to acquire pulsing data for evaluating reservoir performance and for updating production-injection strategies after the field's commissioning.

It is also interesting to note that, at the time of this article, well tests indicate productivities of the horizontal wells are three to five times more than those of the current few existing vertical wells in the fields. The complex would have had a higher development cost if it had vertical wells.

Field-wide interference tests in Khurais indicate an excellent reservoir connectivity and pressure propagation from peripheral injection to in-field producers, setting the stage to ensure that the Khurais complex will produce efficiently, safely, and economically.

Acknowledgments

The authors thank Saudi Aramco management for its support and permission to present the information contained in this article. The authors acknowledge the contributions of all the members of the Khurais development team, especially Abdel Nasser Abitrabi (KRMD), Khalid Sheddi, Mohammed Yaacob, and John Cole (RCD), Bevan Yuen (RSD), Fahad Bani (drilling engineering), and Salman Gamber (production engineering). ✦

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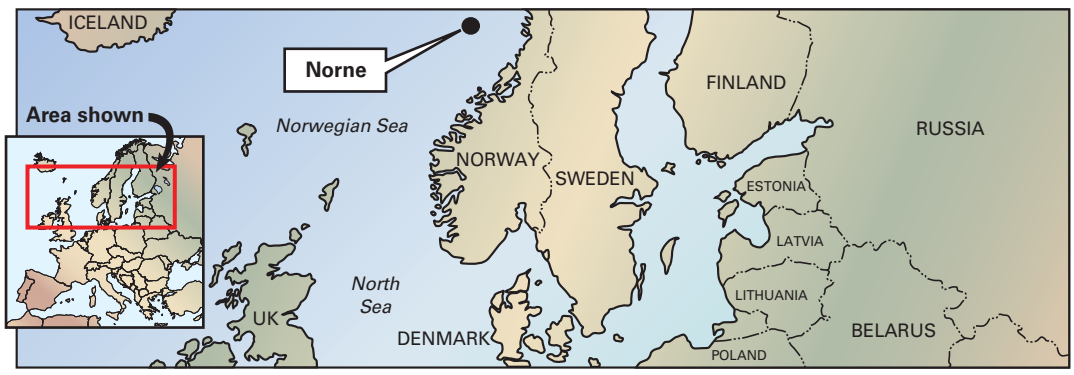
NORNE FIELD



GUIDE TO WORLD CRUDES

Statoil publishes Norne Blend assay

Statoil late last year published an assay of its Norne Blend crude oil.

Norne lies in a license awarded in 1986 and embraces Blocks 6608/10 and 6608/11 in the Norwegian Sea about 85 km from Heidrun in water depths of 380 m.

Production began from Norne on Nov. 6, 1997.

Statoil developed the field with a production and storage ship tied to subsea templates. Flexible risers carry the well stream to the ship, which rotates on a cylindrical turret moored to the seabed. Risers and umbilicals are also connected to the turret. The ship has a processing plant on deck and storage tanks for stabilized oil (OGJ, Dec. 20. 1993, p. 27).

Gas has been exported from Norne since February 2001. It travels through the Norne gas export pipeline and the Aasgard transport trunkline via Karsto north of Stavanger to continental Europe.

The field is roughly 1,400 km north of pipeline landfall at Dornum, Germany.

The current partnership structure is Petoro AS (54%), Statoil (39.1%), and Eni Norge AS (6.9%).

Whole crude

Density at 15° C., kg/l.: 0.8615
Specific gravity at 60/60° F.: 0.8619
API gravity at 60/60° F.: 32.7
Dry oil density at 15° C., kg/l.: 0.8613
Sulfur, mass %: 0.208
Total acid number, mg KOH/g: 0.19
Reid vapor pressure, kPa: 23.7
Pour point, °C.: 9
Kin. vis. at 20° C., cst: 14.1
Kin. vis. at 50° C., cst: 5.56
Nitrogen, mg/kg: 390
Hydrogen sulfide, mass %: ND[1]
Vanadium, mg/kg: 0.3
Nickel, mg/kg: 0.9
Sodium, mg/kg: 12
Salt as NaCl, mg/l.: 37.2
Wax content, mass %: 8.2
Flash point, °C.: <10
Water content, mass %: 0.10

Legend:

[1]ND = not detectable; HPLC = high performance liquid chromatography; DVPE = dry vapor pressure equivalent. [2]Corrected in accordance with EN 228. [3]Calculated density for 525+ fraction. [4]Unable to distinguish between 3-methylheptane and cis-1,3-dimethylcyclohexane.

Test conditions: true boiling point distillation

Equipment

Distillation up to 375° C. is performed according to D-2892; from 375° C., according to internal HiVac method (Modified D-5236).

Conditions*

Cut points are as follows:

- Atmospheric distillation: C5 - 205° C. AET
- 100 Torr: 205-240° C. AET
- 10 Torr: 240-320° C. AET
- 5 Torr: 320-375° C. AET
- 1—0.1 Torr: 375-525° C. AET

Volume

Volume expansion or contraction is normalized among fractions boiling at less than 150° C. in proportion to their yields. (Usually the "loss" is negative due to volume expansion.)

Holdup*

Holdup at 375° C. AET is distributed as follows: 50% on the first fraction of the HiVac method (375-420° C.) and 50% in accordance with the mass-ratios of the fractions from 420° C. AET.

Loss

Loss up to 375° C. AET is distributed with two-thirds in the gas fraction and one-third in the first liquid fraction.

*AET = average equivalent temperature; Torr. ≈ 1 mm Hg ≈ 19.3 lb_f/sq in.

Pentanes to 65° C.

Yield on crude, mass %: 1.35
Yield on crude, vol %: 1.77
Density at 15° C., kg/l.: 0.6518
Specific gravity at 60/60° F.: 0.6518
API gravity at 60/60° F.: 85.6
Mercaptan sulfur, mg/kg: <3
n-Paraffins, mass %: 44.8
i-Paraffins, mass %: 41.9
Naphthenes, mass %: 9.6
Aromatics (incl. benzene), mass %: 3.8
n-Paraffins, vol %: 46.4
i-Paraffins, vol %: 42.6
Naphthenes, vol %: 8.2
Aromatics (incl. benzene), vol %: 2.8
Vapor pressure (DVPE), kPa: 122.3
Research octane no.: 78.0
Motor octane no.: 76.1
Research octane no.: [2]77.8
Motor octane no.: [2]75.9

65-90° C.

Yield on crude, mass %: 1.75
Yield on crude, vol %: 2.04
Density at 15° C., kg/l.: 0.7352
Specific gravity at 60/60° F.: 0.7354
API gravity at 60/60° F.: 60.9
Sulfur, mass %: <0.001
Mercaptan sulfur, mg/kg: <3
n-Paraffins, mass %: 20.4
i-Paraffins, mass %: 21.6
Naphthenes, mass %: 44.6
Aromatics (incl. benzene), mass %: 13.5
Benzene, mass %: 10.3
n-Paraffins, vol %: 22.6
i-Paraffins, vol %: 23.5
Naphthenes, vol %: 42.7
Aromatics (incl. benzene), vol %: 11.2
Benzene, vol %: 8.6
Vapor pressure (DVPE), kPa: 36.1
Research octane no.: 72.7
Motor octane no.:70.8
Research octane no.: [2]72.5
Motor octane no.: [2]70.6
Nitrogen, mg/kg: <1

90-150° C.

Yield on crude, mass %: 8.3
Yield on crude, vol %: 9.1
Density at 15° C., kg/l.: 0.7799
Specific gravity at 60/60° F.: 0.7802
API gravity at 60/60° F.: 49.9
Sulfur, mass %: 0.001
Mercaptan sulfur, mg/kg: <3
n-Paraffins, mass %: 14.5
i-Paraffins, mass %: 14.7
Naphthenes, mass %: 37.1
Aromatics (incl. benzene), mass %: 33.8
Benzene, mass %: 0.9
n-Paraffins, vol %: 16.2
i-Paraffins, vol %: 16.1
Naphthenes, vol %: 37.4
Aromatics (incl. benzene), vol %: 30.3
Benzene, vol %: 0.8
Flash point, °C.: <10
Nitrogen, mg/kg: <1

150-180° C.

Yield on crude, mass %: 3.74
Yield on crude, vol %: 4.04
Density at 15° C., kg/l.: 0.7989
Specific gravity at 60/60° F.: 0.7992
API gravity at 60/60° F.: 45.6
Sulfur, mass %: 0.013
Mercaptan sulfur, mg/kg: <3
Copper corrosion: 1a
Total acid no., mg KOH/g: <0.01
n-Paraffins, mass %: 18.4
i-Paraffins, mass %: 18.6
Naphthenes, mass %: 29.3
Aromatics, mass %: 33.7
n-Paraffins, vol %: 20.2
i-Paraffins, vol %: 19.8
Naphthenes, vol %: 29.0
Aromatics, vol %: 30.9
Aromatics (HPLC)
Total, mass %: 31.0
Monoaromatics, mass %: 30.8
Diaromatics, mass %: 0.2
Polycyclic aromatics, mass %: <0.1
Naphthalenes, vol %: 0.07
Aniline point, °C.: 37.5
Smoke point, mm: 19.0
Flash point, °C.: 35.0
Freezing point, °C.: <–60

Test methods: Norne Blend

Density at 15° C., kg/l.: D-4052/D-5002
Specific gravity at 60/60° F.
Dry density at 15° C., kg/l.: IP-479

Total sulfur, mass %: D-4294
Total sulfur, mass %: D-5453 for sulfur content less than 0.01%
Hydrogen sulfide, mass %: D-3227
Mercaptan sulfur, mg/kg: D-3227

n-Paraffins, mass %, GC*
i-Paraffins, mass %: GC
Naphthenes, mass %: GC
Aromatics, mass %: GC
Benzene, mass %: GC
Aromatics (HPLC*), mass %: D-6591

Naphthalene, vol %: D-1840
Watson K: UOP 375
Vapor pressure (DVPE*), kPa: D-5191
Reid vapor pressure, kPa: D-323
Flash point (Pensky Martens), °C.: D-93

Freezing point, °C.: D-2386
Cloud point, °C.: D = 2500/D-5772
Pour point, °C.: D-5853/D-5950
Cold filter plugging point, °C.: IP 309

Kin. vis. at 20° C., cst: D-445
Kin. vis. at 40° C., cst: D-445
Kin. vis. at 50° C., cst: D-445
Kin. vis. at 80° C., cst: D-445
Kin. vis. at 100° C., cst: D-445
Kin. vis. at 135° C., cst: D-445

Aniline point, °C.: D-611
Research octane number: D-2699/01a
Motor octane number: D-2700/01a
Cetane index: D-976
Calculated cetane index: D-4737
Cetane number: D-613
Smoke point, mm: D-1322
Distillation of whole crude <375° C.: D-2892
Distillation of individual fractions: D-86
Distillation of 375°+ C.: D-5236

Total acid number, mgKOH/g: D-664
Copper corrosion: D-130
Nitrogen, fractions up to 420° C.: D-4629
Nitrogen, fractions greater than 420° C.: D-4629

Basic nitrogen, mass %: UOP 269

Vanadium, mg/kg: ICP
Nickel, mg/kg: ICP
Sodium, mg/kg: ICP
Salt as NaCl, mg/l.: IP 265

Conradson carbon residue, mass %: D-189; or,
Carbon residue (micromethod), mass %: D-4530
Asphaltenes, mass %: IP 143

n-C_5 insolubles, mass %: D-4055
Ash, mass %: D-482

Penetration at 25° C., 0.1 mm: D-1321

Refractive index at 67° C., Abbe refractometer
Wax content, mass %: UOP 46 (mod. acetone precip.)
Water content, mg/kg: D-4928

Compositional analysis of crude oil, mass %: D-5134

*GC = gas chromatograph; HPLC = high performance liquid chromatography; DVPE = dry vapor pressure equivalent; ICP = inductively coupled plasma.

Cetane index (D-976): 24.7
Calculated cetane index (D-4737): 29.1
Kin. vis. at 20° C., cst: 1.06
Kin. vis. at 50° C., cst: 0.75
Nitrogen, mg/kg: <1
Distillation D-86 (50%), °C.: 160.5

180-240° C.

Yield on crude, mass %: 9.01
Yield on crude, vol %: 9.43
Density at 15° C., kg/l.: 0.8234
Specific gravity at 60/60° F.: 0.8237
API gravity at 60/60° F.: 40.3
Sulfur, mass %: 0.021
Mercaptan sulfur, mg/kg: <3
Copper corrosion: 1a
Total acid no., mg KOH/g: 0.01
Aromatics (HPLC)
Total, mass %: 25.4
Monoaromatics, mass %: 19.1
Diaromatics, mass %: 6.3
Polycyclic aromatics, mass %: <0.1
Naphthalenes, vol %: 4.02
Aniline point, °C.: 53.9
Smoke point, mm: 19.0
Freezing point, °C.: –48.0
Cloud point, °C.: <–49
Cold-filter plugging point, °C.: <–48
Pour point, °C.: <–48
Cetane no.: 44.8
Cetane index (D-976): 38.5
Calculated cetane index (D-4737): 38.6
Kin. vis. at 20° C., cst: 1.92
Kin. vis. at 50° C., cst: 1.21
Nitrogen, mg/kg: <1
Distillation D-86 (50%), °C.: 207.4

240-320° C.

Yield on crude, mass %: 20.67
Yield on crude, vol %: 20.75
Density at 15° C., kg/l.: 0.8581
Specific gravity at 60/60° F.: 0.8585
API gravity at 60/60° F.: 33.3

Statoil developed Norne with a production and storage vessel that possesses a processing plant on deck and storage tanks for stabilized oil (photo from Statoil).

Sulfur, mass %: 0.091
Total acid no., mg KOH/g: 0.10
Aromatics (HPLC)
Total, mass %: 29.7
Monoaromatics, mass %: 16.6
Diaromatics, mass %: 12.8
Polycyclic aromatics, mass %: 0.3
Aniline point, °C.: 65.0
Cloud point, °C.: –15
Cold-filter plugging point, °C.: –18
Pour point, °C.: –15
Cetane no.: 50.7
Cetane index (D-976): 46.2
Calculated cetane index (D-4737): 48.3
Kin. vis. at 20° C., cst: 5.35
Kin. vis. at 50° C., cst: 2.63
Nitrogen, mg/kg: 8
Basic nitrogen, mass %: <0.001
Distillation D-86 (50%), °C.: 274.4

320-375° C.

Yield on crude, mass %: 13.51
Yield on crude, vol %: 13.34
Density at 15° C., kg/l.: 0.8725
Specific gravity at 60/60° F.: 0.8729
API gravity at 60/60° F.: 30.6
Sulfur, mass %: 0.236
Total acid no., mg KOH/g: 0.18
Aromatics (HPLC)
Total, mass %: 27.5
Monoaromatics, mass %: 16.3
Diaromatics, mass %: 8.3
Polycyclic aromatics, mass %: 2.9
Aniline point, °C.: 78.8
Watson K-factor: 11.8
Cloud point, °C.: 12
Cold-filter plugging point, °C.: 12
Pour point, °C.: 12
Cetane no.: 58.4
Cetane index (D-976): 50.4
Calculated cetane index (D-4737): 61.8
Carbon residue (micromethod), mass %: <0.10
Kin. vis. at 20° C., cst: 17.3
Kin. vis. at 50° C., cst: 6.40
Kin. vis. at 100° C., cst: 2.35
Nitrogen, mg/kg: 86
Basic nitrogen, mass %: 0.004
Refractive index at 67° C.: 1.468
Distillation D-86 (50%), °C.: 335.7

375-420° C.

Yield on crude, mass %: 11.03
Yield on crude, vol %: 10.72
Density at 15° C., kg/l.: 0.8861
Specific gravity at 60/60° F.: 0.8866
API gravity at 60/60° F.: 28.1
Sulfur, mass %: 0.243
Total acid no., mg KOH/g: 0.20
Aniline point, °C.: 91.1
Watson K-factor: 12.0
Pour point, °C.: 30
Carbon residue (micromethod), mass %: <0.10
Kin. vis. at 50° C., cst: 16.1
Kin. vis. at 100° C., cst: 4.81
Vanadium, mg/kg: <0.1
Nickel, mg/kg: <0.1
Nitrogen, mg/kg: 240
Basic nitrogen, mass %: 0.010
Refractive index at 67° C.: 1.473

420-525° C.

Yield on crude, mass %: 18.74
Yield on crude, vol %: 17.91
Density at 15° C., kg/l.: 0.9016
Specific gravity at 60/60° F.: 0.9021
API gravity at 60/60° F.: 25.4
Sulfur, mass %: 0.293
Total acid no., mg KOH/g: 0.20
Aniline point, °C.: 97.2
Watson K-factor: 12.0
Pour point, °C.: 42
Carbon residue (micromethod), mass %: <0.10
Kin. vis. at 50° C., cst: 45.7
Kin. vis. at 100° C., cst: 8.79
Vanadium, mg/kg: <0.1
Nickel, mg/kg: <0.1
Nitrogen, mg/kg: 540
Basic nitrogen, mass %: 0.019
Refractive index at 67° C.: 1.483

375°+ C.

Yield on crude, mass %: 41.12
Yield on crude, vol %: 38.82
Density at 15° C., kg/l.: 0.9128
Specific gravity at 60/60° F.: 0.9133
API gravity at 60/60° F.: 23.4
Sulfur, mass %: 0.359

Total acid no., mg KOH/g: 1.17
Aniline point, °C.: 96.0
Watson K-factor: 12.0
Pour point, °C.: 45
Carbon residue (micromethod), mass %: 2.55
Asphaltenes, mass %: <0.5
n-Pentane insolubles, mass %: 1.1
Ash, mass %: 0.010
Kin. vis. at 50° C., cst: 78.0
Kin. vis. at 100° C., cst: 12.3
Vanadium, mg/kg: 0.7
Nickel, mg/kg: 2.2
Nitrogen, mg/kg: 1,000
Basic nitrogen, mass %: 0.033
Refractive index at 67° C.: 1.492

525°+ C.

Yield on crude, mass %: 11.35
Yield on crude, vol %: 10.19
Density at 15° C., kg/l.: [3]0.9600
Specific gravity at 60/60° F.: 0.9606
API gravity at 60/60° F.: 15.8
Sulfur, mass %: 0.584
Aniline point, °C.: 99.9
Watson K-factor: 11.8
Pour point, °C.: 51
Carbon residue (micromethod), mass %: 9.61
Asphaltenes, mass %: <0.50
n-Pentane insolubles, mass %: 4.2
Ash, mass %: 0.024
Kin. vis. at 100° C., cst: 122
Kin. vis. at 135° C., cst: 34.4
Vanadium, mg/kg: 2.4
Nickel, mg/kg: 7.9
Nitrogen, mg/kg: 2,390
Basic nitrogen, mass %: 0.072
Penetration at 25° C., mm: 290

Composition, mass %

Normal paraffins

Methane: <0.01
Ethane: 0.02
Propane: 0.16
Butane: 0.31
Pentane: 0.36
Hexane: 0.42
Heptane: 0.50
Octane: 0.58
Nonane: 0.55
Total n-paraffins: 2.91

C_4 hydrocarbons

i-Butane: 0.11

C_5 hydrocarbons

Isoparaffins
2,2-Dimethylpropane: <0.01
i-Pentane: 0.29
Total C_5 i-paraffins: 0.29

Naphthenes
Cyclopentane: 0.05

C_6 hydrocarbons

Isoparaffins
2,2-Dimethylbutane: 0.02
2,3-Dimethylbutane: 0.05
2-Methylpentane: 0.22
3-Methylpentane: 0.14
Total C_6 i-paraffins: 0.43

Naphthenes
Methylcyclopentane (incl. 2,2-Dimethylpentane): 0.34
Cyclohexane: 0.60
Total C_6 naphthenes: 0.94

Aromatics
Benzene: 0.34

C_7 hydrocarbons

Isoparaffins
2,2,3-Trimethylbutane: <0.01
3,3-Dimethylpentane: <0.01
2,4-Dimethylpentane: 0.02
2-Methylhexane: 0.17
2,3-Dimethylpentane: 0.03
3-Methylhexane: 0.16
Total C_7 i-paraffins: 0.40

Naphthenes
cis-1,3-Dimethylcyclopentane: 0.08
trans-1,3-Dimethylcyclopentane: 0.07
trans-1,2-Dimethylcyclopentane: 0.13
Methylcyclohexane: 1.28
Ethylcyclopentane: 0.06
1,1-Dimethylcyclopentane: 0.04
Total C_7 naphthenes: 1.65

Aromatics
Toluene: 1.40

C_8 hydrocarbons

Isoparaffins
2,2,4-Trimethylpentane: <0.01
2,5-Dimethylhexane: 0.02
2,4-Dimethylhexane: 0.03
3,4-Dimethylhexane: <0.01
3,3-Dimethylhexane: <0.01
2,3-Dimethylhexane (incl. naphthenic compound): 0.04
2-Methyl-3-ethylpentane: <0.01
2-Methylheptane: 0.17
4-Methylheptane: 0.06
3-Methylheptane: <0.01
2,3,4-Trimethylpentane: <0.01
Total C_8 i-paraffins: 0.32

Naphthenes
1,1,3-Trimethylcyclopentane (incl. 2,2-Dimethylhexane): 0.04
trans, cis-1,2,4-Trimethylcyclopentane: 0.03
trans,cis-1,2,3-Trimethylcyclopentane: 0.03
trans-1,4-Dimethylcyclohexane: 0.10
1,1-Dimethylcyclohexane: 0.04
trans-1-Methyl-3-ethylcyclopentane: 0.02
cis-1-Methyl-3-ethylcyclopentane: 0.02
trans-1-Methyl-2-ethylcyclopentane: 0.03
trans-1,2-Dimethylcyclohexane: 0.11
2-Propylcyclopentane: <0.01
cis-1,2-Dimethylcyclohexane: 0.05
Ethylcyclohexane: 0.26
1-Propylcyclopentane: 0.06
cis,cis-1,2,4-Trimethylcyclopentane: <0.01
1-Methyl-1-ethylcyclopentane: <0.01
cis-1,3-Dimethylcyclohexane (incl. naphthenic compound): [4]0.37
Total C_8 naphthenes: 1.16

Aromatics
Ethylbenzene: 0.21
m-Dimethylbenzene (m-xylene): 0.89
p-Dimethylbenzene (p-xylene): 0.27
o-Dimethylbenzene (o-Xylene): 0.32
Total C_8 aromatics: 1.69

C_9 hydrocarbons

Isoparaffins
3,5-Dimethylheptane: 0.06

4-Methyloctane: 0.06
2-Methyloctane: 0.09
3-Methyloctane: 0.11
2,3,4-Trimethylhexane: <0.01
Unidentified paraffin: 0.03
Total C_9 i-paraffins: 0.36

Naphthenes
1,1,3-Trimethylcyclohexane: 0.06
1-Methyl-2-propylcyclopentane: 0.03
1-Methyl-3-ethylcyclohexane: 0.09
1-Methyl-4-ethylcyclohexane: 0.06
1,1,4-Trimethylcyclohexane: 0.04
Unidentified naphthenes: 0.04
Total C_9 naphthenes: 0.33

Total identified: 12.37
Total unidentified: 0.10

Total C_{10+}: 87.54

NELSON-FARRAR COST INDEXES

Refinery construction (1946 basis)
(Explained in OGJ, Dec. 30, 1985, p. 145, and at www.pennenergy.com/index/research-and_data/oil-and_gas/Statistic-Definitions.html; click "Nelson-Farrar Cost Indices")

	1962	1980	2006	2007	2008	Nov. 2008	Oct. 2009	Nov. 2009
Pumps, compressors, etc.	222.5	777.3	1,758.2	1,844.4	1,949.8	2,003.4	2,011.9	2,010.9
Electrical machinery	189.5	394.7	520.2	517.3	515.6	516.4	514.6	516.4
Internal-comb. engines	183.4	512.6	959.7	974.6	990.9	1,007.3	1,023.7	1,025.0
Instruments	214.8	587.3	1,166.0	1,267.9	1,342.1	1,365.0	1,411.7	1,408.4
Heat exchangers	183.6	618.7	1,162.7	1,342.2	1,354.6	1,253.8	1,253.8	1,253.8
Misc. equip. average	198.8	578.1	1,113.3	1,189.3	1,230.6	1,229.2	1,243.1	1,242.9
Materials component	205.9	629.2	1,273.5	1,364.8	1,572.0	1,436.7	1,375.1	1,354.7
Labor component	258.8	951.9	2,497.8	2,601.4	2,704.3	2,781.7	2,835.1	2,835.1
Refinery (Inflation) Index	237.6	822.8	2,008.1	2,106.7	2,251.4	2,243.7	2,251.1	2,242.9

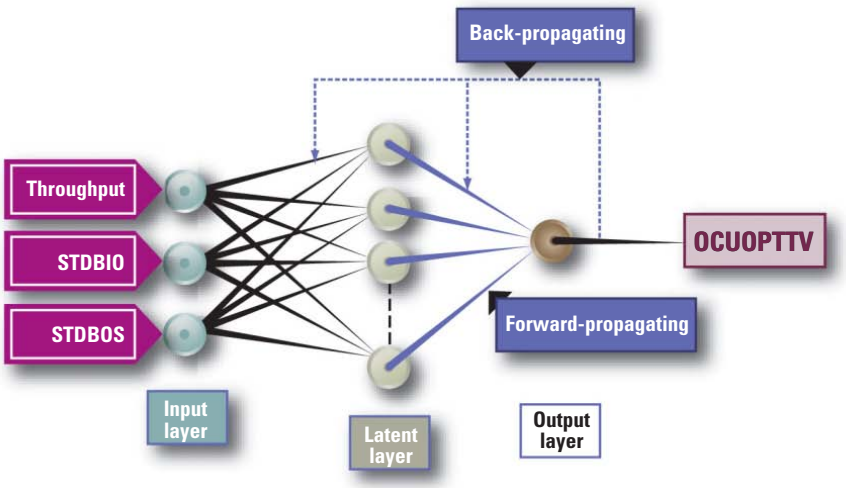
Refinery operating (1956 basis)
(Explained in OGJ, Dec. 30, 1985, p. 145, and at www.pennenergy.com/index/research-and_data/oil-and_gas/Statistic-Definitions.html; click "Nelson-Farrar Cost Indices")

	1962	1980	2006	2007	2008	Nov. 2008	Oct. 2009	Nov. 2009
Fuel cost	100.9	810.5	1,569.0	1,530.7	1,951.3	1,173.9	978.1	1,170.4
Labor cost	93.9	200.5	204.2	215.8	237.9	255.0	273.5	277.2
Wages	123.9	439.9	1,015.4	1,042.8	1,092.2	1,167.6	1,212.1	1,229.6
Productivity	131.8	226.3	497.5	483.4	460.8	457.9	443.1	443.6
Invest., maint., etc.	121.7	324.8	743.7	777.4	830.8	827.9	824.6	821.6
Chemical costs	96.7	229.2	365.4	385.9	472.5	455.7	414.7	424.8
Operating indexes								
Refinery	103.7	312.7	579.0	596.5	674.1	607.8	592.1	610.4
*Process units**	103.6	457.5	870.7	872.6	1,045.1	777.1	713.0	780.3

**Add separate index(es) for chemicals, if any are used. See current Quarterly Costimating, first issue, months of January, April, July, and October. These indexes are published in the first issue of each month. They are compiled by Gary Farrar, OGJ Contributing Editor. Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.*

OCUOPTTV BP NEURAL NETWORK PREDICTION MODEL

Fig. 1



Back-propagation network simplifies energy-use prediction

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Changzhou

A back-propagation neural network can easily predict the energy consumption of a pipeline system with fewer mathematical statistics than other methods and a simple pretreatment of the original data.

The energy consumption prediction uses different nonlinear influence factors by learning the operation data of a certain pipeline via the BP neural network. Calculated results show a prediction error within 5%, capable of satisfying engineering demand.

No uniform selection criterion exists for the number of nodes in the latent layer. The selection of a latent layer and its number of nodes, however, do influence the degree of nonlinear error and therefore need further study.

The prediction uses actual pipeline operation data and therefore will only improve as more data are monitored and recorded and more influence factors emerge.

Background

Fuel oil and electricity consumption account for most of pipeline operating costs. Improving efficiency requires analysis of energy consumption trends and identification of the weak links in energy utilization. Energy consumption prediction for pipeline systems remains an immature science despite considerable research.

One proposed energy-consumption prediction model applies regression treatment to a pipeline's operation data.[1] Computations using the regression method, however, are lengthy and its prediction accuracy is low. It also is incapable of predicting energy consumption at any chosen throughput point.

The gray theory method needs fewer samples, simple calculations, and has a wide range of application. Its accuracy, however, is not ideal because it only considers throughput even though many factors can affect a pipeline's energy consumption.[2]

An artificial neural network (ANN) model belongs to a latent-formula model and is capable of self-organizing, self-adaptability, and self-learning.[3-4] BP neural network is a supervised training, multi-layer back-propagation neural network. It can perform discretionary nonlinear mapping.

The relation between a pipeline system's energy consumption, its facilities, and operating scheme is complicated.[5-9] This article describes the mapping relation between energy consumption and different factors, including throughput, as simulated by BP neural network for the Zhong-Luo oil pipeline.

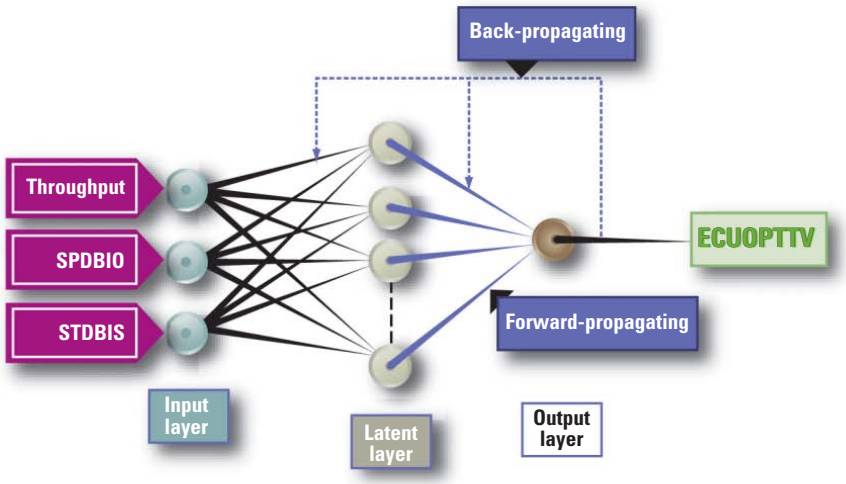
Thermal energy

Equation 1 defines effective heat load at an oil transport station. Equation 1 shows the energy needed to heat oil depends on throughput, oil density, specific heat capacity, and the difference between inlet temperature and outlet temperature at the oil transport station.

Oil density and specific heat ca-

ECUOPTTV BP NEURAL NETWORK PREDICTION MODEL

Fig. 2



EQUATIONS

$$q = Q\rho c\sum_{i=1}^{n}(T_{Ri} - t_{Zi}) \quad (1)$$

Where:
q is the effective heat load of oil transport station, kW; Q is the throughput of crude oil, cu m/sec; ρ is the oil density, kg/m^3; c is the specific heat capacity of crude oil at the average temperature, kJ/(kg·°C.); T_{Ri} is the outlet temperature of crude oil at ith oil transport station, °C.; T_{Zi} is the inlet temperature of crude oil at the ith oil transport station, °C.

Normalized value = (actual value – the minimum) ÷ (the maximum – the minimum) (2)

pacity vary slightly as temperature changes and can thus be calculated at the average temperature. Changes in temperature difference at the oil transport station and operation data can be processed monthly to guarantee the soil temperature is unchanged or changes only slightly.

Temperature at the inlet and outlet of each oil transport station decreases as the throughput of the pipeline increases. The difference between inlet temperature and outlet temperature of the oil transport station is a function of oil throughput. Throughput affects thermal consumption and should be considered among the influence factors when establishing the BP neural network prediction model of oil consumption for unit oil pipeline transportation turnover volume (OCUOPTTV).

Thermal consumption increases with the increasing outlet temperature for certain oil pipelines. Considering the influence of the sum of the temperature difference between the inlet and outlet for every oil transport station (STDBIO) on the prediction model allows consideration of outlet temperature.

The difference between the oil temperature and soil temperature can affect thermal consumption. The sum of the temperature difference between the oil and the soil around the pipeline (STDBOS) therefore acts as one of the influence factors of the predictive model.

Electricity consumption

Electricity is mainly consumed to overcome pump pressure drop. Equation 2 expresses frictional loss of an oil pipeline.

Equation 2 shows the electricity consumption of an oil pipeline as mainly related to pipeline throughput and oil kinematic viscosity. Oil kinematic viscosity can be calculated at the average temperature.

The absence of data addressing oil kinematic viscosity in the operation report table, however, excludes consideration of the oil kinematic viscosity for certain oil pipelines when establishing the BP neural network prediction model. Electricity consumption is instead related to throughput directly, and throughput should be regarded as an influence factor when establishing the BP neural network's prediction model for electricity consumption of unit oil pipeline transportation turnover volume (ECUOPTTV).

The outlet temperature of the oil transport station can affect electricity consumption of the pipeline indirectly. The oil's kinematic viscosity decreases as the outlet temperatures rise. The friction loss increases as kinematic viscosity is decreased, resulting in greater electricity consumption. Including the STDBIO as one of the influence factors of the prediction model allows consideration of the outlet temperature for every transport station.

The oil pump's electricity consumption is also related to the oil transport station's outlet pressure. Electricity consumption increases with outlet pressure. Considering the outlet pressure of each oil transport station requires using the sum of the pressure difference between the inlet and outlet for every oil transport station (SPDBIO) as one of the influence factors of the prediction model.

OCUOPTTV, ECUOPTTV, and the comprehensive energy consumption measured as unit oil pipeline transportation turnover volume (CECUOPTTV) are the widely used indexes in statistical analysis of energy consumption by pipeline systems. The above analysis treats throughput, STDBOS, STDBIO, and SPDBIO as the main factors influencing the pipeline system's energy consumption.

BP network

Kolmogorov theory states a three-layer BP network can approach discretionary continuous nonlinear mapping.[10] The three layers consist of an input layer, latent layer, and output layer.

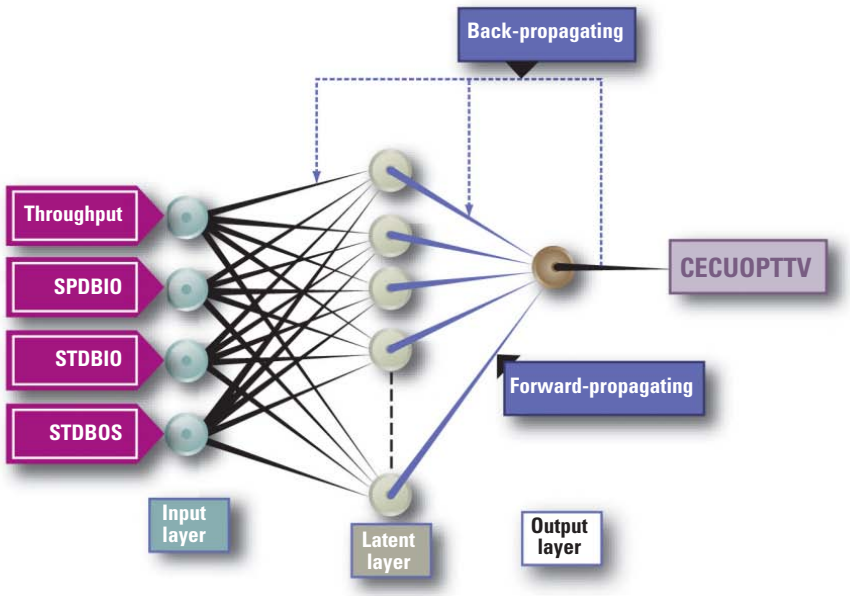
The input layer receives the external data, the latent layer processes and converts the input data, and the output layer produces the output. Interconnection occurs among layers and the nodes in the same layer have no connection. The number of variables, such as energy consumption influence factors and energy consumption indicators, determines the number of nodes in the input and output layers. The node quantity of the latent layer is confirmed by trial and error.

The essential step in BP neural network modeling therefore is determining how to confirm the node number. The latent layer nodes express the nonlinearity between the network's input and output. Selection of a latent layer and its number of nodes influences the nonlinear error between the predictive and actual values.

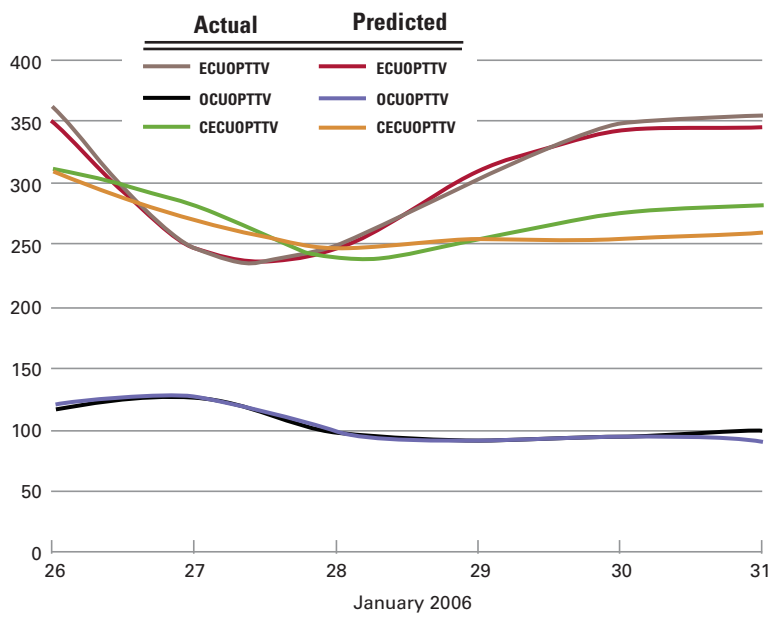
Increasing the number of latent layer nodes can increase the adjustable parameters of the nonlinear optimizing problem, strengthen the memory of the network, and yield a more accurate result, but it debases the study speed of the network. Too few latent layer nodes can cause the network to converge to its partial minimum. Experiment and experience yield the correct number of latent layer nodes.

Throughput, STDBOS, STDBIO, and SPDBIO act as the target output for constructing the three-layer BP neural network's energy-consumption prediction models: OCUOPTTV, ECUOPTTV, and CECUOPTTV. Fig. 1 shows the prediction model of OCUOPTTV having three layers of input—throughput, STDBOS, and STDBIO—and one of output, OCUOPTTV. The prediction model of the ECUOPTTV (Fig. 2) has the same structure, with SPDBIO replacing STDBOS as the input layer and ECUOPTTV replacing OCUOPTTV as the output layer. CECUOPTTV's prediction model (Fig. 3) has four nodes in the input layer, throughput, the STDBOS, STDBIO, and SPDBIO. The output layer is the CECUOPTTV.

CECUOPTTV BP NEURAL NETWORK PREDICTION MODEL Fig. 3



PREDICTED VS. ACTUAL ENERGY CONSUMPTION Fig. 4



Pipeline system

The Zhong-Luo oil pipeline's energy consumption served as a prediction example. This pipeline is 282 km long, originating at the Zhongyuan oilfield and ending at Luoyang oil refinery.

ZHONG-LUO OIL PIPELINE OPERATION DATA STUDY SAMPLES, JANUARY 2006

Table 1

Date	Q, t·d⁻¹	SPDBIO, MPa	STDBIO, °C.	STDBOS, °C.	ECUOPTTV, kW·h·(10⁴t·km)⁻¹	OCUOPTTV, kg·(10⁴t·km)⁻¹	CECUOPTTV, kgce·(10⁴t·km)⁻¹
1	11,878.79	15.91	15.7	26.9	276.33	78.07	223.16
2	12,239.49	13.13	15.0	26.2	263.15	82.41	224.04
3	10,714.99	13.10	15.1	25.4	237.75	79.28	209.31
4	14,300.44	16.80	14.3	24.9	285.82	73.14	219.95
5	14,245.29	17.17	14.2	25.3	326.88	68.83	230.39
6	14,251.13	17.20	15.2	26.6	335.06	74.16	241.31
7	12,399.48	13.65	16.9	28.2	320.59	95.63	266.13
8	11,204.03	11.54	38.9	81.6	268.08	138.71	306.47
9	10,682.55	10.86	44.8	88.5	254.54	153.63	322.31
10	10,412.85	10.88	44.7	89.1	248.33	163.35	333.69
11	10,706.49	11.80	43.0	89.3	261.03	160.07	334.13
12	9,089.58	13.26	37.4	84.0	288.22	141.59	318.71
13	13,008.76	15.89	29.1	76.0	263.87	106.66	258.97
14	13,832.89	17.22	22.2	52.4	345.73	87.22	264.28
15	11,991.18	17.34	21.8	50.9	342.66	90.91	268.31
16	13,756.12	17.34	21.9	51.6	334.60	94.83	270.65
17	12,340.69	14.58	25.1	54.0	342.54	101.19	282.95
18	11,592.52	13.37	24.4	53.0	288.33	108.24	271.11
19	13,126.42	15.65	23.6	51.0	269.97	95.87	246.02
20	14,127.46	17.23	22.0	50.6	328.98	93.98	267.17
21	13,934.39	17.11	22.1	51.0	330.62	92.93	266.32
22	13,901.19	17.17	21.1	50.1	342.25	88.58	264.81
23	13,930.58	17.14	21.1	50.5	331.07	84.86	254.99
24	11,975.98	17.29	21.4	50.3	351.11	82.77	260.09
25	13,523.67	17.31	22.1	51.6	331.28	84.56	254.64

TESTED ZHONG-LUO OIL PIPELINE OPERATING DATA SAMPLES, JANUARY 2006

Table 2

Date	Q, t·d⁻¹	SPDBIO, MPa	STDBIO, °C.	STDBOS, °C.	ECUOPTTV, kW·h·(10⁴t·km)⁻¹	OCUOPTTV, kg·(10⁴t·km)⁻¹	CECUOPTTV, kgce·(10⁴t·km)⁻¹
26	7,421.44	11.71	26.6	53.0	362.09	117.01	313.44
27	10,159.44	11.08	28.6	53.9	246.65	127.23	281.41
28	10,182.20	15.50	25.9	66.1	250.25	96.56	239.04
29	12,443.76	15.62	24.3	67.6	306.18	91.64	254.61
30	13,442.07	17.78	22.7	51.7	348.89	94.54	276.01
31	13,133.35	17.76	22.6	52.4	354.87	98.70	284.37

The line includes six pump (transport) stations.

Analysis used the pipeline's operating data for January 2006, consisting of 31 groups of data. Twenty-five of these served as the study samples for network analysis (Table 1). Avoiding the negative effects of the absolute size of the data on the results, the method expressed in Equation 2 normalized treatment of input and output data.[11]

The study method already detailed trained the network. Studying the samples allowed for adjustment of the network's weight and bias. The nonlinear relation between different influence factors and pipeline energy consumption entered the network continuously and was stored to weight the network.

The artificial neural network recorded the complicated nonlinear relation of the object function between different influence factors and pipeline energy consumption according to the number matrix of the weight. The network realized discretionary nonlinear mapping from input mode to output mode and predicted energy consumption under the effects of many uncertain factors in different conditions.

Matlab programmed the corresponding calculation process using its neural network toolbox, integrating a wide range of learning algorithms. Calling function trainlm trained the network. Hyperbolic tangent function tansig is the transformation function in the latent layer, purelin is the transformation function in the output layer. Repeated testing determined the numbers of nodes in the latent layer of each model as 7, 10, and 7, respectively, producing a better prediction result.

ECUOPTTV PREDICTED, ACTUAL VALUES, JANUARY 2006

Table 3

Date	Actual value, kW·h·(10⁴t·km)⁻¹	Predicted value, kW·h·(10⁴t·km)⁻¹	Absolute deviation, kW·h·(10⁴t·km)⁻¹	Relative deviation, %
26	362.09	353.80	8.29	–2.29
27	246.65	247.61	–0.96	0.39
28	250.25	247.32	2.93	–1.17
29	306.18	309.79	–3.61	1.18
30	348.89	343.95	4.94	–1.42
31	354.87	346.10	8.77	–2.47

Prediction model

The model calculation consists of input signal

OCUOPTTV PREDICTED, ACTUAL VALUES, JANUARY 2006

Table 4

Date	Actual value, kg·(10⁴t·km)⁻¹	Predicted value, kg·(10⁴t·km)⁻¹	Absolute deviation, kg·(10⁴t·km)⁻¹	Relative deviation, %
26	117.01	121.35	–4.34	3.71
27	127.23	126.67	0.56	–0.44
28	96.56	100.57	–4.01	4.15
29	91.64	91.752	–0.11	0.12
30	94.54	93.596	0.94	–1.00
31	98.70	91.795	6.90	–6.99

CECUOPTTV PREDICTED, ACTUAL VALUES, JANUARY 2006

Table 5

Date	Actual value, kgce·(10⁴t·km)⁻¹	Predicted value, kgce·(10⁴t·km)⁻¹	Absolute deviation, kgce·(10⁴t·km)⁻¹	Relative deviation, %
26	313.44	309.41	4.03	–1.29
27	281.41	270.72	10.69	–3.80
28	239.04	248.27	–9.23	3.86
29	254.61	255.57	–0.96	0.38
30	276.01	254.89	21.12	–7.65
31	284.37	259.63	24.74	–8.70

forward-propagation and error signal back-propagation. In forward-propagation, the input signal moves from input layer to output layer, layer by layer. The neurons in the output layer respond to the input mode.

Adaptive learning requires changes in the training procedure used by trainlm. These include first calculating the initial network output and error. At each epoch the current learning rate calculates new weights and biases, which it then uses to calculate new outputs and errors. If new errors are fewer than in the previous iteration, calculation ceases. If new errors expand, back-propagation occurs until new errors are less than old errors.

Network testing must follow training. The test uses a simulated function to obtain network output and check whether the deviation between the predicted value and the actual value meets requirements. The tested samples in Table 2 trained the BP network after initialization treatment, producing corresponding output values from the now trained network.

The system compared the predicted value and the actual value. If errors are within required levels the network is available if not it must be trained again.[6]

The previously discussed network predictive models forecast pipeline energy consumption. Tables 3-5 show the calculated results. The tables show the average relative deviation range between predicted and actual values as <5% in all cases: 1.49%, 2.74%, and 4.28% respectively.

Fig. 4 shows the contrast curves between predicted and actual values. The units of OCUOPTTV, ECUOPTTV, and CECUOPTTV are kg/(10^4 tonne·km), kW·hr/(10^4 tonnne·km), and kg coal equivalent/(10^4 tonne·km), respectively. This method indirectly considers almost all the influence factors affecting the pipeline's energy consumption.

Deviation analysis

Three factors cause the deviation between predicted value and actual value. Energy consumption data cannot reflect actual operating conditions exactly. Using only the four available influence factors reduces the model's abilities. Determining the number of latent layer nodes by repeated testing led to some systematic errors. ✦

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Barclays: 2010 to bring change to global LNG trade

With the turn of the year, Barclays Capital analysts reviewed major developments in global LNG trade for 2009 and offered insights for 2010 in a research note published in late January.

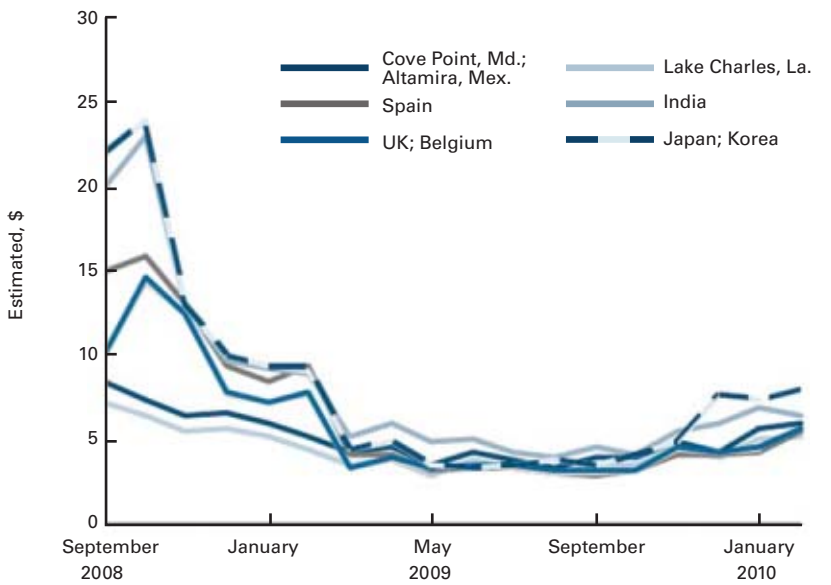
In 2009, said James Crandell, Biliana Pehilvanova, and Michael Zenker, weak Asian demand and growing global supply pushed a large number of spot LNG cargoes toward the Atlantic Basin. Rather than flooding US markets, as was feared, however, Europe absorbed most of the excess, as the continent rejected pipeline imports and filled storage to accommodate record LNG. European markets maintained a small price premium to the US.

Global oversupply last year pushed natural gas prices in Europe, the Americas, and Asia into convergence. In third-quarter 2009, spot LNG traded for $3.10-4.60/MMbtu around the world, said the analysts, the "tightest price range for spot global LNG in some time."

Supply growth could accelerate in 2010 as liquefaction plants that started up last year ramp towards full capacities this year and a few new plants begin operation.

Despite recovering global LNG demand, the size of expected supply increases again threatens to flood the world with LNG well more than potential growth in demand. And, barring extended cold weather, a global oversupply would promote greater interdependence for global gas prices this year.

LANDED LNG PRICES Fig. 1



Source: Waterborne Energy, Houston; Barclays Capital

Global supply

Natural gas prices in 2009 in Europe, the Americas, and Asia converged, thanks to a global glut of LNG (Fig. 1), and represented perhaps "the tightest connection of global gas prices ever."

The glut occurred despite underperforming supply. Global liquefaction capacity added a record 5.8 bcfd in nameplate capacity in 2009 (Fig. 2), but much of this came on in second-half 2009. Start-up problems delayed production from several new trains and lost production from existing plants offset much of the new additions.

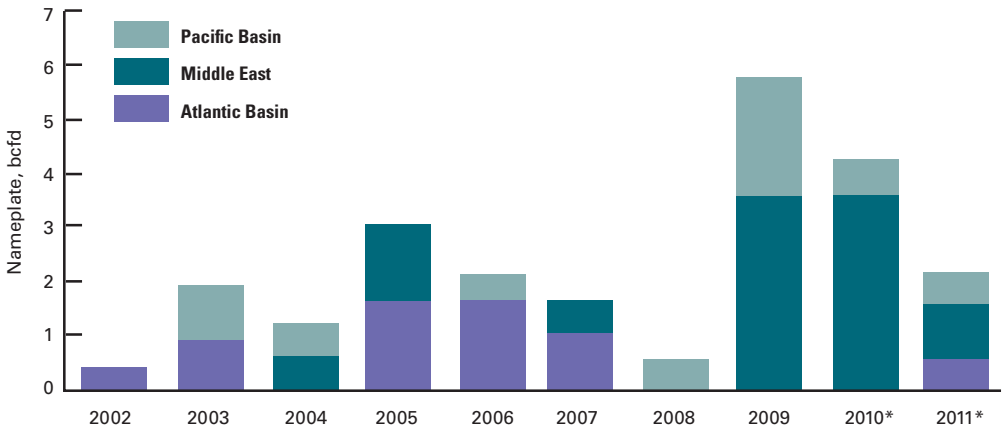
Consequently, global LNG supply

rose by roughly 1 bcfd year-over-year, large but well short of what markets anticipated.

This year, rapid growth of LNG supply is more certain. If all trains produce at capacity and 2010 plant additions come online as planned, global LNG supply would grow by more than 6 bcfd this year. But even this estimate may be too high, said Barclays Capital's analysts, given a history of delays and glitches.

More reasonable, they said, is incremental LNG production growth in 2010 of 4.5-5.5 bcfd. That would nonetheless be difficult for LNG markets to absorb. Restoration of Nigerian and Algerian LNG production poses further risks of fueling a global supply glut.

LIQUEFACTION CAPACITY GROWTH Fig. 2



*Estimated.
Source: Barclays Capital

Demand

In the face of growing supply, economic slowdown and the resulting contraction in LNG and pipeline gas demand were "unfortunate."

Some countries last year, however, actually added LNG import capacity. Growth in Indian, Chinese, and Taiwanese imports offset some of the sharp decline in South Korea and Japan. Total Asian demand contracted by 3.4%, or 500 MMcfd, "less than economic indicators alone would suggest and far less than the market feared."

Growing regasification capacity in 2010 will support demand. Latin American countries received 31%, or 160 MMcfd, more LNG in 2009 than in 2008. Kuwait launched its first regasification terminal and quickly increased volumes to 500 MMcfd.

Most notable was the jump in LNG receipts in Europe. As several countries launched new regasification terminals, European imports grew steadily, aided by the relative strength of prices in Europe vs. the US. Estimates point to a record average 6.7 bcfd of LNG imports to Europe January-November 2009.

Nonetheless, the International Energy Agency estimates that through October 2009, natural gas consumption in European countries of the Organization for Economic Cooperation and Development dropped by 7.7%, or 4 bcfd. Increased LNG receipts were offset by a drop in pipeline imports, and aggregate (pipe + LNG) imports fell 10.3%, or 2.5 bcfd.

Stockpiling balanced the European market, while the pace of inventory growth set a record. The injection season extended well into November in Europe, similar to the US, and the winter season started with storage full.

Recovery

Global LNG demand for 2010 should grow, said the Barclays analysts. The global economy is on pace for a healthy recovery in 2010, yet the magnitude of expected expansions in LNG supply threatens to flood the world, outpacing potential increase in demand.

Assuming a strong, "but not full," recovery of Asian demand and taking into account new regasification terminals coming on in capacity-constrained markets, LNG imports in the Pacific Basin and the Middle East could grow by 2 bcfd this year, following a 5-MMcfd drop in 2009. South American and Mexican consumers could contribute 5-7 MMcfd growth in global demand.

With an estimated increase of global LNG supply next year of 5 bcfd, this would leave more than 2 bcfd of LNG aimed at US and European markets in 2010.

Last year, most excess spot LNG sailed to Europe. In 2010, however, European markets could struggle to expand LNG receipts. Although regas capacity allows for further gains, record inventories and already-low pipeline imports afford little flexibility for Europe to absorb LNG more than for immediate needs.

Nevertheless, LNG demand is "poised for recovery," and import demand (by pipe or boat) and stocks should grow in 2010. Ultimately, the need for LNG in Europe will depend not only on demand growth, but also on the interplay between pipeline imports, LNG, and storage change, all of which will influence the strength of European prices relative to the rest of the world.

North American markets face a glut of gas as well.

North America

Recently developed shale-gas re-

sources have transformed the North American market to one in which demand is failing to match potential for supply additions. The US and Canada started this winter season with record gas in storage. Although balances will likely tighten this year, production continues to outpace expectations, while the recovery of demand marginally lags Barclays Capital's earlier projections.

The US and North America have already in 2010 received more LNG imports than for the same period in 2009. Even greater flows could result if European needs drop more than expected or global demand falters.

Weather could alter the outlook not only for North America, but also for global gas (and LNG) markets this year, as Europe and parts of Asia have also been unusually cold, said the analysts.

Most global LNG consumption is in the northern hemisphere and is, therefore, exposed to cold weather in many markets simultaneously. In Europe, UK demand jumped to daily records in January, pushing deliverability infrastructure and causing some shortages.

China in December and January was struggling to meet heating load in its northern provinces, as the country was hit by extended extreme cold. Such cold already helped reduce the inventory surplus around the world, said the analysis, although not yet enough to ensure a balanced market.

The cold could prove to be transient, but a continuation of below-normal temperatures across the globe over the course of the northern hemisphere's winter could substantially affect balances, potentially alleviating much of the oversupply and resetting regional balances and price differentials. ✦

Equipment/Software/Literature

New mobile evaporator for shale gas operations

Newly launched MoVap is a mobile evaporator system specifically designed for the frac and produced waste water treatment needs of the Marcellus gas shale region in the US East.

The unit is designed to reduce the volume of high total dissolved solids laden waste waters from the gas well frac operation directly at the wellhead. The advantages of carrying out the operation are recovery of waste for reuse and reduction of waste discharge, the company notes.

Versatility of the MoVap design and its mobility allow the unit to be effective in other oil and gas shale regions of the US such as Barnett, Haynesville, Fayetteville, and Antrim.

Source: **Aquatech International Corp.,** One Four Coins Drive, Canonsburg, PA 15317.

New acid system for carbonate reservoirs

The new MaxCO$_3$ Acid degradable diversion acid system is polymer-free and nondamaging. It can be used for matrix and fracture stimulation in carbonate reservoirs with permeability contrasts or natural fractures.

The system is designed to be used in oil or gas wells in openhole and cased-hole intervals, regardless of deviation. Treatment design, execution, and evaluation are optimized using this firm's proprietary software applications.

Treatments can be bullheaded or pumped through coiled tubing, batch-mixed for small volume jobs, or mixed on the fly for larger treatments. The treatment works effectively at low treatment rates and continues to stimulate as it degrades.

Source: **Schlumberger Ltd.,** 5599 San Felipe, 17th Floor, Houston, TX 77056.

New work flow integration helps prospect evaluation

KINGDOM 8.5 includes the new product introduction of KINGDOM GeoModeling, which allows organizations to conduct integrated interpretation and 3D geocellular modeling in a single product.

Integrating these two work flows enables interpreters and modelers to share the same work space during prospect evaluation. This process improvement helps increase productivity and reduce the time needed to generate and evaluate prospects in more detail and with greater accuracy.

KINGDOM GeoModeling incorporates patented 3D gridding technology from JewelSuite, Delft, Netherlands, a provider of Windows-based reservoir modeling software. The second generation JewelSuite 3D gridding capability allows complex structural environments to be modeled without compromising the integrity and accuracy of the original structural interpretation, the company says.

KINGDOM 8.5 also has numerous enhancements available to customers of the KINGDOM Core product line.

Source: **Seismic Micro-Technology Inc.,** 8584 Katy Freeway, Suite 400, Houston, TX 77024.

Services/Suppliers

PAS,

Houston, has appointed Jim Huff vice-president, technology. Huff, with more than 25 years of industry experience, will lead the company's technology and solution marketing strategies. He previously worked as vice-president, product marketing and portfolio management, for Invensys. Prior to that, Huff held a variety of roles spanning the engineering and services, consulting, and marketing disciplines with leading companies such as Emerson, Aspentech, and Invensys.


Huff

PAS is a leading supplier of software products and consulting services to the processing industries worldwide.

VAM Drilling,

Boulogne-Billancourt, France, has acquired Abu Dhabi-based Protools. The acquisition is in line with the company's objective to manufacture drill stems from the rig floor to the bottomhole assembly (BHA) close to where customers drill. Combined with its existing footprints in the US, the Middle East, and Europe, VAM Drilling will become with this acquisition the only manufacturer of complete drilling product solutions in the Middle East. This investment will also allow VAM Drilling to build on its Middle Eastern sales channels and leverage Protools' existing service organization.

Formerly owned by Hunt Oiltools LLC, Protools is a manufacturer of BHA products in the Middle East

VAM Drilling, a Vallourec company, offers a complete range of products and services including drill pipe, heavyweight drill pipe, drill collars, non-magnetic drill collars and measurement-while-drilling housings, safety valves, and accessories for all drilling applications.

Toromont Industries Ltd.,

Toronto, has acquired Enerflex Systems Income Fund, Calgary, and is merging the company with Toromont Energy Systems. The combined organization is now Enerflex Ltd. Toromont named former Enerflex Systems Pres. and CEO Blair Goertzen president and CEO; Jerry Fraelic, president, US; Ivan Heidecker, president, Canada; Bill Moore, president, International; Caspar De Jong, managing director, Europe; Toufic Khalik, managing director, Middle East and North Africa; Steve Dropulich, managing director, Australasia; James Harbilas, vice-president and CFO; Rachel Moore, vice-president, human resources; and Greg Stewart, vice-president and CIO.

Enerflex engineers, designs, manufactures, constructs, commissions, and services field production facilities, natural gas compression and processing plants, and power generators. It is merging with Toromont's compression group, which provides design, engineering, fabrication, and installation of compression systems for natural gas, coalbed methane, fuel gas, and carbon dioxide.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	2-12 2010	2-5 2010	2-12 2010	2-5 2010	2-12 2010	2-5 2010	*2-13 2008
	1,000 b/d						
Total motor gasoline	689	1,160	20	8	709	1,168	826
Mo. gas. blending comp.	493	881	20	8	513	889	685
Distillate	391	630	0	0	391	630	477
Residual	357	402	16	174	373	576	464
Jet fuel-kerosine	47	63	17	46	64	109	23
Propane-propylene	79	312	15	8	94	320	154
Other	109	(354)	99	56	208	(298)	75
Total products	**2,165**	**3,094**	**187**	**300**	**2,352**	**3,394**	**2,704**
Total crude	**7,542**	**7,253**	**1,006**	**1,089**	**8,548**	**8,342**	**8,793**
Total imports	**9,707**	**10,347**	**1,193**	**1,389**	**10,900**	**11,736**	**11,497**

*Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Additional analysis of market trends is available through **OGJ Online**, *Oil & Gas Journal's* electronic information source, at http://www.ogjonline.com.

OIL&GAS JOURNAL online research center

OGJ crack spread

	*2-19-10	*2-20-09	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	85.01	48.65	36.37	74.8
Brent crude	75.71	41.40	34.31	82.9
Crack spread	9.30	7.25	2.05	28.3
FUTURES MARKET PRICES				
One month				
Product value	85.47	47.29	38.18	80.7
Light sweet crude	78.30	36.99	41.31	111.7
Crack spread	7.17	10.30	-3.13	-30.4
Six month				
Product value	89.58	51.76	37.83	73.1
Light sweet crude	80.37	45.29	35.08	77.5
Crack spread	9.22	6.46	2.75	42.6

*Average for week ending.
Source: Oil & Gas Journal
Data available in OGJ Online Research Center.

Purvin & Gertz LNG netbacks—Feb. 19, 2010

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	7.53	5.39	6.68	5.28	5.99	6.60
Everett	5.08	2.88	4.71	2.96	3.50	5.37
Isle of Grain	4.21	1.77	3.59	1.63	2.53	3.61
Lake Charles	2.94	0.94	2.70	1.11	1.34	3.55
Sodegaura	5.83	8.11	6.08	7.80	7.07	4.84
Zeebrugge	6.54	4.61	5.87	4.57	5.12	5.93

Definitions, see OGJ Apr. 9, 2007, p. 57.
Source: Purvin & Gertz Inc.
Data available in OGJ Online Research Center.

Crude and product stocks

District	Crude oil	Motor gasoline		Jet fuel, kerosine	Fuel oils		Propane–propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	13,101	62,079	44,124	9,832	61,693	13,476	2,805
PADD 2	81,313	56,648	27,877	8,368	31,840	1,257	12,282
PADD 3	177,901	74,249	44,425	13,789	43,855	18,866	14,012
PADD 4	15,449	6,179	1,996	500	3,388	199	[1]918
PADD 5	46,739	32,910	28,416	10,187	12,479	4,053	—
Feb. 12, 2010	**334,503**	**232,065**	**146,838**	**42,676**	**153,255**	**37,851**	**30,017**
Feb. 5, 2010	**331,418**	**230,445**	**144,740**	**42,374**	**156,192**	**39,431**	**32,588**
Feb. 13, 2009[2]	**350,630**	**218,664**	**125,195**	**40,957**	**140,752**	**36,320**	**40,012**

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Refinery report—Feb. 12, 2010

District	REFINERY OPERATIONS		REFINERY OUTPUT				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane–propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,151	1,139	2,212	66	356	61	48
PADD 2	3,362	3,339	1,995	194	920	40	249
PADD 3	6,698	6,572	2,469	593	1,604	306	650
PADD 4	486	492	309	24	152	4	[1]51
PADD 5	2,410	2,230	1,443	399	401	131	—
Feb. 12, 2010	**14,107**	**13,772**	**8,428**	**1,276**	**3,433**	**542**	**998**
Feb. 5, 2010	**13,993**	**13,590**	**8,807**	**1,219**	**3,413**	**579**	**1,069**
Feb. 13, 2009[2]	**14,497**	**14,143**	**8,765**	**1,296**	**4,147**	**519**	**1,077**
	17,688 Operable capacity		**79.8% utilization rate**				

[1]Includes PADD 5. [2]Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

OGJ GASOLINE PRICES

	Price ex tax 2-17-10	Pump price* 2-17-10	Pump price 2-18-09
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	227.0	258.4	191.3
Baltimore	222.3	264.2	189.3
Boston	218.4	260.3	187.5
Buffalo	212.4	275.6	193.3
Miami	222.6	275.5	190.5
Newark	225.2	258.1	182.3
New York	210.5	273.7	184.1
Norfolk	217.9	255.6	182.3
Philadelphia	218.4	269.1	196.5
Pittsburgh	217.0	267.7	206.3
Wash., DC	227.8	269.7	205.8
PAD I avg	220.0	266.2	191.7
Chicago	237.6	292.7	215.7
Cleveland	236.2	282.6	198.8
Des Moines	217.3	257.7	190.7
Detroit	233.1	284.7	197.8
Indianapolis	225.5	275.6	196.8
Kansas City	216.9	252.6	184.7
Louisville	224.7	265.6	193.6
Memphis	214.1	253.9	182.8
Milwaukee	222.4	273.7	194.8
Minn.-St. Paul	212.1	257.7	188.7
Oklahoma City	197.2	232.6	173.6
Omaha	210.9	256.6	184.7
St. Louis	208.9	244.6	181.8
Tulsa	195.2	230.6	176.7
Wichita	199.3	242.7	180.8
PAD II avg	216.8	260.3	189.5
Albuquerque	215.5	252.7	184.6
Birmingham	212.5	251.8	182.6
Dallas-Fort Worth	207.4	245.8	179.7
Houston	209.4	247.8	175.6
Little Rock	203.6	243.8	187.0
New Orleans	213.5	251.9	183.0
San Antonio	217.3	255.7	181.3
PAD III avg	211.3	249.9	182.0
Cheyenne	220.0	252.4	169.8
Denver	235.0	275.4	184.2
Salt Lake City	214.5	257.4	184.8
PAD IV avg	223.2	261.8	179.6
Los Angeles	226.0	291.8	212.6
Phoenix	235.5	272.9	196.2
Portland	241.5	284.9	221.2
San Diego	227.1	292.9	227.2
San Francisco	229.1	294.9	232.2
Seattle	232.1	288.0	220.8
PAD V avg	231.9	287.6	218.4
Week's avg.	**219.3**	**264.1**	**182.2**
Jan. avg.	**224.9**	**269.7**	**177.1**
Dec. avg.	**214.4**	**259.2**	**171.1**
2010 to date	**222.9**	**267.7**	—
2009 to date	**136.6**	**182.2**	—

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

REFINED PRODUCT PRICES

	2-12-10 ¢/gal		2-12-10 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	191.45	New York Harbor	190.67
Gulf Coast	188.45	Gulf Coast	188.17
Los Angeles	189.20	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	186.54	ARA	185.76
Singapore	200.00	Singapore	194.17
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	190.45	New York Harbor	161.62
Gulf Coast	189.45	Gulf Coast	166.98
Los Angeles	195.20	Los Angeles	190.34
		ARA	165.65
		Singapore	173.42

Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

BAKER HUGHES RIG COUNT

	2-19-10	2-20-09
Alabama	4	2
Alaska	9	7
Arkansas	42	49
California	25	24
Land	24	23
Offshore	1	1
Colorado	50	69
Florida	1	0
Illinois	1	1
Indiana	0	1
Kansas	18	17
Kentucky	8	11
Louisiana	207	151
N. Land	137	76
S. Inland waters	12	5
S. Land	19	23
Offshore	39	47
Maryland	0	0
Michigan	0	0
Mississippi	11	12
Montana	7	4
Nebraska	2	0
New Mexico	56	46
New York	1	3
North Dakota	80	62
Ohio	7	8
Oklahoma	113	130
Pennsylvania	66	24
South Dakota	0	0
Texas	544	564
Offshore	4	5
Inland waters	0	0
Dist. 1	21	8
Dist. 2	20	30
Dist. 3	39	44
Dist. 4	47	45
Dist. 5	76	126
Dist. 6	69	92
Dist. 7B	7	14
Dist. 7C	52	40
Dist. 8	113	69
Dist. 8A	19	20
Dist. 9	34	24
Dist. 10	43	47
Utah	23	25
West Virginia	26	25
Wyoming	38	51
Others—HI-1; NV-4; TN-1	6	14
Total US	**1,345**	**1,300**
Total Canada	**570**	**401**
Grand total	**1,915**	**1,701**
US Oil rigs	440	269
US Gas rigs	893	1,018
Total US offshore	45	54
Total US cum. avg. YTD	**1,285**	**1,476**

Rotary rigs from spudding in to total depth.
Definitions, see OGJ Sept. 18, 2006, p. 42.

Source: Baker Hughes Inc.
Data available in OGJ Online Research Center.

SMITH RIG COUNT

Proposed depth, ft	Rig count	2-19-10 Percent footage*	Rig count	2-20-09 Percent footage*
0-2,500	108	3.7	50	—
2,501-5,000	47	70.2	67	49.2
5,001-7,500	138	26.0	171	21.6
7,501-10,000	261	6.1	276	3.6
10,001-12,500	282	7.8	260	2.6
12,501-15,000	212	1.8	251	0.3
15,001-17,500	183	—	136	—
17,501-20,000	76	—	77	—
20,001-over	46	—	41	—
Total	**1,353**	**8.4**	**1,329**	**6.6**
INLAND	13		15	
LAND	1,293		1,262	
OFFSHORE	47		52	

*Rigs employed under footage contracts.
Definitions, see OGJ Sept. 18, 2006, p. 42.

Source: Smith International Inc.
Data available in OGJ Online Research Center.

OGJ PRODUCTION REPORT

	[1]2-19-10	[2]2-20-09
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	21	21
Alaska	712	679
California	648	643
Colorado	67	65
Florida	5	2
Illinois	25	25
Kansas	114	110
Louisiana	1,431	1,352
Michigan	16	16
Mississippi	62	62
Montana	86	81
New Mexico	164	161
North Dakota	229	191
Oklahoma	184	178
Texas	1,430	1,374
Utah	66	65
Wyoming	147	142
All others	72	79
Total	**5,479**	**5,246**

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

US CRUDE PRICES

	2-19-10 $/bbl*
Alaska-North Slope 27°	70.46
South Louisiana Sweet	81.00
California-Midway Sunset 13°	72.35
Lost Hills 30°	80.30
Wyoming Sweet	70.81
East Texas Sweet	75.75
West Texas Sour 34°	71.25
West Texas Intermediate	76.25
Oklahoma Sweet	76.25
Texas Upper Gulf Coast	69.25
Michigan Sour	68.25
Kansas Common	75.25
North Dakota Sweet	62.50

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

WORLD CRUDE PRICES

$/bbl[1]	2-12-10
United Kingdom-Brent 38°	70.52
Russia-Urals 32°	69.73
Saudi Light 34°	69.51
Dubai Fateh 32°	70.71
Algeria Saharan 44°	71.60
Nigeria-Bonny Light 37°	72.47
Indonesia-Minas 34°	72.84
Venezuela-Tia Juana Light 31°	71.24
Mexico-Isthmus 33°	71.13
OPEC basket	71.11
Total OPEC[2]	70.35
Total non-OPEC[2]	70.50
Total world[2]	70.42
US imports[3]	70.13

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume.
Source: DOE Weekly Petroleum Status Report.
Data available in OGJ Online Research Center.

US NATURAL GAS STORAGE[1]

	2-12-10	2-5-10	2-12-09	Change, %
	bcf			
Producing region	673	736	735	-8.4
Consuming region east	1,030	1,135	951	8.3
Consuming region west	322	344	314	2.5
Total US	**2,025**	**2,215**	**2,000**	**1.3**
	Nov. 09	**Nov. 08**	**Change, %**	
Total US[2]	**3,833**	**3,346**	**14.6**	

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

PACE REFINING MARGINS

	Dec. 2009	Jan. 2010	Feb. 2010	Feb. 2009	Change	Change, %
			$/bbl			
US Gulf Coast						
West Texas Sour	3.46	4.05	3.69	9.52	–5.83	–61.2
Composite US Gulf Refinery	4.38	5.09	4.82	7.74	–2.92	–37.7
Mars (Cracking)	1.39	2.43	3.14	2.95	0.19	6.5
Bonny Light	0.10	–0.13	2.03	0.67	1.36	202.9
US PADD II						
Chicago (WTI)	2.36	1.61	0.83	8.48	–7.64	–90.2
US East Coast						
Brass River	1.36	1.46	1.98	2.03	–0.06	–2.7
East Coast Comp	2.90	2.77	3.46	5.25	–1.79	–34.1
US West Coast						
Los Angeles (ANS)	10.23	6.61	9.03	19.75	–10.72	–54.3
NW Europe						
Rotterdam (Brent)	1.14	2.40	2.44	4.32	–1.88	–43.6
Mediterranean						
Italy (Urals)	–1.85	–0.92	–0.37	2.56	–2.93	–114.3
Far East						
Singapore (Dubai)	0.02	1.71	1.65	6.04	–4.39	–72.7

Source: Jacobs Consultancy Inc.
Data available in OGJ Online Research Center.

US NATURAL GAS BALANCE DEMAND/SUPPLY SCOREBOARD

	Nov. 2009	Oct. 2009	Nov. 2008	Nov. 2009-2008 change	Total YTD 2009	Total YTD 2008	YTD 2009-2008 change
				bcf			
DEMAND							
Consumption	1,762	1,657	1,858	–96	20,306	20,805	–499
Addition to storage	171	258	194	–23	3,237	3,226	11
Exports	84	77	95	–11	943	896	47
Canada	53	46	65	–12	606	512	94
Mexico	29	29	26	3	310	338	–28
LNG	2	2	4	–2	27	46	–19
Total demand	**2,017**	**1,992**	**2,147**	**–130**	**24,486**	**24,927**	**–441**
SUPPLY							
Production (dry gas)	1,734	1,789	1,706	28	19,303	18,609	694
Supplemental gas	6	6	6	0	59	57	2
Storage withdrawal	140	97	251	–111	2,225	2,752	–527
Imports	270	262	321	–51	3,365	3,619	–254
Canada	233	233	292	–59	2,923	3,262	–339
Mexico	0	2	6	–6	25	36	–11
LNG	37	27	23	14	417	321	96
Total supply	**2,150**	**2,154**	**2,284**	**–134**	**24,952**	**25,037**	**–85**

NATURAL GAS IN UNDERGROUND STORAGE

	Nov. 2009	Oct. 2009	Sept. 2009	Nov. 2008	Change
			bcf		
Base gas	4,284	4,279	4,278	4,231	53
Working gas	3,833	3,807	3,643	3,346	487
Total gas	**8,117**	**8,086**	**7,921**	**7,577**	**540**

Source: DOE Monthly Energy Review.
Data available in OGJ Online Research Center.

US HEATING DEGREE-DAYS

	Dec. 2009	Dec. 2008	Normal	2009 % change from normal	Total degree-days July 1 through Dec. 31 2009	2008	Normal	% change from normal
New England	1,099	1,049	1,078	1.9	2,480	2,481	2,462	0.7
Middle Atlantic	1,021	973	998	2.3	2,100	2,171	2,191	–4.2
East North Central	1,145	1,218	1,135	0.9	2,460	2,574	2,472	–0.5
West North Central	1,348	1,368	1,248	8.0	2,724	2,761	2,695	1.1
South Atlantic	582	480	555	4.9	1,061	1,105	1,083	–2.0
East South Central	755	671	715	5.6	1,431	1,449	1,410	1.5
West South Central	637	497	520	22.5	1,001	887	905	10.6
Mountain	1,057	938	928	13.9	2,163	1,919	2,147	0.7
Pacific	618	624	563	9.8	1,224	1,094	1,253	–2.3
US average*	**867**	**824**	**817**	**6.1**	**1,732**	**1,724**	**1,739**	**–0.4**

*Excludes Alaska and Hawaii.
Source: DOE Monthly Energy Review.
Data available in OGJ Online Research Center.

WORLDWIDE NGL PRODUCTION

	Nov. 2009	Oct. 2009	11 month average production 2009	11 month average production 2008	Change vs. previous year Volume	Change vs. previous year %
			1,000 b/d			
Brazil	80	80	78	87	–8	–9.5
Canada	611	570	575	644	–69	–10.6
Mexico	369	361	369	365	4	1.0
United States	1,970	1,953	1,881	1,797	84	4.7
Venezuela	200	200	200	200	—	—
Other Western Hemisphere	195	205	201	197	5	2.3
Western Hemisphere	**3,425**	**3,369**	**3,305**	**3,290**	**16**	**0.5**
Norway	292	283	276	275	2	0.7
United Kingdom	122	123	127	164	–37	–22.4
Other Western Europe	10	10	10	10	—	4.6
Western Europe	**424**	**416**	**414**	**448**	**–34**	**–7.7**
Russia	437	436	422	422	—	–0.1
Other FSU	150	150	150	150	—	—
Other Eastern Europe	15	14	14	15	–1	–5.6
Eastern Europe	**602**	**600**	**586**	**587**	**–1**	**–0.2**
Algeria	350	350	345	358	–13	–3.6
Egypt	70	70	70	70	—	—
Libya	80	80	80	80	—	—
Other Africa	131	131	131	127	4	3.1
Africa	**631**	**631**	**626**	**635**	**–9**	**–1.4**
Saudi Arabia	1,513	1,511	1,417	1,441	–24	–1.7
United Arab Emirates	250	250	250	250	—	—
Other Middle East	835	835	835	872	–37	–4.2
Middle East	**2,598**	**2,596**	**2,503**	**2,563**	**–60**	**–2.4**
Australia	68	73	70	66	4	6.0
China	650	650	650	634	16	2.6
India	—	—	—	—	—	—
Other Asia–Pacific	169	169	169	178	–9	–4.9
Asia-Pacific	**887**	**892**	**889**	**877**	**12**	**1.3**
TOTAL WORLD	**8,567**	**8,504**	**8,322**	**8,400**	**–78**	**–0.9**

Totals may not add due to rounding.
Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

OXYGENATES

	Nov. 2009	Oct. 2009	Change	YTD 2009	YTD 2008	Change
			1,000 bbl			
Fuel ethanol						
Production	23,592	22,956	636	231,725	199,585	32,140
Stocks	15,518	15,080	438	15,518	15,227	291
MTBE						
Production	808	938	(130)	15,215	16,056	(841)
Stocks	1,359	985	374	1,359	649	710

Source: DOE Petroleum Supply Monthly.
Data available in OGJ Online Research Center.

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BP, ConocoPhillips show opinions vary on climate change

It should be clear now if it wasn't before that the oil and gas industry does not represent uniform opposition to policies addressing climate change.

Even Big Oil, that monolith of popular villainy, is divided on important questions about the issue.

Popular mythology, contrived by environmental propagandists and reinforced by gullible media, won't acknowledge

The Editor's Perspective

by Bob Tippee, Editor

that serious adults and the companies they work for can disagree over serious questions about climate change. In the mythological view, oil companies all see response to climate change as a threat to profits and therefore resist it in defiance of clear and urgent reasons to act.

In fact, companies vary in their corporate opinions about the extent and nature of the threat of climate change, about causes and the need to respond, about costs, and about what responses—if any are in order—would be best. Disagreement has been demonstrated anew by the withdrawal of two major oil and gas companies from a group called the US Climate Action Program (USCAP), formed to create a framework for policy-making.

BP and ConocoPhillips support action on climate change but became disaffected when USCAP supported cap-and-trade legislation threatening to penalize refiners and raise fuel costs.

Why it took them this long to see problems with membership in a coalition that includes the antioil likes of the Environmental Defense Fund and Natural Resources Defense Council is anyone's guess. But right choices are right choices, whenever they occur.

Erosion of the scientific case for urgent action, spun out of the scandal-ridden Intergovernmental Panel on Climate Change, must have influenced their decisions.

As IPCC lapses come to light, alarm over climate change increasingly seems driven by the political usurpation of science. Now the lone remaining oil company in UNCAP is Shell, whose executives have been heard to describe climate-change science as "settled."

That banality comes from the chapter of popular mythology entitled, "Oil Companies All Think Alike on Climate Change."

As credibility of the IPCC, the supposed science settler, melts away, it's a proposition worth reconsideration of the type BP and ConocoPhillips gave UNCAP membership.

(Online Feb. 19, 2010; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Futures price contango compresses

There has been a gradual compression this year of the futures price contango for key benchmark crudes, with the narrowing most evident at the front of the North Sea Brent curve.

As to when the market will tighten enough to remove the front-month contango completely, Paul Horsnell, managing director and head of commodities research at Barclays Capital in London, said Feb. 18, "An aggressive timing would be as early as next month, although that would require a run of particularly strong data. The slowest likely timing would be June, but we see the current dynamics as favoring a slight flirtation with backwardation by the end of April."

He said, "The flattening of the very front of the curve seems to have some more urgent momentum." The fall of commercial crude inventories at Cushing, Okla., in the week ended Feb. 12, "even as overall US crude inventories rose, is one source of support for that transition in West Texas Intermediate, but the process has some broader base beyond just the constructive pattern of Midwest dynamics," Horsnell said.

The Energy Information Administration said US crude stocks jumped by 3.1 million bbl to 334.5 million bbl in that week, well above Wall Street's consensus of a 1.7 million bbl gain. Gasoline stocks advanced 1.7 million bbl to 232.1 million bbl, also exceeding a consensus for a 1.5 million bbl increase. Distillate fuel inventories fell 2.9 million bbl to 153.3 million bbl, exceeding analysts' expectations of a 1.5 million bbl decline but still above average for this time of year (OGJ Online, Feb. 18, 2010).

Crude prices climbed in eight out of nine sessions on the New York Mercantile Exchange Feb. 8-19, falling only in the Feb. 12 session. The front-month crude contract closed at $79.81/bbl Feb. 19, after climbing a total 8% through that shortened week with the New York market closed for the Presidents Day holiday on Feb. 15. Horsnell said, "We expect to see the low point of the range shift upwards in the transition towards a dominant $80-90/bbl range.

Crude prices were relatively flat in early trading Feb. 22. However, natural gas was down more than 2% despite the National Weather Service's 8-14-day prediction of a "high probability" of unseasonably cold temperatures in the Southeast and Southern Plains in March.

Air, truck freight increases

Horsnell cited a recent Barclays Capital report of a steady rise in the absolute level and year-over-year profile in air freight traffic volumes "that has recovered sharply from a 1% fall in October to a 10% increase in November and a 24% increase in December."

He said, "With the overall recovery in global distillate demand waiting on a sustained increase in freight volumes and a normalization in final goods inventory to goods sales ratios, the air freight recovery seems to augur well for the path of overall freight volumes."

He said, "What has been lacking to date is evidence of a sustained uptick in road (and rail) freight. The latest trucking data do, however, seem to suggest that there has been something of a turning point, or to be more precise that the low point for US truck movements is more clearly in the rear-view mirror. The latest American Trucking Association data show a slight month-over-month uptick in trucking mileages for December in the raw data, and a slight month-over-month fall in the seasonally adjusted data. However, it also shows the first year-over-year increase in trucking mileage since June 2008. Using the seasonally adjusted data, the year-over-year increase of 5.9% contrasts with the decline of 16.9% for 2009 as a whole."

Overall, trucking dynamics "appear to be continuing their gradual improvement, and we are confident enough in that data flow to declare that the low point for US truck freight was indeed reached and passed as long ago as April 2009," Horsnell said. "It may be apparent in the trucking data, but the evidence of the watershed having been reached has been slower in the weekly oil data. Diesel inventories are at least moving closer to their 5-year average in a constructive manner."

He added, "The latest weekly reading on distillate demand is, at 3.787 million b/d, the highest of the year so far, but as a herald of better things to come it seems rather muted. The overall overhang of inventories above the 5-year average ticked up by a mild 1.4 million bbl in the latest data, made up of 900,000 bbl of crude and 500,000 bbl of products.

(Online Feb. 22, 2010; author's e-mail: samf@ogjonline.com)

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Cameroon: The Land of opportunities

From crude oil to biofuel, from mining to refining, from revenues to investments the serenity has returned.

Numerous studies present the Cameroonian soil as one of the richest of the continent with many mining layers. Experts are forecasting a bright future to the country.

Huge potential of natural resources under the ground

The already existing exploitation and some recent researches are very promising; it could consolidate the overall economy of the country.

Indeed, current geological facts reveals that six to seven mineral layers are now beyond the stage of research; certain minerals are already in a production such as iron, bauxite, and nickel/cobalt.

The Ministry for industry, mines and technological development, ensures that the government encourages strategic partnership between companies that already have a good know how and other operators conducting researches, in order to boost the sector and move to production as soon as possible.

From studies to action

In his speech addressed to the Nation, at the end of the year on December 31, 2009, H.E President Paul Biya, stressed out the importance of the mining potentialities and confirmed that certain projects were very encouraging and already showing some great results.

During 2010, special attention will be given to "*the construction of the cobalt, nickel, and manganese mine located in Nkamouna, the government will follow closely the diamond mine exploitation of Mobilong and the rehabilitation of the site of the ex-Cellucam for the starting of the activities of the Edéatech technopolis.*

We will accelerate the process for bauxite exploitation in Minim-Martap-Ngaoundal and iron in Mballam. As per the gold in Bétaré-Oya, its industrial exploitation has already started in 2009".

The different studies made recently confirm the enormous potential of the country.

More precisely, the potential is so important in many different fields that it's important here to outline each and every one of them;

For the oil sector the potentialities are estimated at 250 million barrels,

* Natural gas 187 billion m^3,
* Bauxite 1000 million tons,
* Iron 1000 million tons,
* Cobalt/nickel/manganese for 225 million tons,
* Diamond layer of 736 million carats.

The cumulated value of these resources quoted above would be higher than 100 billion dollars; it could lead to the creation of 200.000 jobs directly and indirectly.

Local transformation

To consolidate these assets, the Cameroonian authorities are counting on an increased transformation process of the raw materials, a local transformation, likely to multiply by ten the receipts and to reinforce the development of the country.

The massive export of rough minerals does not allow the country to benefit from the real revenue of minerals.

Therefore, "*we need to tackle the different issues starting with the lack of infrastructures, the lack of qualified personnel and the ignorance of the mining potential of the countries by the investors. These problems need to be solved,*" insist the ministry.

According to reliable studies form the Ministry for industry, mines and technological development, a production of 2,5 million tons of bauxite dedicated to export, is traded at 62,5 million dollars. If this same quantity were to be transformed on Cameroonian soil into aluminum, the profit would be of 1000 million dollars, sixteen times higher than the current trading (you need six tons of bauxite to obtain a ton of aluminum).

Good Governance in the mining sector

Cameroon is now asking for more transparency and good governance from the companies.

The country has ratified the "Extractive Industry Transparency International (EITI)", and came up with a very precise mining Code of non-discriminatory measures for granting and managing of the mining titles and the distribution of income of mining taxation, as well as the effective application of the process of Kimberley for the sale of minerals.

By Achille Mbog Pibasso, Douala

Contents

Research and explorations are in progress; the perspectives are encouraging for a higher production in the oil and gas sector.
It will change the face of industry in Cameroon and will allow the country to be a stronger player in the current international market.

Important crude oil and gas reserves

With a potential of 250 million barrels, Cameroon is not yet part of the largest oil producers of the continent. However, many explorations and research in progress clearly demonstrate that the potential is very important.
The reasons are geographical, indeed Cameroon, being located at the center of Africa, offers the possibility of a diverse production.
It shares the same basin as certain large producer countries, for example Nigeria and Equatorial Guinea, whom are among the first five-oil producer in Africa, but also, Gabon, Congo and Chad, which are average producers.
Currently, explorations continue in several parts of the country, from the basin of Logone Birni, frontier to Chad and Nigeria, as those of Rio del Rey, the Atlantic and the littoral next to Gabon, Equatorial Guinea and Nigeria.
The National company of hydrocarbons (SNH), secular arm of the State on that matter, recently issued certificates of exploration and research to Western multinationals, in fact, the French firm Total, very present in the field of exploration, signed a new agreement.

The peninsula of Bakassi

Although the policy of the development of the country is not based specifically on the incomes of oil, it should be stressed that the oil resources constitute after the revenues from taxes and customs, one of the main incomes of the State with a contribution of more than 400 billion francs CFA in the budget of the State, which represent, 1/5 of the global envelope of the country in 2010.
According to experts, the handover of the peninsula of Bakassi from Nigeria to Cameroon should increase the potentialities of the country, this zone being known as a rich oil region.
In order to prepare all these changes, the Cameroonian government has just undertaken the extension and the modernization of the single refinery of the country, called the National company of refining (SONARA).
With an estimate cost of 350 billion francs CFA, the modernization of the factory should allow, in the long term, Cameroon, to refine the heavy and light crude on the spot and, consequently, to dope its oil production.
Once the refinery will be fully up and running, the annual production capacity will pass from 2.100.000 tons to 3.500.000 tons, "*It will allow us to increase development of our market shares to export and in priority in our hinterland, the national market being already satisfied*", reassured the managing director of the SONARA, Charles Metouck.
Main targets are, East Africa, the Latin America market and the United States, where Cameroon intends to conquer important market shares.

After the handover, The peninsula of Bakassi, a rich oil region, will increase the potentialities of Cameroon.

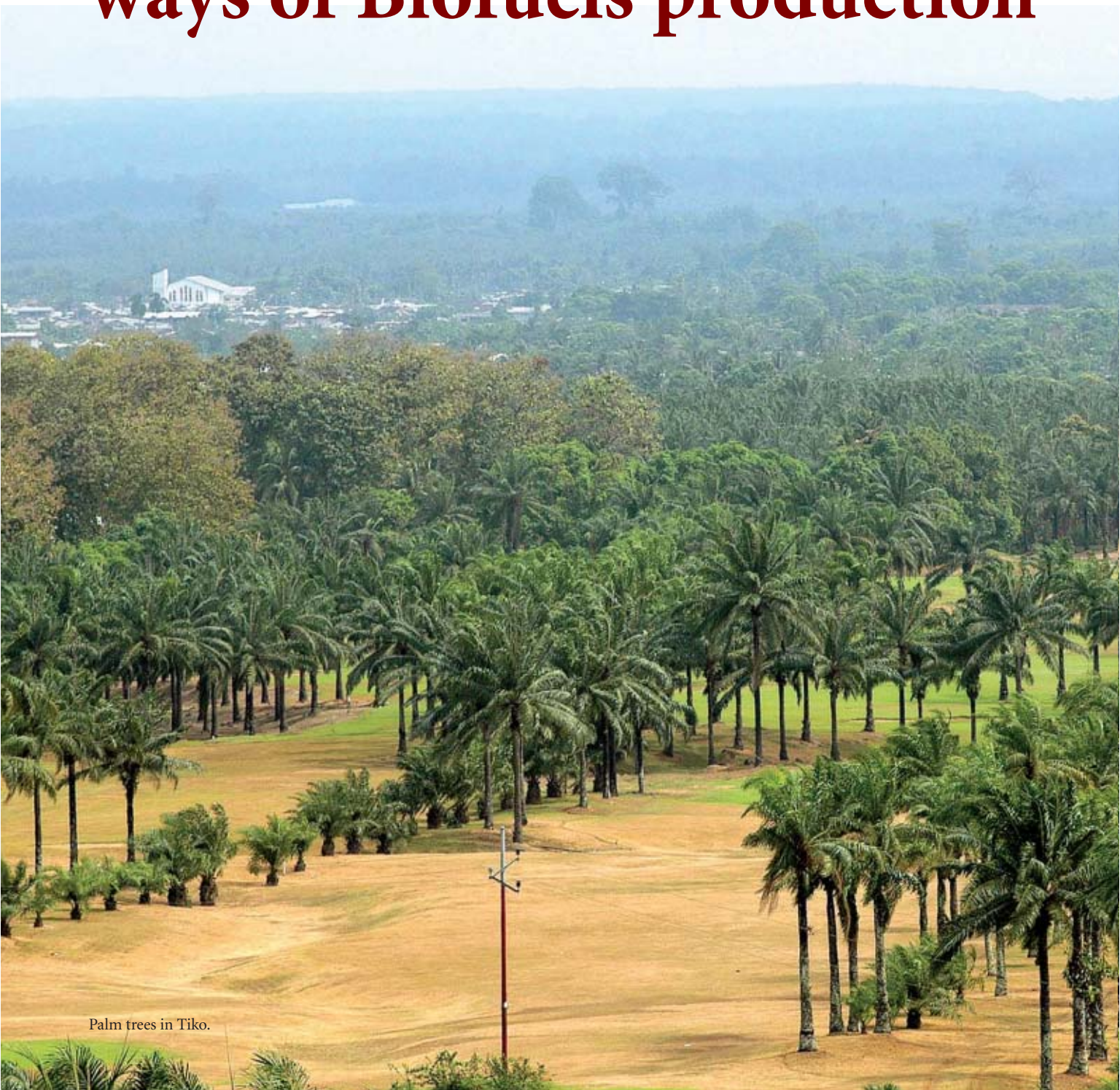
Technological changes

The project that integrates the recent technological changes offers the possibility, thanks to the modification of the installations, to be able to treat any quality of crude and in particular the crude produced from Cameroon.
The capacity will be doubled once the new unit will be launched, it will be identical to the already existing one; the new capacity should be able to reach 610.000 tons/yr (2 x 50 m^3/h).
In addition to the increase in storage capacity, the construction of a flash distillation with a capacity of 1.300.000 tons/yr will be carried out, without forgetting the installation of a unit of cogeneration operating on vacuum residue, for a new capacity of 9MW and 11t/h - vapor HP, indicates a source at the SONARA.
Natural gas, whose potentialities are estimated at 187 billion m^3, is also looking at a bright future. A few days ago, a delegation of Gaz de France (GDF) Suez Global LNG, led by the vice-president managing director, Jean François Cerelli, came to Cameroon with the idea of a development program of gas in a joint-venture with SNH "*We are confident that this great project of valorization of Cameroonian gas, with the building of a factory of liquefaction, will allow Cameroon to export towards foreign markets, and part of the production of this gas will remain in Cameroon*".
The country has the ambition of building two factories for the production of gas in Douala and Kribi, of which an important quantity will be intended for export, since the potentialities exist to cover the national market.

By Achille Mbog Pibasso, Douala

Even if the production is still at a domestic scale, the initiatives for the production of biofuels in Cameroon is in everyone's mind. However, this technology is not very welcomed by local NGO's.

Cameroon: on the complex ways of Biofuels production



Palm trees in Tiko.

The production of biofuels in Cameroon has still a long way to go before becoming a large-scale consumption product. Although, a development program exists, their implementation is not an easy process.

The Bolloré group – which is seen as a pioneer in that field – via its subsidiary (SOCAPALM), along with the African Company of Cameroon (SAFACAM) and the Firm-Switzerland Company, have had for a few years, set up an experimental program of biofuels production.

Limited use

At the moment, the use of biofuels is still limited to these companies.

Based on the Kyoto Protocol, signed in 1997 by many developed countries which objective aims at the adoption of policies favorable to renewable energies, the reduction of climate changes of gases with greenhouse effect of 5,2% between 2008 and 2012 compared to the period 1980-1990 which was of 55% is not favorable to these companies.

Natural palm oil constitutes a suitable source for the production of biofuels and these companies have been producing biofuels since 2005.

In this context, it is difficult to have correct production figures, although one could estimate the production to be around 100.000 liters per annum for the three companies of the Bolloré group, the French multinational whom controls, more than 80% of the total production of the palm oil in Cameroon.

A few months ago, a manager at Bolloré in charge of the biofuels project was optimistic regarding the development of the biofuels sector in Africa.

"*We want to explore the various tracks that can offer the palm oil and its derivatives like energy sources, and involve the African countries by helping them to play a part in the development of the products offering an ecological and economic alternative to oil*" he stated.

The project are well advanced and should extend, indeed, in addition to the palm oil, the experimentation of the peelings of the plantain for the production of the biofuels. Studies are currently on their way to take it to an industrial production scale.

Multiplication of Initiatives

There is no doubt that the development of the biofuels sector has a future in Africa.

Indeed, for the past two years, the former French minister for Defense, Charles Million, now director of Agro Energy Development (AED), has been multiplying visits to Cameroon, talking with local authorities and partners, about the possibilities of development of the biofuels sector in Cameroon, as well as the diversification of the potential sources of biomass to produce electrical energy.

Many persons in charge of the AED development team clearly indicated the possibility of producing biofuels in Cameroon using sunflower and jatropha.

These plants are not cultivated in Cameroon but their experimentation is proposed, as the manufacturer of biofuels often uses them in Europe. However, the Cameroonian authorities recommended the use of the local products, especially related products to the palm tree, already in place in the industrial town of Edéa, located about sixty kilometers of Douala, the principal industrial and business center of the country.

Disputes

While tests are being made to accentuate the development of biofuels in Cameroon, some voices have arisen. In fact, the civil society among the populations, is organizing protests against this development.

Not only they estimate, that the production of biofuels requires the extension of the plantations, but it also means the destruction of the forest, which takes part in climate changes that one wants to fight, they claim that the production of biofuels would be inappropriate as the production of oil has not met the needs of local consumer yet.

There is no doubt that the development of the biofuel sector has a future in Africa.

The main sector benefiting from biofuels are the agricultural processing industries, the households and the exporters.

For others, among the civil society regarding the development of biomass, they believe that first they need to solve the palm oil problem offer, as the supply is higher than the national demand.

It needs to solve the land issue between the operators producing the palm tree oil and the local residents whom do not want to lose their land.

Finally, the environmental challenge in a context of global warming needs to be addressed.

None of these main issues have been solved.

Social tensions have been rising between the populations and local operators, which makes the task difficult for the government to come up with the right strategy in terms of biofuel production in Cameroon.

By Achille Mbog Pibasso, Douala

At last Sonara will soon be able to refine Cameroonian crude. Beyond the national market, Sonara intends to become a stronger player at the regional scale.

Sonara
A long walk towards modernization

February 2009 is a milestone in the history of the National company of refining (SONARA) of Cameroon.
Indeed, for the first time, since the creation of the company, the Cameroonian engineers are the one ensuring the maintenance of the installations. The technical assistance, historically done by French Total has ended. But Sonara does not intend to stop there; they are now on march towards what they like to call it, sovereignty.
The general management wants to repair a historical nonsense: they will end the days when the whole export of Cameroonian oil was just crude. The extension of the principal factory will allow Cameroon to produce refined oil. Within this framework, the company contracted, at the beginning of December, a loan of 68,6 million euros to the private banking group Afriland First Bank to modernize the refinery and to increase its production.
This loan is divided among four branches (Cameroon, Equatorial Guinea, Democratic republic of Congo and Sao Tome and Principe) of the Afriland group which headquarters are located in Cameroon. The project must partly finance the first phase of the modernization of the refinery of Sonara. The objective is to increase the annual production of the company and have the production increased from 2,1 to 3,5 million tons.

Since the beginning of its activities in 1981, the refinery, which treats 7 different products was provided with crude oil extracted from the Niger Delta region and from Equatorial Guinea, but not from Cameroon!

Since the beginning of its activities in 1981, the refinery, which treats 7 different products (butane, super gasoline, oil paraffin and gas oil), had Total providing them with crude oil extracted from the Niger Delta region and from Equatorial Guinea, but not from Cameroon! Initially supervised by Elf, then Total, the delivery of this crude oil was done at the price traded on the international market. Therefore, when the crude would sky rock on the worldwide market, Sonara had to pay the high price, a non-sense, when the majority of the refiners of oil-producing countries were making substantial dividends.
When the crude reached the price of 60 dollars/barrel in 2005, the Cameroonian model showed its limits.
The company started its reorganization and started to tackle historical issues and mismanagement. Consequently, an operation of voluntary departures would equal to 1/3 of the personnel to leave the company between 2005 and 2012. The number of 700 employees will be reduced to approximately 500.

Why Cameroon would not be able to refine its oil?

This paradoxical situation is explained by historical mismanagement. Indeed, the refinery of Limbe does not answer specificities of Cameroonian oil, which explains its dependence from Nigerian oil mainly, and Total, leading vendor. The modernization program should correct this anachronism. Conceived at the beginning to treat light crude, Sonara would from now on, refine Cameroonian oil, classified as heavy crude.
The current production of Cameroon, of 85.000 barrels per day, should in-

Sonara will from now on, refine Cameroonian crude in the Limbe refinery and play a role in both national and regional markets.

crease significantly.

Beyond the national market, Sonara intends to become a stronger player at the regional scale.

Currently, with production of 2,1 million tons of crude, 51% are devoted to the national market, the remaining is being traded within CEMAC countries (Economic and monetary community of the States of Central Africa).

The increase in capacity for treatment of 3,5 million per annum should reinforce its regional presence. Sonara would then meet the needs estimated at 1,2 million tons per annum, of all central Africa as well as Nigeria.

Modernization will be done in two stages, with, initially, the change of the plates of the principal fractionating column to increase production capacity. In the second phase, Sonara will start the transformation of heavy fuel.

MBF

The new Management of Mr. Charles Metouk on Sonara

The managing director Mr. Charles Metouk undertook the reform put in place at Sonara as soon as he took over in 2002. At that time, the role of the company was to "supply Cameroonians with finished and semi-finished oil products". "When I started back, in September 2002, the refinery had some problems: cash flow problems, structural problem, relationship with the financial partners and the local suppliers where somehow difficult", indicated Mr. Metouk in an interview granted to Oil Magazine.

Thanks to the reforms undertaken, volumes of crude produced at the refinery increased from 6% in 2003 to 18% in 2008, representing approximately 130.000 tons to 400.000 tons. The results of 2008 are the best posted by the company in 27 years of existence. Huge progress have been accomplished even tough like the majority of its colleagues of West Africa the company had to stick to the price of the fuels at the gas station. When Mr. Charles Metouk took over the Cameroonian State owed 40 billion to Sonara, which recorded a deficit of 17 billion.

The situation was similar with financial institutions where Sonara had a 17 billion debt. To solve this financial imbroglio, Charles Metouk obtained an agreement from the Cameroonian State based on performances centered on the suppression of the official support for the price applied to the consumer. The managing director then engaged a 5 years recovery package; encouraging results were recorded at the end of 2008. The audit carried out in March 2008 by Det Norske Veritas (DNV) proved to be very encouraging with the attribution of level 8 on a scale from 1 to 10.

The oil income continues to support the growth in the CEMAC region, which balances with the drop of other commodities due to economical downturn.

The CEMAC zone is surfing on oil Revenues

The hydrocarbon that contributes for 45% of the gross domestic product of the Economic community and monetarist of central Africa (CEMAC) remain the pillar of its economical growth. Their production dropped certainly by 1,2%, passing from 52,2 million tons in 2007 to 51,6 million tons in 2008. But this retreat is less than the -4,4% decrease that occurred between 2006 and 2007. It was largely compensated by an increase of 24,4% of the average costs from export of oil products.

The economy being based on the increase of oil incomes, the growth of the real GDP for the CEMAC zone was established at 4%, against 4,6% in 2007, as indicated in the report of Banque de France 2008 on the Free zone. The non-oil sector with 3.9 contributions is certainly responsible for the current figure. However, the contribution of the hydrocarbons sector of is even more substantial with 4.1.

The national growth rate of the GDP is higher in Equatorial Guinea with (16,8%), in Congo (5,2%) and Cameroon (3,5%) where volumes of extracted hydrocarbons increased or remained stable. It is weaker in Gabon (1,9%), where the production of oil contracted, and it became negative in Chad (-0,8%) where, political instability is seen as the major problem for higher production. "stated the report of Banque de France.

The growth rate of the Central African Republic, which is rather an importer of oil products, significantly regressed, passing from 3,6% in 2007 to 2% in 2008.

Trucks leaving the oil refinery of Limbe.

Investments

The industry sector recorded a growth of 2.2 within the CEMAC in 2008, which is the same figure as 2007.

It reflects the importance of the investment plans implemented by companies who decided to extend their production, mainly in the oil sector.

The contribution of the construction sector was established to 0.6, mainly due to the upgrade of the highway networks and railways systems. In the service sector, the good performances recorded by the marketing activities, in the transport and telecommunications fields, allowed the sector to grow by 1.9.

This sector particularly benefited from a strong local demand especially in the mobile development.

On the other hand, the contribution of the agricultural sector remained modest in 2008, mostly due to important decline in demand in cotton harvests (-3,8% after -15,4% in 2007) and a fall of the coffee production (-11,1%), slightly attenuated by the increase in the production of cocoa (+1,8%), mentions the report of the Banque de France.

Except hydrocarbons, the Zone suffered from a decrease of world demand for raw materials.

Drop of incomes

The drop of incomes in the CEMAC Zone in the export of basic commodities was largely compensated by the increase

Last year the CEMAC zone got a 10% inflow of investment thanks to the oil sector and a good business environment.

The CEMAC zone sees higher investments

in manganese exports (134%), in addition to those of hydrocarbons.
The trade balance for 2008, ended up with a surplus of +23,6%.
The oil revenues account for 85,8% of the total of exports of the CEMAC zone evaluated at 19 2003,2 billion FCFA in 2008, against 15 643,4 billion FCFA in 2007.
This financial surplus contributed to keep the level of investment rate in the CEMAC zone where it accounted for (28,8% of the GDP in 2008 compared to 29,5% in 2007), "*primarily thanks to the dynamism of the private sector investments, in particular in the oil sector (investments of exploration and development), telecommunication and agro-business*", added the Banque de France manager.
Thanks to the oil sector which represents 74% of the national budgets, public finances have also improved with an increase of 33,1% of their total revenues and a budget surplus of 11,5% of the GDP, against 8,2% in 2007.
In general, the CEMAC States made use of this money to reimburse foreign debts (1 501 billion FCFA) and interiors debts (2 383 billion FCFA), to increase the salaries and wages (+16,6%), to invest in the infrastructures sector and to attenuate the impact of the increase of food prices; However the consumer price index has been rising to 5,9% in 2008, against 1,8% in 2007.

By Amadou Fall, Dakar

The investment rate in the monetary area has recorded a 10% increase in 2008, while rising to 38% in 2009 against 29% last year, indicated the CEMAC Zone committee.
The CEMAC Zone has come as long a way in terms of investment. Indeed, during the Eighties and the Nineties, the CEMAC showed a preoccupying withdrawal of investment rather than incoming investment. Flows of FDI had become negative. The tendency started to be reversed timidly in 2000. Cameroon, for example, had recorded a retreat of 16 million dollars between 1985 and1991, however saw an increase of 83,1 million dollars in 2002. Central Africa had investment for a little less than 10 million dollars in 1993 dropped to 4,3 million dollars in 2002. The most spectacular flow of investment goes to Chad, thanks to newly found oil reserves. According to the figures of the UNCTAD, in 1992, its investments had retracted to 2,3 million dollars.
In 2002, more than 900 million dollars flowed into the country.

Significant progress

To reverse the tendency, the region needed, to improve its infrastructures, to upgrade its means of communication, to provide a more attractive business environment, and install good governance, indicated Joseph Djaowe in an article in the African Review for Integration published last January.
The report stated some significant progresses in fields considered to be the most sensitive for the FDI.
Indeed, the creation of a special banking commission for central Africa allowed the sector to have a better visibility and got rid off past problems.
At the same time, the macro-economic indicators of the region evolved in a positive way. The privatization of several state enterprises (National company of Electricity, Control of the Railroads of Cameroon) in Cameroon, the leading economy of the region, shows great progress in the zone.
The oil discoveries are not taken into account in this indication. The conjunction of theses efforts and measures explains the flow of investment.
The measures taken by the CEMAC ZONE Commission could justify the growth rate, which appears to be less affected than predicted due to economical downturn.
The Economy grew to +2,4% against a forecast of +2,1%. Nevertheless, it shows a Net retreat compared to 2008, with +4,1%.
The renewal of the investments and the growth did not involve any inflationary push. The rate is in fold, approximately 4%, against 5,9% in 2008.External Deposit rate should remain around 100%.
The central bank maintained the directing rate with 4,25%.
On the other hand, monetary reserves got hit by the international financial crisis, while falling from 6839 billion FCFA (10,43 billion euros) in 2008 to 6344 billion FCFA. Equatorial Guinea is the first contributor with 1671 billion FCFA, followed closely by Congo with 1619 Billion and Cameroon with 1526 Billion.
The only disappointment comes from the emission of public titles, initially scheduled for last October, has once again to be deferred to the first quarter of the next year.
The BEAC estimated that the tests revealed some problems and additional reforms would be implemented.

By Hance Guèye, Dakar

The Cameroon maintains with its main financial backers, trusting relationships. Whether with international monetary institutions, the multilateral and bilateral cooperation, the serenity has returned.

Thanks to financial backers, the serenity has returned

Yaoundé is the capital city of Cameroon and the second largest city in the country after Douala.

"The analysis of debt sustainability in low-income (DSA) conducted jointly by the IMF and the World Bank shows that the risk of debt distress remains low in Cameroon. All external debt ratios remain well below thresholds associated with policy implementation, included in the baseline scenario and stress tests; indicators of public debt also remain at comfortable levels. The building practices of debt management, improving the mobilization of non-oil revenue and broadening the export base remains desirable, given the expected decline in oil revenues over the long term." The common position of the Bretton Woods reflected in the latest IMF report, released in late 2009, gives an outline of the relations between Cameroon and major financial backers. Distrust observed in the past has turned into a relationship of trust, although improvements should be made to both sides so that people finally feel the positive effects of this cooperation.

Indeed, the Cameroonian authorities are to be commended for their recent economic achievements. Prudent management of oil windfalls under the recently completed PRGF-supported program has allowed the authorities to accumulate government deposits at the BEAC and contribute to the regional pool of foreign exchange reserves. These savings now provide some welcome buffers that can be used to alleviate the impact of the global crisis.

Economic analysts describe the success of Cameroon's completion point under the Initiative Highly Indebted Poor Countries (HIPC) in 2006, as the start of a new relationship between Cameroon and its financial backers. Apart from the IMF and World Bank, Cameroon reaching the completion point has allowed other backers, multilateral and bilateral agencies, including the London Club and Paris Club, to give flexibility to the national economy. The consequences, namely a cancellation of Cameroon's debt to just over 1,000 billion CFA francs, confirm these good reciprocal relationships.

Completion point under the HIPC initiative

On the basis of relevant studies, it is proved that Cameroon has adequate

means to repay the IMF. Access to 50% of the share (about 0.6% of GDP) does not jeopardize debt sustainability. The stock of external debt is small and the analysis of debt sustainability shows that the country presents a low risk of debt distress.

Thanks to the debt relief obtained under the HIPC Initiative and Relief (MDRI), the stock of public debt Cameroon fell about 10% of GDP external debt to about 6% of GDP at the end of 2008, while the NPV of external debt (NPV) was equal to 10.2% of exports. Despite adverse international economic crisis "*the staff welcomed the accelerated implementation of structural reforms to make the economy more resilient to shocks*".

After the last phase of the three-year facility of poverty reduction and growth Facility (PRGF) last year, the Cameroonian authorities have clearly expressed their option to withdraw from the mentoring IMF because, unlike past two decades when the country's economic policy was virtually defined by donors, international financial institutions of Bretton Woods would play a more advisory role. In this regard, instead of the regular three-year program, a normal cycle of a year was suggested.

On the occasion of the annual greeting to the diplomatic corps on January 6, 2010, Cameroon President Paul Biya emphasized relations with financial backers, where he particularly welcomed the consolidation of this cooperation. "*We also maintained a dialogue with our multilateral and bilateral partners, maintained dialogue with the European Union, which remains our main partner in development assistance with whom we appreciate the continued support. Finally, we maintained dialogue with the IMF and World Bank whose role, I repeat, will be crucial for the economic recovery of our country*", said the Head of State of Cameroon.

By Achille Mbog Pibasso, Douala

Capital: Yaoundé
Largest city: Douala
Official languages: French, English
Area: total 475,442 km^2 (53rd in the world)
Population:
July 2009 estimate 18,879,301 (58th in the world)
Density 39.7/km^2 (167th in the world)

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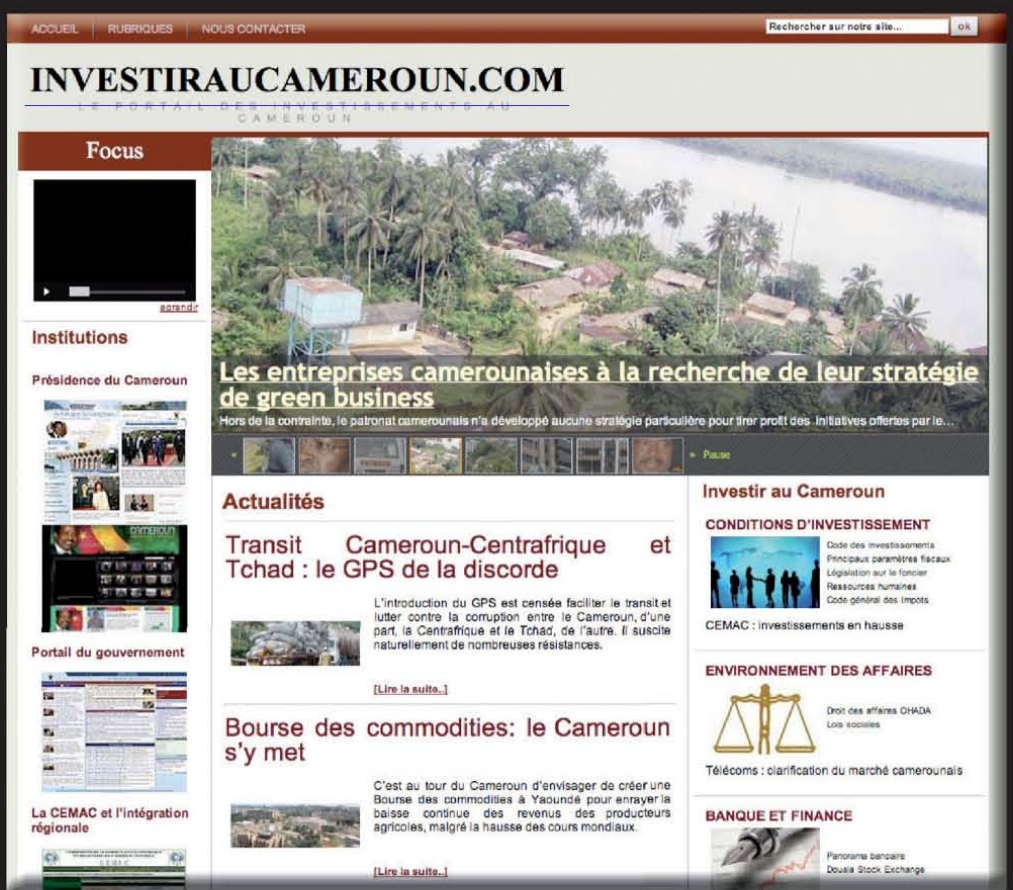

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