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Worldwide Report

Chile awards E&P rights for Magallanes blocks
Custom technology makes shale resources profitable
US offshore LNG terminals face technical, political maze

OIL&GAS JOURNAL®

Dec. 24, 2007
Volume 105.48

WORLDWIDE REPORT

REGULAR FEATURES

COVER

Saudi Aramco's 550,000-b/cd refinery in Ras Tanura, looking north toward the crude unit and Rheniformer, is the largest refinery in the Middle East and seventh largest in the world, according to the 2007 OGJ Refining Survey. Worldwide in 2007, the number of refineries remained stable, while global capacity increased slightly. For the sixth year in a row, worldwide capacity is at a record level. Apache Corp. established its newest core area in Argentina (lower photo) in 2006 with acquisitions of exploration and production assets in the Neuquen and Austral basins, including 714,000 acres on the island of Tierra del Fuego. This week's Worldwide Report, starting on p. 22, includes an article discussing worldwide production and an article, starting on p. 50, covering the latest capacity trends from the refining survey. Photos from Saudi Aramco and Apache.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

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- How will the industry meet the challenge of demand growth?
- Energy policy and foreign policy: Two sides of the same coin?
- Russian oil: Beyond the presidential election
- The geopolitics of gas: Striking a balance between energy security and market competitiveness
- Riding the curve: How traders and investors influence oil prices
- The Unconventional Transformation: New North American Gas Supply
- Low carbon business strategies
- Transportation: Alternate fuels, vehicle technologies, and demand trends

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OGJ Newsletter

Dec. 24, 2007
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General Interest — Quick Takes

SEC mulls oil, gas reserves disclosure rules

The US Securities and Exchange Commission is seeking public comment on possibly revising oil and gas reserves disclosure requirements.The proposal recognizes that significant changes have occurred in the business in the 3 decades since the federal securities regulator first adopted oil and gas reserves disclosure rules, it said on Dec. 11.

"Technological advancements over the last 30 years have changed the way in which companies detect and extract oil and gas resources. Managements of oil and gas companies rely on these advancements to consider their investments," said John White, who directs SEC's corporation finance division.

A number of analysts and investors also told the agency that its oil and gas disclosure requirements needed to be updated to reflect companies' reserves and how they are managed, he added.

The commission seeks input on five questions:

- Should the SEC revise the proved reserves definition, including assessment and measurement criteria?
- How do new technologies affect that definition?
- How might the rules be changed to accommodate future technological innovations?
- Should the rules permit other resource categories to be disclosed?
- Should the rules require third-party verification of companies' reported reserves?

Comments may be filed with the SEC for 60 days following the notice's publication in the Federal Register, SEC said.

MMS to revise Indian oil valuation rule

The US Minerals Management Service has published a revised US Indian oil valuation rule, which the Department of the Interior said is designed to bring more certainty to the valuation process, as many changes have occurred in the oil market since the March 1988 oil valuation rule was codified.

MMS also is seeking nominations of individuals to a negotiated rulemaking committee to make recommendations regarding the "major portion" provision contained in most Indian tribal and allotted leases. The committee will include representatives from the federal government, Indian tribes, individual Indian mineral owners, and the oil and gas industry, it said.

The agency said the leases define "major portion" as the highest price paid or offered at the time of production for the major portion of oil produced from the same field. The rulemaking is intended to improve the Indian oil valuation process by eliminating reliance on posted prices and addressing the unique terms of tribal and allotted leases, MMS said.

Oil services consolidation continues

The end of 2007 brought more consolidation with oil services.

National Oilwell Varco Inc. (NOV) is buying Grant Prideco Inc. for $7.4 billion in cash and equity.

The boards of both companies already approved the transaction, which creates a giant supplier of drilling rig equipment and pipes used in oil and gas wells.

Separately, private equity firm First Reserve Corp. said it was acquiring European for Abbot Group PLC for $1.8 billion.

First Reserve said it was the largest private equity buyout in the drilling services industry. Last month, offshore drilling contractor Transocean Inc. bought GlobalSanteFe Corp for $18 billion.

NOV and Grant Prideco both are based in Houston. Closing is expected in the first half of 2008. Upon completion, current stockholders of NOV will own 86% of the combined company.

The transaction remains subject to regulatory and Grant Prideco shareholder approvals. NOV designs, manufactures, and sells drilling and production equipment and provides field services. Grant Prideco specializes in drillstem technology and drill pipe. ✦

Exploration & Development — Quick Takes

Indonesia reduces exploration period for blocks

Indonesia's upstream oil and gas executive agency BP Migas may reduce the mandatory oil and gas exploration period to 3 years from 10 years to accelerate exploration at newly awarded oil and gas blocks.

BP Migas Chairman Kardaya Warnika said if oil and gas companies fail to find reserves during the 3-year period, they would have to return the leases to the government. Should the companies find reserves during the period, they would not be given deadlines for conducting drilling activities, he said. Under current regulations, oil and gas contractors have 10 years for exploration and drilling activities, or the government will revoke their rights.

"We plan to exclude drilling activities from the list of commitments stated in the exploration stage. Drilling can be done only if the feasibility study proves that reserves are available," Kardaya said. His hope is that the government will see a 30% increase in oil and gas production by 2009, rising by 100,000 b/d to 1.03 million b/d as targeted in the 2008 national budget.

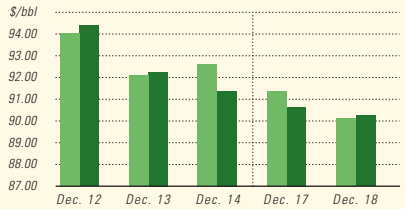
Thailand awards 10 exploration blocks

Thailand has awarded 10 exploration blocks in its current petroleum exploration licensing round.

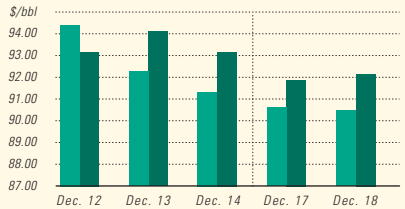
Winning groups were selected from bids submitted in the first round of the 20th bidding that closed July 16 and attracted 28 in-

Industry Scoreboard

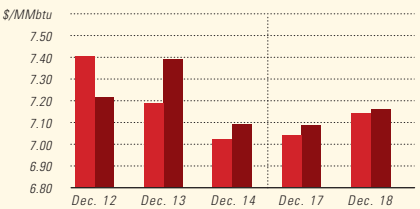
IPE BRENT / NYMEX LIGHT SWEET CRUDE



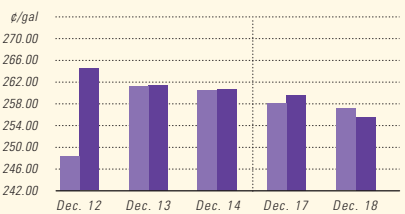
WTI CUSHING / BRENT SPOT



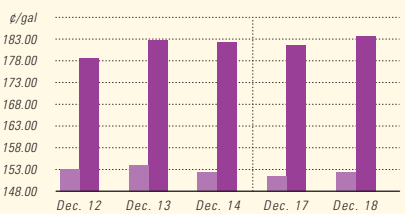
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



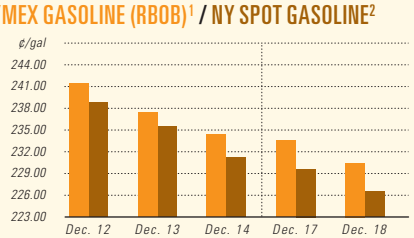
IPE GAS OIL / NYMEX HEATING OIL



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 — 12/24

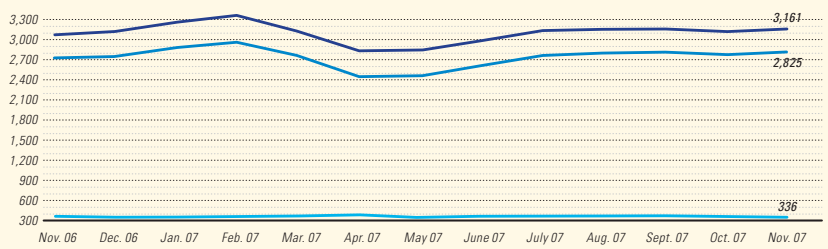
Latest week 12/7	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,268	9,264	0.4	9,303	9,246	0.6
Distillate	4,381	4,199	4.3	4,233	4,162	1.7
Jet fuel	1,653	1,617	2.2	1,624	1,633	–0.6
Residual	717	569	26.0	738	686	7.6
Other products	4,947	5,047	–2.0	4,810	4,878	–1.4
TOTAL DEMAND	20,996	20,696	1.4	20,708	20,679	0.1
Supply, 1,000 b/d						
Crude production	5,077	5,118	–0.8	5,119	5,097	0.4
NGL production[2]	2,400	2,471	–2.9	2,387	2,228	7.1
Crude imports	9,903	9,817	0.9	10,026	10,150	–1.2
Product imports	3,457	3,127	10.6	3,514	3,620	–2.9
Other supply[3]	969	1,070	–9.4	967	1,037	–6.8
TOTAL SUPPLY	21,806	21,603	0.9	22,013	22,132	–0.5
Refining, 1,000 b/d						
Crude runs to stills	14,939	14,865	0.5	15,237	15,240	—
Input to crude stills	15,139	15,437	–1.9	15,471	15,598	–0.8
% utilization	86.8	88.8	—	88.7	89.7	—

Latest week 12/7	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	304,518	305,240	–722	339,725	–35,207	–10.4
Motor gasoline	202,241	200,623	1,618	200,031	2,210	1.1
Distillate	131,534	132,344	–810	132,359	–825	–0.6
Jet fuel-kerosine	39,864	39,939	–75	38,194	1,670	4.4
Residual	39,522	38,033	1,489	42,624	–3,102	–7.3
Stock cover (days)[4]			Change, %		Change, %	
Crude	19.9	20.1	–1.0	22.4	–11.2	
Motor gasoline	21.8	21.7	0.5	21.6	0.9	
Distillate	30.0	29.9	0.3	30.6	–2.0	
Propane	42.5	47.5	–10.5	52.5	–19.0	

Futures prices[5] 12/14			Change		Change	%
Light sweet crude, $/bbl	91.16	88.73	2.43	62.29	28.87	46.3
Natural gas, $/MMbtu	7.15	7.21	–0.06	7.69	–0.54	–7.0

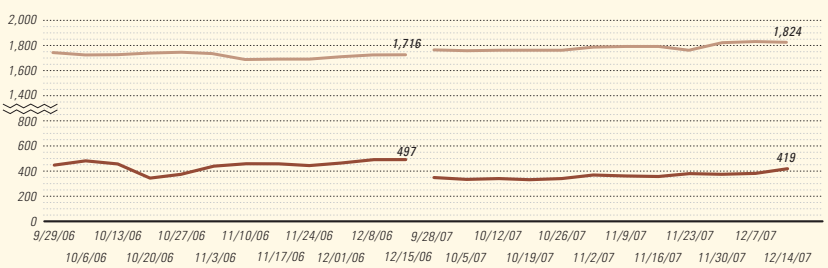
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average 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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ternational firms vying for 21 blocks (OGJ Online July 26, 2007).

The selected companies are committed to spending $79.41 million to explore their acreages over the next 3 years and another $110 million should they opt for a 6-year extension, according to the Department of Mineral Fuels.

Two awarded tracts are in the Gulf of Thailand, and eight others are onshore:

- Offshore Block G4/50 (11,655 sq km) was awarded to Chevron and Mitsui Oil.
- Offshore Block G9/50 (122 sq km) went to Harrods Natural Resources (Thailand) Ltd.
- Onshore tracts L7/50 (3,906 sq km) and L13/50 (3,934 sq km), both in the Northern Intermontane basins, were awarded to Australia's Twinza Oil Ltd.
- Tract L16/50 (3,934 sq km) in the northeast's Khorat Plateau, was granted to Tatex Thailand LLC.
- Tract L26/50 (3,301 sq km), also on Khorat Plateau, went to UK-based Salamander Energy (E&P) Ltd.
- Tracts L36/50 (3,970 sq km), L37/50 (3,972 sq km), and L38/50 (3,972 sq km) in Khorat Plateau were awarded to Bangkok-based Thai Petrochemical Industry Co. and TPI Polene Power Co.
- Tract L51/50 (3,933 sq km) in the Central Plains went to Thai Petrochemical Industry Co.

Hannon Westwood forecasts 210 wells on UKCS

Operators on the UK Continental Shelf are expected to drill at least 210 wells by 2010, according to a report by UK North Sea consultancy Hannon Westwood LLP, Glasgow.

A total investment of $500 billion will be required to maximize the UKCS's potential of 24 billion boe over the next 40 years. About $1 billion/year should be spent over the next 4 years to develop 83 exploration prospects with farmin investment. The consultancy forecasts that 50 exploration and appraisal wells will be drilled on the UKCS each year.

However, operators are turning away from the gas basin on the UKCS because of low gas prices and high equipment costs. Instead, gas-prone companies are moving into oil projects, particularly in the Central North Sea.

The report said, "The majority of the 83 wells expected to be partially or fully offered for farmin funding–mostly in the Central North Sea–are mainly offered by independents that are seeking to fully fund their portfolio of proposed wells." There are 26 prospects on promote or frontier licenses up for farm-in opportunities. In contrast, the number of projects available in the southern North Sea for farmin have fallen since July 2007.

Chris Bulley, executive director of Hannon Westwood, said: "Since we first started reporting on farmin opportunities, the Central North Sea has consistently delivered the most farmin opportunities, signaling a continued drift towards an oil province and despite the continued uncertainty over gas prices a continuation in [high pressure, high temperature] drilling."

Chevron, CNPC to develop Sichuan gas fields

Chevron Corp. and China National Petroleum Corp. signed a 30-year production-sharing contract to develop the 2,000-km Chuandongbei gas area in Sichuan province.

Chevron's main Chinese subsidiary will be the operator and hold 49% interest, while CNPC will hold 51% interest.

The Chuandongbei area includes Tieshanpo, Dukouhe-Qilibei, and Luojiazhai gas fields (OGJ Online, Aug. 8, 2007).

Total makes oil find on Angola's Block 32

Total SA and its partners have tested 5,400 b/d of oil from the Alho exploration well on deepwater Block 32 off Angola.

The well, drilled to a TD of 4,981 m, produced 26° gravity oil from reservoirs in the Oligocene section. Alho is the twelfth discovery on Block 32. Earlier this year Total and its block partners drilled the Colorau-1 exploration well, the group's eleventh find on Block 32 (OGJ Online, Aug. 7, 2007). Alho was drilled in 1,700 m of water and hit Upper Oligocene oil-bearing reservoirs. It is 9 km northwest of the previously announced Cominhos discovery and is 155 km off the Angolan coast in 1,607 m of water.

Operator Total holds 30% in the block. Other Block 32 partners include Marathon Oil Co. 30%, Sonangol EP 20%, Esso Exploration & Production Angola (Block 32) Ltd. 15%, and Petrogal 5%.

Cuba invites Russian firms to explore offshore

Cuban Deputy Foreign Minister Eumelio Caballero, in Moscow on a state visit, invited Russian oil and gas companies to undertake exploration off Cuba in the Gulf of Mexico.

"We are in contact with the Russian companies, and we hope that they participate in the prospecting for those deposits, in particular creating the necessary infrastructure," said Caballero.

He said Cuba is "open to cooperation" and that "favorable" political conditions on the island create "magnificent prospects" for Russian firms that participate in the project. "Russia and Cuba have considerable prospects for increasing their bilateral economic and trade links," he said, adding that one of the most attractive and advantageous areas is energy cooperation.

Caballero said his country has signed contracts with companies from Spain, Norway, Venezuela, and China for exploration and exploitation of offshore petroleum deposits.

Brazil awards five Santos basin blocks to Karoon

Melbourne-based Karoon Gas Australia Ltd. has been awarded five contiguous offshore exploration blocks in the Santos basin off Brazil—the same region as the recent 8 billion bbl Tupi oil discovery (OGJ Online, Nov. 16, 2007).

Karoon said the Brazilian permits are 300 km east-southeast of Tupi and 100 km from producing Caravela and Coral oil and gas fields.

The blocks—1037, 1101, 1102, 1165, and 1166—will be officially awarded next March when Karoon pays $25 million in nonrefundable signature bonuses and refundable bid bonds.

Karoon has pledged a work program consisting of geological analysis along with the reprocessing and interpretation of existing seismic data. The company must acquire an additional 170-sq-km 3D seismic survey in three of the permits during the first 3 years. In an optional second 3-year term, one well is committed to each block. Karoon was one of the successful companies that bid a total $1.5 billion in cash for 117 exploration blocks.

Harvest Resources acquires Gabon block

Harvest Natural Resources Inc., Houston, will operate a block off Gabon after signing a purchase agreement with Sasol Petroleum West Africa Ltd. Harvest will gain a 50% interest under the Dussafu Marin exploration and production-sharing contract.

The PSC contains 680,000 acres that lie in 1-1,000 ft of water.

Harvest Pres. and Chief Executive James A. Edmiston said, "The Dussafu PSC lies within an active proven hydrocarbon basin containing significant production and infrastructure in contiguous blocks and provides Harvest with exposure to multiple medium-to-low risk exploration plays and a pre-existing small oil discovery." The partners will acquire 500 km of 2D seismic data, geology and geophysical interpretation, and engineering studies, and it will drill a conditional well. This second exploration phase of the PSC, which started May 28, is expected to last for 3 years.

The PSC requires approval from the government and the other coventurers before it is finalized.

Another oil shock will accelerate the emphasis ✦

Drilling & Production — *Quick Takes*

Mexico sees 2.1-3.4 million b/d oil output to 2016

Mexico's ministry of energy has released the country's oil outlook for 2006-16, providing best-case and worst-case scenarios for the outlook period, as well as key recommendations for development of state-owned Petroleos Mexicanos.

Under the best-case scenario, Pemex production levels will average some 3.255 million b/d over the period, reaching 3.4 million b/d in 2016. Under the worst case scenario, production will average 2.5 million b/d during 2006-16 and fall to 2.1 million b/d by 2016.

According to Energy Minister Georgia Kessel, the best-case scenario will depend on annual investments of some 157 billion pesos as well as new production from Chicontepec and from Gulf of Mexico deep water.

However, Kessel said that developing deepwater reserves requires "carrying out works in extremely complex conditions and above all, a multiplication of Pemex's operating capacity that would be impossible under current conditions."

More broadly, she said, "We should design the technical, legal, and economic instruments to strengthen Pemex so it can generate the investments, experience, and employment Mexicans demand. I'm confident that with the help of our legislators, we'll find the solutions."

Surmont oil sands project starts production

The Surmont oil sands project in Alberta started commercial production Dec. 11, said Total E&P Canada Ltd., which owns 50% interest in the ConocoPhillips-operated project (OGJ, May 21, 2007, Newsletter).

Surmont is 60 km southeast of Fort McMurray. Phase 1 has a capacity of 25,000 b/d, and it is expected to reach plateau production by 2012. Phase 2, scheduled for commercial production before 2015, is expected to reach plateau production of 75,000 b/d. A Surmont pilot project began in 1997. In 2003, the partnership decided to launch the first phase of commercial development at Surmont using steam-assisted gravity drainage. First steam was injected into the ground in June.

Total also holds other oil sands leases.

Husky lets EPC contract for White Rose field

Husky Operations Ltd. has awarded AKCS Offshore Partner a contract for the engineering, procurement, construction, and maintenance support services related to the production and operations of White Rose field in the Jeanne d'Arc basin 350 km east of St John's, Newf.

The $75 million (Can.) contract is for 5 years. At an additional cost, the contract may be extended for up to 15 successive years.

The contract includes engineering design, modifications and support services, campaign maintenance services, field development planning, feasibility and engineering concept development, subsea and floating production, storage, and offloading moorings support, and engineering services.

AKCS Offshore Partner consists of Aker Kvaerner Offshore Partner AS 40%, SNC-Lavalin Inc. 40%, and G.J. Cahill & Co. Ltd. 20%.

White Rose oil field's southern section is scheduled to go on stream in late 2009. A 2006 delineation program in the field increased the assessment of White Rose oil field's reserves by 190 million bbl of oil. The field could contain 40-100 million bbl of oil, with a likely estimate of 70 million bbl (OGJ Online, Nov. 21, 2006).

Darfur rebels halt 50,000 b/d Defra oil production

Darfur rebels of the Justice and Equality Movement (JEM) in Sudan said they attacked the Defra oil facility in south Kordofan, halting an estimated 50,000 b/d of oil production.

If confirmed, the refinery closure would be the third assault since October by JEM rebels against petroleum installations in Kordofan after the group vowed to target Chinese oil firms.

Earlier this month, a rebel attack prompted the Chinese government to call for the safety of its oil workers in the country (OGJ Online, Dec. 13, 2007). In October JEM rebels said they attacked the Chinese-run Defra oil field. The rebels accuse China of indirectly funding Khartoum's war effort in Darfur by investing in Sudan's oil industry. The Sudanese government receives large royalties from estimated production of 500,000 b/d, and JEM says some 70% of the oil revenue goes to the military.

US drilling slips from 14-week high

US drilling activity slipped from a 14-week high, down by 4 rotary rigs to 1,824 still drilling, up from 1,716 a year ago, Baker Hughes Inc. reported Dec. 14.

As usual, land operations registered the biggest change, down 5 rigs to 1,734 working. Inland waters activity increased by 1 rig to 29. Offshore drilling was unchanged with 61 rotary rigs drilling, including 59 in the Gulf of Mexico.

Texas had the biggest gain among the major producing states, up by 13 units to 885 drilling. California's weekly rig count increased by 1 to 39. Louisiana and Alaska were unchanged at 160

and 10, respectively. New Mexico dropped 2 rigs to 77 working. Colorado and Wyoming lost 4 rigs each, with respective counts of 113 and 70. Oklahoma, which was hit by ice storms this week, was down 5 to 196 rigs still working.

Canada's weekly count jumped by 31 to 419, but still remained below the year-ago level of 497 rigs drilling. ✦

Processing — *Quick Takes*

Placid refinery expansion on schedule

Privately owned independent refiner Placid Refining Co. LLC said its previously announced $300 million project to upgrade and expand its Port Allen, La., refinery is on schedule for completion in first-half 2010.

The project will expand the refinery's crude throughput capacity to 80,000 b/d from 55,000 b/d while cutting total air emissions in half. All existing process units are being expanded and upgraded. In addition, a fluid catalytic cracker gasoline hydrotreater, sulfur extraction capacity, tankage, and other environmental improvements are being constructed to enable the refinery to meet all applicable clean fuel standards for its products. The upgrades will allow the company flexibility to utilize a less-costly, high-sulfur crude oil mix in its production process, officials said.

More than 100 construction workers are on site for Placid Refining Co.'s $300 million expansion, which will increase the Port Allen, facility's capacity to 80,000 b/d from 55,000 b/d (OGJ Online, July 23, 2007). Photo from Placid Refining.

Placid currently supplies 35-40% of the gasoline consumed in the Baton Rouge area. The refinery's gasoline production will increase to 1.5 million gpd from 1 million gpd when expansion is completed. Diesel production will increase to 1 million gpd from 750,000 gpd. The 80-acre refinery, purchased in 1975, is Placid's only manufacturing facility.

China's NDRC okays Sinopec, KPC joint venture

China's economic planning agency, the National Development and Reform Commission (NDRC), has approved a refinery planned by a joint venture of China Petroleum & Chemical Corp. (Sinopec) and Kuwait Petroleum Corp. (KPC) in southern China's Guangdong province. Sinopec last year agreed to establish a JV with KPC to build the $5 billion refinery in the Guangdong city of Nansha, with a refining ✦

Transportation — *Quick Takes*

Nicaragua, Esso near oil import storage accord

Nicaraguan President Daniel Ortega said his country is nearing an agreement with ExxonMobil Corp. subsidiary Esso that would allow increased oil imports from Venezuela next year. Ortega's statement, unconfirmed by ExxonMobil, follows stepped-up pressure on the firm.

Ortega has ordered Energy and Mines Minister Emilio Rappaccioli to "quickly" draft a proposal to nationalize the import of oil, claiming Esso officials were "acting like true mercenaries, speculators, [and] bleeding the Nicaraguan people." Ortega alleged that Esso refused to store the additional supplies of Venezuelan crude. Ortega wants to increase the amount of oil received from Venezuela by 8 million bbl/year and to begin producing products for export.

However, Nicaragua can store only 2 million bbl. Ortega wants the additional storage capacity to be provided by Esso which owns import and storage facilities at Corinto port.

An earlier dispute between the company and the government over use of the Esso terminal led to a temporary seizure of the facility in August (OGJ Online, Aug. 23, 2007). The government returned the terminal after Esso signed a memorandum of understanding with state oil company Petronic granting its shared use.

The increased Venezuelan imports follow an earlier agreement between Ortega and Venezuelan President Hugo Chavez who jointly launched construction in July of a 150,000 b/d refinery at Piedras Blancas, near Nicaragua's Pacific coast (OGJ Online, July 23, 2007).

Greece proposes Libyan gas pipeline

Greece is interested in having a new gas pipeline from Libya to the island of Crete, according to media reports. Details have not yet been released, but the two nations are in consultation regarding the project. Senior Greek business officials, led by Greek Deputy Minister for Foreign Affairs Petros Dukas, are visiting Libya to strengthen relationships on several fronts, including energy, transport, telecoms, and tourism. Greece is a major consumer of Libyan oil and petroleum products, with trade estimated at about $1.2 billion in 2007.

El Paso plans Ruby natural gas pipeline

El Paso Corp. has filed a federal right-of-way application with the Department of the Interior's Bureau of Land Management for its Ruby Pipeline, a 680-mile, 42-in. natural gas transmission line that will extend from the Opal Hub in Wyoming to the Malin, Ore., interconnect near California's northern border.

The pipeline will have an initial capacity of 1.2 bcfd and will be expandable to 2 bcfd. On this project, El Paso plans to partner with the Bear Stearns Cos. Inc. subsidiary Bear Energy LP, Houston.

The Ruby Pipeline is expected to be in service in the first quarter of 2011 subject to regulatory approvals. ✦

Calendar

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

OIL&GAS JOURNAL online

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.

2008

JANUARY

Middle East Petrotech Conference and Exhibition, Bahrain, +60 3 4041 0311, +60 3 4043 7241 (fax), e-mail: mep@oesallworld.com, website: www.allworldexhibitions.com/oil. 14-16.

World Future Energy Summit, Abu Dhabi, +971 2 444 6011, +971 2 444 3987 (fax), website: www.wfes08.com. 21-23.

API Exploration & Production Winter Standards Meeting, Ft. Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 21-25.

API/AGA Oil & Gas Pipeline Welding Practices Meeting, Ft. Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-25.

International Forum Process Analytical Technology (IFPAC), Baltimore, (847) 543-6800, (847) 548-1811 (fax), e-mail: info@ifpacnet.org, website: www.ifpac.com. 27-30.

SPE/IADC Managed Pressure Drilling & Underbalanced Operations Conference & Exhibition, Abu Dhabi, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-29.

Offshore West Africa Conference & Exhibition, Abuja, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshorewestafrica.com. 29-31.

Petroleum Exploration Society of Great Britain Geophysical Seminar, London, +44 (0)20 7408 2000, +44 (0)20 7408 2050 (fax), e-mail: pesgb@pesgb.org.co.uk, website: www.pesgb.org.uk. 30-31.

SIHGAZ International Hydrocarbon and Gas Fair, Hassi Messaoud, Algeria, website: www.sihgaz2008.com. Jan. 30-Feb. 3.

FEBRUARY

Middle East Corrosion Conference, Bahrain, + 973 17 729819, + 973 17 7299819 (fax), e-mail: bseng@batelco.com.bh, website: www.mohandis.org. 3-6.

IADC Health, Safety, Environment & Training Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 5-6.

SPE Unconventional Reservoirs Conference, Keystone, Colo., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 10-12.

International Pipeline Pigging & Integrity Management Conference & Exhibition, Houston, (713) 521-5929, (713) 521-9255 (fax), e-mail: clarion@clarion.org, website: www.clarion.org. 12-14.

Deep Offshore Technology International Conference & Exhibition, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail:

registration@pennwell.com, website: www.dotinternational.net. 12-14.

SPE International Formation Damage Control Symposium & Exhibition, Lafayette, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 13-15.

Alternative Fuels Technology Conference, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 18.

IP Week, London, +44 (0)20 7467 7100, +44 (0)20 8561 0131 (fax), e-mail: events@energyinst.org.uk, website: www.ipweek.co.uk. 18-21.

International Catalyst Technology Conference, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 19-20.

Pipe Line Contractors Association Annual Conference (PLCA), Maui, (214) 969-2700, (214) 969-2705 (fax), e-mail: plca@plca.org, website: www.plca.org. 20-24.

International Petrochemicals & Gas Technology Conference & Exhibition, Prague, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: Conferences@EuroPetro.com. website: www.europetro.com. 21-22.

AAPG Southwest Section Meeting, Abilene, Tex., (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 24-27.

Laurance Reid Gas Conditioning Conference, Norman, Okla., (405) 325-3136, (405) 325-7329 (fax), e-mail: bettyk@ou.edu, website: www.lrgcc.org. 24-27.

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. 25-26.

CERI Natural Gas Conference, Calgary, Alta., (403) 220-2380, (403) 284-4181 (fax), e-mail: jstaple@ceri.ca, website: www.ceri.ca. 25-26.

SPE Intelligent Energy Conference & Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 25-27.

IADC Drilling HSE Asia Pacific Conference & Exhibition, Kuala Lumpur, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 26-27.

Middle East Fuels Symposium, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 27-28.

MARCH

GPA Annual Convention, Grapevine, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 2-5.

GEO Middle East Geosciences Conference & Exhibition, Bahrain, +44 20 7840 2139, +44 20 7840 2119 (fax), (fax), e-mail: geo@oesallworld.com, website: www.allworldexhibitions.com. 3-5.

Subsea Tieback Forum & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.subseatiebackforum.com. 3-5.

NPRA Security Conference, The Woodlands, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 4-5.

ARTC Annual Meeting, Bangkok, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 4-6.

Global Petrochemicals Annual Meeting, Dusseldorf, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 4-6.

IADC/SPE Drilling Conference & Exhibition, Orlando, (713) 292-1945, (713)

Calendar

292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 4-6.

SPE Indian Oil & Gas Technical Conference & Exhibition, Mumbai, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-6.

Annual Middle East Gas Summit, Doha, +971 4 336 2992, +971 4 336 0116 (fax), e-mail: sarita.singh@ibc-gulf.com, website: www.ibcgulfconferences.com. 5-6.

NPRA Annual Meeting, San Diego, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 9-11.

World Heavy Oil Congress, Edmonton, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 10-12.

New Zealand Petroleum Conference, Auckland, +64 3 962 6179, +64 4 471 0187 (fax), e-mail: crown.minerals@med.govt.nz, website: www.crownminerals.govt.nz. 10-12.

Gastech International Conference & Exhibition, Bangkok, +44 (0) 1737 855005, +44 (0) 1737 855482 (fax), e-mail: tonystephenson@dmgworldmedia.com, website: www.gastech.co.uk. 10-13.

API Spring Petroleum Measurement Standards Meeting, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 10-14.

European Fuels Conference & Annual Meeting, Paris, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 11-12.

IADC International Deepwater Drilling Conference & Exhibition, Rio de Janeiro, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 11-12.

SPE North Africa Technical Conference & Exhibition, Marrakech, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 12-14.

NACE International Conference & Expo, New Orleans, (281) 228-6200, (281) 228-6300 (fax), website: www.nace.org. 16-20.

Offshore Asia Conference & Exhibition, Kuala Lumpur, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoreasiaevent.com. 17-19.

Sub-Saharan Oil, Gas & Petrochemical Exhibition & Conference, Cape Town, +27 21 713 3360, +27 21 713 3366 (fax), e-mail: expo@fairconsultants.com, website: www.fairconsultants.com. 17-19.

Turoge and Black Sea Oil & Gas Exhibition & Conference, Ankara, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 18-20.

AAPG Prospect & Property Expo (APPEX), London, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 24-26.

AAPG Pacific Section Meeting, Bakersfield, Calif., (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. Mar. 29-Apr. 2.

NPRA International Petrochemical Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. Mar. 30-Apr. 1.

SPE Middle East Petroleum Engineering Colloquium, Dubai, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Mar. 30-Apr. 2.

✦ERTC Sustainable Refining Conference, Brussels, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Mar. 31–Apr. 2.

APRIL

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. 1-2.

✦ERTC Biofuels+ Conference, Brussels, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 2-4.

GIOGIE Georgian International Oil & Gas Conference & Showcase, Tbilisi, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 3-4.

Middle East Petroleum & Gas Conference, Doha, +65 6222 0230, +65 6222 0121 (fax), e-mail: mpgc@cconnection.org, website: www.cconnection.org. 6-8.

ACS National Meeting & Exposition, New Orleans, 1 (800) 227-5558, e-mail: natlmtgs@acs.org, website: www.acs.org. 6-10.

American Institute of Chemical Engineers (AIChE) Spring National Meeting, New Orleans, (212) 591-8100, (212) 591-8888 (fax), website: www.aiche.org. 6-10.

CIOGE China International Oil & Gas Conference, Beijing, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-8.

API Pipeline Conference & Cybernetics Symposium, Orlando, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 7-10.

EAGE Saint Petersburg International Conference & Exhibition, Saint Petersburg, +7 495 9308452, +7 495 9308452 (fax), e-mail: eage@eage.ru, website: www.eage.nl. 7-10.

IADC Well Control Europe Conference & Exhibition, Amsterdam, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 9-10.

ENTELEC Annual Conference & Expo, Houston, (888) 503-8700, website: www.entelec.org. 9-11.

North Caspian Regional Atyrau Oil & Gas Exhibition & Petroleum Technology Conference, Atyrau, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 9-11.

API Spring Refining & Equipment Standards Meeting, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 14-16.

API/NPRA Spring Operating Practices Symposium, New Orleans, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 15.

SPE Gas Technology Symposium, Calgary, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 15-17.

SPE International Health, Safety & Environment Conference, Nice, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 15-17.

GPA Midcontinent Annual Meeting, Okla. City, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 17.

AAPG Annual Convention & Exhibition, San Antonio, 1 (888) 945 2274, ext. 617, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org/sanantonio. 20-23.

SPE Improved Oil Recovery Symposium, Tulsa, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

ERTC Coking & Gasification Conference, Rome, +44 1737 365100, +44 1737 365101 (fax), e-mail: 50

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IOGCC Midyear Meeting, Calgary, Alta., (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state.ok.us, website: www.iogcc.state.ok.us. 4-6.

API International Oil Spill Conference, Savannah, Ga., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 5-8.

Offshore Technology Conference (OTC), Houston, (972) 952-9494, (972) 952-9435 (fax), e-mail: service@otcnet.org, website: www.otcnet.org. 5-8.

GPA Permian Basin Annual Meeting, Odessa, Tex., , (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 6.

ERTC Asset Maximization Conference, Lisbon, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 12-14.

International School of Hydrocarbon Measurement, Oklahoma City, (405) 325-1217, (405) 325-1388 (fax), e-mail: lcrowley@ou.edu, website: www.ishm.info. 13-15.

Uzbekistan International Oil & Gas Exhibition & Conference, Tashkent, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 13-15.

NPRA National Safety Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 14-15.

IADC Drilling Onshore America Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 15.

SPE Digital Energy Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: service@spe.org, website: www.spe.org. 20-21.

NPRA Reliability & Maintenance Conference & Exhibition, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npradc.org. 20-23.

Mediterranean Offshore Conference & Exhibition (MOC), Alexandria, Egypt, + 39 0761 527976, + 39 0761 527945 (fax), e-mail: st@ies.co.it, website: www.moc2008.com. 20-22.

Society of Professional Well Log Analysts (SPWLA) Annual Symposium, Edinburgh, (713) 947-8727, (713) 947-7181 (fax), website: www.spwla.org. 25-28.

Middle East Refining and Petrochemicals Conference & Exhibition, Bahrain, +973 1755 0033. +973 1755 3288 (fax), e-mail: mep@oesallworld.com, website: www.allworldexhibitions.com. 26-28.

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

SPE International Oilfield Scale Conference, Aberdeen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-29.

JUNE

ERTC Management Forum, Copenhagen, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 2-4.

Caspian Oil & Gas Exhibition & Conference, Baku, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 3-6.

Oklahoma Independent Petroleum Association (OIPA) Annual Meeting, Dallas, (405) 942-2334, (405) 942-4636 (fax), website: www.oipa.com. 6-10.

Asian Geosciences Conference & Exhibition, Kuala Lumpur, +44 (0) 20 7862 2136. +44 (0) 20 7862 2119, e-mail: geoasia@oesallworld.com, website: www.geo-asia.com. 9-11.

Independent Liquid Terminals Association (ILTA) Annual Operating Conference & Trade Show, Houston, (202) 842-9200, (202) 326-8660 (fax), e-mail: info@ilta.org, website: www.ilta.org. 9-11.

SPE Tight Gas Completions Conference, San Antonio, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 9-11.

EAGE/SPE EUROPEC Conference & Exhibition, Rome, +31 30 6354055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.nl. 9-12.

ASME Turbo Expo, Berlin, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 9-13.

Global Petroleum Show, Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 10-12.

IADC World Drilling Conference & Exhibition, Berlin, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 11-12.

CIPC/SPE GTS Joint Conference, Calgary, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 16-19.

American Association of Professional Landmen (AAPL) Annual Meeting, Chicago, (817) 847-7700, (817) 847-7704(fax), e-mail: aapl@landman.org, website: www.landman.org. 18-21.

IPAA Midyear Meeting, Colorado Springs, Colo., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 19-21.

API Tanker Conference, San Diego, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-24.

API Exploration & Production Standards on Oilfield Equipment & Materials Conference, Calgary, Alta., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 23-27.

Russian Petroleum & Gas Congress, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

NEFTEGAZ Exhibition, Moscow, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 24-26.

World Petroleum Congress, Madrid, +34 91 745 3008, +34 91 563 8496 (fax), e-mail: info@19wpc.com, website: www.19wpc.com. June 29- July 3.

JULY

International Offshore & Polar Engineering Conference, Vancouver, (650) 254 2038, (650) 254 1871 (fax), e-mail: meetings@isope.org, website: www.isope.org. 6-11.

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Struggling to be green

David N. Nakamura
Refining/Petrochemical Editor

On Dec. 13, the US Senate passed a revised energy bill that included a large expansion of the federal motor fuel ethanol mandate (OGJ Online, Dec. 18, 2007). On Dec. 18 the House approved the measure, which calls for sales of 15 billion gal/year of ethanol by 2015 and an increase in the renewable fuels standard to 36 billion gal/year by 2022, at least half from advanced biofuels.

Is this a case of being green just for the sake of being green? One recent study stated that the cure of biofuels may be worse than the disease. Another study found that people weren't environmentally conscious regarding energy savings.

OECD study

In September, the Round Table on Sustainable Development at the Organization for Economic Cooperation and Development (OECD) released a study that came to sobering conclusions: Biofuels may hurt global economies, raise food prices, and still suffer from unfavorable economics (OGJ, Oct. 8, 2007, p. 22).

In 2005, global production of biofuels amounted to about 1% of total road transportation fuel consumption. By 2050, this number could theoretically jump to 11% given conventional technologies for producing ethanol and biodiesel, according to the study.

"An expansion on this scale could not be achieved, however, without significant impacts on the wider global economy," the study said. "It is more likely that land-use constraints will limit the amount of new land that can be brought into production, leading to a 'food-versus-fuel' debate."

Before taking carbon emissions through land-use change into account, conventional biofuel technologies typically deliver less than 40% reductions in greenhouse gas emissions compared to fossil fuels.

"When such impacts as soil acidification, fertilizer use, biodiversity loss, and toxicity of agricultural pesticides are taken into account, the overall environmental impacts of ethanol and biodiesel can very easily exceed those of petrol and mineral diesel," the study said. "The conclusion must be that the potential of the current technologies of choice—ethanol and biodiesel—to deliver a major contribution to the energy demands of the transport sector without compromising food prices and the environment is very limited."

Biofuels are also uneconomic, a situation that could worsen in the future, especially considering them in light of government policies.

"Increasing competition with biomass feedstocks…is actually pushing feedstock prices and production costs up," according to the study. "Higher oil prices will have the effect of increasing biofuel production costs."

The study went on to state that the use of biofuels roughly doubles the cost of transportation energy.

Responding to economics

Even when it makes economic sense to be "green," many consumers don't respond. Vattenfall AB, a Swedish utility company, as reported in the June 2, 2007, issue of The Economist, quantified which technologies for saving energy would be most economic.

The company found that efficient lighting systems are among the highest in return on investment in energy savings, typically with a payout of less than a year. According to the article, low-energy light bulbs can cost 4-5 times as much as an incandescent bulb but use 80% less energy. But sales of low-energy light bulbs remain slow—representing, for example, only 30% of sales of one major European bulb maker, Philips Lighting.

The reasons for this behavior are that "the savings are too small and the effort involved in change too large," according to the article, and that consumers are not willing to make the initial investment for a long-term benefit.

If anyone feels guilty about making nongreen choices, there is a web site that allows people to confess their "eco-sins." Called truegreenconfessions.com, the web site lets posters admit their struggles to be green and lets them vent their frustrations about the various environmental rules.

From some of the confessions, it is indeed obvious that many consumers are green only if it's convenient.

"Why must being green take up so much of my time?" asks one anonymous writer. "Peer pressure is the only reason I do anything even remotely environmentally friendly."

Someone whose recycling bin had been stolen confesses, "I haven't gotten around to getting a new one, so I haven't been recycling."

A third writes, "I absolutely love my hybrid but I drink from plastic water bottles. Sorry, but our tap water tastes like cows have been swimming in it. At least I do recycle the bottles."

It isn't easy being green. ✦

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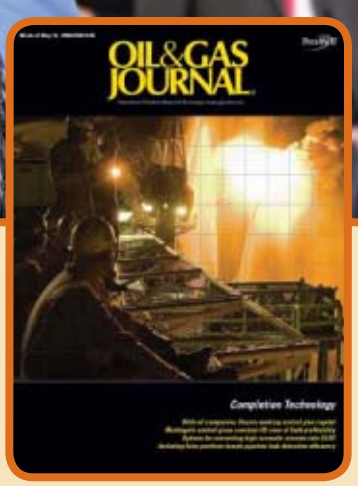

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[1] *Signet Readership Survey (February 2007)*

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More politics, less energy

The US oil and gas industry can find little consolation in last week's passage of energy legislation that could have been worse. The Energy Independence and Security Act, passed by the Senate Dec. 13 and the House 5 days later, doesn't punish the industry with taxation as originally proposed. As energy policy, though, it still fails.

The worst recent proposal of a hostile Congress fell victim to a veto threat. The bill doesn't raise taxes on oil and gas to pay for costlier substitutes. It does, however, sustain the economic poison of fuel choice by the government. And it promises more energy supply than it will deliver.

CAFE standards

The bill's centerpiece is a toughening of standards for vehicle fuel efficiency. In 2020, new cars and light trucks will have to meet a corporate average fuel economy (CAFE) standard of 35 mpg, up from 27.5 mpg for cars and 22.5 mpg for light trucks. It's the first change to CAFE standards since 1985 and the feature to which politicians will point when they boast about having acted on energy.

The bill also raises the standard for vehicle fuels from renewable sources, mainly ethanol in gasoline. The mandate, now rising annually to 7.5 billion gal/year in 2012, will jump to twice that level in 2015. By 2022, 36 billion gal/year of vehicle fuel sold in the US will have to come from renewable sources, of which more than half must be "advanced," such as cellulosic ethanol.

And instead of outlawing "price-gouging," the bill makes it "unlawful for any person, directly or indirectly, to use or employ, in connection with the purchase or sale of crude oil, gasoline, or petroleum distillates at wholesale, any manipulative or deceptive device or contrivance, in contravention of such rules and regulations as the Federal Trade Commission may prescribe as necessary or appropriate in the public interest or for the protection of United States citizens." Whatever this means, the infraction is subject to a civil penalty of as much as $1 million/day of violation. The same penalty applies to the new crime of reporting false information to a federal agency on the wholesale prices of crude and products.

The bill won't cut oil use or lift supply by anywhere near the amounts claimed by its supporters.

The extent to which toughened CAFE standards can lower fuel consumption is a matter of dispute. According to some economists, lowering fuel mileage just encourages driving. And market controls always produce surprises. The first round of CAFE standards, for example, spawned the sport utility vehicle. But how much worry about consequence can anyone expect from a Congress that stiffens CAFE requirements in a bill that also extends tax incentives for vehicles able to burn low-mileage, 85% ethanol blends?

Extension of the renewable-fuel standard is an attempt to paint over a huge mistake while bailing a coddled industry out of its greedy misery. Because extravagant ethanol incentives have raised the price of corn and encouraged construction of too much distillation capacity, ethanol manufacturers are caught in a margin squeeze. By elevating the mandate, Congress hopes to sop up the surplus while perpetuating the myth that ethanol meaningfully extends energy supply at reasonable cost. In fact, the original ethanol mandate placed a huge, unfair burden on taxpayers and consumers of food and fuel while raising the amount of energy needed for the production and transportation of ethanol. Expanding it even as the costs become obvious is scandalous.

Prohibiting what?

And what can be the point of the section on unlawful market activity other than a subtitle, "Prohibitions on Market Manipulation and False Information," that enables politicians to claim to have prohibited market manipulation? Subjecting wretchedly ambiguous offenses to criminal prosecution and huge civil penalties might in fact crimp the information flows on which free markets depend.

In the name of energy policy, Congress again has indulged base political impulses at the expense of taxpayers and consumers. When lawmakers crow about having acted on energy, Americans should note what they're paying for food. ✦

Oil, gas reserves inch up, production steady in 2007

Marilyn Radler
Senior Editor-Economics

Worldwide oil and gas reserves grew marginally from a year ago, and oil production declined slightly during 2007, according to Oil & Gas Journal's annual survey.

New estimates of worldwide oil reserves total 1.33 trillion bbl, up 1.1% from previous estimates (OGJ, Dec. 18, 2006, p. 20). Gas reserves estimates total 6.185 quadrillion cu ft, nearly unchanged.

Oil reserves held by the Organization of Petroleum Exporting Countries are up a bit, as Angola's inclusion boosted the group's share of the world's reserves. Angola joined OPEC at the beginning of the year. But total gas reserves held by OPEC members edged lower.

OGJ's estimates of proved reserves are compiled from a survey of official sources. Many estimates are unchanged from the previous report because most countries do not assess their reserves annually.

Reserves changes

There were few major changes to individual countries' oil and gas reserves reported this year. Most of the adjustments were small and due to production. Reevaluations and economics are also reasons cited for adjustments, especially in light of higher oil and gas prices.

The region with the largest percentage addition to reserves is the Western Hemisphere. The newest estimates of natural gas reserves in North America and Latin America climbed a collective 5.3%, while oil reserves estimates increased 1.6% from a year ago.

Canada's gas reserves moved slightly higher, but its oil reserves are now a bit lower. The country's conventional crude and condensate reserves are now estimated at 5.392 billion bbl, according to the Canadian Association of Petroleum Producers. The latest estimate of Canada's oil sands reserves is 173.2 billion bbl.

The biggest regional decline in reserves is for Western Europe. Collectively, oil reserves across the region are estimated 10.5% lower than previously, and gas reserves estimates are down 5%. Norway's oil reserves sank more than 12%.

The UK attributed its 7% decline in proved oil reserves and 14% decline in gas reserves to a combination of production during the year, reserves additions from new field developments, and reserves revisions in established fields.

Oil reserves for the Asia-Pacific region are up almost 3%, primarily due to upward revisions in Malaysia and Thailand. Malaysia's reserves climbed—oil up more than 2% and gas up more than 1%—as a result of exploration, Petronas reported.

The newest reserves figures for Papua New Guinea show large downward revisions for both oil and gas. Collectively, gas reserves for the Asia-Pacific region declined 1% in spite of increases in Malaysia and New Zealand.

Total OPEC oil reserves climbed 2.7% with the addition of Angola this year. This puts OPEC's oil reserves at 927.5 billion bbl, accounting for 69.6% of the world's oil reserves. The organization's gas reserves are now estimated at 3.15 quadrillion cu ft.

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US reserves

Proved reserves of oil in the US declined, but US gas reserves increased from previous estimates, according to the US Energy Information Administration.

Down 3.6% from a year earlier, crude oil reserves at yearend 2006 were 20.972 billion bbl. Due to downward revisions and fewer new discoveries, the Gulf of Mexico federal offshore and Alaska reported 10% and 7% reserves declines respectively.

Utah reported the largest crude oil reserves increase, adding 78 million bbl, followed by Colorado and New Mexico. Total US oil production outpaced reserves additions, as operators replaced only 52% of production during 2006.

Total discoveries of crude oil were 577 million bbl last year, the majority of which came from field extensions in Texas, Alaska, the Gulf of Mexico federal offshore, and Montana, as well as in California, New Mexico, and Louisiana.

Gas reserves totaled 211.085 tcf, up 3.3% from a year earlier. Most of the gains, 21.778 tcf, were from extensions to existing gas fields.

New field discoveries were 409 bcf, and new reservoir discoveries in old fields added 1.155 tcf to total US gas reserves.

EIA reported that Texas led the US in gas reserves additions during 2006. The 9% increase was due to rapid development of Barnett shale reservoirs in Newark East field. Relatively high gas prices and advances in technology, including horizontal drilling and hydraulic fracturing, drove these reserves additions. Following Texas in gas reserves additions were Alaska and Utah.

Coalbed gas reserves declined 1% during 2006, accounting for 9% of US gas reserves. Production of coalbed gas was up 2% last year.

EIA also reported that US reserves of natural gas liquids increased 3.8% last year to 8.472 billion bbl, as operators replaced 138% of production with reserves additions.

A DECADE OF RESERVES CHANGES

Table 1

Jan. 1	World	OPEC	World gas, bcf
	1,000 bbl		
2008	1,331,698,077	927,482,000	6,185,693
2007	1,317,447,415	902,343,000	6,182,692
2006	1,293,344,534	901,659,000	6,101,158
2005	1,277,701,992	885,188,000	6,040,208
2004	1,265,811,583	869,521,000	6,068,302
2003	1,212,880,852	819,007,000	5,501,424
2002	1,031,100,681	818,842,000	5,451,332
2001	1,028,457,585	814,398,710	5,278,484
2000	1,016,041,221	802,479,710	5,146,207
1999	1,034,264,678	800,479,710	5,144,753

Source: OGJ Worldwide Production Reports

RUSSIAN PRODUCTION

Table 2

	1,000 b/d
2006	9,498
2005	9,190
2004	8,887
2003	8,216
2002	7,405
2001	6,781
2000	6,325
1999	5,930
1998	5,919
1997	5,914

Oil production

Worldwide production of crude and condensate declined 0.4% last year to average 72.36 million b/d, according to OGJ estimates.

The countries of the former Soviet Union led all other regions in 2007 production growth. Russia's estimated production this year averaged 9.72 million b/d, up from 9.5 million b/d in 2006.

Africa was the second-fastest growing region with 2007 crude and condensate production up an estimated 3.3% from 2006. Angola, Sudan, and Tunisia posted output gains, while Nigeria's average production declined about 2.4% this year because of political disruptions.

Western Europe is the region estimated to have posted the largest production decline this year. The region's 6.4% production drop was led by a 10% decline in Norway and a 9% decline in Denmark. UK crude and condensate production is estimated to have declined nearly 2% this year.

Down almost 6%, Saudi Arabian output led the 2.6% decline in production in the Middle East, mostly due to OPEC output restraint. Meanwhile, combined production in the Asia-Pacific region was little changed, averaging an estimated 7.377 million b/d this year. Production in Indonesia slid, but New Zealand and Thailand reported increases for 2007.

With the addition of Angola, OPEC oil production is estimated to have climbed nearly 3% this year. Excluding Angola's production from the organization's 2007 production shows that all other members posted a collective 2.8% decline from 2006 output.

Crude and condensate production declined 1.1% this year in the Western Hemisphere. Venezuela's 6.7% production decline led the region, while Mexico's production slid 3.7%. US crude and condensate production held steady at 5.135 million b/d. ✦

WORLDWIDE LOOK AT RESERVES AND PRODUCTION

	ESTIMATED PROVED RESERVES				OIL PRODUCTION			
	Jan. 1, 2008		Jan. 1, 2007					
COUNTRY	Oil (1,000 bbl)	Gas (bcf)	Oil (1,000 bbl)	Gas (bcf)	Producing oil wells* Dec. 31, 2006	Estimated 2007 (1,000 b/d)	Change from 2006 (%)	Actual 2006 (1,000 b/d)
ASIA-PACIFIC								
Afghanistan	—	1,750	—	1,750	—	—	—	—
Australia	1,500,000	30,000	1,591,790	30,370	1,317	445.0	–5.3	469.8
Bangladesh	28,000	5,000	28,000	5,000	41	3.6	0.0	3.6
Brunei	1,100,000	13,800	1,100,000	13,800	779	180.0	–11.5	203.5
China	16,000,000	80,000	16,000,000	80,000	71,542	3,747.0	1.7	3,684.4
China, Taiwan	2,380	220	2,380	297	71	1.0	—	1.0
India	5,624,640	37,960	5,624,640	37,960	3,686	683.0	0.4	680.2
Indonesia	4,370,000	93,900	4,300,000	97,780	8,331	838.0	–6.1	892.5
Japan	44,115	738	58,500	1,400	145	16.0	3.2	15.5
Malaysia	4,000,000	83,000	3,000,000	75,000	788	755.0	0.6	750.8
Myanmar	50,000	10,000	50,000	10,000	450	13.0	—	13.0
New Zealand	55,000	1,048	53,000	900	72	37.0	137.2	15.6
Pakistan	289,202	28,000	289,202	28,000	204	69.0	6.5	64.8
Papua New Guinea	88,000	8,000	240,000	12,200	46	50.0	2.0	49.0
Philippines	138,500	3,480	138,500	3,480	11	17.0	11.8	15.2
Thailand	460,000	11,697	290,000	14,750	1,180	212.0	13.4	186.9
Vietnam	600,000	6,800	600,000	6,800	28	310.0	–10.0	344.6
Total Asia-Pacific	**34,349,837**	**415,393**	**33,366,012**	**419,487**	**88,691**	**7,376.6**	**–0.2**	**7,390.4**
WESTERN EUROPE								
Austria	50,000	570	50,000	570	905	17.0	–2.3	17.4
Denmark	1,188,000	2,490	1,277,000	2,542	221	312.0	–8.8	342.2
France	119,800	257	121,500	341	462	19.5	–9.1	21.4
Germany	367,000	9,000	367,000	9,000	996	67.5	–4.0	70.3
Greece	10,000	70	5,000	35	12	1.5	–15.7	1.8
Ireland	—	350	—	350	—	—	—	—
Italy	406,500	3,325	600,000	5,800	207	109.0	–1.3	110.4
Netherlands	100,000	50,000	100,000	50,000	203	38.0	44.5	26.3
Norway	6,865,325	79,130	7,849,300	82,320	801	2,250.0	–9.7	2,492.0
Spain	150,000	90	150,000	90	2,900	3.0	3.4	2.9
Turkey	300,000	300	300,000	300	855	40.5	–2.3	41.5
United Kingdom	3,600,000	14,550	3,875,000	17,000	1,360	1,490.0	–1.9	1,518.2
Total Western Europe	**13,156,625**	**160,132**	**14,694,800**	**168,349**	**8,922**	**4,348.0**	**–6.4**	**4,644.4**
EASTERN EUROPE and FSU								
Albania	199,140	30	198,130	30	2,042	9.7	9.0	8.9
Azerbaijan	7,000,000	30,000	7,000,000	30,000	138	865.0	34.6	642.5
Belarus	198,000	100	198,000	100	—	36.0	—	36.0
Bulgaria	15,000	200	15,000	200	100	1.0	—	1.0
Croatia	79,150	1,008	74,320	1,052	846	15.7	–6.0	16.7
Czech Republic	15,000	140	15,000	140	—	4.5	–8.2	4.9
Georgia	35,000	300	35,000	300	283	2.0	—	2.0
Hungary	20,180	286	20,180	286	875	15.8	–3.7	16.4
Kazakhstan	30,000,000	100,000	30,000,000	100,000	705	1,100.0	3.4	1,064.2
Kyrgyzstan	40,000	200	40,000	200	—	1.0	—	1.0
Lithuania	12,000	—	12,000	—	—	3.0	–16.7	3.6
Poland	96,375	5,820	96,375	5,820	512	17.0	–2.6	17.5
Romania	600,000	2,225	600,000	2,225	6,000	99.0	0.8	98.2
Russia	60,000,000	1,680,000	60,000,000	1,680,000	99,337	9,720.0	2.3	9,498.3
Serbia	77,500	1,700	77,500	1,700	646	15.0	—	15.0
Slovakia	9,000	500	9,000	500	—	0.3	—	0.3
Tajikistan	12,000	200	12,000	200	—	—	—	—
Turkmenistan	600,000	100,000	600,000	100,000	2,460	180.0	9.1	165.0
Ukraine	395,000	39,000	395,000	39,000	1,353	94.5	–0.5	95.0
Uzbekistan	594,000	65,000	594,000	65,000	2,190	100.0	–7.4	108.0
Total Eastern Europe and FSU	**99,997,345**	**2,026,709**	**99,991,505**	**2,026,753**	**117,487**	**12,279.5**	**4.1**	**11,794.4**
MIDDLE EAST								
Abu Dhabi	92,200,000	198,500	92,200,000	198,500	1,200	2,320.0	–5.5	2,455.0
Bahrain	124,560	3,250	124,560	3,250	496	172.0	0.0	171.9
Dubai	4,000,000	4,000	4,000,000	4,000	200	95.0	–5.0	100.0
Iran	138,400,000	948,200	136,270,000	974,000	1,128	3,917.0	0.7	3,890.8
Iraq	115,000,000	111,940	115,000,000	112,000	1,685	2,080.0	9.5	1,900.0
Israel	1,940	1,075	1,960	1,275	6	—	—	0.1
Jordan	1,000	213	1,000	213	4	—	—	—
Kuwait	101,500,000	55,515	99,000,000	54,500	790	2,160.0	–2.3	2,210.0

COUNTRY	ESTIMATED PROVED RESERVES Jan. 1, 2008 Oil (1,000 bbl)	Jan. 1, 2008 Gas (bcf)	Jan. 1, 2007 Oil (1,000 bbl)	Jan. 1, 2007 Gas (bcf)	OIL PRODUCTION Producing oil wells* Dec. 31, 2006	Estimated 2007 (1,000 b/d)	Change from 2006 (%)	Actual 2006 (1,000 b/d)
Neutral Zone	5,000,000	1,000	5,000,000	1,000	578	550.0	–5.2	580.0
Oman	5,500,000	30,000	5,500,000	30,000	2,298	708.0	–4.3	740.0
Qatar	15,207,000	905,300	15,207,000	910,500	421	800.0	–2.7	822.5
Ras al Khaimah	100,000	1,200	100,000	1,200	7	0.7	—	0.7
Saudi Arabia	264,251,000	252,607	259,800,000	239,500	1,560	8,425.0	–5.7	8,930.0
Sharjah	1,500,000	10,700	1,500,000	10,700	49	50.0	—	50.0
Syria	2,500,000	8,500	2,500,000	8,500	132	386.0	–8.6	422.5
Yemen	3,000,000	16,900	3,000,000	16,900	1,658	370.0	4.4	354.3
Total Middle East	**748,285,500**	**2,548,900**	**739,204,520**	**2,566,038**	**12,212**	**22,033.7**	**–2.6**	**22,627.8**
AFRICA								
Algeria	12,200,000	159,000	12,270,000	161,740	1,285	1,355.0	0.6	1,347.5
Angola	9,035,000	9,530	8,000,000	2,000	1,064	1,695.0	20.2	1,410.0
Benin	8,000	40	8,000	40	8	—	—	—
Cameroon	200,000	4,770	400,000	3,900	255	84.0	–3.9	87.4
Chad	1,500,000	—	1,500,000	—	250	150.0	—	150.0
Congo (former Zaire)	180,000	35	180,000	35	150	20.0	—	20.0
Congo Brazzaville	1,600,000	3,200	1,600,000	3,200	460	240.0	—	240.0
Egypt	3,700,000	58,500	3,700,000	58,500	1,266	637.0	–4.9	670.0
Equatorial Guinea	1,100,000	1,300	1,100,000	1,300	38	320.0	—	320.0
Ethiopia	428	880	428	880	—	—	—	—
Gabon	2,000,000	1,000	2,000,000	1,000	395	230.0	–2.1	235.0
Ghana	15,000	800	15,000	800	3	6.0	—	6.0
Ivory Coast	100,000	1,000	100,000	1,000	9	30.0	—	30.0
Libya	41,464,000	50,100	41,464,000	52,650	1,472	1,700.0	–0.5	1,708.3
Mauritania	100,000	1,000	100,000	1,000	—	26.0	—	—
Morocco	836	55	988	58	7	—	—	0.2
Mozambique	—	4,500	—	4,500	—	—	—	—
Namibia	—	2,200	—	2,200	—	—	—	—
Nigeria	36,220,000	183,990	36,220,000	181,900	2,378	2,167.0	–2.4	2,219.2
Rwanda	—	2,000	—	2,000	—	—	—	—
Somalia	—	200	—	200	—	—	—	—
South Africa	15,000	—	15,000	—	28	20.0	—	20.0
Sudan	5,000,000	3,000	5,000,000	3,000	9	472.0	14.0	414.2
Tanzania	—	230	—	230	—	—	—	—
Tunisia	400,000	2,300	400,000	2,300	237	92.0	34.9	68.2
Total Africa	**114,838,264**	**489,630**	**114,073,416**	**484,433**	**9,314**	**9,244.0**	**3.3**	**8,946.1**
WESTERN HEMISPHERE								
Argentina	2,586,750	15,750	2,468,000	16,090	20,872	630.0	–1.6	640.5
Barbados	2,200	5	2,852	6	77	0.8	–11.1	0.9
Belize	6,700	—	6,700	—	—	—	—	—
Bolivia	465,000	26,500	440,000	24,000	346	44.0	–1.8	44.8
Brazil	12,181,620	12,280	11,772,640	10,820	11,995	1,760.0	2.2	1,722.3
Canada	178,592,000	58,200	179,210,000	57,946	60,944	2,645.0	5.1	2,517.2
Chile	150,000	3,460	150,000	3,460	315	10.0	—	10.0
Colombia	1,506,000	4,342	1,453,000	3,996	7,600	525.0	–0.5	527.5
Cuba	124,000	2,500	124,000	2,500	251	39.0	0.9	38.7
Ecuador	4,517,000	—	4,517,000	—	1,044	500.0	–6.5	534.6
Guatemala	83,070	—	83,070	—	20	15.0	–7.1	16.1
Mexico	11,650,000	13,850	12,352,000	14,557	2,912	3,135.0	–3.7	3,256.3
Peru	382,866	11,928	929,600	8,723	4,660	114.0	–1.3	115.6
Suriname	88,000	—	111,000	—	975	14.8	12.5	13.2
Trinidad and Tobago	728,300	18,770	728,300	18,770	3,823	122.0	–14.5	142.8
United States	20,972,000	211,085	21,757,000	204,385	499,621	5,135.0	0.7	5,101.7
Venezuela	87,035,000	166,260	80,012,000	152,380	15,669	2,390.0	–6.7	2,561.7
Total Western Hemisphere	**321,070,506**	**544,930**	**316,117,162**	**517,633**	**631,124**	**17,079.6**	**–1.0**	**17,243.6**
TOTAL WORLD	**1,331,698,077**	**6,185,693**	**1,317,447,415**	**6,182,692**	**867,750**	**72,361**	**–0.4**	**72,647**
Total OPEC	**927,482,000**	**3,151,742**	**902,343,000**	**3,152,350**	**36,753**	**30,543**	**2.9**	**29,668**

*Does not include shut in, injection, or service wells.

Deloitte: Stanislaw sees changing role for oil companies

Paula Dittrick
Senior Staff Writer

Oil and gas companies might want to redefine themselves as high-technology companies given growing public awareness of climate change and energy security, said energy consultant Joseph Stanislaw in a report entitled "Climate Change and Energy Security: The Future is Now."

An independent senior advisor to Deloitte & Touche USA LLP's Energy & Resources Group, Stanislaw spoke Dec. 12 at an annual Deloitte oil and gas conference in Houston.

He said oil companies need to become "far more active in fostering the technology that will enable a new energy era." He said, "We have no time to lose."

Hurricane Katrina, which struck the US Gulf Coast in 2005 "was the trigger—the moment, in retrospect, when climate change for so many went from theory to reality," Stanislaw said. "Accurately or not, Katrina settled in the American imagination as proof of climate change, while underscoring the vulnerability of our energy supply system."

Meanwhile, energy consumption increasingly is becoming a political concern because of greater awareness of its effect "on our wallets, on foreign policy, the environment, and climate change," he said.

Changing consumption

"Until now, energy has largely been seen as the domain of giant multinational corporations and of mighty oil-producing nations," Stanislaw said. "But because of the convergence of concerns about climate change and energy security, the picture that has emerged in the past year is a far more complicated, and yet more promising, one."

Venture capitalists have invested in more than 1,000 start-up companies focused on clean-tech energy sources such as biofuels, solar, and wind, he said.

Deloitte: Consumers, oil execs differ on solutions

Paula Dittrick
Senior Staff Writer

Oil and gas executives and consumers often disagree about how US energy challenges should be resolved, said results of a survey commissioned by Deloitte & Touche USA LLP.

For instance, 73% of executives surveyed had a positive view about industry efforts to solve America's energy challenges, while only 12% of the polled consumers agreed with that view.

International Communications Research conducted the Deloitte survey by telephone during October, polling 504 consumers and 200 oil and gas industry executives. Results were released Dec. 12 at Deloitte's annual oil and gas conference in Houston.

Some 37% of executives saw oil and gas companies as the best at solving US energy problems, while 27% of consumers rated themselves as best at solving US energy problems.

Each group held venture capitalists in high regard as energy problem-solvers (21% for consumers and 20% for industry.) Some 17% of consumers listed the federal government as the best energy problem-solver, while 10% of executives supported that view.

Gary A. Adams, Deloitte's vice-chairman and US oil and gas leader, said industry needs to become more communicative and collaborative if it is to win public support and improve alliances with politicians to develop a coherent, long-term national energy policy.

Top concerns listed

Executives and consumers agreed that a top energy-related concern is too much dependence on oil from places unfriendly to the US. A total of 29% of executives and 27% of consumers cited this as the most critical US energy issue.

"With the growing trend toward energy resource nationalism, it is easy to understand the anxiety about being too reliant on these sources," Adams said. "It is a troublesome trend for consumers and industry executives."

Consumers and industry executives also were concerned about what Adams called the lack of a "realistic energy policy for America."

"Regrettably, most of our national efforts to address long-term energy challenges have been politically inspired, piecemeal, short-term projects," Adams said.

Meanwhile, 19% of consumers reported concern about high gasoline prices, and 20% of executives reported angst over diminishing US oil and gas supplies. But neither issue was a shared concern.

Of the executives surveyed, 67% expect oil companies to allocate less than 20% of capital costs toward alternative energy investments, while 55% of consumers believe the commitment will be less than 20% of capital budgets for companies.

Yet, 72% of consumers expressed a strong desire for greater investments in developing alternative energy sources.

Survey participants gave low priority to energy conservation, which was listed as a concern by 9% of consumers and 6% of executives.

"Consumer behavior can substantially reduce consumption, thus lessening the need for energy," he said. "Seen from this perspective, demand reduction is potentially the largest source of supply. It is this drive towards efficiency—enabled by end-use technologies that sip rather than chug energy—that must be put at the heart of the new energy era."

Consumers are paying attention to how they can consume oil, gas, and electricity more efficiently, he said.

"Whether driving hybrid cars, diesel cars, weatherizing homes, or buying offsets to lighten their carbon footprints, consumers are becoming an activist force. And this comes with the realization that their actions are not a sacrifice," he said.

Stanislaw believes he sees "the very beginning of a global race to create dominant green economies." Corporations must decide if they want to be seen as friends or foes of the environment.

Changing companies

"Hydrocarbons will continue, of course, to absorb most of the $500 billion that the world invests each year in energy," he said. "They will continue to define the energy of geopolitics, as energy superpowers such as Russia flex their muscles and as the might and market of China and India grow. And vast fortunes, both national and individual, will continue to be reaped from fossil fuels."

In the future, energy companies will no longer profit from selling oil and gas, he said. Instead, the new energy company will be what he calls a high-value service company that provides light, heat, and mobility in the most environmentally-acceptable way.

He identified five ways in which corporations will adapt and assist in the green economy:

- Defining new efficiency technology from energy audits to smart meters and smart appliances.
- Establishing low-impact production processes to lower environmental impact. One critical trend involves building or growing products as close as possible to the end market to reduce transportation needs.
- Creating new "eco-chic" products and services. Companies are working to create low-energy computers, cars, and light bulbs. They also are creating services.
- "Green" their brand. Companies are cutting their own energy use and emissions to appeal to consumers and employees.
- Discovering supply alternatives. More than 1,000 start-up companies around the world are trying to devise new energy supply and new efficiency technologies. ✦

Deloitte: Sieminski forecasts $80/bbl oil in 2008

Paula Dittrick
Senior Staff Writer

Deutsche Bank AG Chief Energy Economist Adam Sieminski expects that light, sweet crude prices will average $80/bbl on the New York Mercantile Exchange in 2008.

Sieminski forecasts crude to likely average nearly $55/bbl this decade—nearly triple the 1990s average oil price.

"So far this decade, the oil price has averaged just above $41/bbl," Sieminski told participants Dec. 12 at the annual Deloitte Oil & Gas conference in Houston.

Sieminski expects natural gas prices to average $7.75/MMbtu on NYMEX in 2008 and sees the gas price holding there, even if the average oil price declines into 2009 from the $80/bbl average forecast for 2008.

"Given the geopolitical problems still creating problems for oil (and some carryover of that into gas), the risk to the price outlook for both crude oil and natural gas is likely still more to the upside," Sieminski said.

Crude oil markets appear to be inversely following the declining value of the US dollar and ignoring deteriorating oil fundamentals, Sieminski said. But a closer look at statistics shows a poor correlation between weekly changes in the dollar and oil prices, he said.

"This suggests that other factors are still important in setting the tone and direction of oil market prices," Sieminski said. "As long as global gross domestic production growth stays near 3.5%, oil demand should grow by 1.5%."

The long-term outlook still looks relatively bullish for oil demand, largely because one third of the world's population is entering the middle class and wants the oil-consuming lifestyle associated with the middle class, he said.

Gas demand, refinery upgrades

Sieminski foresees the need for more gas-fired electric power generation, adding that gas also is expected to play a strong role in an anticipated US carbon cap and trade program. Carbon caps also will increase the demand for LNG.

"We expect a gas price recovery in 2008-09 as US supplies tighten, and the current storage overhang is trimmed," Sieminski said.

Regarding refining, he said a trend toward lower spare refining capacity contributed to oil market strength during the last few years.

"The ability of the global refining system to handle heavy and high-sulfur crude streams has been significantly eroded by high demand and growth for light products (gasoline, jet fuel, diesel fuel) and rising environmental quality standards around the world," Sieminski said. "This situation should change as new upgrading capacity comes on at refineries in the US and India in 2008-10 and in the Middle East in 2012-13." ✦

Deloitte: NOCs seeking broader services, technology

Paula Dittrick
Senior Staff Writer

National oil companies are seeking broader service capabilities and more technology, and this trend could prompt more consolidation among service companies, a speaker told the Deloitte & Touche USA LLP oil and gas conference Dec. 12.

Chad C. Deaton, chairman and chief executive officer of Baker Hughes Inc., foresees continuing consolidation within the oil service industry in general. He declined to comment on any specific deals that Baker Hughes might be considering.

"Service companies need a strong balance sheet and the mass to take on big projects," Deaton said in response to questions after his speech to the Deloitte annual conference in Houston.

"More NOCs are acting like IOCs" [international oil companies], Deaton said, noting that every NOC must be handled as a unique, individual customer with its individual level of drilling expertise.

State-owned oil companies are becoming increasingly important customers for Baker Hughes, Deaton said. Meanwhile, oil production is becoming increasingly complex as companies target more-remote frontier areas and reach into deeper water.

Farouk Al-Zanki, Kuwait National Petroleum Co. chairman and managing director, also confirmed the need for more drilling and production technology.

"Over the next 5 years, Kuwait will need to develop more complex reservoirs," al-Zanki said. Kuwait plans to invest $64 billion over 14 years on its upstream efforts, he added.

R&D investment scale needed

Given increasing complex international projects, service companies need to be large enough that they can afford to invest heavily in research and development, Deaton said.

The three largest service companies—Schlumberger Ltd., Halliburton, and Baker Hughes—spend a combined $1.5 billion/year in research and development, he said.

"The way you differentiate is through technology and through the quality of people that you have, and the footprint that you have around the world," Deaton said.

Activities of Russian oil and gas companies outside Russia are providing increasing business for Baker Hughes, Deaton said in response to questions about Russia.

TNK-BP reorganization

It's common for Russian oil companies to own their own service divisions and drilling rigs, said Tim Summers, TNK-BP chief operating officer.

TNK-BP's six drilling subsidaries are being consolidated into one company, and that process is expected to be finalized by June or July 2008, Summers said. The process includes an evaluation of whether to spin off the services company operations.

"I think that (decision) will come in 2008," Summers said.

When asked what BP has brought to TNK-BP, Summers listed the integration of skills and an organizational model along with technology.

"In Russia, we're bringing together reservoir engineers, petroleum engineers, and drillers," Summers said. TNK-BP also has clarified its needs and expectations to contractors, he said. ✦

Senate passes energy bill, drops two major provisions

Nick Snow
Washington Editor

The US Senate Dec. 13 passed an energy bill that does less than many Democrats had hoped but stands a greater chance of being signed into law.

Provisions that would have taxed oil and gas producers to finance renewable energy projects and research and that would have established a renewable portfolio standard for electric utilities were deleted before the 86-8 vote. But the heavily reworked HR 6 retained the first major increase in motor vehicle fuel efficiency requirements in 32 years and a significant expansion of the federal motor fuel ethanol mandate.

US House Speaker Nancy Pelosi said the House would pass the bill quickly and send it to President George W. Bush for his signature. "This legislation includes an historic increase in fuel efficiency to 35 mpg by 2020—the first

such action in 32 years. It makes a major commitment to homegrown biofuels, sending our energy dollars to the Midwest, not the Middle East. It sets our nation on a new course, a new direction for energy security," she said following the Senate's vote.

Senate Democrats simultaneously applauded the surviving provisions while criticizing Republicans for opposing requirements that were deleted. Several leading Republicans praised Democrats for their willingness to compromise, while others said the bill would do nothing to increase available energy supplies.

'Good first step'

The senators who chair the two committees that affect oil and gas most directly said the approved bill was significant although it fell short of what they wanted. "While it should have been a better and stronger bill with tax breaks for renewable energy and a requirement for electric utilities to use more solar, wind, and geothermal energy, it is still a good first step toward a cleaner future for America," said Barbara Boxer (D-Calif.), the Environment and Public Works Committee's chairwoman.

Energy and Natural Resources Committee Chairman Jeff Bingaman noted that the bill also would reduce energy consumption by increasing home appliance energy efficiency. "I'm disappointed that we were not able to move ahead with a renewable energy standard or provisions to extend and expand the tax incentives for renewable energy production and energy conservation. I hope in the next session of Congress we are able to revisit both of these issues and enact legislation," he said.

Other Senate Democrats were upset that a second vote to limit debate earlier that day fell one vote short, forcing removal of the oil and gas tax provisions. "Once again, President Bush and Senate Republicans have chosen to defend oil company profits instead of standing with consumers and moving toward a clean energy future. President Bush issued a veto threat because the energy bill would have eliminated oil company tax breaks in order to fund wind and other clean energy sources. Senate Republicans fell in line and blocked the bill," said Hillary R. Clinton of New York.

Maria Cantwell (D-Wash.) said an earlier veto threat led to removal of a provision that would have made gasoline price-gouging a federal crime. "Although I'm disappointed we weren't able to more completely break away from our over-dependence on fossil fuels, this is still the most important, and greenest, energy bill ever passed by Congress. It bets on American energy and investment rather than gambling our future on the good will of [the Organization of Petroleum Exporting Countries]," she said.

Russell J. Feingold (D-Wis.), while also expressing disappointment that the oil and gas tax and renewable energy requirement for utilities had to be removed, said the legisla-

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Lugar: Energy needs attention

The winner of the 2008 presidential election will need to take bold steps to address energy and climate change problems despite the absence of substantive discussions from the current campaigns, said US Sen. Richard G. Lugar (R-Ind.) on Dec. 18. "I would state unequivocally that energy security and the economic and environmental issues closely associated with it should be the most important topics of the 2008 presidential election," said Lugar, the Foreign Relations Committee's ranking minority member, in a speech at the Brookings Institution.

He said that three factors led him to this conclusion: Energy is the issue with the widest gulf between what is required to make the nation secure and what is likely to be achieved under existing programs and congressional proposals. Transformational energy policies probably will be needed to achieve US social and economic aspirations. And energy exacerbates almost every foreign policy issue.

"Only the president has the visibility to elevate a cause to national status, and only the president can leverage the buying power, regulatory authority, and legislative leadership of an administration behind solving a problem that is highly conducive to political procrastination and partisanship," Lugar said.

Core goal

The next US president will need to make energy security a core national goal and engage all Americans in the solution, he said. He or she must operate outside his or her party's energy policy orthodoxy and resist popular gestures such as reducing gasoline taxes or tapping the Strategic Petroleum Reserve.

The next president also must be willing to reject subservience to energy and environmental lobbying groups without denying ideas they can contribute, Lugar said.

Specifically, he said, the next president should quickly state that the federal government will use its power to make competitively priced biofuels available nationwide. He or she also must move beyond the 2007 energy bill's higher motor fuel efficiency standards and use every federal tool, from research support to market regulations and incentives, to commercialize plug-in hybrid vehicles.

Coal, nuclear

The next president also must initiate a plan to use US coal resources by accelerating work on carbon sequestration technologies and address waste disposal concerns so that providing liability protection and loan guarantees for new nuclear power plants can be considered, Lugar said.

That chief executive also will need to keep bureaucracy or political inertia from delaying initiatives. Projects related to battery technology, cellulosic ethanol, carbon capture and storage, solar and wind power, and other technologies should receive the highest priority, he said.

"The question is whether we will heed abundant warning signs and apply the leadership and political will to deal with this problem in the present rather than suffering grave consequences in the future. Meeting this challenge of statesmanship will be the defining test of the next presidency," Lugar maintained. ✦

tion's passage still was a positive step. "This year's bill finally moves past the misguided debates of previous Congresses and the fiscally and environmentally irresponsible proposals that were considered and passed in recent years," he maintained.

Ethanol expansion

Farm state senators applauded the surviving ethanol mandate expansion. Tim Johnson (D-SD) noted that it would ensure minimum production of 15 billion gal/year of ethanol by 2015, essentially doubling the amount currently produced in the US. "South Dakota's ethanol plants will have the capability to produce 1 billion gal of ethanol in 2008, and this bill will ensure a strong future for renewable energy in our state," he said.

"This new legislation will continue to allow for the growth of ethanol, while also promoting other biofuels such as those derived from cellulosic material. The bill will raise the Renewable Fuel Standard to 36 billion gal by 2022, more than half of which would have to come from advance biofuels. It also provides resources for more biofuels research," said Ben Nelson (D-Neb.).

"This is the most robust renewable fuels standard we've ever had and will dramatically expand the use of renewable energy and drive the production and development of cellulosic biofuels. It will give a tremendous boost to ethanol and biodiesel producers who have suffered from lower prices," said Charles E. Grassley (R-Iowa).

Ethanol and agriculture lobbies also applauded the provision. The National Petrochemical & Refiners Association did not. "NPRA continues to oppose expanding the biofuels mandate, to say nothing of tying the nation's energy future to nonexistent technologies such as cellulosic ethanol. Both the Senate and House versions of HR 6 do very little to increase domestic energy supplies, but they do everything to choose winners and losers in the markets, which will ultimately mean instability and uncertainty for our

businesses and consumers," NPRA Pres. Charles T. Drevna said.

New CAFE requirements

Backers of the higher average motor vehicle mileage requirement also were elated. Dianne Feinstein (D-Calif.) said that she and Olympia Snowe (R-Me.) "fought for 6 long years to get this bill passed." Approval would not have been possible without the efforts of Commerce Committee Chairman Daniel K. Inouye (D-Hi.) and Vice-Chairman Ted Stevens (R-Ak.) among others, she continued.

"I am elated that a strong bipartisan consensus has agreed that it is time to move our automobile fleet into the 21st Century. That both parties would come together to chart a new energy policy is a landmark moment for this institution and frankly, with [gasoline] prices continuing to skyrocket, comes not a moment too soon," Snowe said.

"This is the first statutory increase in fuel economy standards for cars since 1975. Our actions today will improve national security, create jobs, help consumers and protect the environment. At times, it is the government's responsibility to balance conflicting interests. Today, I believe we found that balance," Inouye said.

Stevens said that he became involved in the automotive mileage issue when he realized that a combination of initiatives was the only way the US could achieve energy independence. "Conservation, domestic production and the development of alternative energy are part of the broader solution," he said.

But Debbie Stabenow (D-Mich.) said she voted against the final bill because the deleted provisions also included a loan program to help automakers retool plants to meet more aggressive mileage standards and $1 billion of tax credits for consumers to buy advanced technology vehicles. "I could not support a new mandate on our auto industry without including the critical incentives and funding support needed to help it be successful and keep jobs in America," she said.

Republican reactions

Some Republicans also criticized the final bill despite the deletion of provisions involving oil and gas taxes and a renewable energy requirement for electric utilities. "I simply could not support an energy bill that will further drive up the already high price of gasoline at the pump or the cost of energy in our homes," James M. Inhofe of Oklahoma, ranking minority member of the Environment and Public Works committee, said on Dec. 14. "Absent from this energy bill are domestic energy resources such as oil, natural gas, and clean coal technologies that are

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Sino-Russian 'cooperation'

China's ambassador to Russia, Liu Guchang, recently said that there are broad prospects for cooperation on oil and gas between the two countries. Sure there are.

"Important progress has been made in China-Russia energy cooperation, typically in oil and gas sectors, and the modalities of cooperation have become more diversified," Liu said.

"There are broad prospects for energy cooperation between China and Russia that has been reciprocal, mutual, beneficial, and marked with a win-win solution," he told some 40 representatives from major Russian and Chinese oil companies, as well as cultural figures.

Shi Ren, a writer for China's official Hong Kong Zhongguo Tongxun She newspaper, has other thoughts about the level of cooperation the Chinese are receiving at the hands of the Russians, especially when it comes to the 4,700-km East Siberia Pacific Ocean pipeline now under construction.

Touching nerves

In fact, according to Shi, oil has recently "touched the nerves" of the two countries most strongly, especially when it comes to the ESPO line and the 40-km spur the Chinese want from it to their border.

In November, the premiers of China and Russia agreed that both sides would ensure that the construction of the branch pipeline extending to Daqing, China, would be completed and the pipeline put into operation by the end of next year.

"However," Shi says, "because the international price of crude oil has tended to rise in a sustained manner, the Russia side said later that no big progress will be made in the oil pipeline between the companies of the two countries."

Shi even refers to one Chinese observer who pointed out that the move made by the Russian side is close to "hoarding and speculation"—a major crime by Chinese standards.

Pacifying the beast

"However," Shi says, "in order to pacify this energy magnate and to maintain good relations of cooperation in energy, the Chinese side may give the opposite side appropriate subsidies." In plain English, it is called paying through the nose, and Shi is well aware of the reasons why.

"Russia is the world's biggest country in the production of natural gas and the second biggest in the production of oil, while China has become the world's second biggest country in the consumption of energy and the second biggest country in importing oil," Shi says.

And things are not going to get much better.

In 2006, Russian crude oil accounted for about 11% of China's total imports of crude oil. According to an agreement signed between the two sides, Russia will provide China with 20% of its imported energy by 2011.

That means Russia will become China's biggest energy supplier. By then, the Chinese really will have learned a lot.

Indeed, as many of us know already, they will learn what it means to be over a barrel. ✦

essential to securing an energy supply that is stable, diverse, and affordable," he said.

The bill also extends the Federal Unemployment Tax Act surtax on businesses that was first established in 1976 to repay loans from the federal unemployment tax fund, he said. "Even though this money was fully repaid in 1987, Congress has extended this temporary tax five times, imposing an annual $1.4 billion tax burden on America's workers and employers," he said.

Wayne Allard of Colorado noted the absence of any provisions aimed at reducing gasoline prices or increasing gas supplies, but added that the bill extended a number of renewable energy tax credits. "I am relieved the Democrats sought compromise, allowing us to pass a reasonable energy bill," he said.

Both of Idaho's senators backed renewable energy and vehicle mileage provisions in the bill but opposed the oil and gas taxes. "This is not an 'either-or' proposition," said Mike Crapo. "We must address the growing energy demand of our country with both a long-term commitment to promoting investment in alternative energy sources such as wind, solar, geothermal and nuclear power with increased incentives, research and development. However, we must do this while maintaining strong domestic production of more traditional energy resources such as oil, natural gas and coal-based electricity," he said.

"The final product is not perfect, but it's vastly better than the version that was sent to us by the House. We recognized here in the Senate that the House bill couldn't pass the Senate and wouldn't be signed into law. So we fixed it, and now it will," Minority Leader Mitch McConnell of Kentucky said. ✦

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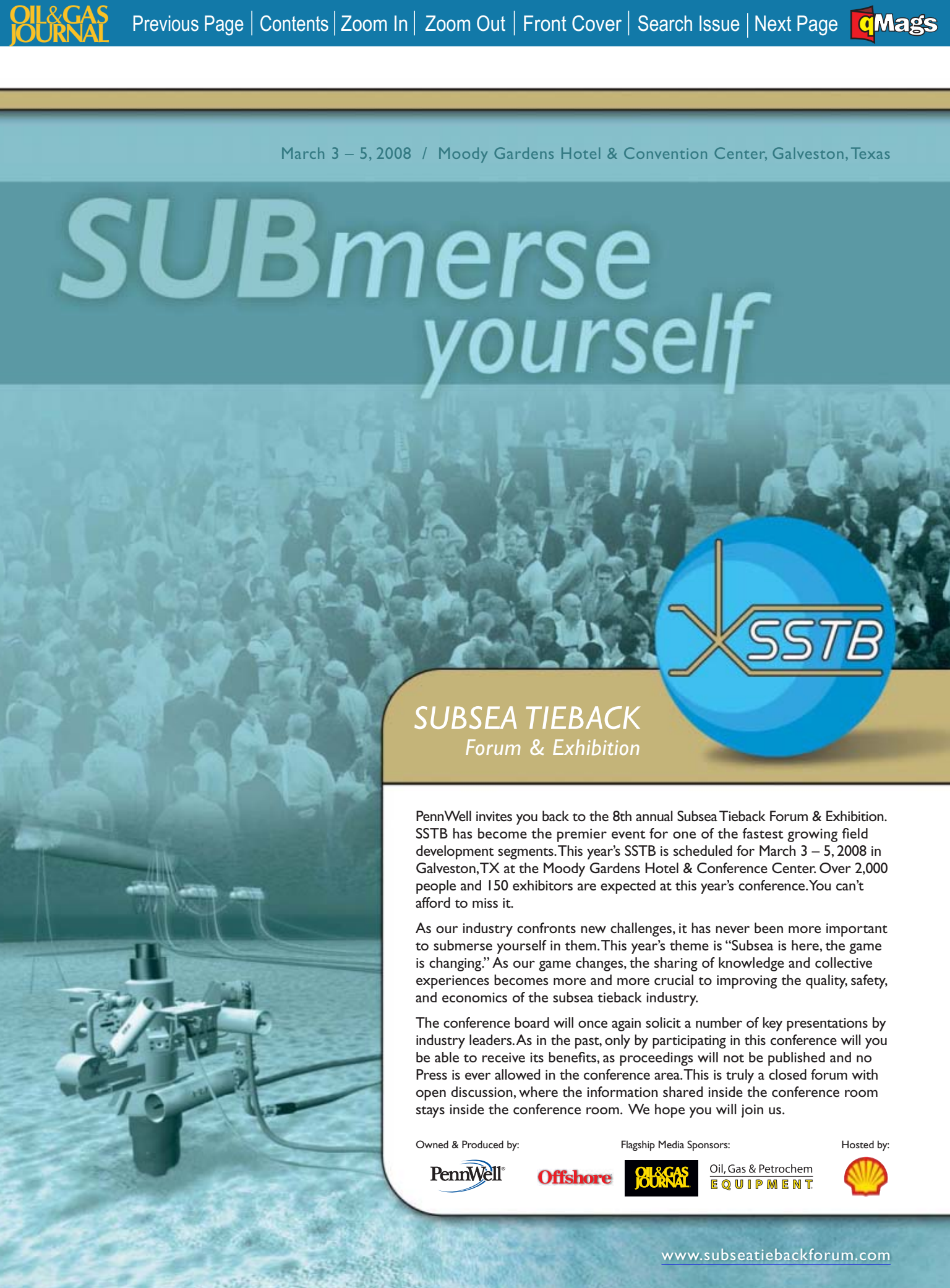

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Chile awards E&P rights for Magallanes blocks

Eric Watkins
Senior Correspondent

Chile has awarded oil and gas exploration and production rights to foreign companies that will invest at least $267 million each in the southern Magellan region.

"It's historic," said Mining Minister Karen Poniachik. "The round is going to contribute to the diversification of our country's energy supply and millions of dollars are going to be spent in the area."

Poniachik said contracts will be signed with Total SA, Apache Canada Ltd., Pan-American Energy LLC, Greymouth Petroleum Holding Ltd., and IPR-Manas.

IPR-Manas was awarded E&P rights for Tranquilo block and plans to invest $33.3 million in the three phases of exploration. IPR, of Dallas, will operate the block on behalf of itself and its partner, Manas Petroleum Corp., Baar, Switzerland.

Apache Corp. was awarded both Russfin and Lenga blocks, where it plans to invest $23.4 million and $24.9 million, respectively.

Greymouth was awarded Porvenir, Brotula, Isla Magdalena, and Caupolican blocks. It plans to spend a total of $107 million in the three exploration phases.

Total was awarded Otway block, where it will invest $44.5 million. Pan-American was awarded the Coiron block, where it will invest $34 million.

No bids were received for the Bahia Inutil block.

The winners will sign special operating contracts with the government that will run for as long as 35 years, including a maximum 25-year production phase.

The first phase of exploration will begin when contracts are formally signed in December and will last for 36 months. The second and third phases will last for 24 months each.

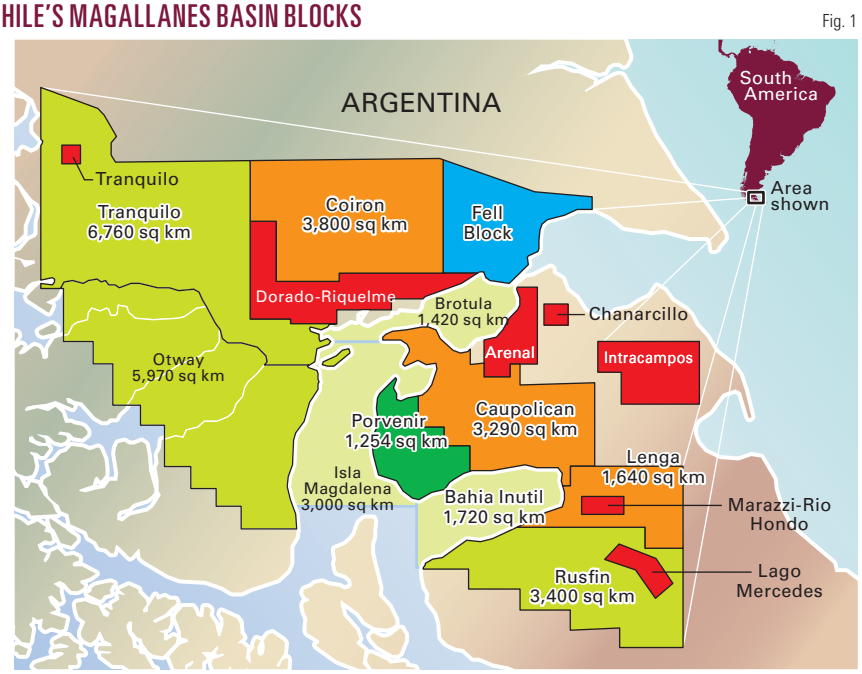
Poniachik said each company has promised to begin exploration within 6 months of signing the contract.

"They'll begin exploring immediately after the contracts are signed in December," she said, adding, "They'll want to take advantage of the warm summer weather we're having in the region at the moment."

Meanwhile, GeoPark Holdings Ltd., Hamilton, Bermuda, reported success at the San Miguel-1 exploration well on the 440,000-acre Fell Block.

CHILE'S MAGALLANES BASIN BLOCKS

Fig. 1



The well, on a structure defined in GeoPark's 2006-07 3D seismic program, gauged 3 MMcfd of gas, 65 b/d of condensate, and 35 b/d of water from Cretaceous Springhill at 3,020 m on a 10-mm choke with 980 psi wellhead pressure.

GeoPark commissioned a gas production and dew point facility in September that permits rapid hookup of new production to the main gas infrastructure.

Apache said the Chilean rights will give the company 1 million acres alongside a 714,000-acre prospecting region it already controls on Argentina's side of the island region.

Apache will split its interest in one of the Chilean zones, known as Lenga, with Empresa Nacional del Petroleo, the country's national oil company.

Apache will have a 100% stake in the larger region, Rusfin. The company said it plans to spend $18.3 million during the first phase of exploration.

Apache committed to shoot 232 sq miles of seismic and drill two exploration wells in the first exploration period on the Chilean side.

Apache's net production on the Argentina side is 113 MMcfd of gas and 4,200 b/d of liquids. ✦

Argentina

Argenta Oil & Gas Inc., Toronto, said logs identified at least three potential pay zones per well in its first two exploratory wells on its 100% owned Loma El Divisadero property in Argentina's Neuquen basin.

Argenta set production pipe at the Ledo-x2 and ADC-x1 wells, drilled to 1,615 m and 1,496 m, respectively.

Colombia

Putumayo basin

Gran Tierra Energy Inc., Calgary, spud the first of two delineation wells at Costayaco field on the Chaza Block in the Putumayo basin.

The field discovery well, which tested at as much as 5,906 b/d of oil from four reservoirs in the second quarter of 2007, has been producing 2,200 b/d, natural, from a single zone. Production is trucked to Toroyaco field facilities.

Production facilities are under construction at Uchupayaco, and a 15-km, 8-in. pipeline from Costayaco to Uchupayaco is to be completed in mid-2008.

Results of a 70 sq km 3D seismic survey over Costayaco field will be used to plan 2008 well locations.

Working interests are Gran Tierra and Solana Resources Ltd. 50% each.

Catatumbo basin

Benchmark Energy Corp., Calgary, struck a deal with Colombia's state Ecopetrol to apply proprietary well-performance enhancement technology to wells in three mature fields in the Catatumbo basin.

The wells are in Sardinata, Petrolea, and Tibz fields. A pilot project on the first Sardinata well started Dec. 9. All pilot projects are to be completed within 45 days.

Upon completion, assuming Ecopetrol is satisfied with the pilot results, Benchmark will attempt to negotiate a farmout from Ecopetrol on one or more of the fields.

Benchmark secured the preferential right to the technology for Colombia through a cooperation agreement with Dominion Oil (USA) Corp., Spring, Tex.

Llanos basin

Petro Rubiales Energy Corp., Vancouver, BC, has boosted production from Rubiales field in the Llanos basin to 25,000 b/d from 18,300 b/d since taking control of the field in July 2007.

Results from the first three of 10 planned appraisal wells indicates that the reservoir extends farther southeast than originally thought.

RPS Scotia, Houston, formerly Scotia Group Inc., is conducting a reserves certification. The company anticipates that the results from the three wells will enable 85 million bbl of oil to be reclassified as proved reserves.

Falkland Islands

BHP Billiton Petroleum acquired 40% interest in 14 exploration and production licenses off the Falkland Islands.

BHP will operate the East Falkland basin licenses after having acquired the interests from Falkland Oil & Gas Ltd. FOGL holds the other 60% interest.

The licenses, south and east of the islands, cover 18 million acres in 656-6,570 ft of water.

Indonesia

Serica Energy PLC said the Global Santa Fe 136 was spudding the Batara Ismaya-1 exploration well in the Biliton Block in the Java Sea off Indonesia.

Next the rig will drill an exploration well on the Batara Indra North prospect.

Serica is operator of the Biliton PSC with 45% interest, and a farmee is carrying the majority of its costs in the two wells.

Italy

Otto Energy Ltd., Perth, agreed to participate with Deltana Energy Ltd., Sydney, in a farmout from Ascent Resources PLC of 50% interest in the 828 sq km Cento and Bastiglia exploration permits in Italy's Po Valley.

The first of two wells is to be drilled in late 2008 on the Gazzata Prospect, estimated to be capable of containing more than 100 bcf of gas. Deltana and Otto will pay 100% of the cost of the first exploration well and 100% of the cost of a second exploration well if the first well finds commercial gas.

Romania

Sterling Resources Ltd., Calgary, was to spud an exploratory well on the Doina Sister prospect in mid-December in the northwestern Black Sea off Romania.

The prospect is an analog to the

rethinking
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Doina gas discovery, which tested gas at a restricted 17 MMscfd.

The company said the established Doina gas trend forms a small part of the offshore Midia Block XV. Media Block XV and the Pelican Block XIII cover 1.1 million acres and contain several other mapped structures.

Sterling obtained 100% of the offshore blocks in 2006 and later reached agreement with three companies to cover its costs to drill and test the Doina Sister well and a large portion of a second well. Sterling retains a 65% working interest in the blocks.

Uganda

Tower Resources PLC launched a 300 line-km 2D seismic survey on Block 5 in Uganda's Albert graben.

The survey area overlies a sedimentary sequence with prospective structures identified by a regional gravity survey (see map, OGJ, Sept. 4, 2006, p. 46).

The survey is being shot under terms of an Aug. 28 agreement between Tower and Orca Exploration. On receipt of the fully interpreted seismic, Orca has the right to acquire a 50% working license interest in Block 5 by funding 83.33% of the cost of two exploration wells. The search for a rig is under way

Alberta

Richards Oil & Gas Ltd., Calgary, drilled a multilateral horizontal well to the Ardley coals (Cretaceous Scollard formation) on its Ansell property in west-central Alberta.

Using an experimental "dry" drilling process, the company extended the original 50-m leg drilled in July 2007 into a further two legs totaling 350 m.

The company released the rig and plans to attempt completion, stimulation, and flow testing in the next two months.

Northwest Territories

Indian and Northern Affairs Canada issued a significant discovery license for Umiak field northwest of Inuvik, NWT, for which MGM Energy Corp., Calgary, is considering development scenarios to feed the proposed Mackenzie Valley gas pipeline.

The Umiak SDL covers 21,270 acres around the Umiak N-05 and N-16 wells and includes multiple pools of gas, oil, and oil and gas in Tertiary Richards and Taglu sandstones.

The company's contingent resource estimate is 444 bcf of gas, which could supply at least 100 MMcfd for 10 years, and further volumes of oil in place.

MGM operates the field with 60% working interest, and ConocoPhillips Canada has 40%.

Mississippi

Penn Virginia Corp., Radnor, Pa., plans to ramp up horizontal drilling to Cretaceous Selma chalk in 2008 after a horizontal well in Baxterville field, Lamar County, Miss., exceeded expectations, the company told investment analysts in early December.

Another horizontal chalk well in Gwinville field, Jefferson Davis County, met expectations. The company believes horizontal drilling will hasten production and increase recoveries.

The formation is at about 6,000 ft, and vertical wells are being drilled on 20-acre spacing for reserves of 375-400 MMcf/well.

Penn Virginia's third quarter gas production from Selma chalk averaged 21.9 MMcfd, up 29% on the year. It had 132 bcf of proved reserves in the formation at the end of 2006 and added 11.2 bcf of proved reserves in a 2007 acquisition at Gwinville.

The company was to drill 72 wells in 2007 compared with 80 wells in 2006 with 100% success.

Texas

West

Arena Resources Inc., Tulsa, found near virgin pressures of 1,500-1,800 psi in two wells recompleted for gas from Permian Yates at 3,000 ft in giant Fuhrman-Mascho oil field in Andrews County, Tex.

By early November, Arena had assured mechanical integrity at 18 of the first 20 wells it identified for recompletion in the Yates.

Arena in June 2007 agreed to dedicate its Yates gas on 14,000 acres to Aspen Pipeline, Houston, which plans to build and start up in mid-2008 a pipeline from the field 30 miles to the 1,000-Mw Odessa electric generating plant operated by PSEG Texas, Dallas, formerly Texas Independent Energy.

Under the agreement, Arena would recomplete or drill 60-90 wells/year for 4 years in an attempt to attain deliveries of 31-37 MMcfd. The Odessa plant can consume a blend that includes Yates gas, which has a high nitrogen content.

Arena has drilled more than 200 wells to the field's oil producing formation at 4,800 ft and run refracs on more than 100 since acquiring the properties.

Offshore

Carson Energy Inc., private Austin independent, acquired a minority working interest in the Dorado development prospect, State Tract 133-1 prospect, in Galveston Bay.

The prospect is on leases adjacent to the Dorado ST 132-1 well, in which Carson Energy holds an interest. The well found multiple productive intervals and is producing 3.2 MMcfd of gas and 130 b/d of oil.

The acquisition adds to Carson's portfolio of wells and 3D prospects in Trinity and Galveston bays through various operators that focus on deep Frio and Vicksburg intervals.

Virginia

Range Resources Corp., Fort Worth, and Equitable Resources Inc., Pittsburgh, placed on production at 1.1 MMcfd of gas Virginia's first horizontal Devonian shale well.

The well, in Nora field in Dickenson County, wend to TD 8,150 ft measured depth including a 3,000-ft lateral. Well cost was $1.2 million.

UNCONVENTIONAL GAS TECHNOLOGY—2

Custom technology makes shale resources profitable

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Low permeability shales are unconventional gas reservoirs that are being more efficiently exploited with newly developed production technologies.

This series began last week, with an article discussing advances in fracture stimulation techniques and fluids used to improve tight gas production (OGJ, Dec. 17, 2007, p. 39).

The final article in this series, to be published next month, deals with coalbed methane (CBM) production.

Shales

There are technical difficulties in producing gas from shales, which have ultralow permeabilities and vary in brittleness. Multilayered shale reservoirs have widely varying reservoir characteristics and flow mechanism regimes. Formations typically have high capillary pressures in hydraulic fracturing scenarios. Treatment fluids can potentially damage shale formations.

Multilayered shale reservoirs with a variety of reservoir characteristics require specialized evaluation and drilling techniques and "next-well" geological, seismic, and production comparisons to identify optimum fracturing targets.

All of these data sources can be fed into custom models for a potential well's production design. Combining logging systems with next-well and field-wide properties, geomechanics, and production performance data forms the basis of an advanced modeling system. The system is tailored for the specific shale-production mechanism and composition of the proposed new well's drilling and completion design. Placing the well's target location is critical and can be done with economical, simplified, rotary-steerable drilling assemblies in land-based shale wells.

Determining proper fracture placement within shale formations is a key to creating large, highly productive fracture networks. Logging systems use an innovative approach, incorporating select mechanical rock properties, geomechanics, total organic content, and porosity to help locate the best fracture-initiation points within shale formations. Microseismic methods also provide invaluable information on the depth and width of the multiple fractures that are created during fracture stimulation.

Due to shale's ultralow permeability, successful economic productivity from a shale reservoir depends on the capability to maximize formation exposure through horizontal or vertical drilling and fracturing, or both.

Economical rotary-steerable drilling assemblies, high-horsepower fracturing units, and multifunctional fracture-placement techniques provide maximum and optimized reservoir exposure.

A complex reservoir's brittleness must be leveraged through drilling and fracturing to create as much fracture face as possible to maximize gas migration from the producing shale. Brittleness can also be leveraged to create formation exposure through the use of high-horsepower fracture pumping units, which have been developed to provide maximum fracturing horsepower in a reduced environmental "footprint."

New designs include increased horsepower and high-rate pumps and offer improved safety, performance, reliability, space utilization, operational efficiency, real-time automation throughout the entire fracturing system, and ultimate improved gas recovery.

Multilayer reservoir characteristics and ultralow formation permeability require precision fracturing of optimum locations along the wellbore, which has led to significantly improved production results.

Pinpoint stimulation techniques have evolved, making shale more profitable as gas prices cycle. Multiple zones can

be efficiently fractured independently by:

- Using coiled tubing or tubulars with hydrojetting techniques.
- Using dynamic diversion techniques for either vertical or horizontal placement.
- Or, incorporating completion mechanical downhole assemblies featuring stimulation sleeves and swellable elastomer packers to enable stimulation of multiple zones without use of bridge plugs to isolate intervals to be treated.

These pinpoint stimulation techniques offer operators cost-effective methods to stimulate multiple zones in one rig-up.

Fluid treatment

Ultralow permeability is the primary challenge in shale formations. Fracturing fluids that are nondamaging and that enhance load recovery is essential in shale formations with very limited permeability. A combination of specialized chemistries delivers maximum effective fractures and preserves the formation's existing permeability to gas, contributing significantly to the shale-production success. Components of the fracture fluids include:

- Special friction reducers formulated to reduce potential fracture-face damage caused by long-chain polymers, without compromising their capability to reduce friction pressure.
- Microemulsion surfactant that helps reduce capillary pressure, releasing imbibed treatment water and improving gas permeability. It also provides significant safety and environmental benefits by replacing methanol in water-block treatments.
- Fracture-cleaning enhancer and conductivity enhancer for accelerating fracture cleanup and flowback of treatment fluids.

Together, these components create a synergistic fluid treatment solution designed to help optimize gas production from formations with ultralow native permeability. The system provides workable, cost-efficient solutions for shale productivity programs from beginning to end—from analysis and planning to drilling, fracturing, early production, long-term production, and ultimate recovery/abandonment.

The ability rapidly to fracture multiple independent zones yields a significant decrease in completion time. The components of the system work together to provide a synergistic solution targeted specifically at changing a potential resource into an important energy producer.

Makeup of productive shale formations

In general, a productive shale formation includes these characteristics:

- Zone thickness >100 ft.
- Well bounded and containing hydraulic fracture energy.
- Maturation in the gas window: R_o = 1.1 to 1.4.
- Good gas content >100 scf/ton.
- High total organic content (TOC) >3%.
- Low hydrogen content.
- Moderate clay content <40% with very low mixed-layer component.
- Brittle composition, as indicated by a low Poisson's ratio and a high Young's modulus.
- Combines rock fabric with reservoirs and lithology features that enhance gas producibility.

Multilayer reservoirs

Multilayered reservoirs exhibit a wide range of reservoir characteristics that need to be evaluated, modeled, and monitored.

A shale-specific modeling and analytical system evaluates formation mechanical properties, total organic carbon content, shale maturity, vitrinite reflectance, gas content in scf/ton, and free and adsorbed gas content. Specialized shale-logging analyses, reservoir simulation, production history matching, injection test analysis, microseismic, and overall field characteristics help to inform new well or new field development decisions. (Microseismic applications are "trained" by data from adjunct wells or fields.)

Passive microseismic fracture monitoring (PMM) applications include mapping the extent of fractures during hydraulic-fracture treatments, fault mapping, and tracking a gas or water front for assisted recovery production. To exploit the benefits of PMM, a recently developed technology combines logging and borehole seismic with the science of microearthquakes to allow the monitoring of fractures while they are created. With this assist, fracturing engineers can obtain the answers they require.

This approach to logging offers:

- Dipole sonic used for pre-stimulation vertical stress profile modeling.
- Velocity profile for borehole seismic modeling.

Fiberoptic monitoring provides temperature profiles over the entire length of the well during the stimulation treatment. Comparing and analyzing temperature profiles over time provides direct indications of injection distribution at various points in the wellbore. The real-time information allows immediate optimization of the treatment and postjob follow-up to aid in future treatment optimization.

Capillary pressure

Shales often have high capillary pressures. A unique microemulsion surfactant helps control fluid-induced fracture-face damage during hydraulic fracturing and helps release trapped water and increase production in low-pressure, tight formations. This surfactant helps reduce fracture-face damage caused by phase trapping; enhances mobilization of liquid hydrocarbons (including condensate); helps increase regained permeability to gas following treatment; improves load recovery;

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improves environmental and safety performance by replacing methanol; and is effective in reservoirs with matrix permeability in the nano-Darcy range.

Formation damage

A new friction reducer helps reduce fracture-face damage from long-chain polymers. The maximum horsepower can be applied in a shale formation rather than being wasted just to get the fluid through the mechanical system. Because this reducer contains no phenols, it provides improved environmental performance and exhibits less flocculation than conventional friction reducers.

A viscosity-reducing agent helps maximize the effectiveness of water-fracturing treatments by reducing fluid viscosity, improving load recovery, minimizing friction-reducer polymer damage, and preventing polymer adsorption to the fracture face, thereby enabling improved production.

These purpose-focused technologies provide a holistic and economical approach to bringing forth energy from unconventional shale resources. Two cases demonstrate the use of the shale production system (SPS):

- *Case 1*. A horizontal shale well was stimulated at four intervals with stimulation sleeves sequentially to isolate each interval of interest during treatment. The four intervals were fractured in 15 hr, placing 1.2 million lb of proppant with 2.3 million gal of fluid in a continuous operation.

Normal stimulation practices would have required 2 days to run four traditional fracturing stages. The operational efficiency gained through the use of the stimulation-sleeve process reduced completion costs by 15-20%.

- *Case 2*. Gas sales from six Barnett shale wells were compared after three of the wells had been treated with SPS additives and three were treated without additives. First gas production was quicker in the three wells treated with SPS additives and these wells produced 100% more gas sales/day.

The Mississippian Barnett shale serves as source, seal, and reservoir in a world-class unconventional natural gas accumulation in the Fort Worth basin of northcentral Texas. The Barnett is lithologically complex, with low permeability, and requires artificial stimulation to produce.[1]

- *Case 3*. Ten horizontal shale wells in Oklahoma were recently completed with massive slick-water fracturing. Four of these wells were fractured with microemulsion surfactant (MS) and six wells did not have the MS treatment.

The MS treatment reduced water saturation and capillary pressures along the fracture faces, which improved relative permeability to gas. Wells using the MS service had initial gas production among the best wells in the field.

Shale technologies

Several production-enhancement processes are useful in shale-gas reservoirs:

- Prospect evaluation and core testing.
- Shale lithotyping to determine key characteristics of productive shale.
- Log data integration and analysis specific to shale.
- Designing and drilling the vertical and horizontal well for stimulation.
- Proppant size and loading considerations.
- Optimization and tailoring water-frac fluid chemistry to the shale.
- Remedial treatment processes for obtaining long-term sustained production.

Life-cycle phases

Operators producing gas from shale reservoirs can be more successful by following the five life-cycle phases of project development and carefully choosing technologies appropriate for each project phase:

1. *Reservoir assessment*. Evaluate shale and reservoir potential.
2. *Start-up exploration*. Drill experimental wells and investigate fracture design and production prediction.
3. *Early development (mass production)*. Rapidly develop using an optimized design. Develop database and benchmarks.
4. *Mature development (reserve harvesting)*. During this cash-flow cycle, match production histories; adjust reservoir model; image database.
5. *Declining phase (maintenance and remediation)*. Identify remedial candidates, restimulate, initialize lift mechanisms and conformance methods.

(Similar coalbed methane life-cycle phases are discussed in the final article in this series.[2])

Prospect evaluation

Usually, the first step in the design and application process is to evaluate the shale prospect. Initially, both 2D and 3D seismic data are processed to determine the extent of the shale play. The volume of shale is estimated in tons/acre (ton/acre-ft). Gas in place (GIP) is calculated from the geochemical determination of standard cubic feet/ton (scf/ton), as follows: GIP = $(\rho)(1,359)$(scf/ton) = scf/acre-ft.

Shale samples collected from various sources help in determination of the commercial viability of the project. Factors include:

- Shale hydrocarbon content (scf/ton, bbl/ton, GIP).
- Shale maturity.
- Kerogen type (Types I and II, oil; Type III, gas).
- Shale porosity, permeability, oil, water, and gas saturations.
- Shale desorption constant, or gas isotherm.
- Shale bulk density, ρ (g/cu cm).

Log data requirement

A triple-combo log can be used to obtain density, gamma ray, resistivity, neutron, and density porosity.

A wave-sonic log should be run to obtain mechanical rock properties.

An EMI (electromagnetic imaging) tool should be run to obtain natural and induced fracture direction, followed by analysis to identify sweet spots and a fracture-initiation site.

A pulsed spectral gamma (PSG) log enhances oil recovery by accurately measuring oil saturations over a wide range of properties and borehole conditions. The PSG log also aids in clay typing, which adds to knowledge of the reservoir and is helpful information for planning future wells.

Enhancing production

Commercial production from shale depends largely on the gas content and natural storage and deliverability of the rock. The prime goal of stimulation is to contact and expose the greatest amount of rock volume and surface area with the least expensive material; in effect, "mining" the shale using hydraulic horsepower and injected water. This hydraulic mining can turn a well in nano-Darcy shale into a commercial gas producer.

Restimulation has proven to increase recoverable reserves by 50-100%. Future vertical and horizontal wells are likely to be completed by selectively treating, isolating, and retreating unstimulated areas along the vertical or horizontal wellbore.

Fracturing fluids and reactive fluids should be designed with knowledge of the specific shale mineralogy. The overall success of any shale play will include observation of the resource through its life cycle.

Vertical well stimulation

Current vertical stimulation designs feature:

- Four or five perforation sites, 2-4 ft long.
- 5 shots/ft (spf) and 60° phasing.
- Pump rates of 1-2 bbl/min per perf or 20 bbl/min per initiation site.

Volumes pumped are about 2,500 gal/ft, delivering 400 lb/ft of proppant.

In early phases of the life cycle, vertical wells are usually drilled and completed to help the operator characterize the reservoir. With the experience gained from drilling, fracturing, and producing the vertical well, more comprehensive life cycle phases 3 and 4 can be planned and performed profitably.

Horizontal well stimulation

Current horizontal stimulation designs typically include:

- Two to eight stages/horizontal wellbore.
- Two to four frac initiation sites/stage.
- 2-4 ft of perforations/site, with 6 spf, at 60° phasing.
- 20-30 bbl/min per frac site or 2-4 bbl/min per perforation.
- Volume average 1,800 gal/ft.

Horizontal completions

Horizontal well completions can be one of three types:

1. Cased, cemented, multistage with composite plugs to separate frac stages.
2. Multistage, with jetted sand and water delivered by coiled or jointed tubing to perforate zones.
3. Mechanical bottomhole assembly.

The cased, cemented, multistage completion with composite plugs is the most commonly used type of horizontal completion in shale wells. Each stage is perforated, fracture-stimulated, and isolated with a packer or bridge plug, allowing the next stage to be treated. The plugs and packers act as a well "bottom" for fracturing pressure to build up against. This process is the most time-consuming, due to the cycle time for perforating, plug-setting, and drilling out plugs or packers. Use of composite plugs reduces drillout times drastically.

Jet-perforated, multistage completions eliminate the need to perforate or set plugs. This service is run on coiled or jointed tubing to the first-stage frac site; perforations and a tunnel are eroded by pumping through the tubing at a high differential pressure, using sand and water as the cutting stream. The fracture initiates and extends at the jet site; packers are not required because the jet velocity causes a pressure drop at the jet exit. The pressure drop pulls fluid from the annulus into the fracture. A more detailed discussion is provided in Part 1 (OGJ, Dec. 17, 2007, p. 39)

Mechanical bottomhole assembly (BHA)-type completions isolation packers have been run in horizontal shale wellbores as a new alternative to cementing and perforating. These systems are deployed as part of the production casing and provide mechanical isolation and selective injection sites that can be opened and, in some cases, closed manually.

Advancements have been made in the development of multistage frac-acid tools being applied in both openhole and cased-hole completions with hydraulic-set packers and sliding valves opened by pumping balls or shifting mechanical devices on jointed or coiled tubing.

Water fracs produce a complex network of narrow-aperture fractures that can be either induced from extensive shear-failures (like shattered safety glass) or created from dilation of preexisting, incipient fractures or planes of weakness in the shale. The frac width must be 1.5± times the maximum grain diameter of the proppant to provide additional propping of the induced fractures.

Because the permeability of the matrix rock is usually ultralow (0.0001-0.001 md), except possibly near the wellbore, the fracture conductivity typically does not need to be high; 20-50 md-ft is sufficient conductivity through the fracture network. The exception would be with deeper wells with higher closure pressure and rock properties that would allow proppant embedment. In a few cases, we have not seen much correlation between production and proppant size. Many created fractures remain open and conductive even without proppant.

Many wells have been fractured proppant-free or with as little as 5,000 to 10,000 lb yet achieved commercial

rates. Most Barnett shale well stimulations, however, are using proppant volumes in the range of hundreds of thousands of pounds. Although some operators question the value of proppants, with advancements in proppant design, correlating volume and type of proppant with actual production increases may be proved.

Adaptation and modification of current fracture models calibrated to real-time microsiesmic mapping are being used to help in the design of stimulation treatments.

Shale water-frac chemistry features application of friction reducers, surface-modification agents (SMA), microemulsions, deflocculants, and reactive fluids. The SMA helps minimize proppant settling, control production of fines, and enhance propped fracture conductivity. Microemulsion additives help remove water load and enhance recovery of fracturing liquids, resulting in significant uplift in recovery factors and estimated ultimate recovery (EUR).

Friction-reducer deflocculants are added to prevent the potential negative impact friction-reducer polymers can have when interacting with formation fines and liquid hydrocarbon. Conventional friction reducers can essentially form damaging, gunk-like material within the created fracture system that can seal off frac conductivity in the narrow-aperture fractures.

Refracturing

Vertical shale wells can see production increases of 30-80% from reperforating the original producing interval and pumping a job volume that is at least 25% larger than the previous frac.

There are two obstacles in refracturing horizontal: The initial frac sites must be somehow isolated, and new frac sites must be created in areas of unstimulated, horizontal wellbore. Various completion methods such as Halliburton's SurgiFrac and mechanical completions with swellable packers eliminate the obstacles.

Hydraulic fracturing is a common completion technique in the Barnett shale. Photo from Halliburton.

Shale-reactive fluids

In general, shale is thought to be relatively nonreactive to low pH or acidic fluids because the clay, silt, and organic materials comprising the major components of shale formations exhibit insignificant bulk solubility in acid. Shale units are highly laminated, however, and contain acid-soluble minerals homogenized in the shale bulk matrix and natural fractures. X-ray diffraction analysis and scanning electron microscope images of shale samples show a great diversity and distribution of soluble material in the shale-producing unit.

The amount of gas produced by desorption is directly related to the amount of surface area exposed, and a shale-reactive fluid may increase the surface area of a newly created hydraulic fracture. Gas production from hydraulically fractured shale is believed to come from desorption and diffusivity from microporosity/fractures. Shale-reactive fluids may help remove acid-soluble minerals in the bulk shale as well as the mineral-filled fractures, thereby enhancing diffusivity of gas into the fracture network.

The use of reactive fluids is a relatively new concept in shale stimulation, evolving from the observation that shale lithologies contain distributed low levels of acid-reactive minerals. In experimental trials of the use of weak-acid reactive systems, the unexpected pressure-drops that occur when the reactive fluids contact the shale formation inspired treatments of 20,000 to 200,000 gal of reactive fluid through the frac water.

Initial production has been double that of treatments without reactive fluids included. Figs. 1 and 2 show shales before and after being exposed to reactive systems. Early field trials are showing excellent production improvement results.

Cementing shale wells

Constructing a suitable cement sheath around the horizontal section of a shale well is a key element in the process of successful fracture-stimulation of shale-gas zones. In recent exploration and production activity in Oklahoma's Woodford shale, wells cemented with foamed cement produced an average of 23% more peak gas than wells cemented with conventional slurries.

Conventionally cemented wells did not provide adequate zonal isolation and allowed fracturing fluid to communicate along the horizontal casing. This condition caused targeted intervals to receive less than the designed volume of stimulation fluid and proppant.

Tensile strengths and mechanical properties of foamed cements make them ideal for zonal isolation in many

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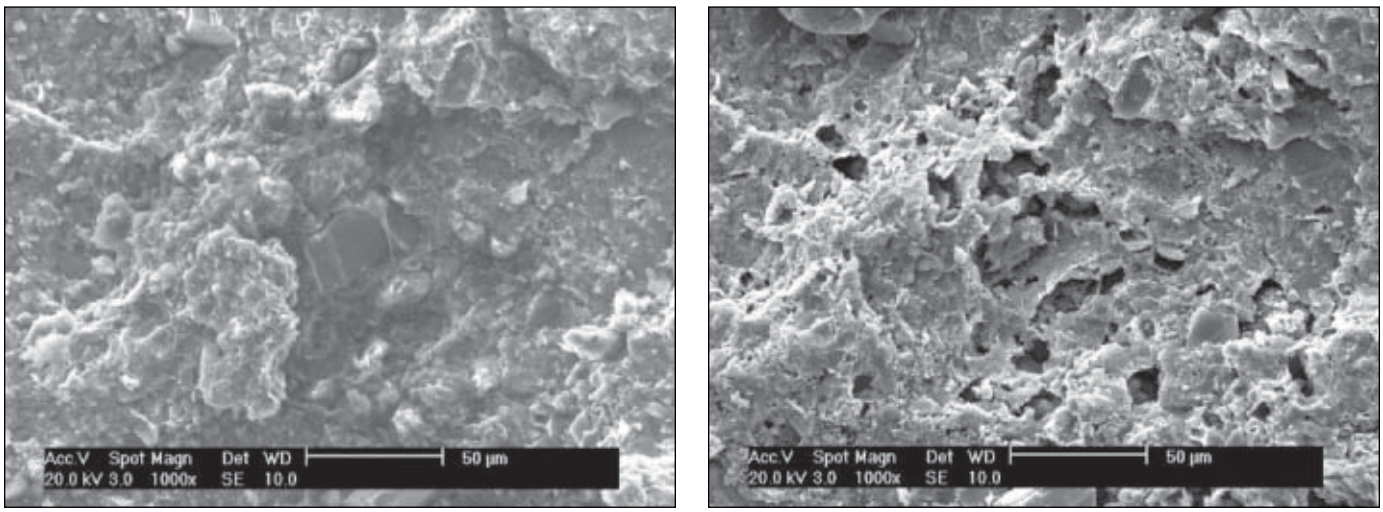

Shale fracture surface (left photo) shown before reactive fluid contact (1,000x magnification on ESEM microscope; Fig. 1). Here is the same shale fracture (right photo) surface as shown in Fig. 1 following contact with a reactive fluid. The result is an increase in effective surface area and enhanced flow channels for gas to diffuse from shale fracture surface into the created fracture void (Fig. 2).

hydraulic-fracturing operations. The low compressive strengths of these cements, however, concern some operators that have long considered compressive strength to be the leading indicator of cement-sheath integrity in high-pressure fracturing conditions.

Foamed cement's relatively low compressive strength does not increase the risk for fracture initiation and propagation in the cement sheath during hydraulic-fracturing treatments. Stresses induced in the cement sheath by increased wellbore pressures during casing-pressure tests or fracture stimulation treatments are tensile in nature. The sheath's capacity to withstand these stresses is predominantly determined by the cement's mechanical properties (Young's modulus and Poisson's ratio) and tensile strength. Cement compressive strength is of minimal importance.[3]

The durability of foamed cement has been demonstrated repeatedly in Woodford shale hydraulic-fracturing operations, where foamed cement outperformed conventional cement in withstanding high internal casing pressures and high fluid hydrostatic pressures.

Two factors explain this performance:

1. Mechanical properties of foamed cement allow it to withstand greater wellbore pressures than conventional cement.
2. The ductile nature of foamed cement helps prevent the propagation of fractures in the cement sheath, helping ensure continued zonal isolation.

Well-cementing professionals believe that the ductile properties of the cement allow it to yield to injection pressure rather than shattering as is usually the case in high-density, more brittle cement. Also, the cement-invasion distance may be less because of improved fluid loss provided by the nitrogen bubbles.

Acid-soluble cement

Zonal isolation for limited-entry stimulation can be provided by acid-soluble cements (ASC).

Because conventional cements have a low solubility in acid, perforations can be difficult to break down and can inhibit fracture initiation and cause excess tortuosity during stimulation and production. Successful horizontal, limited-entry stimulation requires that all perforations are open and in communication with the formation and the designed perforation friction controls the fluid distribution along the wellbore.

Unopened perforations and near-wellbore friction resulting from tortuosity caused by the conventional cement can significantly alter the fluid distribution and decrease stimulation effectiveness. Conventional high-compressive strength cements with a typical acid solubility of less than 5% cannot be reliably removed so that each perforation is openly communicating with the formation.

Instead, acid-soluble cement can be used to provide zonal isolation without impeding stimulation and production. This type of cement has a fast solubility rate and is highly soluble (>90%) in acid-based stimulation fluids. ASC has physical properties much like conventional cement. It can be specifically formulated to provide the proper weight, fluid-loss, free water, compressive strengths, and pump times required for particular well conditions. Slurry densities and yield ratios can range from 13.0 lb/gal to 15.8 lb/gal and 3.55 cu ft/sk to 2.00 cu ft/sk, respectively (sk = sack). ASC can also be foamed if lower-density slurries are needed.

The easy removal of ASC material from the perforation cluster makes it especially suitable for limited-entry horizontal applications. The high-solubility allows the development of a larger communication area in the

annulus immediately adjacent to the perforations while still providing excellent zonal isolation along the wellbore. This pocket that is dissolved around the casing at the clustered perforation point eliminates the tortuosity and fracture-entry pressure effects that could alter the planned limited-entry fluid distribution. Also, during production, the skin effects, reduced near-wellbore conductivity, and perforation-plugging problems associated with conventional cements are eliminated.

Cement process

The following well information is used to support an initial design for the foam-cementing process:

- Operator well plan for casing strings, drillbit sizes, casing sizes, drilling mud systems, and if the well is horizontal, a proposed directional survey.
- Depths and thickness of potential productive intervals and the fracture gradients and pore pressures of these intervals.
- Depths, thicknesses, and fracture gradients of potential lost-circulation intervals.
- Desired top of cement.

Design software aids in developing a cementing process tailored for the well, and the recommended cement slurries are laboratory tested for performance. During drilling, the cementing program is updated to reflect the influence of events that were not expected, for example, encountering an unanticipated pressure zone.

When well total depth is reached, initial well information is confirmed, drilling-mud reports are consulted, and drilling-mud and mixing-water samples are collected to be tested for compatibility with spacers.

Updated wellbore information is entered into the planning program to develop a final cementing-process design. Several aspects of the design are updated in the software program:

- Total depth.
- Casing depths.
- Size and grade of casing.
- Bit size used for horizontal section.
- Final directional survey.
- Last 3 or 4 days' drilling-mud reports.
- Depths and fracture gradients of lost-circulation zones.

The cementing operation is monitored and controlled by operating company and service company representatives to maximize opportunities to make real-time changes to the procedure.

Other solutions

In areas where alternatives to foam cement may be preferred, recent advances in well cementing technology have made it possible to provide the option of nonfoamed cements with the enhanced mechanical properties and ductility required to cement shale wells that will be fracture stimulated. These cements can also be designed to expand. The required mechanical modification additives can be dry-blended with cement and mixed and pumped in the field using conventional equipment.

In practice, combinations of salts in cements and spacers and sodium silicates in preflushes in cementing fluids have provided a simple and proven means for managing shale instability during the cementing process when shale instability is considered to be an issue. ✦

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Glenda Wylie's biography was published in Part 1, OGJ, Dec. 17, 2007, p. 39.

Global refining capacity increases slightly in 2007

David Nakamura
Refining/Petrochemical Editor

Worldwide in 2007, the number of refineries remained stable, while global capacity increased slightly. For the sixth year in a row, worldwide capacity is at a record level.

Last year's refining report showed a worldwide capacity of 85.179 million b/cd in 658 refineries as of Jan. 1, 2007. This year, OGJ's survey reflects a total capacity of 85.309 million b/cd in 657 refineries, an increase of slightly more than 129,000 b/cd.

The increase is more than double last year's gain of 52,000 b/cd.

Fig. 1 shows the trend in operable refineries and worldwide capacity. The large jump in number of refineries in 1999 was due to improved information from China.

Expansions and capacity creep that offset losses were the main reasons for the increases in capacity for the latest survey.

North America showed the largest increase in the amount of refining capacity, up about 103,000 b/cd or 0.5%. Africa showed the largest percentage increase, about 2%, increasing to 3.278 million b/cd from 3.212 million b/cd.

Eastern Europe showed an increase of about 71,000 b/cd.

Other regions experienced decreases in capacity. Asia-Pacific and Western Europe lost capacity according to the latest survey numbers, decreasing about 96,000 b/cd and 13,000 b/cd, respectively.

The Middle East and South America were essentially unchanged, losing 1,900 b/cd and gaining 200 b/cd of capacity, respectively.

New crude capacity

This year's survey does not list any new refineries. All the increases in refining capacity occurred in existing facilities.

The largest single-facility increase occurred in Rosneft's Syzran, Russia, refinery. The company reported a capacity of 214,000 b/cd, up from 151,460 b/cd, which was the capacity listed in last year's survey. The refinery was previously owned by OAO Yukos and was acquired by Rosneft in May 2007 in an auction.

In the US, the largest reported capacity increase occurred in Flint Hills Resources' Rosemount, Minn., refinery. Flint Hills reported a 43,700-b/cd increase, growing to 323,000 b/cd in this year's survey from 279,300 b/cd reported in last year's survey.

Other major increases in reported capacity occurred in BP PLC's Texas City refinery, which increased to 475,000 b/cd from 446,500 b/cd; Petro-

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Canada's Montreal refinery, which rose to 129,800 b/cd from 105,000 b/cd; and Holly Corp.'s Artesia, NM, refinery, which went from 60,000 b/cd to 85,000 b/cd.

Refinery closures, delistings

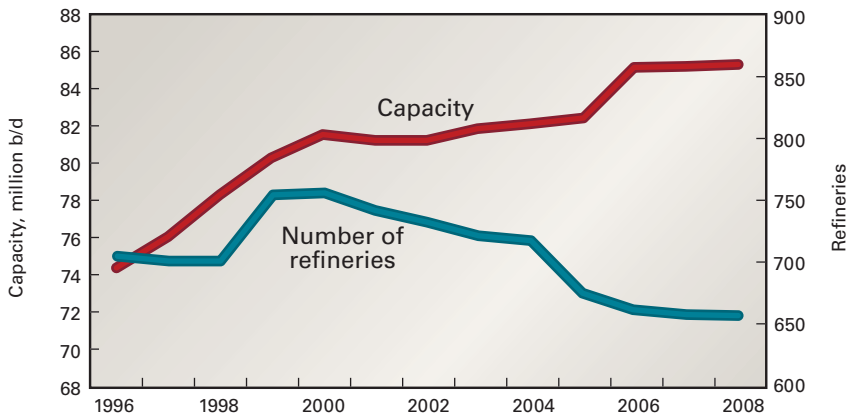
No refineries shut down in 2007, mainly due to high refining margins that made even the smallest plants profitable.

The only closure reported in this year's survey is Petro-Canada's 83,000 b/cd Oakville, Ont., refinery. The company reported that the plant had ceased operations in 2003, but the shutdown was not reflected in the survey until this year.

Other refineries lost capacity as owners restated and updated the survey

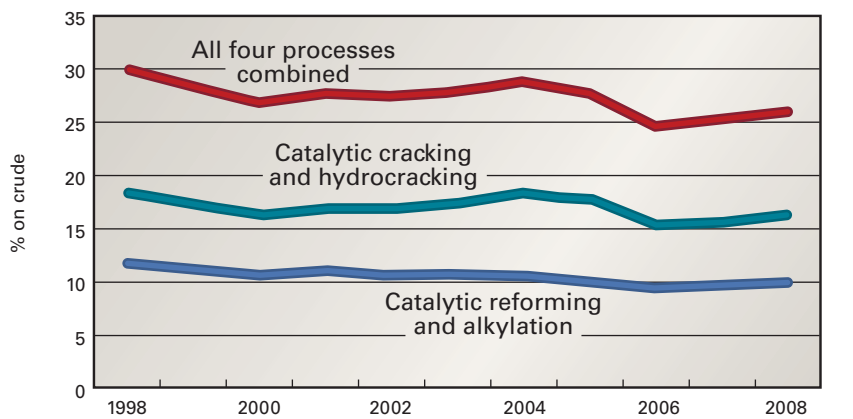
WORLDWIDE REFINING

Fig. 1



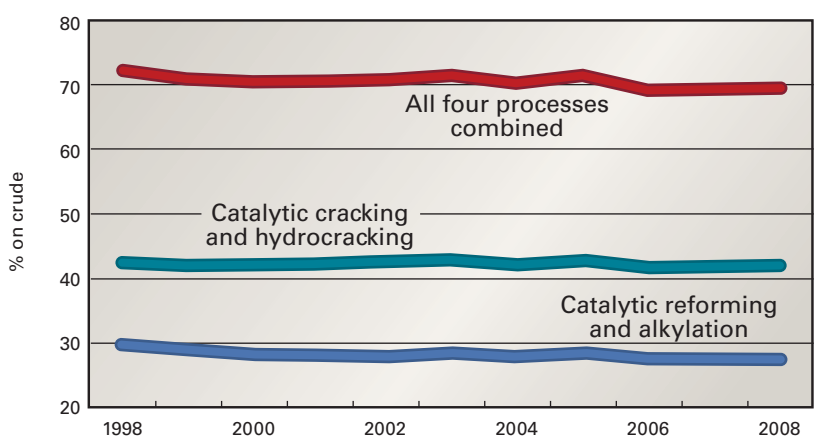
ASIA PROCESSING CAPABILITIES

Fig. 2



US PROCESSING CAPABILITIES

Fig. 3



HOW THE WORLD'S LARGEST REFINERS RANK

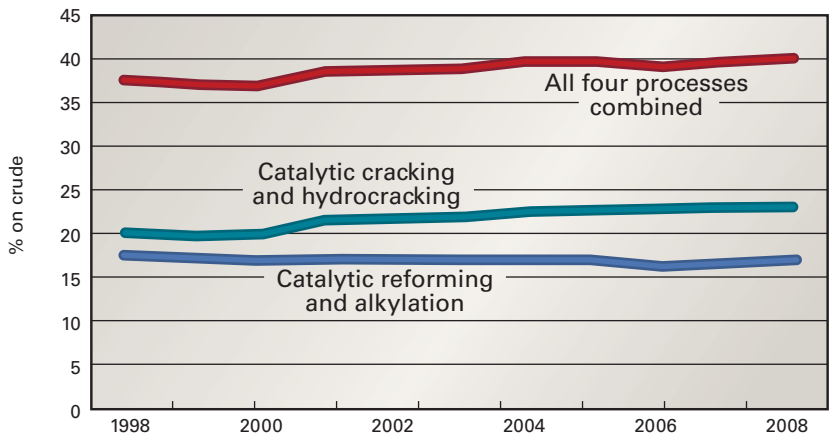
Table 1

Rank			
Jan. 1, 2008	Jan. 1, 2007	Company	Crude capacity, b/cd[1]
1	1	ExxonMobil Corp.	5,626,000
2	2	Royal Dutch Shell PLC	4,885,000
3	3	Sinopec	3,611,000
4	4	BP PLC	3,420,000
5	8	Total SA	2,719,000
6	5	ConocoPhillips	2,696,000
7	7	Petroleos de Venezuela SA	2,678,000
8	6	Valero Energy Corp.	2,672,000
9	9	China National Petroleum Corp.	2,440,000
10	10	Saudi Aramco	2,433,000
11	11	Chevron Corp.[2]	2,082,000
12	12	Petroleo Brasileiro SA	1,997,000
13	13	Petroleos Mexicanos	1,705,000
14	14	National Iranian Oil Co.	1,451,000
15		Rosneft	1,293,000
16	15	OAO Yukos	1,217,000
17	17	Nippon Oil Co. Ltd.	1,157,000
18	18	Repsol YPF SA	1,105,000
19	19	Kuwait National Petroleum Co.	1,085,000
20	20	Pertamina	993,000
21	21	Marathon Oil Corp.	974,000
22	22	Agip Petroli SpA	904,000
23	23	Sunoco Inc.	880,000
24		Flint Hills Resources	817,000
24	25	SK Corp.	817,000

[1]Includes partial interests in refineries not wholly owned by the company. [2]Includes holdings in Caltex.

EU PROCESSING CAPABILITIES

Fig. 4



numbers. Royal Dutch Shell PLC restated capacity for many of its refineries.

Some of the larger declines occurred in Pilipinas Shell Petroleum Corp.'s Tabango, Phillipines, refinery, which lost 51,000 b/cd of capacity, falling to 102,000 b/cd from 153,000 b/cd. The Shell Refining Co. Bhd. Port Dickson, Malaysia, refinery lost 30,000 b/cd of capacity, and the Shell UK Ltd. Stanlow, England, plant lost 29,400 b/cd of capacity.

Largest refining companies

Table 1 lists the top 25 refining companies that own the most worldwide capacity. Table 2 lists companies with more than 200,000 b/cd of capacity in Asia, the US, and Western Europe. Capacities from Tables 1 and 2 include partial interests in refineries that the companies do not wholly own.

Significant changes from last year involve ConocoPhillips, Valero Energy Corp., Rosneft, Yukos, Shell, and Petroplus.

On June 1, 2007, Petroplus completed a deal to purchase BP's 172,000-b/cd Coryton, UK, refinery for $1.4 billion. Petroplus said that the refinery can run an additional 70,000 b/d of other feedstocks. The deal is significant because BP now has no refining capacity in the UK.

Petroplus also purchased ExxonMobil Corp.'s Igolstadt, Germany, refinery in a deal that closed on Apr. 1, 2007. Petroplus purchased the 110,000-b/cd refinery for a reported $627.5 million.

The two purchases significantly expand Petroplus' refining capacity, to 552,000 b/cd at yearend 2007 from 300,000 b/cd in last year's survey.

On Nov. 13, 2007, Petroleo Brasileiro SA (Petrobras) agreed with ExxonMobil subsidiary TonenGeneral Sekiyu Kabushiki Kaisha to buy an 87.5% interest in the Japanese company Nansei Sekiyu Kabushiki Kaisha (NSKK) for about $50 million.

The acquisition includes a 100,000 b/d refinery and, with this purchase, Petrobras will start refining operations in Asia for the first time. The remaining 12.5% interest in NSKK is held by Japan's Sumitomo Corp.

This acquisition was enough to move Petrobras up one spot in Table 1, to number 11. ExxonMobil moved down one position, to No. 4, in Table 2 Asia Pacific.

Petroplus may move up in 2008 as well. The company has agreed to purchase two French refineries from Shell.

On Aug. 2, Petroplus agreed to purchase Shell's Petit Couronne and Reichstett Vendenheim refineries for $875 million. The companies hope to reach agreement on the sale in 2008. The two refineries have a combined capacity of 219,000 b/cd according to the latest survey.

Shell has also agreed to sell its 78,000-b/cd Berre l'Etang refinery to Basell for $700 million. This deal should also be competed in early 2008 and will be reflected in next year's survey.

On Jan. 29, 2007, Shell agreed to sell its 100,000-b/cd Los Angeles, Calif., refinery and related assets to Tesoro

COMPANIES WITH 200,000+ B/CD REFINING CAPACITY IN ASIA, THE US, WESTERN EUROPE

Table 2

Rank	Company	No. of refineries	Crude capacity, b/cd[1]
Asia[2]			
1	Sinopec	26	3,611,000
2	China National Petroleum Corp.	24	2,425,000
3	ExxonMobil Corp.	10	1,333,132
4	Royal Dutch Shell PLC	13	1,271,875
5	Nippon Oil Co. Ltd.	6	1,157,000
6	Pertamina	8	992,745
7	SK Corp.	1	817,000
8	Indian Oil Co. Ltd.	10	787,290
9	Chinese Petroleum Corp.	3	770,000
10	Reliance Petroleum Ltd.	1	660,000
11	Chevron Corp.	6	653,667
12	LG-Caltex Corp.	1	[3]650,000
13	Tonen/General Sekiyu Seisei KK	4	[4]629,375
14	Idemitsu Kosan Co. Ltd.	4	608,000
15	Hyundai Oil Refinery Co.	3	589,500
16	Cosmo Oil Co. Ltd.	4	565,250
17	S-Oil Corp.	1	[5]520,000
17	Formosa Petrochemical Co.	1	520,000
19	BP PLC	4	358,966
20	Saudi Aramco	6	327,652
21	Hindustan Petroleum Corp. Ltd.	2	296,250
22	Showa Yokkaichi Sekiyu Co. Ltd.	1	[6]205,010
US			
1	Valero Energy Corp.	14	2,158,660
2	ConocoPhillips	13	2,000,200
3	ExxonMobil Corp.	7	1,964,250
4	BP PLC	6	1,553,500
5	Royal Dutch Shell PLC	8	[7]981,500
6	Marathon Oil Corp.	7	974,000
7	Chevron Corp.	5	909,000
8	Sunoco Inc.	5	880,000
9	Petroleos de Venezuela SA	4	[8]849,400
10	Flint Hills Resources (Koch Industries)	3	817,475
11	Motiva Enterprises LLC[9]	3	730,000
12	Tesoro Corp.	7	658,000
13	Saudi Aramco	3	[10]370,000
14	Lyondell Chemical Co.	1	282,600
15	Total SA	1	231,452
16	EnCana Corp.	2	226,000
Western Europe[11]			
1	Total SA	16	2,330,772
2	Royal Dutch Shell PLC	14	1,835,541
3	ExxonMobil Corp.	9	1,636,856
4	AgipPetroli SPA	10	876,117
5	BP PLC	9	755,020
6	Repsol YPF SA	5	709,200
7	Turkish Petroleum Refineries Corp.	4	613,275
8	ConocoPhillips	4	610,125
9	Petroplus International NV	5	552,000
10	Compania Espanola de Petroles SA (CEPSA)	3	427,000
11	Ineos Group Holdings Inc.	2	402,800
12	OMV AG	3	398,635
13	ERG Group	4	396,214
14	Chevron Corp.	2	331,520
15	Preem Raffinaderi AB	2	316,000
16	Hellenic Petroleum SA	3	313,000
17	Statoil AS	3	304,210
18	Galp Energia SA	2	304,172
19	Neste Oil	6	[12]302,300
20	Saras SPA	1	300,000

[1]Includes partial interest in refineries not wholly owned by the company. [2]Asia includes Australia, Bangladesh, Brunei, China (and Taiwan), India, Indonesia, Japan, Malaysia, Myanmar, New Zealand, North Korea, Pakistan, Papua New Guinea, the Philippines, Singapore, South Korea, Sri Lanka, and Thailand. [3]Includes Caltex's 50% stake. [4]Includes ExxonMobil Corp.'s 50% stake. [5]Includes Saudi Aramco's 35% stake. [6]Includes Royal Dutch Shell PLC's 50% stake. [7]Includes Shell's stakes in Motiva and its 50% stake in the Deer Park, Tex., refinery. [8]Consists of PDVSA's ownership of Citgo and its 50% stake in the ExxonMobil Chalmette, La., refinery. [9]50/50 joint venture between Shell and Saudi Aramco. [10]Consists of 50% stake in Motiva. [11]Western Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and the UK. [12]Includes 50% stake in AB Nynas refineries.

Corp. The deal was completed on May 11 for a purchase price of $1.76 billion, which included $213 million for estimated inventories.

On Jan. 3, 2007, ConocoPhillips and EnCana Corp. entered into a joint venture named WRB Refining LLC, which involved the Borger, Tex., and Wood River, Ill., refineries. The two refineries have a combined capacity of 452,000 b/cd of capacity.

The transfer of capacity to EnCana was enough to move ConocoPhillips down one spot in Table 1. EnCana now appears in Table 2 with a capacity of 226,000 b/cd.

Valero Energy Corp. fell two spots in Table 1 because it sold its Lima, Ohio, refinery to Husky Energy Inc. Finalized on July 1, 2007, the deal transferred ownership of the 161,500-b/cd refinery for $1.9 billion.

EnCana and Husky are, respectively, the second and third Canadian firms to merge unconventional crude with US-based refining capacity. The first was Suncor Energy Inc.

On Oct. 2, the US Federal Trade Commission ended its administrative action against the merger of Giant Industries Inc. and Western Refining Inc. The two refiners had announced the merger on Aug. 28, 2006, and completed it on May 31, 2007, creating a company with just more than 200,000 b/cd of refining capacity.

In March 2007, BP bought out Chevron Corp.'s 31% interest in the 392,000-b/cd Nerefco refinery. BP is the sole owner and operator in the refinery after completing the $900-million deal.

In July 2007, Basell announced it was merging with Lyondell Chemical Co. for about $12 billion. The deal includes Lyondell's 282,600-b/cd refinery in Houston. The new company will be named LyondellBasell Industries.

Lyondell anticipates the closing of the transaction on or about Dec. 20, 2007. The transaction will therefore be reflected in next year's survey.

In one of the largest deals of the year, Rosneft significantly expanded its refining assets by purchasing five Russian oil refineries at the auctions held as part of the OAO Yukos bankruptcy proceedings. Rosneft purchased Kuibyshev, Novokuibyshev, and Syzran refineries in the Samara Region, and the Achinsk refinery and Angarsk petrochemical company in Eastern Siberia.

At the beginning of 2007, Rosneft owned two oil refineries in Komsomolsk and Tuapse. The company now owns about 1.29 million b/cd of refining

capacity.

Yukos no longer appears in Table 1 and Rosneft now appears at No. 14.

Other changes in capacity that appear in Tables 1 and 2 are due to adjustments in declared capacity.

Largest refineries

Table 3 lists the world's largest refineries with a minimum capacity of 400,000 b/cd.

BP's Texas City refinery moved up one spot, to No. 12 from No. 13, due to increased capacity. In addition, the No. 15 refinery fell off the list when Rosneft restated capacity for the Angarsk, Russia, refinery to 385,000 b/cd.

A newcomer to Table 3 is BP's Whiting, Ind., refinery. Capacity increased to 405,000 b/cd from 399,000 b/cd listed in last year's survey. The increase was enough for the refinery to meet the minimum 400,000 b/cd requirement for listing in Table 3.

Regional crude capacities

Table 4 lists regional process capabilities as of Jan. 1, 2007. As mentioned, the largest increase in crude capacity occurred in North America.

North American growth was due to a 175,000-b/cd capacity increase in the US offset by 72,000-b/cd decrease in Canada.

Processing capabilities

Figs. 2-4 show the processing capabilities of Asia, the European Union (EU), and the US for the past 10 years. Processing capabilities are defined as conversion capacity (catalytic cracking and hydrocracking) and fuels-producing processes (catalytic reforming and alkylation) divided by crude distillation capacity (% on crude).

Countries in the EU include Belgium, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, and the UK. ✦

World's largest refineries

Table 3

	Company	Location	Crude capacity, b/cd
1	Paraguana Refining Center	Cardon/Judibana, Falcon, Venezuela	940,000
2	SK Corp.	Ulsan, South Korea	817,000
3	Reliance Industries Ltd.	Jamnagar, India	660,000
4	LG-Caltex	Yosu, South Korea	650,000
5	ExxonMobil Refining & Supply Co.	Jurong/Pulau Ayer Chawan, Singapore	605,000
6	ExxonMobil Refining & Supply Co.	Baytown, Tex.	567,000
7	Saudi Arabian Oil Co. (Saudi Aramco)	Ras Tanura, Saudi Arabia	550,000
8	Formosa Petrochemical Co.	Mailiao, Taiwan	520,000
8	S-Oil Corp.	Onsan, South Korea	520,000
10	ExxonMobil Refining & Supply Co.	Baton Rouge, La.	503,000
11	Hovensa LLC	St. Croix, Virgin Islands	500,000
12	BP PLC	Texas City, Tex.	475,000
13	Shell Eastern Petroleum (Pte.) Ltd.	Pulau Bukom, Singapore	449,000
14	Kuwait National Petroleum Co.	Mina Al-Ahmadi, Kuwait	442,700
15	Citgo Petroleum Corp.	Lake Charles, La.	440,000
16	Shell Nederland Raffinaderij BV	Pernis, Netherlands	406,000
17	BP PLC	Whiting, Ind.	405,000
18	Sinopec	Zhenhai, China	403,000
19	Saudi Arabian Oil Co. (Saudi Aramco)	Rabigh, Saudi Arabia	400,000
20	Saudi Aramco-Mobil	Yanbu, Saudi Arabia	400,000

Regional look at worldwide refining operations

Table 4

Region	No. of refineries	Crude distillation	Vacuum distillation	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Coke, tonnes/day
		b/cd						
Africa	45	3,278,382	507,904	205,765	458,427	61,754	824,066	1,841
Asia	156	22,214,251	4,239,486	2,782,289	2,001,722	806,628	9,105,145	20,200
Eastern Europe	91	10,343,580	3,903,261	928,865	1,474,382	330,392	4,287,893	12,570
Middle East	42	7,036,215	1,983,905	364,450	652,897	602,021	2,043,563	3,300
North America	155	20,956,687	9,250,456	6,605,784	4,254,003	1,863,560	16,022,974	123,293
South America	66	6,602,903	2,845,885	1,309,507	402,195	132,400	1,904,061	24,640
Western Europe	102	14,876,541	5,852,323	2,222,751	2,187,681	1,160,184	9,816,231	11,534
Total	**657**	**85,308,559**	**28,583,220**	**14,419,411**	**11,431,307**	**4,956,939**	**44,003,933**	**197,378**

US offshore LNG terminals face technical, political maze

Daron T. Threet
Sutherland Asbill & Brennan LLP
Washington

Experience to date with US offshore LNG projects teaches critical lessons and offers many clues for where the offshore LNG market is heading. And nowhere is that experience more vivid than in the files of the LNG Deepwater Ports Program at the Maritime Administration of the US Department of Transportation.

As the federal agency responsible for permitting offshore facilities, MARAD's looking glass offers one of the best predictors for how current and future proposals will shake out. The rest will be up to the marketplace (Fig. 1).

Over the past 4 years, commercial, environmental, and political factors have fundamentally shaped how projects are designed, as well as where terminals should be located to have the best opportunities for success.

What emerges is a shift from large, permanent or fixed designs that aim to emulate onshore facilities to smaller, more flexible and environmentally friendly designs that target markets where onshore facilities would be difficult, if not impossible to build.

A tale of two coasts sheds light on the current and future state of offshore LNG terminal siting in the US.

When Gov. Arnold Schwarzenegger in May 2007 denied BHP Billiton's application to construct a massive floating LNG terminal off California, he brought to an end more than 3 years of comprehensive federal and state review and extensive efforts by BHP to pursue the project.

The terminal, proposed for siting off Malibu, was heavily lobbied for by the Australian government on behalf of BHP and fiercely opposed by environmental interest groups, as well as several notable (and vocal) celebrities, worried about increased air and water pollution, the dangers of LNG fires, and a host of other issues.

Several months back, on the US East Coast, two offshore LNG projects met with a different fate. On Dec. 26, 2006, then-Gov. Mitt Romney approved applications from Northeast Gateway Energy Bridge, an affiliate of Excelerate Energy, and Neptune LNG LLC, an affiliate of Suez Energy North America, to construct two terminals off the coast of Boston. Concerns about the close proximity of the terminals to a sensitive marine sanctuary were overcome by small design footprints and extensive environmental mitigation measures, which enabled the projects to gain state and federal approval.

MARAD PERMITTING ACTIVITY

Fig. 1

Source: US Maritime Administration

Offshore realities

All things being equal, onshore terminals have advantages over current offshore designs. Onshore terminals have robust gas storage capabilities, use proven technologies, and have seamless compatibility with conventional LNG carriers. Many current offshore proposals, in contrast, offer no storage, rely on new technologies, and in some cases require use of specialized LNG vessels.

But offshore terminals, despite their current limitations, offer one crucial advantage over their onshore counterparts: They offer siting options in markets where onshore terminals may face insurmountable hurdles. This enables offshore terminals to target markets where new onshore facilities will not likely appear, including densely populated urban areas where safety concerns are high and real estate is limited.

This emerging trend, even reality, for offshore terminals to target niche markets is a departure from many of the original LNG projects that were planned for the US.

Big footprints

In 2002, following amendment of the Deepwater Port Act to include natural gas terminals, the first wave of project proposals were for facilities in the Gulf Coast that were designed primarily around the use of large gravity-based structures—"Texas Towers," in oil and gas parlance. The projects were designed to compete effectively with onshore facilities, with features including gas storage and the ability to accept shipments from conventional LNG carriers.

None of the proposed Texas Towers, it now appears, will likely be constructed in the gulf (Fig. 1). Their designs are capital intensive, with construction cost estimates that escalated significantly over time. In the case of Chevron's Port Pelican project, approved in 2004 by MARAD for siting 40 miles off Louisiana, cost estimates rose to well more than $1 billion from $700 million. Despite having the necessary approvals to proceed, Chevron suspended work and wrote off tens of millions in project costs.

Shell's permitted Gulf Landing project shared a similar fate, as the company announced in March 2007 its intent to suspend the project indefinitely. Two other similar projects—Exxon's Pearl Crossing and ConocoPhillips's Beacon Port—were cancelled by the companies during the permitting process.

The sole gulf gravity-based-structure survivor is a project sponsored by Freeport-McMoRan, Main Pass Energy Hub, which MARAD approved in January 2007. The project would involve the conversion of an existing sulfur-mining platform to a deepwater port. While the developer is actively pursuing the project, its future is unknown as, to date, no supplier has committed for capacity at Main Pass.

Other fixed terminals, known as floating storage and regasification units (FSRUs), have been proposed in the Gulf Coast (ConocoPhillip's Compass Port, for example) and along the coasts of California (the BHP project already

Excelerate Energy's Gulf Gateway Energy Bridge terminal lies 116 miles off Louisiana and began operating in March 2005 (Fig. 2; image from Excelerate Energy).

PROJECT REVIEW: WHO'S INVOLVED?

Agency	Role
Maritime Administration	Licensing agency
Coast Guard	Lead environmental; safety and operations
EPA	Environmental—air and water permits
Dept. of Commerce—NOAA Fisheries	Environmental—marine ecosystems
Dept. of Commerce—Nat'l. Ocean Service	Environmental—coastal zone management
Army Corps of Engineers	Environmental—water permits; waterways management
Dept. of Interior/Minerals Management Service	Subsea land resource management
Dept. of Defense	Military interests
Dept. of State	International interests
Dept. of Transportation—Pipelines and Hazardous Materials Safety Administration	Pipeline safety
Federal Energy Regulatory Commission	Third-party offshore pipelines; landside pipelines
Council on Environmental Quality	Energy policy; agency dispute resolution
Dept. of Energy	Energy policy; gas commodity regulation
Coastal state governor(s)	**Project veto authority**

TORP Technology's HiLoad unit floats in an L-shaped configuration while docking with a conventional LNG carrier (Fig. 3; image from TORP Technology).

noted), New York (the Broadwater project in Long Island Sound), and Florida (Suez's Calypso LNG). FSRUs are large, permanently moored floating facilities, which also have relatively high capital costs.

The high cost of the gravity-based structures and other fixed designs is and likely will remain a significant factor threatening the commercial viability of such offshore projects—in the gulf and in any other region where competitive onshore capacity exists. The gulf region features robust onshore capacity in the Trunkline LNG terminal in Lake Charles, La., as well as several other terminals under construction totaling about 15 bcfd of capacity by 2010.

East Coast exception?

Beyond the gulf, the jury is still out on the remaining fixed-structure projects.

On the East Coast, three projects that would use such designs are currently under review by regulators. Two of the projects are in the New York area, Broadwater Energy and Atlantic Sea Island Group's Safe Harbor Energy project.

Broadwater proposes to use an FSRU that would be permanently moored in Long Island Sound. Because the facility will be in state rather than federal waters, the Federal Energy Regulatory Commission has jurisdiction. The Safe Harbor Energy project, to be located south of Long Island, proposes to construct an about 60-acre artificial island to serve as an LNG terminal. The final terminal, Calypso LNG proposed by Suez, would lie off Fort Lauderdale, Fla., and would use an FSRU as part of its design.

What the future portends for these projects depends on how open state and local officials, as well as local citizens, will be to allowing large energy infrastructure projects off of their coasts. That may turn in large part on perceived environmental issues (discussed below). If the projects ultimately are approved, any higher costs associated with their designs could well be absorbed by providing natural gas supplies to the lucrative New York and Florida markets.

Small footprints

While the larger, more capital-intensive offshore designs have not materialized in the gulf and elsewhere, a totally different breed of offshore facility, with a novel design configuration, has been constructed in the gulf and shows promise for other markets. The first of this breed—Excelerate Energy's Gulf Gateway Energy Bridge terminal 116 miles off Louisiana—has been in operation since March 2005.

The design utilizes custom-built LNG vessels with onboard regasification equipment. The vessel connects to underwater pipelines through a buoy system that attaches to the underside of each ship (Fig. 2). This proven model has become the preferred design of many offshore project developers.

The design's imperceptible environmental footprint offers its premier advantage. When the buoy is not in use, it drops below the ocean surface, leaving what looks like a beach ball in place to tether the buoy. This key feature makes the design more palatable with the "Not in My Backyard" crowd, as the terminal is not a permanent fixture on the horizon.

The buoy terminal also has lower capital costs, depending in large part on the length of the pipelines needed to connect the terminal to the trunk pipeline, either onshore or offshore.

On the other hand, these facilities require the use of custom-built regasification ships that are significantly more costly than their conventional counterparts. But while the vessels' cost must be factored into the overall cost of the project, the ships can be redeployed in regular LNG trade if market prices at the buoy terminal market are less favorable than in alternate destinations.

Excelerate has relied on this flexibility, bringing only a handful of shipments into its Gulf Gateway facility since its christening but using its vessels in other international trade.

Another design that shares many of the same benefits as the vessel regasification-buoy system is the HiLoad system, currently under development by TORP Technology. The HiLoad unit is a floating L-shaped terminal that docks with conventional LNG carriers. Like the buoy systems, terminals utilizing the HiLoad system have a relatively

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Recently, Offshore's Editor, Eldon Ball, moderated a webcast presentation on the successful collaboration of DeepStar VIII and RPSEA (Research Partnership to Secure Energy for America). You can view the entire webcast online at www.offshore-mag.com.

The program identifies four generic Gulf of Mexico fields that frame current opportunities, facility requirements, operating limitations, and technical gaps that challenge developments today. These challenges have been matured and jointly prioritized by RPSEA and DeepStar experts into a promising ultra-deepwater program portfolio.

Presenters:

Christopher Haver
DeepStar Director

Chris received his degree in Metallurgical & Materials Engineering from California State Polytechnic University and has 17 years of experience with Unocal and Chevron. He has held positions in Brea, California as a Research Engineer at Unocal's Science and Technology Center; in Lafayette, Louisiana as an Operations Engineer; and in Houston, Texas in a variety of deep and shallow water Facilities Engineering roles. Chris' experience includes facilities design and operation in the Gulf of Mexico, Venezuela, Thailand and Indonesia. Chris has been focused on the Early Conceptual Phases of Major Capital Projects since the Unocal and Chevron merger. In his current position as DeepStar Director, Chris is responsible for leading the DeepStar Project and managing the RPSEA Ultra-Deepwater Technology Program. Chaver@chevron.com

Jim Chitwood
Chevron DeepStar Project Consultant

Mr. Chitwood is an offshore engineer and R&D consultant. His principal project since 1991 has been the Chevron DeepStar Project. The DeepStar consortium of 10 oil companies and 50+ service companies routinely extends deepwater production limits and is currently working on 10,000 ft water depth and marginal field development technologies.

Mr. Chitwood began his career in 1971 with Brown & Root on the BP Forties Development, after which he concentrated on subsea production systems at Vetco. He went on to acquire intervention and field service experience while he was employed with Comex SEAL. Since 1984, he has served as a consultant to the offshore industry. He has worked on many long-term projects for several Operators including Statoil, Shell, Chevron and ExxonMobil.

Mr. Chitwood has a Masters in Mechanical Engineering from Texas A&M University. He is a registered Engineer in the State of Texas and a member of ASME and SPE. He has several patents and has authored numerous technical papers.

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small footprint and can be sited far from shore (Fig. 3).

The smaller environmental footprint designs provide much greater flexibility in siting locations. Because the length of the pipeline is the main determining factor as to how far the terminals can be placed from shore, terminals can be sited very remotely, as is the case with Gulf Gateway.

Offshore terminals located away from densely populated areas and congested waterways can avoid many of the public safety and security concerns that increasingly have been raised by local governments, federal regulators, and members of the US Congress in recent months.

Limitations of 'smaller'

From a commercial perspective, remote siting means market access, as terminals can be placed far off the shores of high-value, high-demand markets, where siting new onshore facilities would be difficult, to say the least.

Smaller footprint terminal designs, however, have significant potential downsides. Many of the designs lack storage capabilities, preventing them from offering a steady baseload supply of gas. To achieve a baseload, two or three vessel shipments would be needed in close succession, which increases capital costs when custom-built vessels are required.

Another potential limitation is gas interchangeability of imported LNG. US domestic natural gas supply has generally been leaner than in European and Asian markets. As a result, LNG produced upstream may have to be treated or conditioned upon importation in order to be interchangeable with domestic natural gas to meet the specifications of FERC-approved tariffs for interstate pipelines.

Without storage or some means of onboard or in-tank mixing or blending, the offloaded gas must be pipeline quality, which potentially limits the available upstream gas supply sources. This limitation is particularly relevant in locations like the Mid-Atlantic and Northeast where there is little if any infrastructure to process incompatible upstream gas.

While smaller footprint terminals have great potential to reach new markets, the ability of developers to overcome commercial limitations may be the key as to whether these terminals will take hold and become part of a viable gas market in the US.

JURISDICTION—WHO'S IN CHARGE?

	Maritime Administration	Federal Energy Regulatory Commission
	Permitting of offshore terminals	Permitting of onshore terminals
	Permitting of pipelines owned by the project developer and constructed as part of the offshore terminal	Permitting of pipelines owned by third parties, and-or not constructed as part of the MARAD-approved offshore terminal

Regulatory tightrope

Finding the right market to locate an offshore terminal is only the beginning; significant barriers stand in the way of gaining regulatory approval to make the project a reality. For offshore terminals, the "800-lb gorilla," for better or for worse, comes in the form of the state governor's veto authority.

Under the federal Deepwater Port Act, the governor of each adjacent coastal state, which are usually states directly connected by pipeline or states within 15 miles of the terminal, has almost unfettered authority to veto projects and broad authority to impose conditions for approval. This places the governor (or governors) "in the catbird's seat," as Keith Lesnick, director of the Deepwater Ports Program at MARAD is apt to say.

Over the years, this veto authority has been used aggressively by governors to force project developers to make their projects as green as possible—or to deny projects for not being green enough. This power, coupled with the range of required federal approvals from the US Environmental Protection Agency, Army Corps of Engineers, and others, creates a strong current against which developers must swim to gain project approval.

By far, the main regulatory hurdles to project approval have been environmental issues. Project developers with any hope of success must design projects with environmentally benign technologies that can pass muster with both state and federal officials. This regulatory tightrope is best illustrated by the heated and ongoing debate regarding offshore regasification systems.

The regasification controversy originated in the Gulf Coast, where several developers planned to use "open-loop" (also known as "open-rack") regasification systems (Fig. 4). Open-loop systems use seawater as the heat source for regasification and can potentially harm marine life by trapping organisms in water intake screens and through thermal shock from discharged water that is colder than surrounding water. The main concern in the gulf is the perceived threat to fish populations, namely the Gulf Coast red drum.

The proposed use of open-loop systems created a firestorm. In an unlikely but massive undertaking, environmental activists, sports fisherman, local politicians, media groups, and other citizens formed a coalition known as the "Gumbo Alliance" that united in opposition to the technology.

The environmentalists sought to protect and rebuild fish populations in the gulf, which they believed would be threatened by the open-loop systems. The sport fishermen sought to protect fish, particularly the red drum, because they are a prized and favorite catch of Gulf Coast anglers.

While there were several projects embroiled in the open-loop controversy, the main battleground involved Freeport-McMoRan's proposed Main

Pass Energy Hub terminal.

Despite significant outreach efforts by Freeport-McMoRan and nods from MARAD, the Coast Guard, and EPA regarding open-loop technology, Gov. Kathleen Blanco (D-La.), under considerable public pressure, vetoed the Main Pass project on May 5, 2006, stating that she would "oppose the licensing of offshore LNG terminals that will use the open-rack vaporizer system."

Within the same month, Freeport-McMoRan, aggressively seeking project approval, amended its application to use a closed-loop regasification system. Closed-loop systems burn a portion of gas cargo to provide the heat source for regasification. The technology has minimal impact on marine life but increases air emissions from gas combustion. This move by Freeport ultimately paid off, as Gov. Blanco approved the redesigned facility on Nov. 20, 2006.

Blanco's veto had a cascading effect. Seeing the line drawn in the sand, ConocoPhillips withdrew its two pending Gulf Coast open-loop applications in the face of certain veto by Gov. Blanco and a likely veto by Gov. Bob Riley (R-Ala.).

The open-loop controversy is now in its last embers, as only one remaining facility—Torp Technology's Bienville Offshore Energy Terminal—proposes to use open-loop technology.

While the two recently approved Boston area terminals will use closed-loop systems, the State of California has not embraced the technology due to air emissions issues. As a result, several California projects have proposed new technologies that focus on minimizing air emissions.

Clearwater Port and Woodside Natural Gas plan to use ambient air systems, which use forced air as the heat source for regasification. Also, Esperanza Energy is currently developing a waste-heat-recovery system that would utilize water discharges piped from a nearby power plant to provide heat for regasification.

The regasification battles demonstrate, first, the power of the governor's veto to force projects to use more environmentally benign technologies. Secondly, and more importantly, they show that through innovation and flexibility on the part of developers, offshore terminals can be designed and configured to overcome environmental and other hurdles to gain regulatory approval.

Future

To increase the potential of offshore projects, developers must continue to push the envelope to refine project designs to overcome the commercial limitations and environmental concerns that are associated with many offshore proposals. Recent progress has been made, for instance, in pioneering ship-to-ship transfer technology that will enable regasification vessels to connect with conventional LNG carriers to offload cargo, expanding the universe of vessels that can call at such terminals.

While many of the current offshore project proposals, which utilize small environmental footprints and increasingly green technologies, have the potential to gain approval from local communities, regulators, and politicians, obstacles remain. If they can be overcome, this next wave of offshore terminals may open the door for LNG to serve commercially lucrative markets in the US. ✦

The author

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Pemex system integration improves crude management

Robert Jackson
National Instruments
Austin

Pemex used internal resources to design a cost-effective system based on open communication protocols and software to manage its crude oil inventory and track changes and fluctuations with real-time data across a large and disparate pipeline system.

Similar approaches could prove useful for any pipeline company seeking to integrate recently acquired assets into a preexisting system.

Background

Pemex Exploration and Production oversees the exploration, production, transportation, and commercialization of oil extracted in Mexico.

PEP's Southern Region transports and distributes about 1.52 million b/d of crude, 43% of national production, through roughly 1,500 km of 10-40-in. OD pipeline. Maintaining an accurate crude inventory inside this system is critical for both tracking and accounting.

PEP relies on electronic measurement systems, and as PEMEX has grown and acquired new reserves, PEP has integrated systems from a variety of vendors to measure daily crude inventory levels. Communication between these substations' systems was manual, making an accurate inventory level difficult to achieve.

Determining inventories

Technicians traveled from distribution centers to tank farms to pipeline stations taking measurements and relaying these data by phone and e-mail to central office systems. Every day 20 to 30 technicians collected temperature, pressure, flow, and level measurements and compiled digital readings from thermostats and pressostats. They then manually calculated density, viscosity, and the normalized volume according to API standard at 20° C.

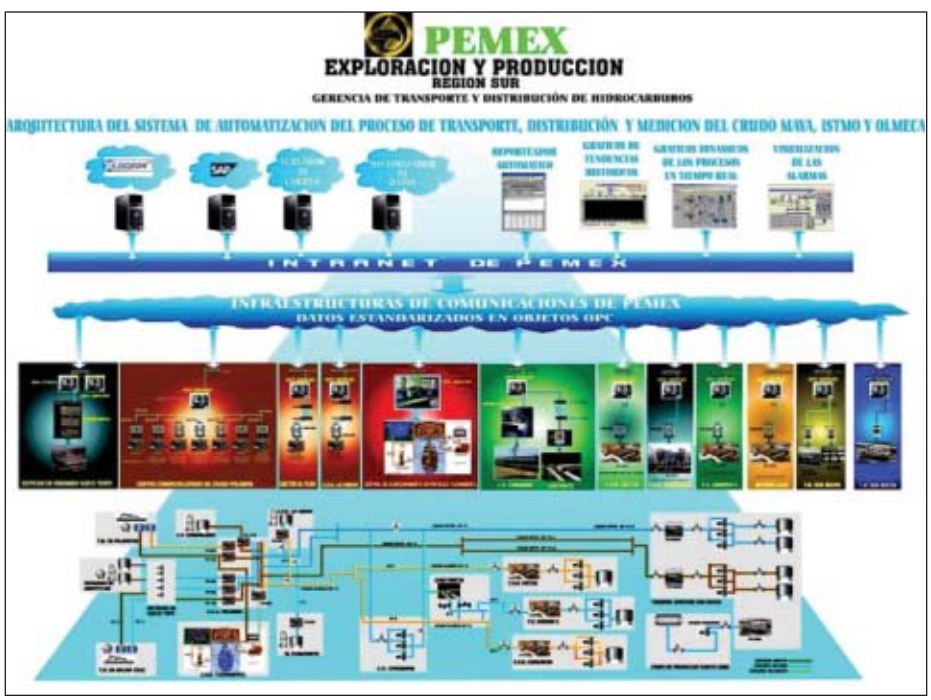
Technicians remotely collected data from 12 different substations spread across hundreds of miles of the Tuzandepetl and Nudo Cárdenas reservoirs, with capacity/cavity of about 900,000 bbl and more than 40 cavities in Tuzandepetl alone.

After collecting the oil in various tanks across the reservoir, PEP transfers it to the ports of Salina Cruz, Pajaritos, and Dos Bocas or to refineries in Cangrejera and La Vienta. Collecting measurements over the breadth of this process requires time and resources.

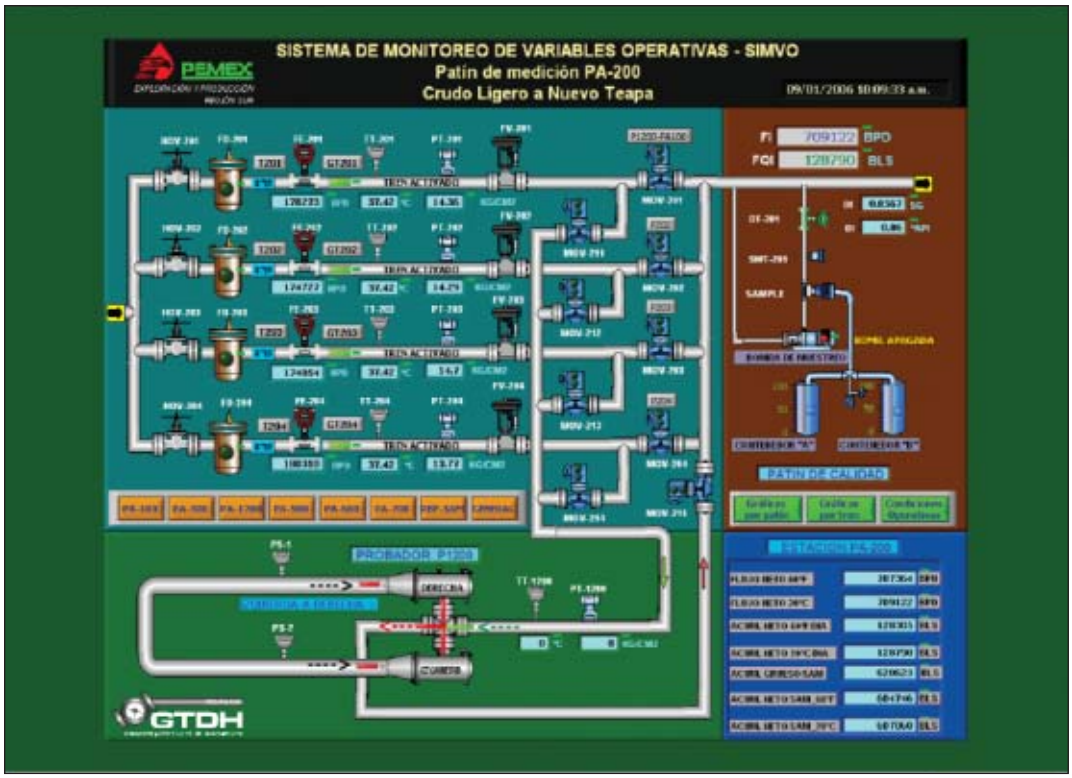
Morning to midafternoon time variations between technician measurements led to temperature fluctuations and constant inventory changes. PEP engineers realized Pemex needed a more integrated solution that preserved its hardware investment and provided access to distributed measurements across substations.

PEP defined the following requirements for a crude oil monitoring and management system, dubbing the system Monitoring System for Operating Variables:

- *Easy communication.* The system must easily link different communication networks through industrial protocols and standards.
- *Low cost.* Reducing project costs requires internal engineering development and support.
- *Existing infrastructure reuse.* Because measurement, control, and communication systems are already installed, SIMVO must reuse existing field equipment.
- *Network security.* An industrial net-



Integrating and automating Pemex Exploration and Production Southern Region's inventory management processes required connecting 12 different substations with different software applications to a single enterprise system (Fig. 1).



Pemex built LabVIEW panels such as this one for its crude oil monitoring and management system, SIMVO (Fig. 2).

work is required to protect the system from virus attacks, unauthorized personnel access, and version incompatibility.

System connectivity

Engineers began SIMVO development by programming each remote work station with LabVIEW software, standardizing the monitoring architecture. Each of the 12 work stations runs different object-linking and embedding for its process control server, depending on the connected device. Devices include the ROC 364 remote terminal unit (RTU), Omni 6000, and Daniel 2500 flow computers; Bristol DPC 3330 controllers; and a Foxboro I/A Series distributed control system. Engineers also used the OPC server to communicate to a Siemens Simatic S5 PLC controlling substation pumps and separators for in-line flow separation of oil and water.

Engineers then used a CP5613 Ethernet to PROFIBUS gateway from Siemens to interface to 12 RTUs and communicate through OPC servers to the software's data logging and supervisory control module. PEP created a uniform monitoring system despite each of the 12 substations having a different hydraulic design.

Supervisory application

PEP developed a DSC module application for each station displaying both real-time values and historical trends of the variables. Connecting these data to the PEP intranet allowed publishing variables on the network through the software's DSC module tag engine.

The PEP application relied on several communication protocols, including OPC, RS-232 custom serial drivers, and DCOMM.

Inventory system

PEP selected a graphical software environment to meet SIMVO requirements, evaluating several available packages and identifying the key features required by a distributed communication system, including:

- OPC server and client functionality.
- Graphical development environment.
- Built-in, open communications for e-mail alarms, report generation, and logging.

PEP used the software and its DSC module to implement an OPC server and client for communication with different field measurement devices and between monitoring stations. It reused existing infrastructure and connected to other PEMEX systems by using Ethernet between the substations, user interfaces, and enterprise systems.

The software's graphical environment made it easy to design and implement SIMVO in less than 3 months. Developing the project in house kept it under budget.

Application architecture

PEP developed the main SIMVO station to monitor all operating variables: more than 3,000 tags from the 12 local stations. The main station provides data logging to a Citadel database and visualization of historical values through graphs. PEP used the selected software environment to add integration to enterprise databases and automatically generate e-mail alarms and events.

Open environments

Pemex built a cost-effective system using standard technologies such as OPC and Ethernet and used an open software development environment to build serial drivers for connectivity to legacy devices. Open standards and software helped Pemex preserve its existing measurement system and move from manual to automatic data collection using the SIMVO it built with acquired software.

The previous manual system required daily support from 20-30 people

for data collection and reporting. The new system achieves the same ends using three to five people monitoring the automatic system and managing maintenance schedules and alarms.

The system measures temperatures, pressure, and inventory levels at 05:00 daily, calculates on-hand crude inventory, and transfers the data to the central office.

PEP used OPC and DCOMM encryption to protect the system from virus attacks and unauthorized access.

The first deployment phase to the 12 substations yielded several benefits. Real-time data from distributed measurement devices helped management make quicker decisions. Having all information centralized in a computerized format improved communication between the different supply and distribution centers.

Daily reports resulted in definable business improvements. A measurement error as low as 1% using the previous system represented a daily potential miscalculation of $1 million of crude oil inventory.

Future plans

Based on results since the first-quarter 2006 connection of the first 12 substations, PEMEX has decided to add more stations to the monitoring network and extend it to areas such as gas distribution. ✦

The author

Robert Jackson is a programmable automation controller and human-machine interface product manager for National Instruments. He also serves as energy, oil, and gas marketing manager. Jackson joined NI in July 2002 and holds a BS in chemical engineering from Oklahoma State University in Stillwater.

New one-piece downhole jet pump

Here's the new one-piece Tex-Jet downhole pump, a unit that features no moving parts and is made of 4140 heat treated, stressed relieved steel. It's available in sizes of ¾ in. to 3½ in.

The jet pump assembly includes this unit interposed between a tubing string and a packer. It requires a fluid separator and compressor for complete operation.

In operation, compressed gas is injected into the annulus formed between the casing and the tubing string. The compressed gas forces the hydrostatic column of fluid above the packer through the angled inlet ports of the pump. It is forced into the upper tubular end and the tubing string where the compressed gas mixes with the production fluid that has been pulled up through the production ports by the compressed gas.

The mixed fluids travel up the tubing string to the surface. At the surface, the fluid exits the tubing string and is passed to the flowline and is introduced into the fluid separator. When fluid begins entering the separator, the jet pump assembly reaches a breakover point, creating suction on the wellbore. In general, 0.5 lb of pressure per foot of fluid column to be lifted is required. Once breakover point is achieved, the discharge line pressure generally drops to 125-150 psi of working pressure. Tex-Jet works in a range of depths of wells, straight wells, or deviated wells and is tolerant of sand, fines, and scale.

Source: **Clem Energy,** Box 2085, 4485 FM 933, Whitney, TX 76692.

New line of enclosures for oil field operations

A new line of rugged enclosures is engineered for applications such as monitoring drilling rigs, compiling and processing seismic data, and maintaining pipelines.

Shielded from extreme conditions in temperature, contaminants, moisture, vibration, and radiated or emitted electrical noise, the enclosures help ensure that critical computing applications operate reliably, with minimum repairs and downtime, the company notes.

Source: **Carlo Gavazzi Computing Solutions,** 10 Mupac Drive, Brockton, MA 02301.

Imports of crude and products

	Districts 1-4 12-7 2007	Districts 1-4 11-30 2007	District 5 12-7 2007	District 5 11-30 2007	Total US 12-7 2007	Total US 11-30 2007	Total US *12-8 2006
	1,000 b/d						
Total motor gasoline	888	1,107	97	62	985	1,169	967
Mo. gas. blending comp.	505	645	59	62	564	707	573
Distillate	176	299	—	—	176	299	465
Residual	336	331	—	19	336	350	246
Jet fuel-kerosine	87	84	59	156	146	240	247
Propane-propylene	230	174	11	36	241	210	184
Other	1,001	820	(11)	4	990	824	635
Total products	**3,223**	**3,460**	**215**	**339**	**3,438**	**3,799**	**3,317**
Total crude	**8,694**	**8,355**	**1,369**	**1,019**	**10,063**	**9,374**	**9,598**
Total imports	**11,917**	**11,815**	**1,584**	**1,358**	**13,501**	**13,173**	**12,915**

*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

	*12-14-07	*12-15-06	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	101.36	70.80	30.56	43.2
Brent crude	92.02	62.40	29.62	47.5
Crack spread	9.33	8.40	0.94	11.2
FUTURES MARKET PRICES				
One month				
Product value	102.05	70.63	31.42	44.5
Light sweet crude	91.16	61.91	29.25	47.2
Crack spread	10.89	8.72	2.17	24.9
Six month				
Product value	104.56	77.89	26.67	34.2
Light sweet crude	90.11	65.41	24.70	37.8
Crack spread	14.45	12.48	1.98	15.8

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

Purvin & Gertz LNG netbacks—Dec. 14, 2007

Receiving terminal	Liquefaction plant: Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	7.30	5.52	6.85	5.41	6.16	6.77
Everett	5.78	3.57	5.39	3.64	4.17	6.09
Isle of Grain	9.62	7.22	9.06	7.10	7.88	8.92
Lake Charles	4.54	2.57	4.30	2.74	3.01	5.20
Sodegaura	5.54	7.88	5.79	7.56	6.82	4.82
Zeebrugge	7.21	4.97	6.53	4.88	5.55	6.54

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: Total	Motor gasoline: Blending comp.[1]	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 bbl						
PADD 1	12,736	52,740	24,933	9,003	57,731	15,248	5,114
PADD 2	63,423	48,666	16,475	7,892	26,983	1,140	21,494
PADD 3	158,647	66,046	30,181	12,671	30,983	16,749	30,051
PADD 4	14,807	5,566	1,575	533	3,066	301	[1]2,984
PADD 5	54,905	29,223	22,990	9,765	12,771	6,084	—
Dec. 7, 2007	**304,518**	**202,241**	**96,154**	**39,864**	**131,534**	**39,522**	**59,643**
Nov. 30, 2007	**305,240**	**200,623**	**95,231**	**39,939**	**132,344**	**38,033**	**60,968**
Dec. 8, 2006[2]	**335,430**	**199,857**	**89,089**	**38,621**	**131,914**	**42,707**	**66,781**

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

Refinery report—Dec. 7, 2007

District	Refinery operations: Gross inputs	Refinery operations: Crude oil inputs	Refinery output: Total motor gasoline	Refinery output: Jet fuel, kerosine	Refinery output: Fuel oils: Distillate	Refinery output: Fuel oils: Residual	Refinery output: Propane-propylene
	1,000 b/d						
PADD 1	1,555	1,580	1,793	95	537	144	65
PADD 2	3,217	3,190	2,059	234	950	63	209
PADD 3	7,343	7,233	3,569	746	2,043	285	772
PADD 4	541	527	295	24	172	14	[1]173
PADD 5	2,820	2,748	1,439	453	532	183	—
Dec. 7, 2007	**15,476**	**15,278**	**9,115**	**1,552**	**4,234**	**689**	**1,219**
Nov. 30, 2007	**15,606**	**15,450**	**9,092**	**1,461**	**4,345**	**697**	**1,156**
Dec. 8, 2006[2]	**15,495**	**15,311**	**9,283**	**1,484**	**4,038**	**630**	**1,085**
	17,436 operable capacity		**88.8% 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 12-12-07	Pump price* 12-12-07	Pump price 12-13-06
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	265.5	305.2	220.3
Baltimore	258.2	300.1	200.7
Boston	256.0	297.9	221.0
Buffalo	255.2	315.3	244.4
Miami	265.1	315.4	243.0
Newark	255.0	287.9	214.4
New York	241.0	301.1	235.0
Norfolk	255.3	292.9	215.0
Philadelphia	252.4	303.1	238.0
Pittsburgh	253.4	304.1	226.9
Wash., DC	264.2	302.6	230.6
PAD I avg.	256.5	302.3	228.1
Chicago	274.7	325.6	274.5
Cleveland	254.3	300.7	223.7
Des Moines	251.5	291.9	217.9
Detroit	255.1	304.3	229.7
Indianapolis	254.0	299.0	227.6
Kansas City	248.0	284.0	216.7
Louisville	256.5	293.4	221.7
Memphis	254.0	293.8	213.6
Milwaukee	244.9	296.2	237.7
Minn.-St. Paul	253.0	293.4	222.8
Oklahoma City	248.6	284.0	209.5
Omaha	240.0	286.4	223.9
St. Louis	257.1	293.1	217.7
Tulsa	244.9	280.3	208.6
Wichita	243.2	286.6	219.7
PAD II avg.	252.0	294.2	224.3
Albuquerque	259.3	295.7	224.3
Birmingham	253.2	291.9	225.9
Dallas-Fort Worth	248.3	286.7	218.5
Houston	246.0	284.4	213.3
Little Rock	253.7	293.9	222.7
New Orleans	254.8	293.2	220.1
San Antonio	242.8	281.2	217.0
PAD III avg.	251.2	289.6	220.3
Cheyenne	258.2	290.6	217.7
Denver	260.5	300.9	212.7
Salt Lake City	258.0	300.9	227.8
PAD IV avg.	258.9	297.6	219.4
Los Angeles	270.4	328.9	244.8
Phoenix	254.8	292.2	224.7
Portland	270.3	313.6	242.9
San Diego	278.9	337.4	249.8
San Francisco	294.3	352.8	267.8
Seattle	269.5	321.9	263.6
PAD V avg.	273.0	324.5	248.9
Week's avg.	**256.5**	**300.1**	**227.8**
Nov. avg.	**264.0**	**307.6**	**223.7**
Oct. avg.	**237.3**	**280.9**	**228.0**
2007 to date	**234.3**	**277.9**	—
2006 to date	**213.3**	**256.9**	—

*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

	12-7-07 ¢/gal		12-7-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	225.70	New York Harbor	249.50
Gulf Coast	219.70	Gulf Coast	242.50
Los Angeles	233.70	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	220.11	ARA	249.70
Singapore	232.14	Singapore	244.29
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	225.70	New York Harbor	166.60
Gulf Coast	220.20	Gulf Coast	162.74
Los Angeles	235.70	Los Angeles	210.13
		ARA	174.17
		Singapore	173.95

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

BAKER HUGHES RIG COUNT

	12-14-07	12-15-06
Alabama	4	5
Alaska	10	9
Arkansas	46	35
California	39	33
Land	37	30
Offshore	2	3
Colorado	113	90
Florida	0	0
Illinois	0	0
Indiana	2	0
Kansas	15	13
Kentucky	8	8
Louisiana	160	187
N. Land	58	60
S. Inland waters	27	21
S. Land	27	40
Offshore	48	66
Maryland	1	0
Michigan	1	2
Mississippi	10	17
Montana	12	20
Nebraska	0	0
New Mexico	77	91
New York	5	10
North Dakota	51	35
Ohio	13	10
Oklahoma	196	177
Pennsylvania	19	19
South Dakota	0	1
Texas	885	781
Offshore	11	10
Inland waters	2	4
Dist. 1	19	18
Dist. 2	36	23
Dist. 3	74	61
Dist. 4	84	96
Dist. 5	185	144
Dist. 6	123	124
Dist. 7B	38	36
Dist. 7C	57	48
Dist. 8	115	97
Dist. 8A	25	27
Dist. 9	43	37
Dist. 10	73	56
Utah	38	45
West Virginia	36	32
Wyoming	70	87
Others—NV-3; TN-6; VA-4	13	9
Total US	**1,824**	**1,716**
Total Canada	**419**	**497**
Grand total	**2,243**	**2,213**
Oil rigs	342	278
Gas rigs	1,477	1,433
Total offshore	61	81
Total cum. avg. YTD	**1,767**	**1,646**

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	12-14-07 Percent footage*	Rig count	12-15-06 Percent footage*
0-2,500	61	6.5	46	—
2,501-5,000	116	60.3	112	49.1
5,001-7,500	219	23.7	219	18.2
7,501-10,000	460	1.3	424	3.3
10,001-12,500	438	4.1	412	2.6
12,501-15,000	268	—	256	0.3
15,001-17,500	122	—	121	0.8
17,501-20,000	66	—	80	—
20,001-over	34	—	34	—
Total	**1,784**	**8.4**	**1,704**	**7.1**
INLAND	34		32	
LAND	1,700		1,613	
OFFSHORE	50		59	

*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]12-14-07	[2]12-15-06
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	20
Alaska	658	733
California	648	681
Colorado	50	59
Florida	5	5
Illinois	29	27
Kansas	94	94
Louisiana	1,387	1,318
Michigan	14	14
Mississippi	49	48
Montana	95	99
New Mexico	175	164
North Dakota	108	114
Oklahoma	164	176
Texas	1,363	1,342
Utah	44	49
Wyoming	143	147
All others	60	68
Total	**5,101**	**5,158**

[1]OGJ estimate. [2]Revised.

Source: Oil & Gas Journal.
Data available in OGJ Online Research Center.

US CRUDE PRICES

$/bbl*	12-14-07
Alaska-North Slope 27°	78.19
South Louisiana Sweet	91.75
California-Kern River 13°	78.75
Lost Hills 30°	87.25
Southwest Wyoming Sweet	82.77
East Texas Sweet	87.25
West Texas Sour 34°	80.25
West Texas Intermediate	87.75
Oklahoma Sweet	87.75
Texas Upper Gulf Coast	84.25
Michigan Sour	80.75
Kansas Common	86.75
North Dakota Sweet	82.50

*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]	12-7-07
United Kingdom-Brent 38°	90.63
Russia-Urals 32°	85.99
Saudi Light 34°	86.90
Dubai Fateh 32°	84.11
Algeria Saharan 44°	90.85
Nigeria-Bonny Light 37°	91.58
Indonesia-Minas 34°	92.75
Venezuela-Tia Juana Light 31°	84.63
Mexico-Isthmus 33°	84.52
OPEC basket	87.91
Total OPEC[2]	86.83
Total non-OPEC[2]	84.78
Total world[2]	85.91
US imports[3]	81.95

[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]

	12-7-07	11-30-07	12-7-06	Change, %
	bcf			
Producing region	1,010	1,045	963	4.9
Consuming region east	1,831	1,932	1,866	–1.9
Consuming region west	453	463	433	4.6
Total US	**3,294**	**3,440**	**3,262**	**1.0**
	Sept. 07	**Sept. 06**	**Change, %**	
Total US[2]	**3,316**	**3,323**	**–0.2**	

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

Statistics

WORLD OIL BALANCE

	2007 2nd qtr.	2007 1st qtr.	2006 4th qtr.	2006 3rd qtr.	2006 2nd qtr.	2006 1st qtr.
	Million b/d					
DEMAND						
OECD						
US & Territories	20.97	21.07	21.09	21.25	20.91	20.91
Canada	2.28	2.34	2.26	2.28	2.20	2.26
Mexico	2.07	2.05	2.00	1.96	1.98	2.05
Japan	4.61	5.39	5.29	4.75	4.72	5.89
South Korea	2.12	2.35	2.32	2.04	2.04	2.29
France	1.85	1.97	1.95	1.93	1.87	2.09
Italy	1.67	1.69	1.71	1.68	1.65	1.89
United Kingdom	1.78	1.80	1.81	1.78	1.82	1.91
Germany	2.40	2.39	2.71	2.75	2.59	2.60
Other OECD Europe	7.21	7.37	7.46	7.43	7.21	7.40
Australia & New Zealand	1.07	1.09	1.10	1.07	1.06	1.06
Total OECD	**48.03**	**49.51**	**49.70**	**48.92**	**48.05**	**50.35**
NON-OECD						
China	7.62	7.43	7.53	7.24	7.30	7.02
FSU	4.40	4.54	4.43	4.23	4.25	4.41
Non-OECD Europe	0.78	0.84	0.78	0.73	0.77	0.83
Other Asia	8.71	8.62	8.73	8.45	8.62	8.53
Other non-OECD	14.93	14.66	14.47	14.71	14.43	14.20
Total non-OECD	**36.44**	**36.09**	**35.94**	**35.36**	**35.37**	**34.99**
TOTAL DEMAND	**84.47**	**85.60**	**85.64**	**84.28**	**83.42**	**85.34**
SUPPLY						
OECD						
US	8.53	8.43	8.40	8.38	8.34	8.20
Canada	3.33	3.42	3.39	3.31	3.16	3.29
Mexico	3.61	3.59	3.52	3.71	3.79	3.81
North Sea	4.48	4.80	4.76	4.51	4.71	5.11
Other OECD	1.54	1.50	1.55	1.55	1.44	1.43
Total OECD	**21.49**	**21.74**	**21.62**	**21.46**	**21.44**	**21.84**
NON-OECD						
FSU	12.60	12.61	12.48	12.26	12.07	11.81
China	3.96	3.92	3.81	3.85	3.87	3.85
Other non-OECD	11.80	11.40	11.73	11.91	11.70	11.52
Total non-OECD, non-OPEC	**28.36**	**27.93**	**28.02**	**28.02**	**27.64**	**27.18**
OPEC*	**34.58**	**34.51**	**34.97**	**35.66**	**35.19**	**35.36**
TOTAL SUPPLY	**84.48**	**84.18**	**84.61**	**85.14**	**84.27**	**84.38**
Stock change	**–0.04**	**–1.42**	**–1.03**	**0.86**	**0.85**	**–0.96**

*Includes Angola.
Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

OECD TOTAL NET OIL IMPORTS

	Aug. 2007	July 2007	June 2007	Aug 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	–1,207	–1,121	–993	–933	–214	21.6
US	12,119	12,173	12,180	13,442	–1,323	–9.8
Mexico	–1,406	–1,609	–1,501	–1,773	367	–20.7
France	1,831	1,790	1,685	1,923	–92	–4.8
Germany	2,249	2,098	2,085	2,426	–177	–7.3
Italy	1,717	1,655	1,688	1,529	188	12.3
Netherlands	1,029	1,027	903	969	60	6.2
Spain	1,674	1,621	1,476	1,519	155	10.2
Other importers	3,915	3,953	3,746	3,887	28	0.7
Norway	–2,332	–2,138	–1,955	–2,526	194	–7.7
United Kingdom	465	–6	–206	318	147	46.2
Total OECD Europe	**10,548**	**10,000**	**9,422**	**10,045**	**503**	**5.0**
Japan	4,933	4,917	4,849	5,091	–158	–3.1
South Korea	1,848	2,270	2,125	2,140	–292	–13.6
Other OECD	769	869	954	864	–95	–11.0
Total OECD	**27,604**	**27,499**	**27,036**	**28,816**	**–1,212**	**–4.2**

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

OECD* TOTAL GROSS IMPORTS FROM OPEC

	Aug. 2007	July 2007	June 2007	Aug. 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	394	439	435	408	–14	–3.4
US	6,106	5,727	6,119	6,273	–167	–2.7
Mexico	35	10	21	—	35	—
France	844	815	786	984	–140	–14.2
Germany	500	567	499	510	–10	–2.0
Italy	1,336	1,237	1,265	1,227	109	8.9
Netherlands	644	759	491	719	–75	–10.4
Spain	667	629	770	790	–123	–15.6
Other importers	1,266	1,100	978	1,276	–50	–3.9
United Kingdom	404	310	247	329	75	22.8
Total OECD Europe	**5,621**	**5,417**	**5,036**	**5,835**	**–214**	**–3.7**
Japan	4,229	4,233	4,023	4,540	–311	–6.9
South Korea	2,116	2,363	2,364	2,485	–369	–14.8
Other OECD	842	727	735	629	213	33.9
Total OECD	**19,343**	**18,916**	**18,733**	**20,170**	**–827**	**–4.1**

*Organization for Economic Cooperation and Development.
Source: DOE International Petroleum Monthly
Data available in OGJ Online Research Center.

US PETROLEUM IMPORTS FROM SOURCE COUNTRY

	Aug. 2007	July 2007	Average YTD 2007	Average YTD 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	1,000 b/d					
Algeria	827	730	736	643	93	14.5
Angola	412	404	538	507	31	6.1
Kuwait	139	202	194	165	29	17.6
Nigeria	1,208	906	1,073	1,146	–73	–6.4
Saudi Arabia	1,499	1,436	1,450	1,452	–2	–0.1
Venezuela	1,330	1,386	1,356	1,467	–111	–7.6
Other OPEC	691	663	641	173	468	270.5
Total OPEC	**6,106**	**5,727**	**5,988**	**5,553**	**435**	**7.8**
Canada	2,510	2,360	2,426	2,328	98	4.2
Mexico	1,474	1,611	1,579	1,787	–208	–11.6
Norway	112	137	158	209	–51	–24.4
United Kingdom	174	369	302	296	6	2.0
Virgin Islands	320	372	326	316	10	3.2
Other non-OPEC	2,903	3,101	2,802	3,384	–582	–17.2
Total non-OPEC	**7,493**	**7,950**	**7,593**	**8,320**	**–727**	**–8.7**
TOTAL IMPORTS	**13,599**	**13,677**	**13,581**	**13,873**	**–292**	**–2.1**

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

OIL STOCKS IN OECD COUNTRIES*

	Aug. 2007	July 2007	June 2007	Aug. 2006	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million bbl					
France	187	187	186	198	–11	–5.6
Germany	280	282	286	281	–1	–0.4
Italy	134	132	133	133	1	0.8
United Kingdom	104	102	101	98	6	6.1
Other OECD Europe	668	671	661	665	3	0.5
Total OECD Europe	**1,373**	**1,374**	**1,367**	**1,375**	**–2**	**–0.1**
Canada	198	192	186	179	19	10.6
US	1,718	1,735	1,729	1,763	–45	–2.6
Japan	635	627	618	641	–6	–0.9
South Korea	157	165	158	159	–2	–1.3
Other OECD	106	108	112	107	–1	–0.9
Total OECD	**4,187**	**4,201**	**4,170**	**4,224**	**–37**	**–0.9**

*End of period.
Source: DOE International Petroleum Monthly Report
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See website for Table of Contents and sample tables, charts and graphs.

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Some dislike oil companies; some just dislike oil

While battling recently against misguided energy legislation, a veteran oil and gas industry representative observed, "They're trying to put us out of business."

Although the industry dodged the worst of what its opponents in Congress proposed in the latest fight, it remains a popular target for political punishment.

Oil companies and the associations that represent them in Washington, DC, need to give systematic thought to repeated efforts to put them out of business.

It's not enough to whine about being misunderstood. It's not enough to think public education alone will solve the problem. Attitudes must be changed. The job is difficult.

It can be useful to start by distinguishing between two factors of antagonism toward the oil and gas industry: Some people dislike oil companies. Some people just dislike oil.

Among people who dislike oil companies are those who hate corporations, especially large ones, in general. Antagonism from this group is constant, but the group itself probably isn't large.

In a much larger group are the people who dislike oil companies when prices of oil products are high and when, therefore, oil-company profits also are high. Antagonism from this group subsides when oil prices fall.

Oil companies should find ways to turn the cyclicality of this source of antagonism to its advantage. It should at least expect trouble from the public and politicians when oil prices jump and act preemptively with its public relations and advertising.

People who just dislike oil are, like corporation-haters, a constant source of antagonism. Most are environmental activists. Without blushing, they will argue against oil and gas leasing of federal land because the activity might lead to the burning of hydrocarbons.

Many oil haters probably are corporation haters, too. Both groups are beyond enlightenment.

The remaining group, though, deserves attention. It encompasses haters of oil companies who do not also hate oil as a substance or corporations in general.

The hatred of these people correlates with oil prices and oil-company profits and therefore, unlike that of the other group, can be dealt with if the industry will make the effort.

(Online Dec. 15, 2007; author's e-mail: bobt@ogjonline.com)

The Editor's Perspective

by Bob Tippee, Editor

Market Journal

by Sam Fletcher, Senior Writer

Economic factors whiplash energy prices

The January crude contract for US light, sweet crudes climbed to $94.85/bbl Dec. 12 on the New York Mercantile Exchange before closing at $94.39/bbl, up $4.37 in the biggest 1-day gain since Jan. 30 and the highest closing since Nov. 27, after the US Federal Reserve said it would make $24 billion available to European central banks to spur economic growth.

Goldman Sachs Group Inc., the world's largest securities firm, raised its 2008 oil price prediction to $95/bbl from $85/bbl for benchmark US crude and predicted crude may hit $105/bbl before 2009. Analysts figure higher investment costs and weaker demand will cause producers to curtail supply.

However, the January NYMEX contract fell to $92.25/bbl Dec. 13 then slipped to $91.27/bbl Dec. 14 in a combination of profit-taking and renewed concern about an economic slowdown.

The Department of Labor said US consumer prices jumped 0.8% in November, the biggest increase in more than 2 years driven by higher energy costs. Meanwhile, the US dollar rose to a 7-week high Dec. 14 after earlier plumbing record lows against other key currencies. As a result, crude is not only challenging gold as a financial hedge against inflation but is now also challenging it as a hedge against the dollar's weakness, said analysts with the Societe Generale Group in Paris.

Financial market outlook

"Historically, the correlation between the oil price and the US dollar has always been weak," SGG reported in its December commodities review. However, it said, "Since the start of 2007, this correlation, and more precisely the euro and US dollar vs. the oil price, has increased to reach a record high recently. While a weakening of the US dollar gives a natural incentive to European and Asian oil consumers to hedge more to capture this foreign exchange effect, we are convinced that this traditional relationship does not suffice to explain the recent surge in the correlation."

The foreign exchange (forex) market for international currencies is the largest financial market in the world, trading more than $3 trillion/day. The higher the price of oil, the more US dollar reserves are accumulated by central banks and sovereign wealth funds that manage national investments of oil exporting countries. A weak dollar gives foreign oil-producing countries more incentive to exchange it for other currencies to diversify their exposure in both forex reserves and investments.

But now that the correlation has become so obvious, SGG analysts said, "The causality may have been reversed for the last few months, with some investors trading it exactly the same way they have traded the gold and dollar correlation." They said. "While gold has confirmed its status as the best hedge against US dollar depreciation, it is facing stiff competition as the best hedge against inflationary pressure. This results from the perception that the current inflation trend is fueled by commodity price increases, in particular energy and food prices. This would explain why gold, oil, and grains have performed so well since October while base metals, US natural gas, and other soft commodities have underperformed."

SGG "does not expect the subprime crisis fears to recede significantly before the second half of 2008, opening then the door to rate hikes on both sides of the Atlantic. Not only should this return to more restrictive monetary policies temper inflation pressures but it should also trigger a trend reversal in the US dollar. In short, the financial outlook is expected to remain favorable for commodities until the third quarter of 2008, which partly explains our more pronounced bearish price forecasts for the second half."

SGG analysts foresee a slight decrease in oil demand within the Organization for Economic Cooperation and Development, with growth coming primarily from China and the Middle East. The increase in the marginal cost of crude production has been "spectacular over the last 5 years" but should moderate over the next 5 as shortages of staff and equipment ease. Analysts at SGG said, "The key feature for 2008 should be the strengthening of the linkage between the US and European natural gas markets. Indeed, while LNG still represents a small component of US supply, it is about to represent the marginal molecule driving the price discovery mechanism on both sides of the Atlantic. However, US natural gas is potentially the commodity that could suffer the most from the subprime crisis and its impact on the US economy, and we therefore see Henry Hub, Okla., [gas spot market] prices averaging the same level as in 2007 ($7.10/MMbtu)."

(Online Dec. 17, 2007; author's e-mail: samf@ogjonline.com)

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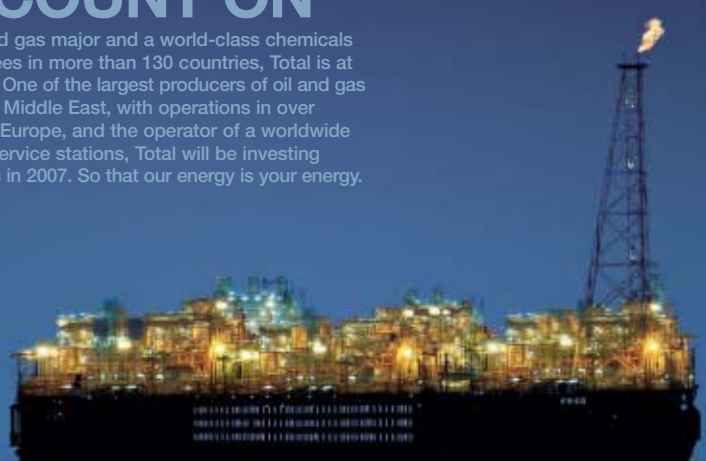

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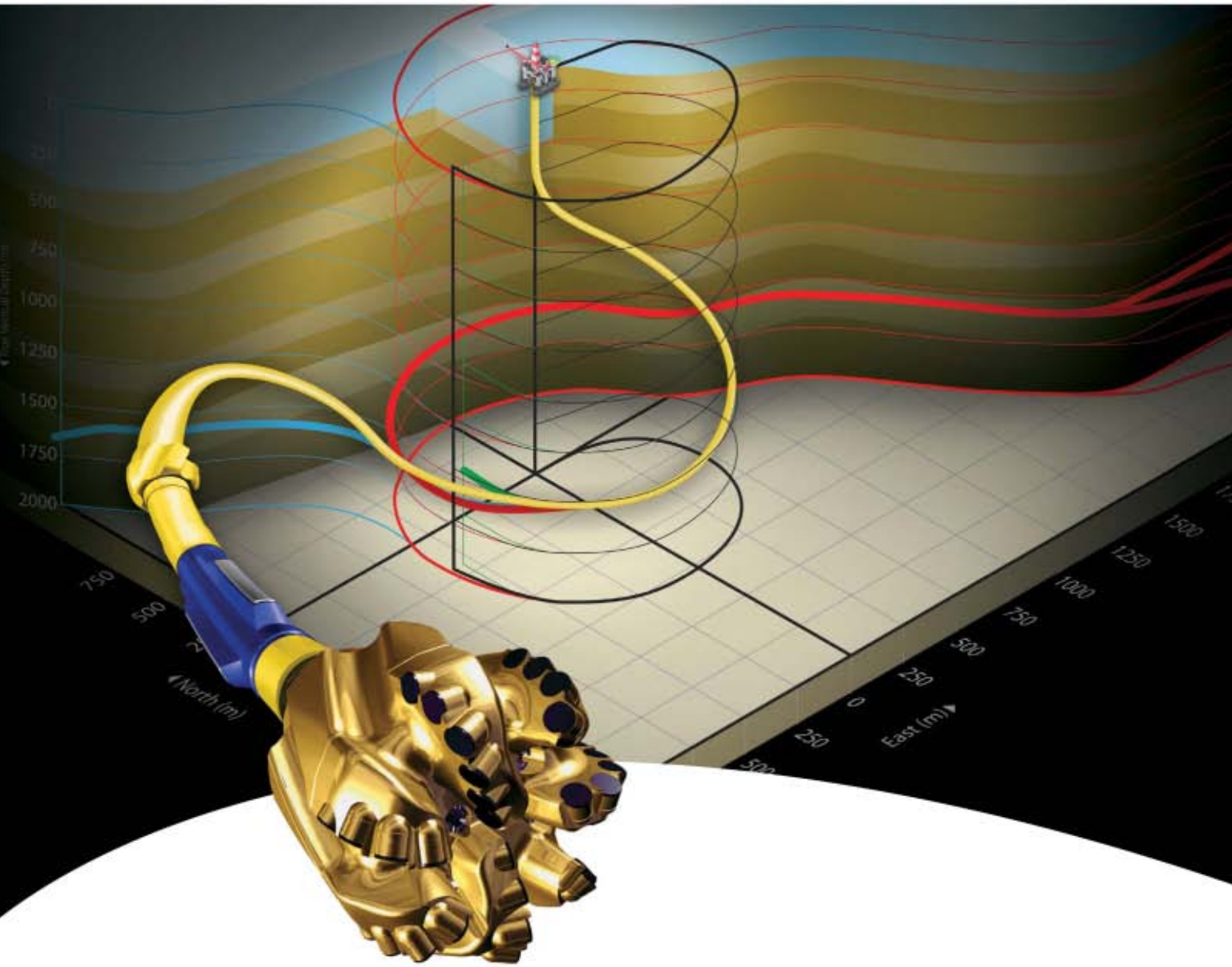

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