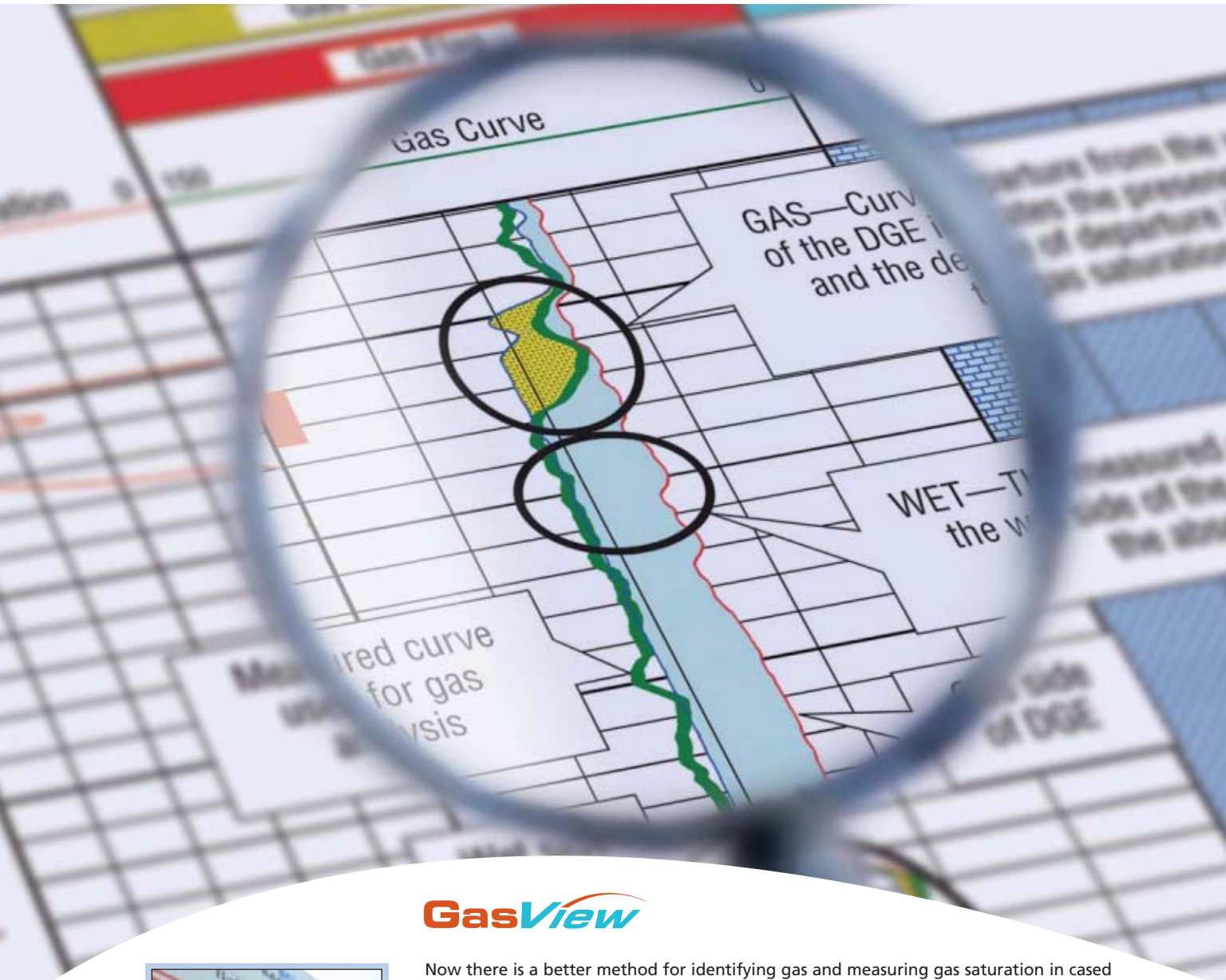
Focusing on Gas?



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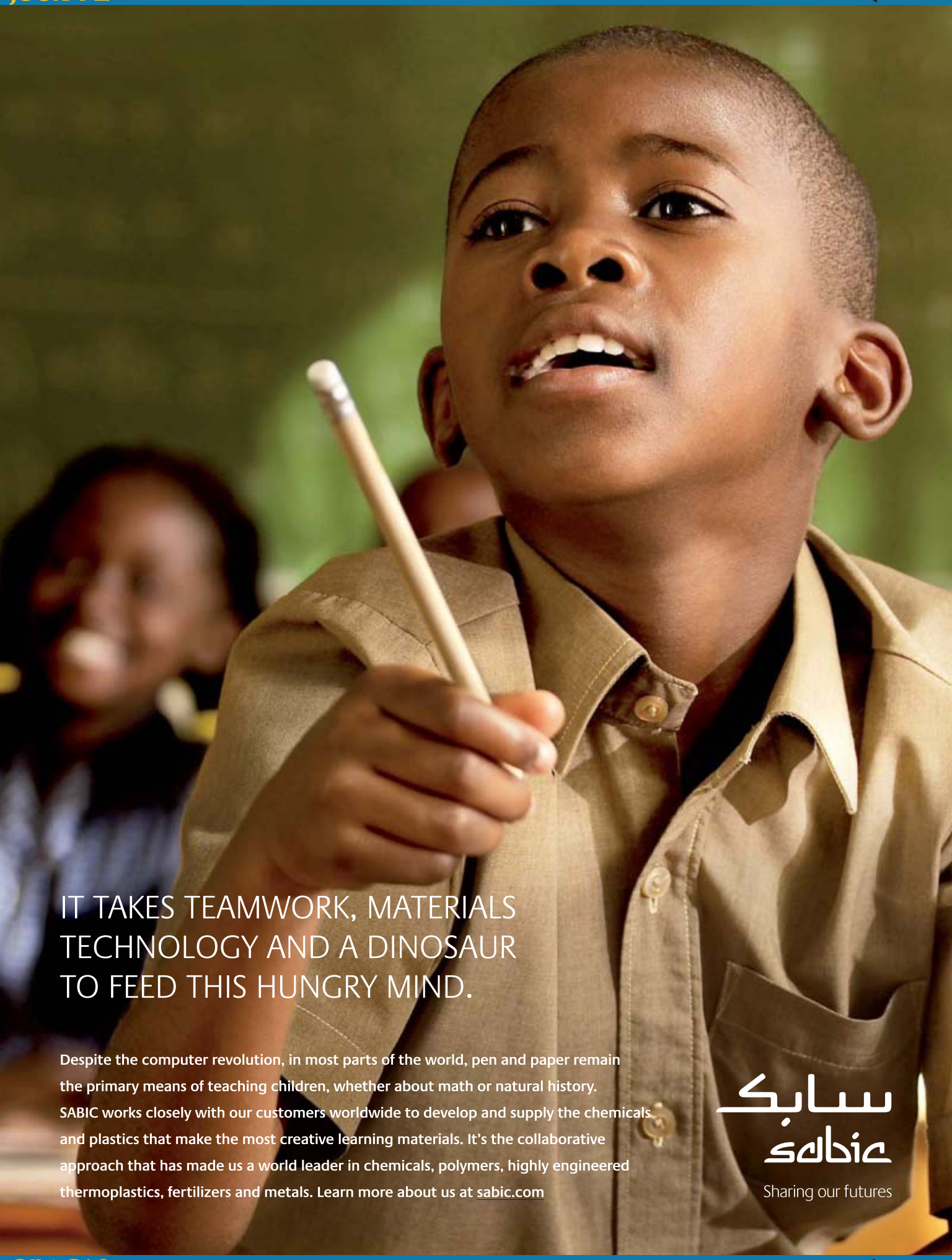
Middle East Processing Trends

Supplier-user teamwork key to stable oil price
Maverick fracs unlock gas in Pearsall shale
Study evaluates storage-tank VOC emissions reduction
LNG emerges as Pakistani natgas supply alternative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OIL&GAS JOURNAL®

Aug. 25, 2008
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MIDDLE EAST PROCESSING TRENDS

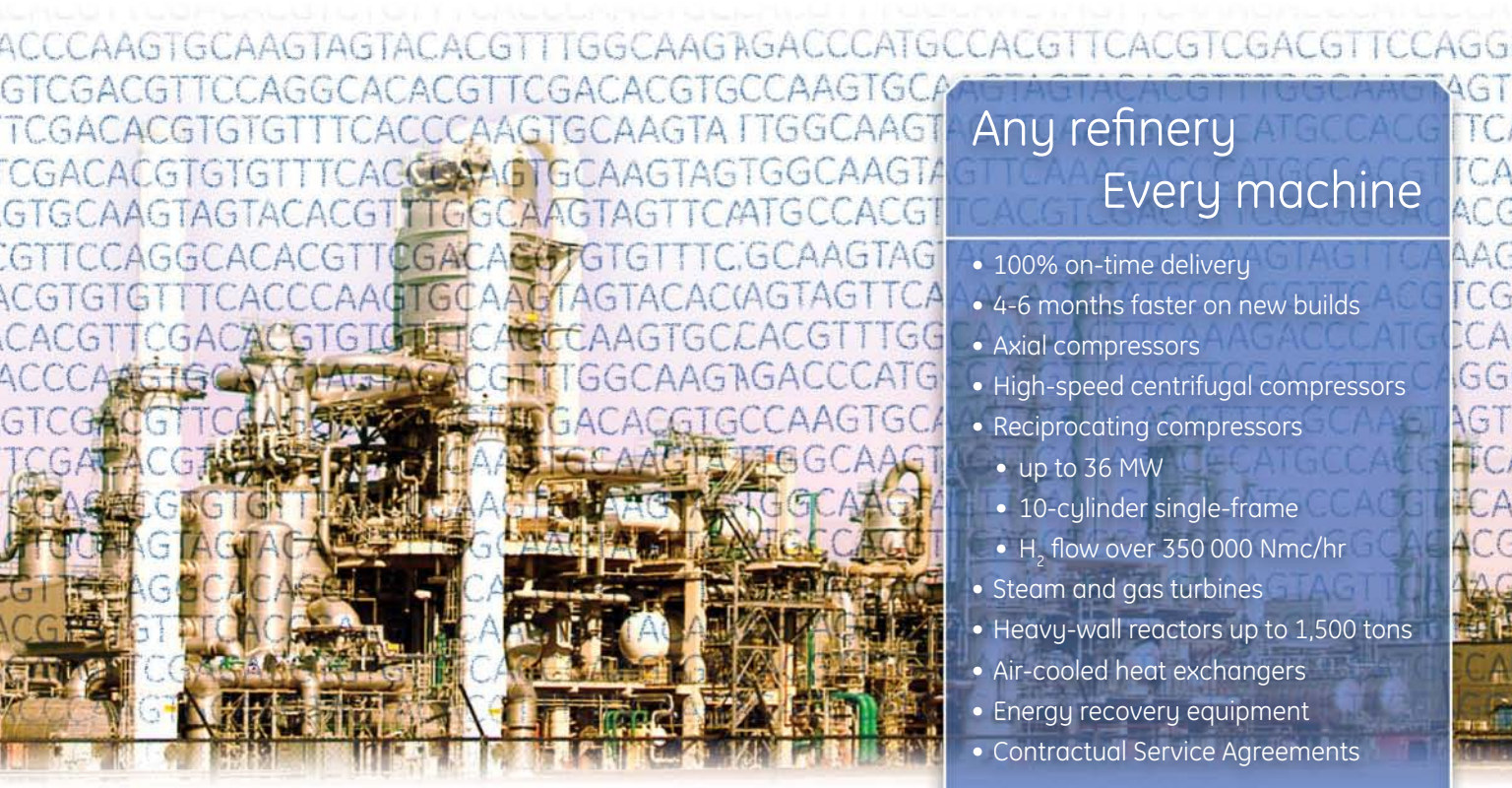
Image from Saudi Aramco

REGULAR FEATURES

COVER

Saudi Arabian Basic Industries Corp.'s (SABIC) Ibn Rushd plant, Yanbu, produces aromatics, purified terephthalic acid, and other petrochemicals from ethylene glycol and butane. Ibn Rushd, a joint venture of SABIC (47%) and regional private investors, started up in 1995. The Middle East, in the next few years, will add considerable refining and petrochemical capacity. A special report on Middle East processing begins on p. 42 with an analysis of how rising gasoline demand will justify grassroots refineries being built there. The second article, p. 48, describes the unprecedented wave of petrochemical capacity that will start up in the Middle East by year 2012. Photo from SABIC.

GE
Oil & Gas



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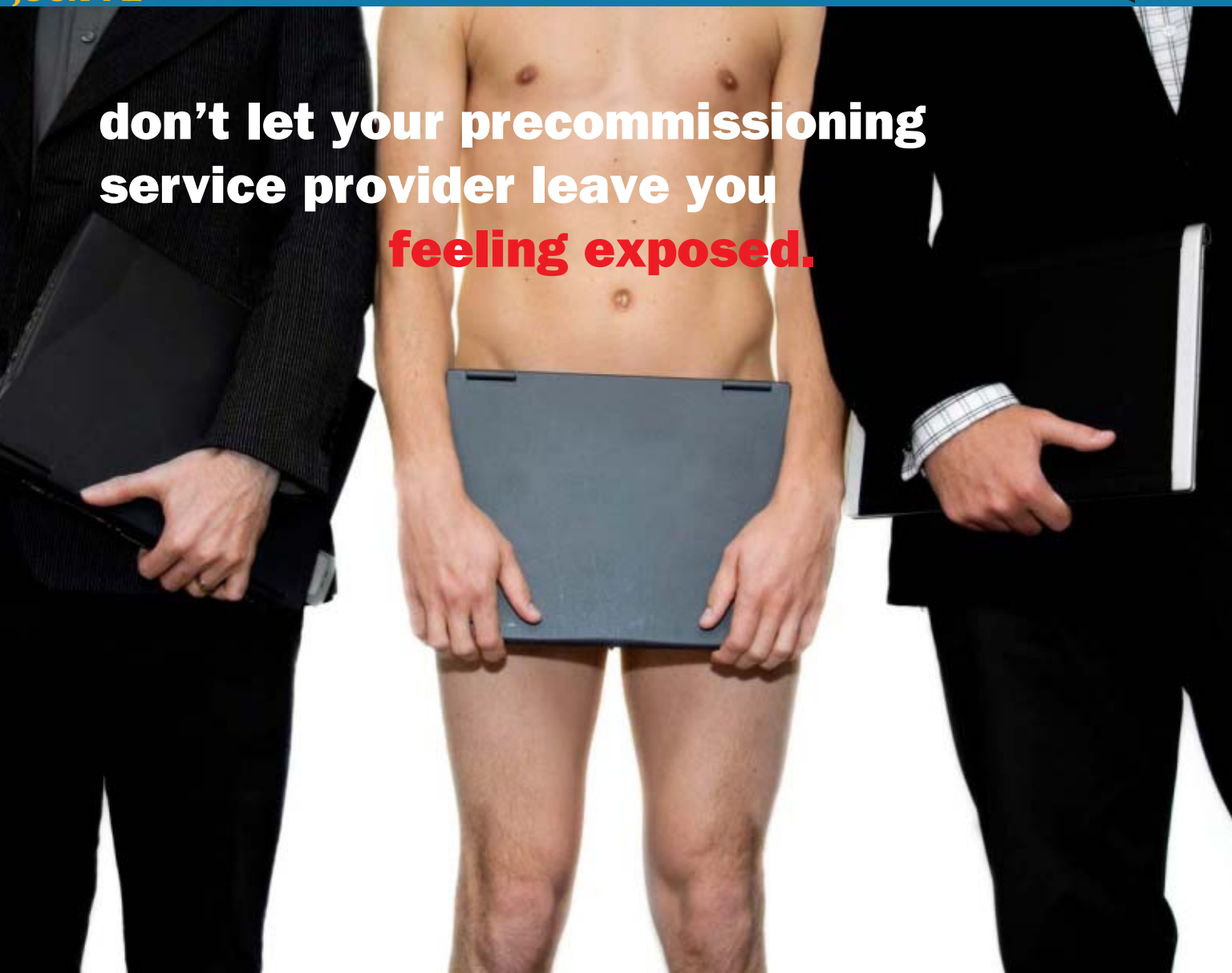

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Aug. 25, 2008

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General Interest — Quick Takes

Enterprise, partners outline Texas port system

Enterprise Products Partners LP, Teppco Partners LP, and Oiltanking Holding Americas Inc. have formed a joint venture to design, construct, own, and operate a Texas offshore oil port and pipeline system to move waterborne oil to refining centers along the upper Texas Gulf Coast. Subject to regulatory approvals and permitting, the partners intend to have the system in service by fourth-quarter 2010.

The Texas Offshore Port System (TOPS) project would include an offshore port about 36 miles from Freeport, Tex., a subsea export pipeline landing near Freeport, two onshore storage facilities with capacity for 5.1 million bbl of oil, and an onshore distribution system.

Plans include a total of 160 miles of pipeline capable of moving 1.8 million b/d. The partners will be able to expand the system with construction of additional offshore facilities.

TOPS initial design calls for two single-point mooring buoys in about 115 ft of water capable of offloading 100,000 bbl/hr.

The TOPS pipeline system would extend from the offshore port to Freeport 49 miles along the Texas Gulf Coast to a planned 3.9 million bbl oil storage facility in Texas City, Tex. From there, the pipeline would connect to existing oil pipeline systems serving Texas City and Houston Ship Channel refineries.

A separate but complementary component of TOPS involves construction of a 75-mile pipeline extending from Texas City to a 1.2-million bbl storage facility near Port Arthur, Tex. (bringing the system to its 5.1 million bbl storage capacity).

This storage facility would connect to area refineries and other facilities via pipeline and would also be able to deliver crude from existing Texas City docks and storage facilities to Port Arthur-Beaumont refineries.

Long-term supply contracts with Motiva Enterprises LLC and an affiliate of ExxonMobil Corp. total about 725,000 b/d and provide the financial underpinning for the project.

Enterprise ascribes demand for TOPS to planned refinery expansions along the upper Texas Gulf Coast expected to add about 425,000 b/d of capacity beginning in 2010, as well as expected increases in general ship traffic at onshore ports. Among current expansion projects is Motiva's Port Arthur refinery expansion, which will add 325,000 b/d of capacity in 2010 (OGJ, Apr. 28, 2008, p. 20) and Valero's 90,000 b/d expansion, also in Port Arthur, and expected to be complete by second-quarter 2011 (OGJ, Aug. 18, 2008, Newsletter).

Enterprise sees TOPS as offering an economic and safe alternative to increased lightering or ship channel transits as this increased demand is met. TOPS would be able to accommodate ultralarge crude carriers (ULCCs) transporting as much as 3 million bbl of crude.

Affiliates of Enterprise, Teppco, and Oiltanking each have one-third ownership in the joint venture and expect to invest about $600 million each in the project.

Petroport Inc., Corpus Christi, Tex., proposed an offshore crude port near Freeport in 1993 (OGJ, Sept. 27, 1993, p. 32), but this project never came to fruition. The Louisiana Offshore Oil Port, 18 miles south of Grand Isle, La., in 110 ft of water uses three single-point mooring buoys and is the only US port currently capable of offloading ULCCs.

Nigeria relinquishes Bakassi to Cameroon

Nigeria has ceded control over the potentially oil-rich Bakassi Peninsula to Cameroon amid threats from armed groups protesting the transfer.

The handover ceremony in Nigeria's Calabar, marked by ceremonial flag swapping, ends a territorial dispute that has almost triggered war in the past. The event was relocated from the peninsula's main town because of security concerns.

Bakassi is a 1,600 km border area that juts into the Gulf of Guinea (OGJ, Sept. 13, 2004, Newsletter). The majority of the population living in the peninsula are Nigerian fishermen and their families.

In 2002, the International Court of Justice ruled that Nigeria should relinquish control following the border dispute between the countries. According to Nigerian press reports, a spokesman for Nigeria's President Umaru Yar'Adua said that although the handover was painful, Nigeria was bound by international commitments to keep its promise to hand back the peninsula in the name of peace.

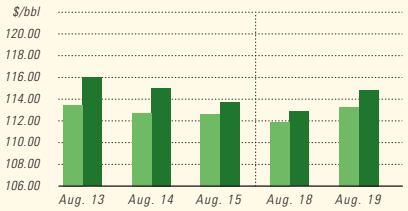
However, legal fighting, political disputes, and gunfire have delayed the process. Opponents in Nigeria argued that parliament, as required by the constitution, never ratified the agreement to hand over the territory. About 50 people died last year in clashes related to this issue, according to Nigerian reports.

Analysts say that Cameroon will need to stabilize security before it can begin oil exploration.

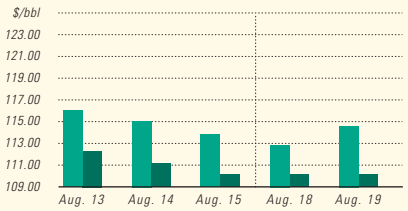
United Nations Chief Ban Ki-moon described the transfer as a triumph for the rule of law. "Beginning with the withdrawal of Nigerian troops from Bakassi 2 years ago and culminating in this ceremony, the case of the Bakassi Peninsula has proven the viability of a peaceful and legal settlement of border disputes when it is done with the full support of the international community and in a spirit of mutual respect, good neighborliness, and cooperation." ✦

Industry Scoreboard

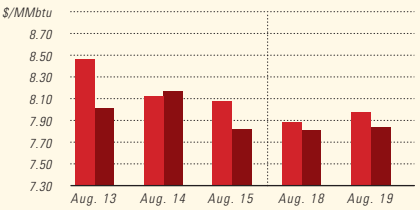
IPE BRENT / NYMEX LIGHT SWEET CRUDE



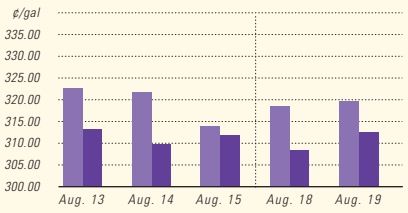
WTI CUSHING / BRENT SPOT



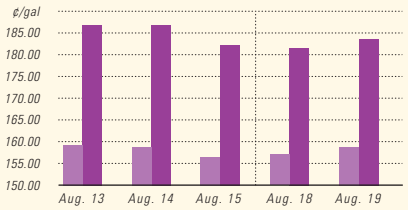
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



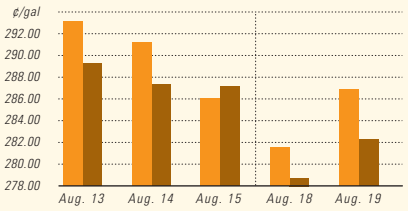
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



[1]Reformulated gasoline blendstock for oxygen blending.
[2]Non-oxygenated regular unleaded.

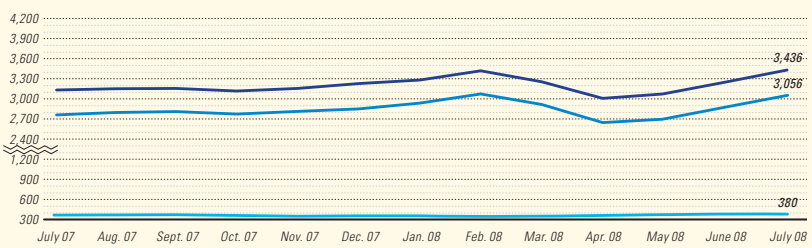
US INDUSTRY SCOREBOARD — 8/25

Latest week 8/8	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	9,435	9,617	–1.9	9,126	9,277	–1.6
Distillate	4,209	4,037	4.3	4,140	4,221	–1.9
Jet fuel	1,534	1,676	–8.5	1,566	1,630	–3.9
Residual	612	686	–10.8	618	741	–16.6
Other products	4,384	4,748	–7.7	4,753	4,822	–1.4
TOTAL DEMAND	20,174	20,764	–2.8	19,976	20,722	–3.6
Supply, 1,000 b/d						
Crude production	5,159	5,045	2.3	5,131	5,116	0.3
NGL production[2]	2,313	2,467	–6.2	2,238	2,367	–5.4
Crude imports	9,915	10,015	–1.0	9,838	10,026	–1.9
Product imports	3,011	3,671	–18.0	3,179	3,589	–11.4
Other supply[3]	1,365	1,054	29.5	1,409	1,060	32.9
TOTAL SUPPLY	21,763	22,252	–2.2	21,795	22,158	–1.6
Refining, 1,000 b/d						
Crude runs to stills	14,905	15,681	–4.9	14,908	15,163	–1.7
Input to crude stills	15,125	15,915	–5.0	15,125	15,449	–2.1
% utilization	86.3	91.2	—	86.3	88.5	—

Latest week 8/8	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	296,547	296,863	–316	335,228	–38,681	–11.5
Motor gasoline	202,822	209,216	–6,394	201,940	882	0.4
Distillate	131,587	133,346	–1,759	127,669	3,918	3.1
Jet fuel–kerosine	40,786	41,429	–643	41,400	–614	–1.5
Residual	36,435	36,545	–110	36,977	–542	–1.5
Stock cover (days)[4]			Change, %		Change, %	
Crude	19.7	19.5	1.0	21.1	–6.6	
Motor gasoline	21.5	22.2	–3.2	21.0	2.4	
Distillate	31.3	32.2	–2.8	31.1	0.6	
Propane	48.4	44.9	7.8	51.2	–5.5	
Futures prices[5] **8/15**			Change		Change	%
Light sweet crude ($/bbl)	114.45	118.88	–4.43	71.91	42.54	59.2
Natural gas, $/MMbtu	8.27	8.61	–0.34	6.41	1.87	29.1

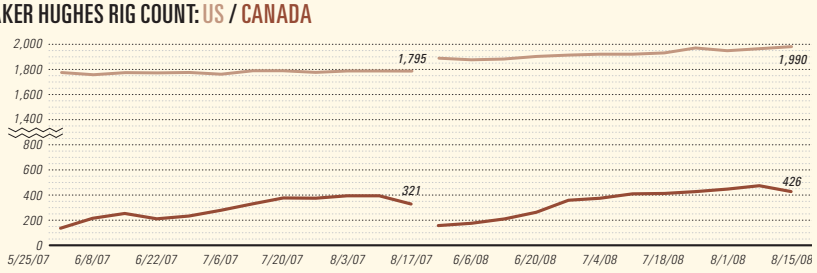
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average 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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Exploration & Development — *Quick Takes*

Nexen to fast-track Blackbird oil development

Nexen Petroleum Inc., Calgary, has suspended its Blackbrid well as a future producer in the UK North Sea after a drillstem test indicated an average of 3,800 b/d of oil production potential, with the oil flowing through a $^{34}/_{64}$-in. choke.

The well, drilled on Block 20/2a, 6 km south of Nexen-operated Ettrick field, struck 111 ft of net pay in multiple zones.

Nexen described the oil as being high quality in good quality reservoir sands. It plans to fast-track the development as a subsea tieback to the nearby Ettrick floating production, storage, and offloading vessel.

Charlie Fischer, Nexen's president and chief executive, said: "Satellite discoveries such as Blackbird allow for quick and cost effective tie-backs to existing infrastructure, which generates incremental value."

Nexen is operator of the Blackbird well with a 79.73% working interest. Other coventurers include Bow Valley Energy Ltd. 12% and Atlantic Petroleum 8.27%.

Bankers eyes higher Ardmore Woodford gas flow

The newly separated US unit of Bankers Petroleum Ltd., Calgary, reported a sharply higher flow rate at its fifth horizontal well in Tishomingo field in the Ardmore basin in southern Oklahoma.

The company is making several efforts to increase capacity for its gas sales from the area.

Initial test rate at the Dunn 2-1H well was 4.8 MMcfd of gas equivalent in what the company supposed is the result of an unspecified modified hydraulic fracturing technique. The wells produce gas-condensate and oil from Mississippian-Devonian Woodford shale.

BNK Petroleum Inc., the US subsidiary, drilled and cased eight wells in the quarter ended June 30 and spud four others. The company, whose 4 MMcfd of gas equivalent of output from the play is limited by facilities constraints, plans to stimulate more wells as it obtains more gas processing capacity.

It installed a gathering system to connect the Brock wells to a processing plant that was completed in late March and is waiting on parts for a tap upgrade to remove throughput restrictions into a pipeline operated by Natural Gas Pipeline Co. of America.

Other work includes laying of gathering lines and addition of two compressors.

A temporary plant is being set up that will allow the company to hike production to as much as 20 MMcfd of gas equivalent, and processing agreements are complete with Atlas Pipeline and pending with Chesapeake Energy Corp.

Bankers' leasehold is in Carter, Murray, and Johnston counties (OGJ, May 26, 2008, p. 34).

Petrobank eyes Muskwa-Evie, Montney shale gas

Petrobank Energy & Resources Ltd., Calgary, has acquired 25 sections of land in Northeast British Columbia to pursue gas in the Devonian Muskwa and Evie shales of the Horn River basin and plans to drill its first vertical well in early 2009.

Petrobank also signed a definitive agreement to buy for $53 million an undisclosed private company that owns 15 sections with strong horizontal development potential in the Triassic Montney formation in the Monias area northwest of Dawson Creek. Consulting engineers assessed the recoverable potential at 148 bcf. Two vertical wells produce 150 Mcfd, and the properties include a 5 MMcfd gas plant. Petrobank plans to complete the acquisition by Oct. 2 and drill two horizontal Montney wells on the lands in 2008.

Canadian Superior's Bounty finds gas off Trinidad

Canadian Superior has reported a major natural gas discovery on Intrepid Block 5(c) off eastern Trinidad and Tobago. The company said the discovery, which it said has the potential for as much as 2.6 tcf of natural gas in place, was made by the Bounty exploration well.

Bounty was drilled to 17,360 ft TD, encountering gas-bearing horizons, with the main targeted zone in the well encountering about 200 ft of pay. According to the company, initial test results indicate that Bounty is capable of producing 200 MMcfd from this high-pressure zone. Production testing equipment capacity was maximized during testing, restricting flow to a stabilized 60 MMcfd of gas, with a flowing bottomhole pressure of 7,186 psi.

The Bounty find is the second gas discovery Canadian Superior and its partners have made this year on Intrepid Block 5(c), which lies 60 miles off eastern Trinidad. The first discovery, by the Victory well, was estimated to contain 600 bcf-1.2 tcf of gas.

Canadian Superior Chief Executive Craig McKenzie said the Bounty discovery "in combination with our extensive 3D seismic data in the area, appears to exceed 7,000 acres in size."

Production potential, he said, "compares favorably with production from the nearest analogous field, Dolphin Deep," where each of the two wells produce at about 150 MMcfd, he said. "We plan to move forward expeditiously with appraisal and development drilling and production." Operations are under way to demobilize the testing equipment and move the Kan Tan IV semisubmersible drilling rig to spud a third exploration well, the Endeavour, on the block by the end of August.

Canadian Superior is paying 26⅔% of the Block 5(c) exploration program costs to maintain a 45% working interest in the block, with partners BG International Ltd. paying 40% for a 30% working interest and Challenger Energy Corp. paying 33⅓% for a 25% working interest. ✦

Drilling & Production — *Quick Takes*

BP lets $1 billion contract for Block 31 off Angola

In a $1 billion deal, BP PLC contracted Heerema Marine Contractors to produce the URF-1 risers and production flowlines for its first deepwater oil development on Block 31 off Angola.

BP will bring on the Plutao, Saturno, Venus, and Marte fields on stream by 2011, which are expected to peak at 150,000 b/d in 2012.

HMC has begun the presanction engineering work and will

start its offshore installation in mid-2010 using the deepwater construction vessel "Balder." The welding technology will be supported by Pipeline Technique Ltd., HMC's recently acquired welding specialist in Scotland.

This contract is the largest in HMC's history and covers engineering, procurement, construction, installation, and the testing of pipe-in-pipe production flowlines, service flowlines as well as vertical riser systems. The award is the first of possibly four similar projects off Angola.

HMC will move its deepwater construction vessel to West Africa and expects to develop other projects in this region. The company will establish local offices, an Angolan Marine Transport Co., and an integrated marine construction support base and multijoint yard to contribute to sustainable Angolan development.

The majority of the onshore fabrication work will be performed by Angolan yards, said Steve Preston, an HMC executive vice-president.

Queensland oil shale project still in the wings

Brisbane-based oil shale hopeful Queensland Energy Resources Ltd. (QER) has shunned the Alberta-Taciuk Processor (ATP) revolving kiln oil shale processing technology in favor of the Paraho II technology to develop its vast oil shale deposits along Queensland's east coast.

The company chose Paraho II following assessment of 63 other possible technologies and noting the lessons learned from the company's now decommissioned ATP demonstration plant on the Stuart deposit near Gladstone. This plant is being dismantled, and obsolete components are being sold.

QER acquired most of the assets of the original operator Southern Pacific Petroleum (SPP) from the liquidator in 2004 and shut down the Stuart plant because it did not meet environmental and operating performance standards despite SPP's having produced and sold more than 1 million bbl of shale oil from the deposit during 2000-03.

QER decided the ATP could not be scaled up to commercial scale production, whereas it believes the Paraho II technology can be a commercial proposition.

Paraho II technology has been tested with more than 8,000 tonnes of samples of Queensland oil shale (which is mined by open cut methods).

QER says the deposits, collectively known as the McFarlane oil shale after the original and long-time chairman and champion of the SPP attempts to commercialize them, have the potential to produce 1.6 billion bbl of shale oil over the next 40 years.

If the shale oil is produced, it will supplement Australia's fast depleting deposits of conventional oil reserves.

Ascent Resources begins gas output in Hungary

Ascent Resources PLC, London, has begun natural gas production from its PEN-104 well in the Peneszlek area of the Nyirseg permits in eastern Hungary.

Initial production of 48,000 cu m/day was increased over a few days to a target of 85,000 cu m/day.

PetroHungaria KFT originally drilled the PEN-104 discovery well in 2006. Gas production, following metering at the newly constructed PEN-104 facility, is transported by pipeline to the MOL gas processing facility at Hajduszoboszlo, 50 km from the well, Ascent said.

The company will shoot 3D seismic over the permits to delineate other gas reservoirs within the vicinity. Two wells in the survey area previously tested gas but have not been put into production.

Ascent also is investigating whether it should redevelop Peneszlek field, which produced gas during 1983-91.

The company has a 45.23% stake in Peneszlek through its equity interest in PetroHungaria KFT. Other partners are DualEx 37.5%, Geomega 8%, Leni Gas & Oil 7.27%, and Swede Resources 2%.

Ascent managing director Jeremy Eng said the gas would help to meet demand "on the domestic market where over 70% of gas consumed is imported."

Ascent Resources has sold a 15% stake in the Szolnok gas exploration project to existing partner Rohol-Aufsuchungs Aktiengesellschaft, which now holds 59.5% interest from purchases of interests from other partners. Following the sale Ascent's interest in the Szolnok project has dropped to 12.5% from 27.5%.

The partners will drill two exploration wells in the Kunstmarten 3D seismic acquisition area, and they will shoot additional 3D seismic nearby. ✦

Processing — *Quick Takes*

NPRA releases refining, storage capacity report

US refiners have continued to add capacity despite soaring oil prices and shrinking margins, the National Petrochemical & Refiners Association said as it released its annual refining and storage capacity report.

Domestic refining capacity increased 0.86% during 2007, 4.1% over the last 5 years and 8.2% over the last 9 years, NPRA said, citing data compiled by the US Energy Information Administration. "Refiners have continued to increase capacity to help meet consumer demand for a reliable supply of fuels and other petroleum-based products," NPRA Pres. Charles T. Drevna said.

The report indicated that as of Jan. 1 there were 149 operable US refineries, excluding Puerto Rico and the Virgin Islands, with a total crude distillation capacity of 17.6 million b/cd and 18.6 million b/sd.

"To continue to meet consumer demand, we must be assured of an adequate, affordable supply of crude oil, and that means expanding domestic exploration and production," Drevna said. "The American public overwhelmingly supports domestic production given the great strides the oil and gas community has made over the last several decades in the way of cleaner, safer technologies," he said.

"Ours is a modern, innovative industry prepared to meet tomorrow's challenges, and policymakers should understand the implications for the consumer in restricting domestic production and singling out American energy producers for punitive, counter-

productive tax measures that would only benefit state-owned oil conglomerates abroad," Drevna said.

Nizhnekamsk refinery upgrade progresses

The 120,500 b/d Nizhnekamsk refinery, 250 km from Tatarstan's capital city of Kazan, will have a refining capacity of 7 million tonnes/year following upgrade efforts currently under way (OGJ, Sept. 25, 2006, Newsletter). The refinery, which will be renamed OJSC Taneco, will be commissioned in phases during 2011-12. OAO Tatneft, Almetyevsk, Russia, is the refinery's main shareholder.

Foster Wheeler Italiana will design and supply materials for two furnaces for the hydrocracking unit, a charge heater, and three interheaters for the continuous catalytic reformer unit. It is also carrying out detailed engineering of two heaters for the new delayed coker (OGJ, Oct. 9, 2006, Newsletter).

Taneco, a Tatneft unit, has let a contract to Foster Wheeler Italiana SPA to supply fired heaters by yearend 2009. Terms were not disclosed.

The company already has carried out the front-end engineering and design for the new complex and the process design package for the delayed coker following the award of the contract in 2006.

The refinery will have aromatics units and a deep conversion section with a fluidized catalytic cracker, a distillate hydrocracker, a delayed coker, and a gasification plant.

The petrochemical plant will include purified terephthalic acid, polyethylene terephthalate, linear alkylbenzene and polypropylene units, plus the associated power generation facilities. Oil products will be sent to Europe.

The project was originally expected to cost $3 billion when it was first announced but rising costs, construction completion, and the ultimate availability of project financing, are all key challenges, the company said. ✦

Transportation — *Quick Takes*

Reversed line would haul Canadian oil to Maine

Portland Pipe Line Corp. and Montreal Pipe Line Ltd. launched an open season to assess interest in reversing an existing 18-in. pipeline to ship Canadian oil from Montreal to South Portland, Me.

The reversal project could begin moving as much as 128,000 b/d of western Canadian heavy crude by the second quarter of 2010. About 2 years later, Portland Pipe Line would accept both light synthetic and heavy grades of western Canadian crude in a two-stream operation and would allow delivery of 128,000-166,000 b/d.

Conditional offers are due by Sept. 10 and binding commitments by Sept. 30. The South Portland marine loading operation is being designed to handle a minimum cargo size of 300,000 bbl. Tankers could deliver the crude to Canadian and US East Coast and US Gulf Coast refineries.

Enbridge Pipeline's Trailbreaker project would complement PMPL's 18-in. pipeline reversal project by providing 200,000 b/d of incremental capacity into Montreal. Enbridge is developing Trailbreaker to be in service concurrently with the reversal project.

PMPL would continue to offer northbound service from South Portland to Montreal through its existing 24-in. pipeline.

Gate LNG terminal adds supplier, plans to expand

E.On Ruhrgas AG has agreed to send 3 billion cu m/year of regasified LNG through the Gate LNG terminal in the Netherlands starting in second-half 2011 and will acquire a stake in the facility.

E.On will market the gas in northwest Europe. This is the fourth supply agreement that the Gate LNG project partners have secured; others include Dong Energy, EconGas, and Essent, which have committed to a total throughput of 12 billion cu m/year.

As part of its agreement, E.On Ruhrgas will acquire a 5% equity stake in the Gate facility, which is the first LNG import terminal under construction in the Netherlands.

"With the supply of LNG by E.On Ruhrgas, the total capacity of 540,000 cu m of the three envisaged tanks has been fully contracted," said Vopak NV, a Gate LNG terminal partner. "To accommodate the additional incoming LNG carriers, Gate terminal will build a second jetty and install the required additional equipment," Vopak reported. It will pay for the new terminal facilities by raising additional external financing within the coming months. With the expansion, total throughput capacity would rise to 16 billion cu m/year from its initial capacity of 12 billion cu m/year.

Gasunie and Vopak together hold an 80% stake in the terminal, with each of the four supply partners holding 5%.

Gorgon JV plans Barrow Island gas plant

The Chevron Australia-led Gorgon Joint Venture, now developing the vast Gorgon area gas fields off Western Australia for LNG exports, has committed to including a 300 terajoules/day domestic gas processing plant alongside the LNG facilities planned for Barrow Island.

Chevron says the JV will carry out final investment decision for the plant with the LNG project. Plans call for gas to be brought on stream for domestic use about the time the JV commissions the LNG project's third (of three) 5 million tonnes/year LNG train.

The JV brought the plant proposal to the table earlier than expected and says this will increase the number of supply points for domestic gas into Western Australia.

In response, the Western Australian government has welcomed the move and says Gorgon gas will increase the state's gas supply by 30% and provide further supply diversity to the local gas market, which has been sorely tested by disruptions caused by the explosion and fire at Apache Energy's facilities on Varanus Island June 3.

The Gorgon JV comprises Chevron Corp., Royal Dutch Shell PLC, and ExxonMobil Corp. ✦

Correction

A Journally Speaking about worker safety misstated the units of certain frequencies regarding pipelines regulated by Canada's National Energy Board (OGJ, July 21, 2008, p. 17). The correct units and frequencies are: 1.5 injuries/100 full-time equivalent workers in 2006 and 0.7 injuries/100 fulltime equivalent workers in 2005.

Letters

EITI reporting

The advice of Mara V.J. Senn and Rachel Frankel in "Firms can avoid EITI, FCPA pitfalls" (OGJ, July 21, 2008, p. 20) gives short shrift to the legitimate concerns of the citizens of many resource-rich countries and runs counter to evolving practice among countries and companies to use more disaggregated reporting under the Extractive Industries Transparency Initiative (EITI). While it is true that EITI does not require disaggregated reporting, disaggregation prevents free-riding and improves the climate of accountability in the extractive sector—a chief goal of EITI and other efforts to address the so-called "paradox of plenty." Countries such as Nigeria and Mongolia are already requiring disaggregated reporting under EITI, and a number of extractive companies already unilaterally report their payments to governments, country by country and broken down by type of payment. Apparently, these companies have concluded that the benefits of such disclosure outweigh any perceived risks, legal or otherwise.

Obviously, the authors write with the lawyerly objective of helping clients minimize legal risk. But even from this narrow perspective, we question some of their conclusions. The authors argue that disaggregated reporting could give rise to heightened Foreign Corrupt Practices Act (FCPA) scrutiny in the case of discrepancies between reported company payments and country receipts but then acknowledge that FCPA investigations of large international companies are still possible with aggregated reporting in the case of significant discrepancies. Where a company makes no improper payments and accurately reports, disaggregated reporting offers the best protection from FCPA scrutiny; with aggregated reporting, a large international company could more easily be swept up into an investigation simply because of the actions of less-scrupulous companies in the same aggregated reporting pool. Disaggregated reporting is thus preferable not only from an economic development and accountability perspective but from a legal risk perspective as well.

Matthew Genasci, Attorney
Revenue Watch Institute
New York

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

AUGUST

IADC/SPE Asia Pacific Drilling Technology Conference, Jakarta, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 25-28.

Deep Water India Summit, New Delhi, +31 (0)26 3653 444, +31 (0)26 3653 446 (fax), e-mail: workshops@energywise.nl, website: www.energywise.nl. 26-27.

Offshore Northern Seas Exhibition & Conference, Stavanger, +47 51 59 81 00, +47 51 55 10 15 (fax), e-mail: info@ons.no, website: www.ons.no. 26-29.

Summer NAPE Expo, Houston, (817) 306-7171, (817) 847-7703 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 27-28.

SEPTEMBER

Annual India Oil & Gas Review Symposium & International Exhibition, Mumbai, (0091-22) 40504900, ext. 225, (0091-22) 26367676 (fax), e-mail: oilasia@vsnl.com, website: www.oilasia.com. 1-2.

China Power, Oil & Gas Conference & Exhibition, Guangzhou, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.chinasenergyfuture.com. 2-4.

ECMOR XI-European Mathematics of Oil Recovery Conference, Bergen, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-11.

Rice Global Engineering & Construction Forum, Houston, (713) 552-1236, ext. 3, (713) 572-3089 (fax), website: www.forum.rice.edu. 9.

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

Rocky Mountain GPA Annual Meeting, Denver, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 10.

API Fall Refining & Equipment Standards Meeting, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 15-17.

Rio Oil & Gas Conference & Expo, Rio de Janeiro, 55 21 2112 9078, 55 21 2220 1596 (fax), e-mail: riooil2008@ibp.org.br, website: www.riooilegas.com.br. 15-18.

API/NPRA Fall Operating Practices Symposium, Los Angeles, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 16.

GEO India South Asia's Geosciences Conference & Exhibition, New Delhi, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: geo@oesallworld.com, website: www.geo-india.com. 17-19.

SPE Annual Technical Conference & Exhibition, Denver, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 21-24.

✦Energy Institute Decommissioning Conference, Aberdeen, + 44 (0) 20 7467 7106, + 44 (0) 20 7580 2230 (fax), e-mail: hetheridge@energyinst.org.uk, website: www.energyinst.org.uk/events. 23.

ERTC Petrochemical Conference, Cannes, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Sept. 29-Oct. 1.

DGMK Future Feedstocks for Fuels & Chemicals Conference, Berlin, 040 639004 0. 040 639004 50 (fax), website: www.dgmk.de. Sept. 29-Oct. 1.

International Pipeline Exposition, Calgary, Alta., 403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. Sept. 30-Oct. 2.

Unconventional Gas International Conference & Exhibition, Ft.Worth, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.unconventionalgas.net. Sept. 30-Oct. 2.

OCTOBER

GPA North Texas/NGS East Texas Red River Conference, Tyler, Tex., (713) 222-0852, (713) 222-0858 (fax), e-mail: tom.rommel@accessed.com, website: www.gasprocessors.com. 1-2.

NPRA Q&A Forum, Orlando, Fla., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 5-8.

GPA Houston Annual Meeting, Kingwood, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessor.com. 7.

KIOGE Kazakhstan International Oil & Gas Exhibition & Conference, Almaty, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-10.

IADC Drilling West Africa Conference & Exhibition, Lisbon, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 8-9.

International Gas Union Research Conference, Paris, +31 50 521 30 78, +31 50 521 19 46 (fax), e-mail: igrc2008@gasunie.nl, website: www.igrc2008.com. 8-10.

ERTC Lubes and Additives Conference, Berlin, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 13-15.

Middle East Plant Maintenance Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: d.michalski@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 13-15.

API Fall Petroleum Measurement Standards Meeting, Long Beach, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 13-17.

Oil Shale Symposium, Golden, Colo., (303) 384-2235, e-mail: jboak@mines.edu, website: www.mines.edu/outreach/cont_ed/oilshale. 13-17.

Central and Eastern European Refining & Petrochemicals Roundtable, Warsaw, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 14-16.

ISA EXPO, Houston, (919) 549-8411, (919) 549-8288 (fax) website: www.isa.org. 14-16.

Oil & Gas Transportation in the CIS & Caspian Region

Calendar

Conference, Moscow, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: j.golodnikova@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/cispipes10register.html. 14-16.

PIRA New York Annual Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 16-17.

Petchem Arabia Conference, Abu Dhabi, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.verma@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 20-22.

SPE Asia Pacific Oil & Gas Conference & Exhibition, Perth, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-22.

SPE International Thermal Operations & Heavy Oil Symposium, Calgary, Alta., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-23.

Permian Basin International Oil Show, Odessa, Tex., (432) 367-1112, (432) 367-1113 (fax), e-mail: pbioilshow@pbioilshow.org, website: www.pbioilshow.org. 21-23.

AAPG International Conference & Exhibition, Cape Town, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 26-29.

Biofuels Conference, Berlin, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: c.taylor@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 28-30.

SPE Russian Oil & Gas Technical Conference & Exhibition, Moscow, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 28-30.

Arab Oil & Gas Show, Dubai, +971 4 3355001, +971 4 3355141 (fax), e-mail: info@icedxb.com, website: www.ogsonline.com. 28-30.

IADC Contracts & Risk Management Conference, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 29-30.

NOVEMBER

ASME International Mechanical Congress & Exposition, Boston, (973) 882-1170, (973) 882-1717 (fax), e-mail: infocentral@asme.org, website: www.asme.org. 2-6.

Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC), Abu Dhabi, +971 (0) 2 4444 909, +971 (0) 2 4444 383 (fax), e-mail: info@adipec.com, website: www.adipec.com. 3-6.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 4-6.

North African Oil and Gas Summit, Vienna, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: c.brown@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk/nas3register.html. 4-6.

Mangystau International Oil & Gas Exhibition, Aktau, + (44) 020 7596 5000, + (44) 020 7596 5111 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 5-7.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), email: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 6.

✦GITA's GIS Annual Oil & Gas Conference, Calgary, (303) 337-0513, (303) 337-1001 (fax), e-mail: info@gita.org, website: www.gita.org/ogca. 6-7.

IADC Annual Meeting, Paradise Valley, Ariz., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 6-7.

SEG International Exposition and Annual Meeting, Las Vegas, (918) 497-5542, (918) 497-5558 (fax), e-mail: register@seg.org, website: www.seg.org. 9-14.

IPAA Annual Meeting, Houston, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 10-12.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 11-13.

American Institute of Chemical Engineers (AIChE) Annual Meeting, Philadelphia, (212) 591-8100, (212) 591-8888 (fax), website: www.aiche.org. 16-21.

ERTC Annual Meeting, Vienna, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 17-19.

Annual Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 18-20.

IADC Well Control Middle East Conference & Exhibition, Muscat, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 24-25.

Annual European Autumn Gas Conference (EAGC), Cernobbio, Italy, +44 (0) 1737 855281, +44 (0) 1737 855482 (fax), e-mail: vanessahurrell@dmgworldmedia.com, website: www.theeagc.com. 25-26.

DECEMBER

IADC Well Control Middle East Conference & Exhibition, Muscat, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 2-3.

Annual Refining & Petrochemicals in Russia and the CIS Countries Roundtable, Prague, +44 207 067 1800, +44 207 430 0552 (fax), e-mail: e.polovinkina@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 2-4.

Downstream Asia Refining & Petrochemicals Conference, Singapore, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/dalregister.html. 3-4.

IADC Drilling Gulf of Mexico Conference & Exhibition, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 3-4.

Deep Offshore Technology International Conference & Exhibition, Perth, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepoffshoretechnology.com. 3-5.

International Petroleum Technology Conference (IPTC), Kuala Lumpur, +971 (0)4 390 3540, +971 (0)4 366 4648 (fax), e-mail: iptc@iptcnet.org, website: www.iptcnet.org. 3-5.

USAEE/IAEE North American Conference, New Orleans, (216) 464-2785, (216) 464-2768 (fax), website: www.usaee.org. 3-5.

PIRA Natural Gas Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8-9.

PIRA Understanding Global Oil Markets Conference, New York, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 10-11.

Seatrade Middle East Maritime Conference & Exhibition, Dubai, +44 1206 545121, +44 1206 545190 (fax), e-mail: events@seatrade-global.com, website: www.seatrade-middleeast.com. 14-16.

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.

XSPE Progressing Cavity Pumps Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 27-29.

2009

JANUARY

Oil & Gas Maintenance Technology Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 19-21.

Pipeline Rehabilitation & Maintenance Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.piipeline-rehab.com. 19-21.

SPE Hydraulic Fracturing Technology Conference, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 19-21.

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FEBRUARY

SPE Reservoir Simulation Symposium, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 2-4.

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Deep Offshore Technology International Conference & Exhibition (DOT), New Orleans, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.dotinternational.net. 3-5.

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International Petrochemicals Technology Conference & Exhibition, London, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: enquiries@europetro.com, website: www.europetro.com. 16-17.

IP Week, London, +44 (0)20 8561 6030, +44 (0)20 8561-0131 (fax), e-mail: events@energyinst.org.uk, website: www.energyinst.org.uk. 16-19.

International Downstream Technology & Catalyst Conference & Exhibition, London, +44 (0) 20 7357 8394, +44 (0) 20 7357 8395 (fax), e-mail: enquiries@europetro.com, website: www.europetro.com. 18-19.

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MARCH

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SPE Research & Development Conference, Lisbon, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 3-4.

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GPA Annual Convention, San Antonio, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8-11.

Doha Natural Gas Conference & Exhibition, Doha, e-mail: gascon@qp.com.qa, website: www.dohagascon.com.qa. 9-12.

Turkish International Oil & Gas Conference & Showcase (TUROGE), Ankara, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 10-12.

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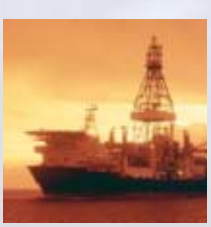

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A UVG counterforce

Bob Tippee
Editor

While dynamism of the English language has been observed many times, it is not at all common to hear anyone suggest that verbal expression follows laws like those of the physical universe.

In fact, that proposition seems to remain the sole province of this writer.

It was with great caution that he put forward in this space 5 years ago the hypothesis of universal verbal gravitation (UVG). The implications of UVG are so profound and potentially so dire that he feared his description of it might incite panic.

Yet publishing is not the business of keeping secrets. So the UVG hypothesis eased into the intellectual light in this space (OGJ, Oct. 27, 2003, p. 19).

That no corpus of academic literature has yet developed around the subject must reflect complexity of the proposition and not, surely not, a lack of interest. This is just as well. Esoteric concepts inevitably slip through scholarly fingers and bounce down the intellectual stairs like runaway rubber balls, submitting eventually to the alarmist distortions of popular media. Chaos ensues.

Happy news is at hand. The threat is not as great as it once seemed. This writer has discovered a counterforce in the world of letters with potential to mitigate UVG's ominous ramifications.

Irresistible force

To review, UVG is the apparently irresistible attraction that causes words to behave like love bugs, or—watch the phenomenon in action here—lovebugs. Anyone perplexed by this analogy should ask an acquaintance from Houston for an explanation, but the name alone is sufficiently descriptive for most people.

UVG works most actively in professional jargon, where writers, for example, eagerly turn "drill bit" into "drillbit," "draw works" into "drawworks," "bubble point" into "bubblepoint," "feed stock" into "feedstock," and so on.

The attractive force between words probably is some function of the square of the frequency of their occurrences together, but this part of the theory will have to be tested.

The urgent question is this: Where does it end?

Clearly, words possess some attractive force akin to gravity. If word pairs readily fuse to become one, what's to stop words formed in this manner from mating with equal abandon? Then there would be one word where once there were four. Soon, foursomes would be linking.

In the absence of some repulsive force, the process logically would continue until the entire language had congealed into one giant word—a lavish and wondrous word encompassing all meaning, all feeling, all context and connation, but surely the doom of talk radio and a devil of a thing to spell.

It is not clear how long the language would take to unify completely, but there must be some tipping point beyond which the process becomes irreversible and before which human intervention must begin, whatever the cost. University researchers are no doubt working in secret on these problems now, supported, one hopes, by whatever public funding may be necessary.

Discovery by this writer of a counterforce to UVG is no reason for the efforts to cease. But it does provide hope that the tipping point may be less imminent than once was feared.

The counterforce is extravagant hyphenation (EH), specifically after prefixes.

Small but powerful, prefixes are the tugboats of English. They steer the meanings of root words (not "rootwords," at least not yet) into new, sometimes reverse, directions. Yet most are not words by themselves. Think of "pre," "un," "non," "anti," and "re," all prefixes you'll never encounter except at the front ends of real words.

With a few exceptions, prefixes are supposed to become seamless parts of their root words, giving rise to verbs like "prejudge" and "untie," adjectives like "rebuilt" and "noncommercial," and nouns like "noncombatant" and "antifreeze."

Notice how the prefixes snuggle up with their root words. Properly hyphenated exceptions include root words beginning with capital letters ("pre-Jurassic") and numerals ("pre-1900").

Hyphenating prefixes

Mysteriously, modern writers have developed an urge to insert hyphens after every prefix they use. This is EH. Hyphenations like "non-combatant" and "pre-judge" appear all the time, with evident sanction by that dubious authority, the computer spell checker (not "spellchecker").

Whereas UVG joins words best left separate, EH pries apart linguistic components that belong together.

EH therefore must be a dynamic language's way of countering UVG. Discovery of it comes just in time. Once people feel pressured by tipping points, anything can happen. ✦


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Editorial

Room to fall

Although the oil market has lost nearly 1 million b/d of strategic transportation capacity, the price of crude oil is falling. Something has changed.

Only a few months ago, a mere rumor about disruption to that much oil movement would have panicked traders and sent the crude price upward. Yet the market all but shrugged off shutdown of the Baku-Tbilisi-Ceyhan oil pipeline early this month after a fire and the outbreak of war between Russia and Georgia, which the BTC line crosses.

Other outlets

The BTC pipeline fire broke out Aug. 6 in Turkey as throughput of light crude, most of it from fields off Azerbaijan operated by BP PLC, was climbing toward an August target of 910,000 b/d. Tanker loadings in the Mediterranean ceased Aug. 7 after storage fed by the pipeline at Ceyhan ran dry.

Other outlets for Azeri crude from the Caspian include whatever capacity is available on a 155,000 b/d pipeline between Baku and Georgia's Black Sea port at Supsa and on the 100,000 b/d pipeline between Baku and Novorossiysk, Russia. Both those routes rely on tanker transport across the Black Sea and through the congested Bosporus Straits, a bottleneck that BTC was designed to bypass, along with Russia, Iran, and Armenia. About 120,000 b/d can be moved by rail from Baku to Georgia's port at Batumi.

At this writing, the Russian government's intentions for Georgia were unclear. Moscow had agreed to a cease-fire but acted in no rush to withdraw troops from the break-away regions of South Ossetia and Abkhazia, over which hostilities initially flared, or from other parts of the country into which its forces had advanced. As a precaution, BP shut the Baku-Supsa oil line as well as the South Caucasus pipeline, which carries natural gas from the Caspian along much of the BTC route. Timing of repairs to the fire-damaged portion of the BTC line was uncertain. Assuming that the pipeline remains down through August and gradually restarts in September, the International Energy Agency cut its forecast for oil production from Azerbaijan by an average of 260,000 b/d for the third quarter and by 65,000 b/d for all of 2008.

As supply disruptions go, this doesn't rank with, say, the politically related halts to exports from Nigeria and Venezuela in 2002 or the hurricane jolts to Gulf of Mexico production in 2005. It was still enough to be alarming. If anything, the pipeline explosion and Georgian military action provided little more than a pause at about $115/bbl in a crude-price swoon that began from a peak of $147/bbl for New York Mercantile Exchange futures in mid-July. By Aug. 19 the price had fallen below $113/bbl.

Several conditions that had been lifting the crude price have eased. Large among them is weakness of the US dollar. Some analysts have scoffed at the dollar's effect on recent crude-price movement. But the month-long price decline coincides with a 9% dollar-value gain against the euro. Reinforcing the correlation, the crude price jumped on Aug. 19, when the dollar's value took its biggest dip in a month. Also starting in mid-July, stock-market indicators gained ground while commodities generally fell. A rush of investment funds into commodities and away from other assets has been cited, like the weak dollar, as an extraordinary factor in elevated oil prices.

Fundamentals changing

Market fundamentals, too, are changing in ways that ease pressure on crude prices. Demand growth is diminishing worldwide, occurring mostly in developing countries, a number of which are dismantling product-price subsidies. And long-awaited production projects large enough to materially raise global oil supply are coming on stream or are expected to start up soon.

It is, of course, too early to tell if relaxation of the forces that had pushed oil prices to record levels are temporary adjustments or elements of a price decline likely to last awhile. A tepid response to events in Turkey and Georgia indicates that the market—that is, the collective net judgment of all buyers and sellers of oil—thinks prices have more room to fall. ✦

Supplier-user teamwork key to stable oil prices

Gawdat Bahgat
Indiana University of Pennsylvania
Indiana, Pa.

Since the early 2000s oil prices have more than tripled (Fig. 1). Prices reflect not only increasing demand and decreasing supply but broader macroeconomic and geopolitical changes such as rising exploration and production costs, the falling value of the US dollar, the reemergence of "resource nationalism," inadequate refining capacity, and an aging labor force.

In addition, another issue has become apparent: The world likely will grow more, not less dependent on oil supplies from the Middle East.

Because high oil prices have posed serious financial challenges to many people in consuming countries, some policymakers and analysts have blamed oil companies and producing countries for the current economic slowdown.

A confrontational approach arising from these circumstances is not a beneficial tactic for dealing with high prices, however. Rather than portraying oil producers as scapegoats for the global economic malaise, policymakers can better achieve stable oil prices and markets by directing international efforts towards promoting transparency and consolidating cooperation between producers and consumers.

Supply-demand imbalance

The imbalance between supply and demand has been the driving force behind the soaring oil prices. Unlike the supply-interruption oil shocks of 1973-74 and 1979-80, the current one is a demand-driven surge, fueled by strong Asian consumption.

In 2008 crude oil prices exceeded the all-time inflation-adjusted high of $99.04/bbl reached in April 1980 (see table).[1] The oil market has been moving away from an almost 2-decade equilibrium into uncharted territory. A close examination of oil price fluctuation suggests that the current skyrocketing has proven more sustainable than previous surges of the 1970s and 1980s.

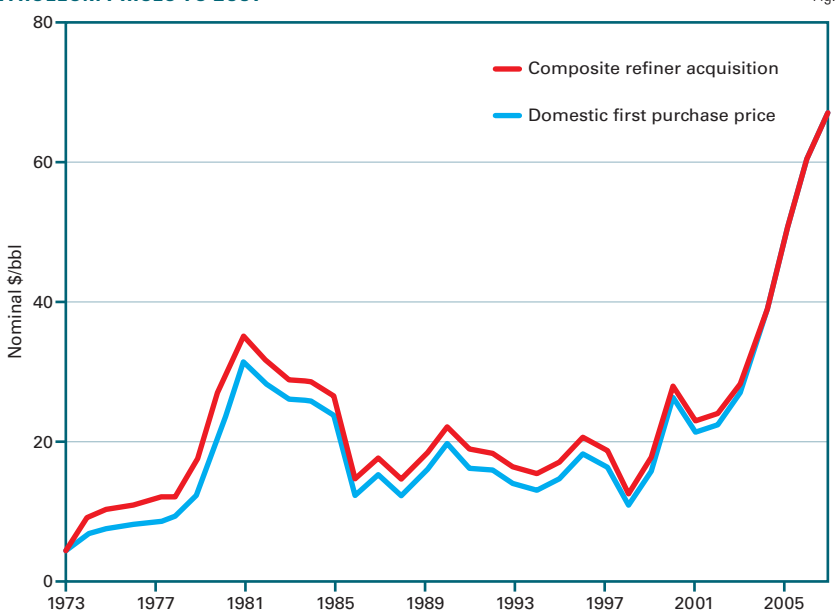
According to BP PLC's most recent report, oil prices have been on an upward path for more than 6 years.[2] Even if prices drop back somewhat in the coming months and years, they are not likely to go back to the $20s or $30s levels. More realistically, there is a new "floor" or "plateau" that has yet to be determined.

Energy analysts at the International Energy Agency (IEA) in Paris, the US Energy Information Administration (EIA), and others argue that the price spike is being fueled by rising concerns that global supply is not keeping pace with global demand. These concerns have renewed interest in the so-called "peak-oil theory," which suggests that oil production will plateau in coming years as suppliers fail to replace depleted fields with enough fresh reserves to boost overall output.

Other analysts and energy executives contend that the world's fossil fuel resource base remains sufficient to support growing levels of production. Guy Caruso, head of EIA, asserts that the challenge is geopoli-

PETROLEUM PRICES TO 2007

Fig. 1



Source: Energy Information Administration, Monthly Energy Review, July 2008

tics not geology: "We are not believers in peak oil," he said. "We believe the above-ground risk is the issue."[3] BP Chief Executive Tony Hayward echoes the sentiment, saying the problems in bringing on new production "are not so much below ground as above it and not geological but political."[4]

Geopolitics

Oil prices reflect not only demand and supply, but broader macroeconomic and geopolitical changes. The imbalance between demand and supply has been heightened, for example, by rising exploration and production costs and an aging labor force. And the rise of "resource nationalism" has complicated the timely allocation of adequate investment and the utilization of most advanced technology.

Political calls to reduce dependency on the Middle East are unrealistic. Given their geological advantages, Middle East producers will continue to play a dominant role in global oil markets, and the world's dependency on the Middle East is likely to expand, not shrink.

The era of confrontation between oil producers and consumers is over because the two sides, as well as oil companies, share a mutual interest in "moderate" oil prices that would contribute to stable energy markets. The International Energy Forum (IEF) can be seen as an embodiment of the current and future cooperation between major players in the oil industry.

Demand-driven price jump

A fundamental characteristic of oil policy is that today's global oil market is overwhelmingly well-integrated. In such a global market, it matters less who buys and who sells oil. More important is the availability of enough supplies to meet growing demand. Economic growth is the single most important determinant of changes in oil demand.

As the world's population continues to rise and living standards continue to improve, the world's energy requirements will continue to grow apace. Over the last few decades energy intensity—energy use per dollar of gross domestic product (GDP)—has improved. As a result, the world economy is better suited to mitigate the impact of high oil prices.

In 1980 the global economy consumed 0.89 bbl of crude oil to produce $1,000 of real GDP (in 2007 US dollars), while today the global economy needs about 0.63 bbl of crude oil to generate the same economic output.[5]

In the last several years, economic growth, and the subsequent demand for energy, has been asymmetric. Economic growth and oil consumption in most members of the Organization for Economic Cooperation and Development (OECD) have substantially slowed down.

Meanwhile, growth and consumption in the non-OECD countries, particularly China, India, and to a lesser extent the Middle East, have shown few signs, if any, of weakness. Indeed, China represents the single largest source of world oil consumption growth. In 2007 China accounted for half of global energy consumption growth.[6]

CRUDE OIL PRICE SUMMARY[1]

Year	US avg., $/bbl — Nominal	Real[2]
1990	20.03	24.55
1991	16.54	19.59
1992	15.99	18.51
1993	14.25	16.12
1994	13.19	14.61
1995	14.62	15.87
1996	18.46	19.67
1997	17.23	18.06
1998	10.87	11.27
1999	15.56	15.90
2000	26.72	26.72
2001	21.84	21.33
2002	22.51	21.61
2003	27.56	25.90
2004	36.77	33.59
2005	50.28	44.50
2006	59.69	51.21
[3]2007	66.52	55.59

[1]Prices are for the marketed first sales price of domestic crude oil. [2]In chained (2000) dollars, calculated by using gross domestic product implicit price deflators. [3]Average for July through December only.

Source: US Energy Information Administration, Petroleum Marketing Monthly (April 2008), Table 18. (http://www.eia.doe.gov/oil_gas/petroleum/info_glance/petroleum.html)

Other factors

In addition to rising demand, other factors have contributed, in different degrees, to the surge in oil prices:

- *Oil companies have had to contend with rising costs across the industry.* Costs for developing a new oil field have more than doubled since the early 2000s. For example, a deepwater drillship might have cost $125,000/day to rent in 2004. In 2008, it commands more than $600,000/day.[10]
- *Refining historically has not been very profitable.* The recent oil costs to refiners are shown in Fig. 2. Through much of the 1990s, refining profit margins were not sufficiently large to generate much interest in the construction of new facilities. Instead, efforts were made in the US to expand the capacity of existing refineries, a phenomenon known as "capacity creep," which contributed an additional 1.5 million b/d capacity since the early 1990s.[7]

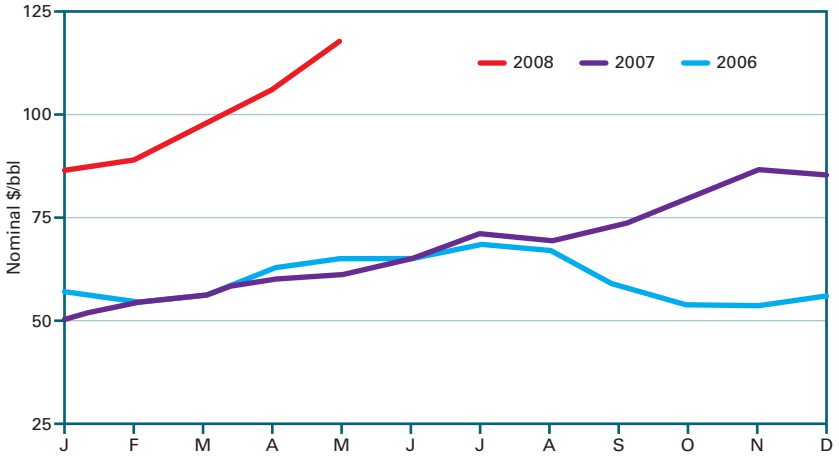
Europe has a mixed refinery outlook. Although Europe overall is relatively balanced in total oil products, there is a chronic imbalance between the supply and demand of individual products.[8] In Asia, major new refineries are being built or are in the planning stage.

Several oil-producing countries recently have sought to expand their refining capacity. In 2006 Saudi Aramco announced plans to build two major refineries, one in a joint venture with Total SA in Jubail and the other with ConocoPhillips at Yanbu.[9]

- *The "missing generation" or aging work force will retire, resulting in a shortage of knowledgeable personnel.*[11] The period of low oil prices that lasted from the mid-1980s to the early 2000s provided few incentives for professionals and workers, at almost all levels, to enter the oil industry. The shortage of a young, dynamic, and experienced labor force is not likely to abate in a few months or a few years. The oil industry needs to remain competitive with other industries to attract qualified engineers, geologists, and other workers and to replace the retiring generation with a new one.
- *Over the last several years the value of the US dollar has deteriorated relative to other currencies.* Concern over the future of the US

COMPOSITE REFINER ACQUISITION COST, MONTHLY

Fig. 2



Source: Energy Information Administration, Monthly Energy Review, July 2008

economy and the long-term sustainability of the US fiscal and trade deficits all contributed to this depreciation. The weakening dollar, in conjunction with rising inflation and concern over a possible collapse in the value of other financial investment vehicles related to real estate and other markets, has compelled investors seeking refuge to move their financial assets to oil and other commodities funds, thereby boosting prices further. The steady decline of the US dollar means a similar decline in the purchasing power of oil exporters.

• *Resource nationalism is on the rise, affecting the internal structure of the oil industry.* In OPEC countries and elsewhere, oil production was wholly or mainly taken over by state-owned companies in the 1970s and 1980s.[12] Today these national companies continue to dominate the industry, holding nearly 80% of global oil reserves and providing the bulk of world production. Their performance in exploration and production has been generally affected by civil unrest, government interference, corruption, inefficiency, and the diversion of capital to social welfare.[13]

Petroleum demand is relatively price inelastic, particularly in the short term. Changes in energy consumption patterns do not occur easily, and it takes a long time and sustained high prices to persuade energy consumers to alter the way they use oil and other sources of energy. The experience of the last several years suggests that where markets are allowed to operate, they do work. Demand for oil has declined or slowed in response to high prices.

The supply side

A key factor contributing to high prices has been the inability of producers, particularly non-OPEC ones, to keep pace with growth in global oil consumption. Despite soaring oil prices, crude output from nations outside OPEC has remained essentially flat since the mid-2000s, defying the normal link between high prices and increased production. Sluggish investment and aging fields have crimped crude production in the North Sea, Russia, and Mexico.

The long period of low prices (mid-1980s-early 2000s) contributed to a broad underinvestment in both upstream and downstream sectors. When prices started the upward trend, some oil companies were more willing to return money to the shareholders than to invest in new opportunities. Meanwhile OPEC producers were initially hesitant to commit substantial investments before being assured that the growth in demand and rise in prices were sustainable.[14]

Russia, the world's second largest oil producer and exporter, has faced tremendous problems maintaining its production level since the mid-2000s. Massive development in Western Siberia allowed Soviet oil production to peak (about 12.5 million b/d) in the late 1980s.

Economic and political turmoil that accompanied the collapse of the Soviet Union led to the fall of production to about 6 million b/d in 1996. Since then, privatization of the oil industry and utilization of foreign investment and technology have contributed to a steady rise of the country's oil production. This massive production, however, has slowed since 2005.[15]

Several factors contributed to this stagnation, including restrictions on foreign investment (the renationalization or deprivatization of the oil industry) and the aging Siberian fields.

Mexico, another major non-OPEC producer and exporter, has experienced a steady decline of its oil production in recent years. This decline is due largely to the peak of production from supergiant Cantarell field. State-owned Petroleos Mexicano (Pemex) holds a monopoly on oil production in the country and lacks the necessary funding for exploration and investment to reverse the production decline.[16]

The Russian and Mexican outlooks underscore IEA's forecast that non-OPEC production will likely level off by the middle of the 2010s. Meanwhile, the agency projects that OPEC's share of world oil supply will jump to 52% by 2030 from 42% in 2007.[17]

IEA also underscores the significance of the Middle East and North Africa (MENA) region in meeting the world's growing demand for oil. It forecasts that MENA's share of world oil production will rise to 44% in 2030 from 35% in 2004.[18]

OPEC members' contributions to world production and the challenges they face vary from one case to another. For example, Indonesia, a member since 1962, decided to terminate its membership in the organization by yearend.[19] The country's production has fallen to less than half the peak it reached in the early 1990s because of aging oil

fields. Indeed, Jakarta has been a net oil importer since 2004.

Another two members, Iraq and Nigeria, face domestic security challenges. Their future production depends to a great extent on overcoming these challenges and to their ability to improve political stability.

Thus, the MENA region has been and is projected to continue to be the most influential player on the production side of the oil equation. In addition, the fact that oil revenues represent the main source of income for most MENA producers has underscored their interests in the stability of the global oil market.

While MENA producers are reaping record profits, they are concerned that soaring prices might eventually dampen economic growth and lead to global recession, which would, in time, reduce demand. (Signs of this scenario are already in place in several major consuming markets.)

Furthermore, skyrocketing oil prices make alternative fuels more attractive, threatening the long-term prospects of the oil-based economy. Thus, supporting high prices would be like "killing the goose that lays the golden egg." In short, excessively high oil prices are likely to harm the long-term interests of major producers as much as those of major consumers. Little wonder the two sides share a common interest in restoring a sense of stability in the global oil market and in containing the volatility of prices.

Confrontation vs. teamwork

In May 2008 the US House of Representative passed HR 6074 bill, which would have created a new oil antitrust task force within the Department of Justice and would have given the DOJ authority to sue foreign oil cartels for violating US antitrust laws. The Senate, however, rejected the bill a few weeks later. These actions by the US Congress highlight the deep uncertainty in the US and around the world on the right approach to address soaring oil prices.

Instead of this confrontational approach, major producers, consumers, and oil companies have sought to lay the foundation for transparency and cooperation among all players in the industry. The move to establish a dialogue between consumers and producers gained momentum in the early 1990s.

At the initiative of Presidents Francois Mitterand of France and Carlos Andres Perez of Venezuela, major producers from OPEC and major consumers from IEA held a seminar in Paris in 1991. In this initial meeting, representatives from the two sides discussed issues of mutual concern such as economic and industrial cooperation. Their discussion helped to alleviate earlier mistrust that had characterized the global oil market in previous decades. Since then, meetings between the two sides have been held on a regular basis.[20] These meetings, known as International Energy Forums (IEF), developed from a ministerial seminar and workshop to become the largest recurring global gathering of energy ministers.[21]

When Saudi Arabia hosted the seventh IEF meeting, in 2000, then-Crown Prince Abdullah Ibn Abd al-Aziz proposed to establish a secretariat in Riyadh for the IEF. The proposed International Energy Forum Secretariat (IEFS) was officially endorsed by the eighth ministerial meeting in Japan in 2002 and started working in Riyadh in December 2003.

IEFS's executive board consists of representatives from producing and consuming countries, as well as both IEA and OPEC. IEF and IEFS have contributed to a growing awareness of long-term common interests among all major parties in the oil industry.

The Joint Oil-Data Transparency Initiative (JODI) was launched in June 2001 to assess the quantity, quality, and timeliness of basic monthly oil data. Currently, more than 90 countries representing more than 90% of global oil supply and demand are submitting data to JODI. The data cover production, demand, and stocks of seven categories: crude oil, liquefied petroleum gas, gasoline, kerosine, diesel oil, fuel oil, and total oil.[22]

Parallel to the IEF gatherings, IEA and OPEC have held a series of joint workshops since the early 2000s, which demonstrates a further strengthening in the dialogue and cooperation between the two organizations. The first two workshops concentrated on oil investment prospects. The third one, held in Kuwait City in May 2005, focused on the economic prospects for the MENA region and its energy supply and demand prospects. In May 2006 a fourth joint workshop was organized in Oslo, where participants discussed global oil demand.[23]

The steady rise in oil prices since the early 2000s has further intensified the efforts for transparency and cooperation. Heads of state and government of OPEC members held a third summit in Riyadh in November 2007. In the Riyadh Declaration, OPEC members agreed on three themes: stability of global energy markets; energy for sustainable development; and energy and environment. They underscored the interrelationships between global security of petroleum supply and the security and predictability of demand. They also pledged to renew efforts to bridge the development gap and make energy accessible to the world's poor while protecting the environment.[24]

In June of this year all major players in the oil industry held a meeting in Jeddah, Saudi Arabia, to address rising oil prices. The joint communiqué underscored several themes, most notably the importance of improving the state of transparency and improving the standards relating to the market's data and information quality based on the JODI.[25]

Seeking to address rising fears that future world supplies may not match rising demand, Saudi Arabia promised an aggressive campaign to push its overall output capability to as much as 15 million b/d by 2018 from about 11.4 million b/d in 2008.[26]

The way ahead

There is no guarantee that promises of full cooperation and transparency or

of investment and production increases will be completely fulfilled. Still, a major achievement is that the dynamics of global oil markets at the end of the 2000s are fundamentally different from those of the 1970s. The underlying consensus is that soaring oil prices are destabilizing global energy markets and the global economy. Ultrahigh prices are not serving the interests of either producers or consumers. They need to be vigorously addressed by joint efforts between the two sides. For the foreseeable future, the following trends are likely to prevail:

- *Oil prices are not likely to keep rising forever.* Since July oil prices have been declining. However, the days of cheap oil are over. Prices are highly unlikely to go back to the $20 and $30 levels. For oil prices to fall significantly, either the world economy has to experience a deep and sustained economic recession or alternative sources have to become commercially and environmentally viable in a timely fashion; neither development is likely to take place in the near future. Major industry organizations such as IEA and EIA project high prices for the next few decades.
- *The energy future is not completely bleak.* There are some grounds for optimism. At today's prices, investment in marginal oil fields becomes attractive, as does the development of alternative energy sources. Prospects of expanding production in the Caspian Sea, deepwater fields off Australia and Brazil, and in the Gulf of Mexico are promising. Meanwhile, global oil consumption is slowing and in some major markets, declining. In short, market laws are working—production, consumption, and investment are responding to price signals.
- *Alternative sources have recently proven competitive in the industrial, commercial, and residential sectors.* In the transportation sector, however, oil remains and is projected to continue to be the dominant fuel. Furthermore, the MENA region's substantial geological and geographical advantages suggest that the world is likely to grow more dependent on oil supplies from the region.

Concentrated efforts to address the region's geopolitical issues such as terrorism and instability in Iran and Iraq would alleviate the so-called "fear premium" and further stabilize oil markets and prices. ✦

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References are available from the author upon request.

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BP suspends Azeri oil shipments via rail to Georgia

Eric Watkins
Senior Correspondent

BP PLC has been forced to suspend shipments of 50,000-70,000 b/d of oil from Azerbaijan to Georgia following the destruction of a key railroad bridge, severing the main east-west train link between the two countries.

"Rail exports have stopped from Azerbaijan to Georgia," said BP spokesman Robert Wine, adding, "There's been some damage along the line in Georgia."

Destruction of the rail link, regardless of the cause, reduced BP's three possible oil export routes to just one alternative route: via the Russian-dominated 100,000 b/d line extending from Baku to Russia's Black Sea port of Novorossiisk.

Georgian officials accused Russian troops of blowing up the railway bridge, but Russian officials denied any involvement in the explosion, which collapsed a 45-m section of the 220-m bridge.

The railway line extends from Tbilisi, through the Georgian town of Gori, before splitting into three offshoots that extend to the Black Sea ports of Poti and Batumi and southwest to a point just short of the Turkish border.

Repairs should be swift

Destruction of the line, which BP said can carry 50,000-70,000 b/d of Azeri oil to the port of Batumi, means at least a temporary disruption of supplies sent to Georgia's Black Sea terminals.

But a shipping agent in the port of Batumi said exports of Azeri oil from the port are unlikely to be delayed by damage to the railway line, saying there was just one tanker in port which could be loaded with oil already on hand.

By the time a new tanker arrives to be loaded, he said, the railway bridge will be repaired and the railway line will receive railcars with additional cargo from Azerbaijan.

A spokesperson for Georgian Railways estimated that the key rail bridge would be rebuilt within a week or sooner. She said engineers, workers, and materials have arrived from Armenia

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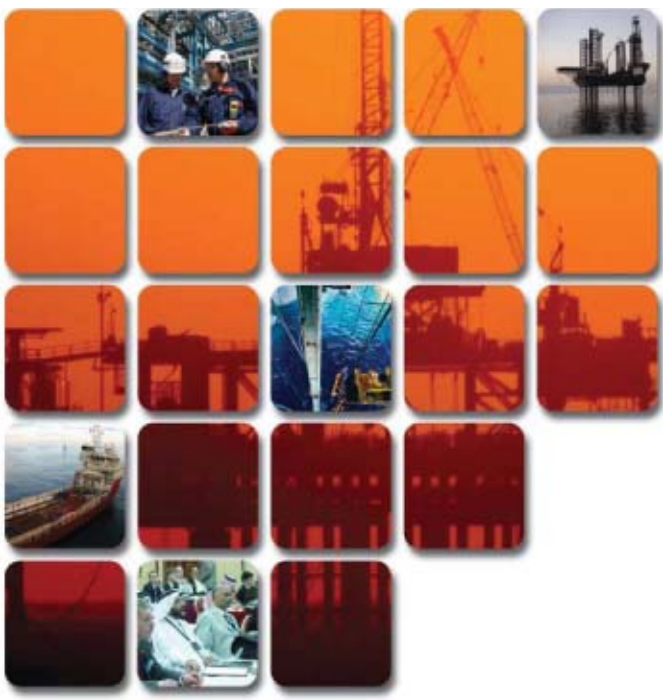

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WATCHING THE WORLD

Eric Watkins, Senior Correspondent

A failure of oil diplomacy

US Sen. John McCain, the Republican Party's presidential hopeful, has underscored concerns in the country about the viability of the Caucasus as a secure transit corridor for oil and gas.

Last week McCain noted that Russia has become more aggressive toward the now-democratic nations that broke free of the old Soviet empire—aggression that became most evident with Moscow's recent attack on Georgia.

Georgia now stands at a strategic crossroads, McCain said, which are traversed in particular by the key Baku-Tbilisi-Ceyhan oil pipeline. "If that pipeline were destroyed or controlled by Russia," he said, "European energy supplies would be even more vulnerable to Russian influence."

McCain is doubtlessly correct in his estimation of the situation but is hardly the first to note the importance of the Caucasus as an energy bridge or the potential for Russian mischief there.

Deja vu

In February, as OGJ reported at the time, it seemed that Washington had finally awakened to the need for a special kind of diplomacy in the region—a kind of diplomacy that would be devoted to oil.

Remember? US Secretary of State Condoleeza Rice announced plans to appoint a special envoy for energy issues to deal with the use of oil and gas for political means.

"It is a really important part of diplomacy, in fact, I think I would go so far as to say that some of the politics of energy is warping diplomacy in certain parts of the world," Rice told the Senate Foreign Relations Committee on Feb. 12.

"I do intend to appoint, and we are looking for, a special energy coordinator who could especially spend time on the Central Asian and Caspian region," she said.

Rice was making her pitch on Capitol Hill in response to questions from Sen. Richard Lugar (R-Ind.), who asked about progress made on establishing such a post as called for in legislation approved in 2007.

Oil as a weapon

Lugar was especially vexed about Russia's use of oil and gas as a political weapon, saying among other things that, "Moscow continues to use energy to extort its neighbors."

Lugar went on to explain: "Russian foreign policy is now largely based on maximizing the political leverage and financial earnings of its energy supplies and dominating the transport of energy in Eurasia.

"Appointment of a special representative for energy would be a clear statement of high-level US priority for this strategically critical region," he said.

"Failure to demonstrate US commitment will jeopardize progress on trans-Caspian energy cooperation, with potentially devastating impacts on long-term US security and economic interests in the region," Lugar said. Could any man or woman sound more like a prophet than Sen. Lugar? It seems he had a vision of the future in describing the need for the US to undertake serious oil diplomacy in the region.

Very clearly, it is a vision that Washington has yet to embrace. ✦

and Azerbaijan and works on the bridge are already under way.

The spokesperson said reconstruction of the bridge is the only viable option for restoring railway traffic, as a nearby alternative bridge, which has been out of use for about 20 years, cannot be reopened.

The stoppage further limits BP's options in taking oil from the Caspian after a fire caused the shutdown of its 1 million b/d capacity Baku-Tbilisi-Ceyhan (BTC) link to Turkey and hostilities in Georgia forced closure of the British firm's 150,000 b/d Western Route Export Pipeline (WREP) for security reasons.

BP's only other export alternative currently, the Baku-Novorossiisk line, leaves the British company with an "unattractive option," according to analysts, as it requires the mixing of Azeri oil with lower-quality Russian Urals crude.

Due to the hostilities in Georgia, however, it remains to be seen how soon BP will be able to lift its shutdown of the WREP, while no definite date has been given for the completion of repairs on the BTC line.

BTC line repairs slow

Repairs to the BTC line in Turkey began over the weekend, but a spokesman for Botas International Ltd., which operates the Turkish sector of the line, said, "It's a step-by-step process.... We don't know just yet how long it will take."

Turkey's energy minister Hilmi Guler said Aug. 18 that oil transport along the BTC might resume "in a few days" as repairs on the line were under way, but that view was not shared by BP spokesman Murat Lecompte, who said it is too early to say when the pipeline could be operational again.

Because of the disruption to its export routes, the BP-led Azeri-Chirag-Gunashli oil fields in the Caspian have cut production to about 250,000 b/d from about 800,000 b/d.

Of more concern, however, closure of the export routes has raised worries of Russia attempting to reassert its

control over the region, as took place in the Soviet era. In Georgia, that would mean Russian control of the existing pipelines, rail routes, and ports.

The Republican presidential candidate, US Senator John McCain underlined those worries over the weekend, saying that if the BTC line "were destroyed or controlled by Russia, European energy supplies would be even more vulnerable to Russian influence."

That view is partially supported by independent analysts. According to Simon Wardell of analyst Global Insight, Russia is not likely to close or destroy the existing oil export routes across the Caucasus. To the contrary, Wardell said, control of the existing export routes would give Russia more power in the negotiation of prices.

With Russian troops showing no haste to withdraw from Georgia, despite both sides signing a ceasefire agreement, it is too soon to tell precisely what sorts of control, if any, Russia will attempt to impose on the region's oil and gas export flows and revenues. ✦

SCP line open; BTC, WREP lines remain shut down

Eric Watkins
Senior Correspondent

BP PLC has restored exports of natural gas from Azerbaijan into the South Caucasus Pipeline (SCP), but said the 150,000-b/d Western Route Export Pipeline (WREP) remains shut, as does the 1 million b/d capacity Baku-Tbilisi-Ceyhan (BTC) oil pipeline.

"We hope to restart the pipelines as soon as the situation becomes safe," said a BP spokesperson, who declined to predict when that would be.

The announcement coincided with reports that Russia, amid accusations that it targeted pipelines and is deliberately blocking oil shipments out of Georgian ports, has offered to increase the amount of crude oil it can carry from Azerbaijan along the Baku-Novorosiisk pipeline.

Operations at the SCP and WREP were suspended Aug. 12 as a precaution after reports that Russian bombs fell near them and the Georgian sector of the BTC during hostilities in Georgia. The BTC line was shut earlier following an explosion and fire in the sector running through Turkey.

BP and its partners, forced to cut output more than fourfold at their Azeri fields from the usual 850,000 b/d, are hoping that Turkish state firm Botas International Ltd. will be able to repair the BTC line quickly.

Botas sources said repair work began on Aug. 14, but gave no estimate of how long it would take to reopen the line. A source in the Turkish ministry of energy said repairs would take less time than earlier estimates of 2 weeks, saying the amount of damage was "not great."

The cause of the explosion and fire on the BTC's Turkish sector remains unknown, according to a Botas spokesman who said state security forces are still inspecting the site of the fire.

Amid the uncertainty over the resumption of BP's oil pipeline operations, the Russian government has been sending mixed signals, saying it is prepared to increase oil flows along the Baku-Novorosissk line, while allegedly preventing shipments of oil from Georgian ports on the Black Sea.

Oil moving again

Russia resumed normal pumping of Azerbaijani oil along the Baku-Novorossiisk pipeline Aug. 13, according to Mikhail Barkov, vice-president of state-owned pipeline monopoly, OAO Transneft.

On Aug. 12, as hostilities arose in Georgia, the State Oil Co. of Azerbaijan Republic (SOCAR) received notification from Transneft that oil shipments along Baku-Novorossiisk had been suspended due to "planned" pipeline maintenance.

Barkov said the "planned" maintenance was carried out for a period of 8 hours, and that SOCAR was informed about this in the "usual" manner. "This probably took place late Monday and the early hours of Tuesday," he said.

"The oil started flowing again a few hours ago," said Barkov, who added that Transneft had "not refused to take Azerbaijani oil or decided to block its transportation. The stoppage was due to maintenance alone," he insisted.

Barkov said the volume of Azerbaijani oil pumped along the pipeline will double to 166,000 tonnes in August, following a request by SOCAR, and that the pipeline could handle 240,000 tonnes/month of oil in September, if SOCAR files such a request.

Azerbaijan had been using the Baku-Novorossiisk pipeline to ship oil produced at the Azeri-Chirag-Gunashli fields since 1997, but Azerbaijan International Operating Co. (AIOC), the operator of the Azeri-Chirag-Gunashli fields, stopped using and operating the Baku-Novorossiisk pipeline once the BTC line was commissioned in 2006.

Transneft's announcement of increased transport through the Baku-Novorossiisk pipeline coincided with a report from Azerbaijan that Russian warships prevented a tanker with Azeri oil from leaving the Georgian port of Poti on the Black Sea.

The report, made by SOCAR head Rovnag Abdullayev over state television, was denied by Russia's General Staff, which said it is not blocking oil traffic in the region despite the military conflict with Georgia.

Russian military officials also have denied deliberately targeting or attacking any of the gas or oil pipelines crossing Georgia—a claim that appeared to be contradicted by evidence emerging from independent sources.

According to a report carried by The Wall Street Journal on Aug. 14, the physical evidence of a recent Russian air

attack on the BTC line "is compelling."

The report said a line of some 45 bomb craters, each some 60 ft across, scar the landscape. It said the craters are "concentrated in an area close to where BTC and the Baku-Supsa line intersect."

"The raids suggest Russia wasn't only aiming to humiliate its neighbor militarily but also to damage its reputation as an energy corridor," the report said.

The Russian Defense Ministry earlier said it had no plans to bomb the pipeline in Georgia, though the deputy chief of Russia's armed forces general staff did voice "deep concern" over the possibility of "ecological catastrophe," (OGJ Online, Aug. 13, 2008). ✦

API: Senate's 'Gang of 10' proposal adds taxes, not tracts

Nick Snow
Washington Editor

A compromise energy legislation proposal advanced by a bipartisan group of US senators falls short of what is needed because it is "light on new production and heavy on new taxes," said the American Petroleum Institute on Aug. 13.

"The proposal's approach to access to federal oil and natural gas resources is far too limited in scope, and it is unfortunately paired with the imposition of at least $30 billion in new taxes on the oil and natural gas industry that would have the effect of limiting needed oil and gas investment," API Pres. Red Cavaney said of the plan, which the so-called "Gang of 10" announced on Aug. 1.

He said that while the proposal would expand access to the US Outer Continental Shelf, it would limit any additions beyond current law in the eastern Gulf of Mexico and only add acreage off four southern Atlantic Coast states. "Even in those areas, development in federal waters less than 50 miles offshore would be banned, despite the fact that offshore facilities would need to be 12 or fewer miles from shore to be visible from land," he said in a letter to all 100 senators.

"Leasing in the North Atlantic and off the Pacific Coast would be banned and plentiful hydrocarbon resources in Alaska would remain off-limits. Significant regulatory burdens on new development would remain in place," Cavaney added.

Imposition of $30 billion in what he termed "clearly discriminatory new taxes" to pay for federal investments in alternative and renewable energy resources "ignores the fact that the industry already provides more than 70% of all North American investment in research and development in emerging energy technologies," API's president maintained.

"The only beneficiaries of such an ill-advised approach would be international competitors in the global oil markets, who would benefit as US companies were made less competitive in the quest to find and develop global energy supplies. Already, the top 27 US energy-producing companies have seen their annual tax liability rise to more than $100 billion, an 80% increase from 2004 to 2006," he continued.

New taxes on these US-based companies would drastically reduce capital which otherwise would be invested in domestic oil and gas production and expanded refinery capacity, according to Cavaney. "The net result could be to stifle high-risk, capital-intensive projects in the US, leaving Americans more dependent on foreign sources of energy while jeopardizing US jobs and economic growth," he warned. ✦

Dallas Fed analysts see reprieve from record-high oil prices

Nick Snow
Washington Editor

World oil prices apparently have been given a reprieve from their early summer peak, two analysts in the Federal Reserve Bank of Dallas' economic research department contended on Aug. 14.

Prices pulled back 20% from a record $147.27/bbl on July 11 to close at $118.58/bbl on Aug. 6, Stephen P.A. Brown and Jackson Thies said in their latest quarterly energy update. "Even after the recent decline, prices are almost 60% above year-ago levels and up around 20% year-to-date. The futures market was in backwardation on Aug. 6, with the December 2010 contract closing at $115.95, implying that markets expect the long-term price of oil to be slightly lower," they observed.

Like their counterparts at the US Energy Information Administration, Brown and Thies said that slower growth in demand reflecting a slowing global economy is the likeliest cause of falling oil prices. Reduced fuel subsidies for consumers in China, India, and some Middle East nations are adding to downward pressure, although the Dallas Fed analysts noted that such subsidies have been reduced, but not eliminated.

"A large portion of the increase in world oil consumption has been driven by the larger emerging economies of China and India" they said. "For instance, in an attempt to further reduce pollution in advance of the Olympic Games, China switched a large amount

of its electricity generation from coal to diesel. China is also thought to have stockpiled oil and diesel in advance of the games to ensure there are no shortages due to the influx of participants and spectators." Brown and Thies said, "Upon completion of the Olympic Games, it is expected that the Chinese will continue to phase out their subsidies, with the goal of eliminating them by the end of 2009. If there is a drop in Chinese demand following the Olympics, there will most likely be further downward pressure on oil prices."

Diesel, gasoline

The analysts said diesel fuel prices came down in tandem with oil, but strong demand from China and India kept them solid. "One factor contributing to the strength of diesel is that refineries are configured to produce more gasoline than diesel fuel. This configuration is based on past consumption patterns and is making it difficult to get enough diesel out of each barrel of oil," they observed.

US retail gasoline prices have hovered at a national average of $3.90/gal after peaking at $4.12/gal in mid-July, Brown and Thies continued. But they added that domestic gasoline prices haven't kept their normal pace with crude oil because US motorists are driving less. "Gasoline inventories are above seasonal norms, which is depressing refiners' margins and holding down capacity utilization. Some of the downward pressure is the result of high diesel margins. With diesel in high demand, more barrels of oil have to be processed, which increases gasoline production," they said.

Assuming that margins recover and crude prices are steady, they suggested that spot gasoline prices would be around $3.13/gal by Labor Day. "However, the futures market is not showing a recovery in refiners' margins and currently projects spot prices at $2.94[/gal] by Labor Day. This translates to a national average pump price of about $3.70/gal for regular unleaded," Brown and Thies said. ✦

WATCHING GOVERNMENT

Nick Snow, Washington Editor

A possible path to a compromise

The single biggest question this August congressional recess remains whether compromise energy legislation that includes opening more of the US Outer Continental Shelf to leasing will be seriously considered in September.

Washington observers generally agreed by mid-August that US House Speaker Nancy Pelosi (D-Calif.) remained adamant that the OCS question wouldn't come to the floor despite dropping some tantalizing hints that it might.

They even suggested that Pelosi told other House Democrats that she'd take any heat for not bringing the question to a vote so they'd be free to say what they wanted if it would help them get reelected.

Pelosi stuck to her guns as other House members proposed at least two bipartisan compromises. HR 6709, which Reps. John E. Peterson (R-Pa.) and Neil Abercrombie (D-Ha.) introduced, has more cosponsors but takes a more aggressive approach to opening additional OCS areas than HR 6817, which Rep. Jim Matheson (D-Utah) offered with six cosponsors.

Reid's responses

Energy legislation compromise prospects looked somewhat better in the US Senate when Majority Leader Harry M. Reid (D-Nev.) commended the so-called "Gang of 10" for developing their proposal and agreed to the bipartisan group's earlier request for a day-long energy summit. Reid also asked Energy and Natural Resources Committee Chairman Jeff Bingaman (D-NM), who ran a day-long forum on oil prices on July 17, to lead the energy summit.

When Bingaman accepted the assignment on Aug. 4, however, he added energy commodities regulation (which the Gang of 10 had sidestepped) to the agenda. "We must ensure the proper functioning of markets for oil and gas so that prices are not artificially high because of excessive speculation," he said.

Other federal lawmakers are ready to bring up their own ideas to modify the Gang of 10's proposal. Two Colorado Democrats, Sen. Ken Salazar and Rep. Mark Udall want to add provisions that would develop additional domestic energy resources much more gradually. Still, its prospects look better than either House bill, at least initially.

Additional taxes

For industry, the Senate plan's biggest problem is the $30 billion of taxes that would be used to help finance the $84 billion of investments for new energy programs. The plan's approach to opening more OCS acreage is so modest that the proposal is "light on new production and heavy on new taxes," the American Petroleum Institute said on Aug. 13.

"Leasing in the North Atlantic and off the Pacific Coast would be banned, and plentiful hydrocarbon resources in Alaska would remain off-limits," API Pres. Red Cavaney said.

The idea could still move forward if new OCS activity is limited to tracts off Virginia, North Carolina, South Carolina, and Georgia, one lobbyist told me, adding that it would then need to become part of a major appropriations bill before being sent to the House. ✦

Record-breaking Colorado lease sale still falls short

Nick Snow
Washington Editor

The long-anticipated Roan Plateau lease sale netted $113.9 million, a record for the US Bureau of Land Management in the Lower 48, the US Department of the Interior agency said on Aug. 14. But the amount fell short of what many politicians and groups in Colorado anticipated, and they quickly blamed each other for the results.

"For more than a year, the oil and gas industry and some politicians have claimed that a Roan Plateau lease sale would generate proceeds of up to $2 billion. Today, when the bids came in at only $114 million, we learned just how wrong and over-exaggerated those claims were," Colorado Gov. Bill Ritter said following the sale.

He and other Colorado Democrats, including Sen. Ken Salazar and Reps. John Salazar and Mark Udall, advocated leasing federal land on the western Colorado plateau in phases instead of holding a full lease sale. "We warned that an all-at-once lease sale would result in vastly undervalued bids. Unfortunately, these predictions turned out to be true," Ritter said.

But others blamed Democrats' opposition to the sale for the lower-than-expected bids. "The efforts of antienergy politicians took their toll in the form of lower bids than we expected and cost Coloradans millions of dollars by pandering to the extreme environmentalists," said Sen. Wayne Allard (R-Colo.).

"Development on top of the plateau is the result of a lengthy and thoughtful planning process that has put the needs of Colorado first," Allard said. "It is one of the most environmentally conscious plans ever created, representing over 7 years of collaboration between local, state, and federal officials. It will be conducted in a staged, ridge-by-ridge approach, and minimize wildlife habitat fragmentation," he said.

'Dark cloud of uncertainty'

Colorado Oil & Gas Association Pres. Meg Collins said actions by Ritter, Udall, and Sen. Salazar were responsible for the "disappointingly low" bonus bids. "The dark cloud of uncertainty cast by these elected officials and environmental groups through their lease sale protests, lawsuits, and rulemaking efforts grossly impact the value of the Roan," she said. Collins compared the Aug. 14 sale's average parcel price of $2,083/acre with the $40,690/acre paid by Marathon Oil Corp. when it leased 8,700 acres for nearly $354 million in May 2007. "If industry believed it could produce the full volume of natural gas present beneath the Roan anytime soon, values much closer to the market comparables would have been obtained," she said.

BLM said 54,631 acres in 31 parcels were leased in the latest sale. It also broke the record for a federal oil and gas lease sale in Colorado of $11.8 million, which was set in February 2006.

Sellmar Co., Denver, submitted the single highest bid, nearly $25.3 million, or $11,800/acre. Vantage Energy Piceance LLC, Englewood, Colo., won 20 of the leases with bids totaling about $57.6 million, followed by Meadow Ridge LLC, Denver, which won eight leases, and Oxy USA Inc., Houston, which won two.

The sale culminated 8 years of public planning which involved state and local governments, constituent groups, and the general public in developing what BLM said is one of the most environmentally sensitive resource management plans connected with oil and gas leasing in the DOI agency's history.

BLM noted that the plan confines development at the top of the plateau to existing road corridors, with disturbance limited to 350 acres or about 1% of the total surface there. More than 50%, or 38,470 acres, of the planning area is stipulated for no surface occupancy. Development on top of the plateau will occur in a staged, ridge-by-ridge process with well pads more than a half-mile apart. Leases there will require operators to enter into a single federal unit, with consolidation of planning and operations under a single unit operator.

Colorado will receive 49% of the lease sale proceeds as well as 49% of future royalties from oil and gas production on the plateau. BLM said no money will be dispersed until its Colorado state office resolves protests to the sale, including those from the state and various environmental groups. ✦

MMS Lease Sale 207 attracts $487 million in apparent high bids

Apparent high bids totaling just over $487 million were offered for 319 tracts in the western Gulf of Mexico at Lease Sale 207, reported the US Department of the Interior's Minerals Management Service Aug. 20 in New Orleans.

MMS received 423 bids totaling just over $607 million from 53 companies at the sale. This compares with 358 bids received totaling $369.5 million from 47 companies at the last western gulf sale (OGJ, Aug. 27, 2007, p. 30).

"This sale is an important next step in the journey to ensuring the nation's energy security," said MMS Director Randall Luthi. "The participation of the offshore oil and gas industry in this sale shows their commitment to the leas-

TOP 10 COMPANIES BY SUM OF APPARENT HIGH BIDS

Table 1

Rank, company	Total high bids	Sum of high bids, $
1. ExxonMobil Corp	130	127,331,000
2. Chevron USA Inc.	20	127,281,322
3. Statoil Gulf of Mexico LLC	5	87,352,000
4. LLOG Exploration Offshore Inc.	11	23,172,800
5. Shell Gulf of Mexico Inc.	15	12,341,000
6. Anadarko E&P Co. LP	19	20,199,985
7. Hess Corp.	22	14,806,839
8. Eni Petroleum US LLC	5	14,162,407
9. ConocoPhillips Co.	2	11,127,512
10. Devon Energy Production Co. LP	20	10,504,410
		6,671,461

Source: US Minerals Management Service

TOP 10 TRACTS BY HIGH BID

Table 2

Rank, company	Block	Water depth, m	High bid, $
1. Statoil Gulf of Mexico LLC	Alaminos Canyon 380	>2,000	61,110,000
2. Chevron USA Inc.	Garden Banks 973	800->2,000	52,107,556
3. Chevron USA Inc.	Garden Banks 972	800-<1,600	34,607,556
4. Statoil Gulf of Mexico LLC	Alaminos Canyon 424	>2,000	22,332,000
5. Chevron USA Inc.	Alaminos Canyon 775	>2,000	20,121,217
6. Shell Gulf of Mexico Inc.	Alaminos Canyon 771	>2,000	11,999,999
7. Eni Petroleum US LLC	Keathley Canyon 580	>2,000	8,103,115
8. LLOG Exploration Offshore Inc.	High Island Area 169	0-<200	8,012,000
9. ConocoPhillips Co.	Keathley Canyon 146	800-<1,600	6,200,110
10. LLOG Exploration Offshore Inc.	High Island Area A7	0-<200	6,012,000

Source: US Minerals Management Service

ing, exploration, and production of the nation's energy resources in the Gulf of Mexico."

The ultradeep water was a big draw at the sale. Of the tracts receiving bids, 169 blocks were in 800-1,600 m of water, 46 were in 1,600-2,000 m of water, and 22 were in more than 2,000 m of water.

This latest sale offered 3,412 blocks covering more than 18 million acres in the western gulf's Outer Continental Shelf planning area off Texas.

Based on the number of total apparent high bids submitted, ExxonMobil Corp. far outnumbered any other company, topping the list with 130 bids totaling more than $127 million. Hess Corp. placed the next highest amount of apparent high bids, 22, totaling a little over $14 million.

Chevron USA Inc. nearly matched ExxonMobil's total with only 20 total high bids totaling just over $127 million.

Statoil Gulf of Mexico LLC placed the highest single bid for a block: $61.11 million for Alaminos Canyon Block 380, which lies in more than 2,000 m of water.

The second and third highest single bids were placed by Chevron USA Inc. The major bid a little more than $52 million for Garden Banks Block 973 in 800-1,600 m of water and $34.6 million for Garden Banks Block 972, also in 800-1,600 m of water.

Historically, the western gulf lease sales are not as active in bidding as central gulf sales, MMS said, however noted that this sale marks the first one since US President George W. Bush lifted the executive ban on OCS leasing.

"The national focus has shifted to the potential of increased offshore energy production, which will continue to be under a strict regulatory regime of safety and environmental safeguards," MMS said.

DOI Secretary Dirk Kempthorne earlier this month announced the initial steps of a new 5-Year OCS oil and gas leasing program that could provide a significant advantage for the next administration, offering options 2 years earlier than the current 5-year program. ✦

Freeport LNG applies to export gas imports

Freeport LNG Development LP is the first US firm to request permission to export LNG imported into its Freeport, Tex., terminal.

It applied this month to the Department of Energy's Office of Fossil Energy for "blanket authorization" for short-term exports of LNG totaling 24 bcf, or about eight tanker cargoes, over 2 years. Freeport LNG Vice-Pres. Bill Henry told OGJ, "We need to do this to keep the equipment cold and sell the excess LNG either into the US market or export the LNG into the [higher priced] international market."

Due to lower prices for gas in the US and increased domestic production from the shale gas plays, Henry said, "There is very little LNG scheduled into the US for the next 12 months." Moreover, capacity holders at the 1.5 bcfd Freeport LNG terminal, which came online in June, do not have a dedicated source of supplies. Yet the terminal still must import a minimal amount of LNG to keep its storage and regasification equipment cooled to the proper temperature.

With an export permit, Henry said, imported LNG would be stored at the terminal until a market develops either in the US or abroad. The company emphasized it has no plans to export gas produced in the US. The terminal has two 3.4 bcf storage tanks.

According to Freeport LNG's application, a minimum of 4-7 MMcfd of natural gas from LNG imports into the Freeport terminal would be sold into US markets "as a result of boil-off and other maintenance and operational requirements at the terminal."

Henry said upgrades, including replacement of a check valve with a short spool required for loading LNG onto vessels, would be "minor" at an estimated cost of less than $10,000 and could be completed within weeks. The company has not let contracts for the project, pending DOE approval, Henry said. It's not yet known if other terminals have similar plans. The Zeebrugge LNG import terminal in Belgium recently offered to load LNG tankers, and the Kenai LNG liquefaction plant in Alaska has a permit to export US produced LNG. ✦

Maverick fracs unlock gas in Pearsall shale

Several operators stand to benefit if early gas flow rates from a horizontal Cretaceous Pearsall shale well in the Southwest Texas Maverick basin hold up.

The Pearsall shale, for decades a marginal producer in vertical wells, flowed gas at the rate of 3.5 MMcfd with 2,500 b/d of frac fluid after a five-stage frac job at a horizontal well in the Maverick basin, said TXCO Resources Inc., San Antonio.

Flowing tubing pressure is 3,875 psi, and the flow rates continued to rise as the frac fluid returned, the company said. The company pumped 750,000 lb of sand and 59,000 bbl of frac fluid and had recovered only 15% of the fluid as of Aug. 7.

The gas rate later impoved to 3.8 MMcfd.

Myers 2-683H is the company's third horizontal Pearsall well to be frac treated this year and the first to be successfully treated with five stages. It is also the first Pearsall well in which the horizontal lateral, 3,000 ft long, was fully cased, cemented, and perforated for limited entry, TXCO Resources said.

Two earlier horizontal wells gave up about 1 MMcfd each after open hole completions with multistage packers and sleeves (see map).

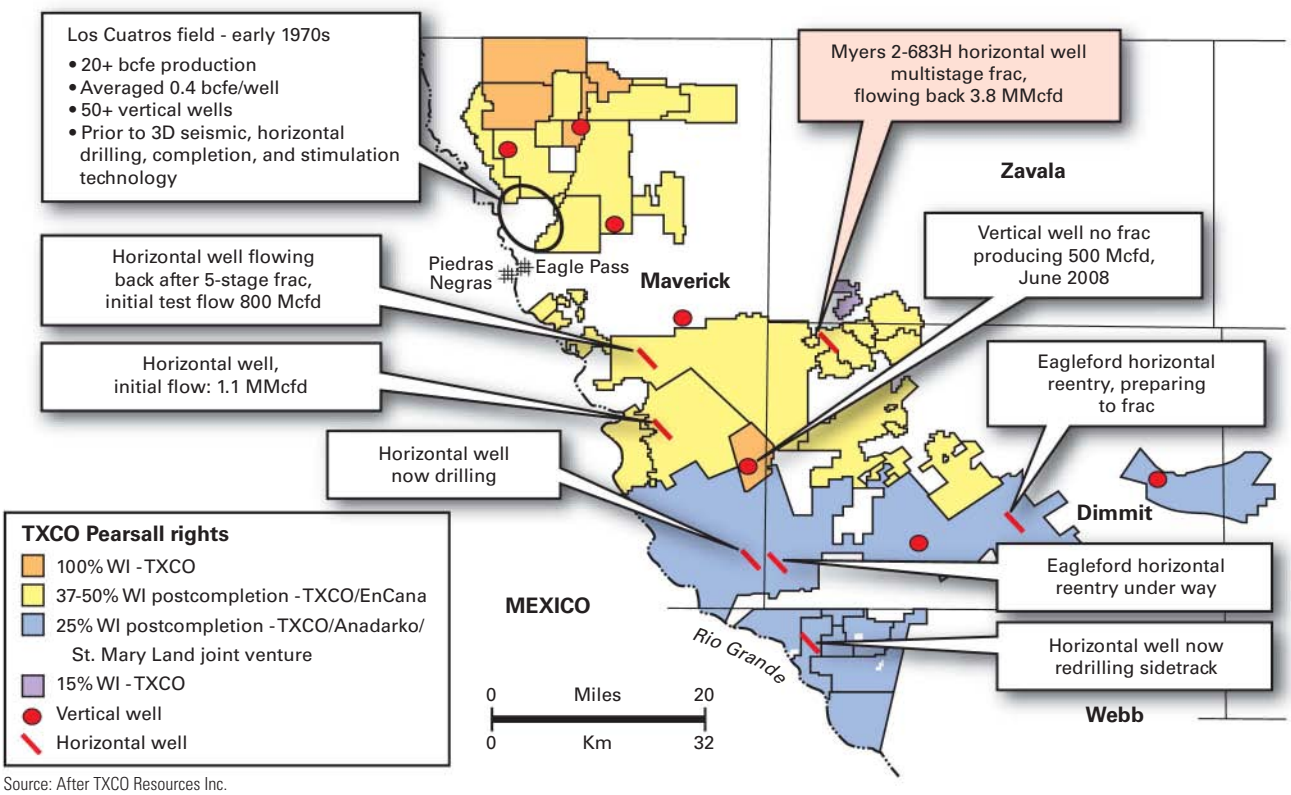
The company, which has 100% working interest in the Myers well through completion, conducted microseismic monitoring from an offset well during the treatment, allowing it to observe and modify the stimulation in real time.

The $5 million well cost included a vertical pilot hole and the five frac stages, and the company still plans to run production logs.

The Myers well provided the company with valuable data that will be used to improve frac designs on other Pearsall wells to be drilled and frac-stimulated in the future.

It was also welcome news to others who had tried to extract commercial gas flows from the Pearsall through vertical wells for decades, such as in Los

MAVERICK BASIN PEARSALL-EAGLEFORD ACTIVITY



Source: After TXCO Resources Inc.

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Cuatros field discovered in the 1970s. To what extent the play emerges will depend on the combination of lateral lengths, number of frac stages, and other elements of the completion process.

TXCO Resources' combined Pearsall project area exposes the company to the overpressured shale play on more than 848,000 gross acres (340,000 net acres) in the Southwest Texas basin (see map, OGJ, Aug. 13, 2007, p. 38).

The company is involved in large joint venture acreage positions in the basin with EnCana Corp., Anadarko Petroleum Corp., and St. Mary Land & Exploration Co.

The Myers well is on TXCO-EnCana properties. TXCO expects to begin frac treatments under the TXCO-Anadarko-St. Mary Land joint venture in the third quarter of 2008. ✦

Tupi area presalt oil discoveries likely contiguous

Eric Watkins
Senior Correspondent

Oil discoveries in the presalt layer off Brazil, triggered by last year's Tupi find, are likely to be contiguous, according to a Brazilian oil company expert.

"Recent seismic studies indicate a high degree of contiguity among sites around the Tupi well," said Eduardo Molinari, exploration and production coordinator at Brazil's state-owned Petroleo Brasileiro SA (Petrobras).

Molinari told a meeting of financial-market analysts that such contiguity is a factor that will trigger formal cooperation among the seven companies holding concessions in the region, including Petrobras, BG, Galp Energia, Repsol-YPF, Royal Dutch Shell, ExxonMobil, and Hess Corp.

Under Brazilian law, according to Molinari, concession areas found to be contiguous become the object of joint exploration by companies holding the various concessions to avoid drilling by one company in another's area.

Brazil has been seeking a variety of ways to maximize its control over the fields in the presalt layer, viewing them as a low-risk opportunity for international oil companies.

In July, Brazilian President Luiz Inacio Lula da Silva set up a commission to study rule changes for the development of the presalt oil reserves. The committee was given 60 days to present proposals, but they may be delayed due to the sensitivity of the issue.

In connection with Lula's aims, Brazil's Mines and Energy Minister Edison Lobao has proposed that a separate company be created to administer production in the presalt area as the oil is a "sovereign asset" that should be used for the benefit of the whole population and not just shareholders of companies.

Under the plan, the new state company would have full control over the oil produced in the presalt area. Petrobras—which is about 60% privately owned—would be a service provider, which either gains a share of production or earns a fee for services rendered.

The Brazilian president appears to support the idea, telling an audience of students on Aug. 12 that the oil discovered in the presalt layer of the Santos basin belongs "to all Brazilians, not just half a dozen oil companies."

Petrobras reported the Tupi discovery last year, estimating that the site could contain 5-8 billion bbl of crude oil. A formal statement on reserves is expected in second-half 2009.

Since the Tupi find, Petrobras and other international oil companies holding exploration concessions in the area have reported oil discoveries from other wells off southeastern Brazil (see map, OGJ, June 16, 2008, p. 38). ✦

Erskine developing Vicksburg gas in Brooks

Erskine Energy Production Co., private Houston independent, has hiked its gas-condensate production in the Ann Mag area 10 miles east and southeast of Falfurrias in Brooks County, Tex.

The company plans to drill more wells in 2008-09 and has completed several this year, boosting gas production from Oligocene Vicksburg sands to 11.6 MMcfd from 4.7 MMcfd at the start of 2008 and condensate and natural gas liquids output to 1,200 b/d from 470 b/d.

Erskine is completing the last of four 2008 wells and plans to add a second rig within 60 days to continue development drilling.

Erskine operated the four wells with 75% working interest in three wells and 96.875% in the other. Maguire Oil Co., Maguire Energy Co., and Cary M. Maguire hold the remaining working interests. The wells went to total depths of 12,000-14,000 ft and produced from various Vicksburg sands.

The company completed the Sullivan-17 and 18 wells in the Vicksburg 5/6, 7/8, and 9/10 sands. Sullivan-17 went to TD 11,850 ft, had 103 ft of net pay, and tested at 6.2 MMcfd and 660 b/d of condensate and natural gas liquids with 4,100 psi flowing tubing pressure. Sullivan-18 went to TD 11,996 ft and tested at 9.7 MMcfd and 1,134 b/d of condensate and NGL with 7,100 psi FTP. It has 91 ft of net pay.

Sullivan-H3 went to TD 10,700 ft and tested at 2.2 MMcfd and 302 b/d of liquids with 3,800 psi FTP from the 10,000-ft sand series. This well has net pay in multiple shallow Vicksburg sands, to be completed in the near future.

Sullivan Deep-C4, TD 14,185 ft, found multiple potential pay zones and

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is under completion.

Erskine has earned or has the opportunity to earn varying interests in 19,000 acres in the immediate area as it drills more wells. ✦

Colombia

The Popa-2 exploration well in the Colombia's Middle Magdalena basin is a gas-condensate discovery in the Upper Cretaceous Monserrate formation, said Gran Tierra Energy Inc., Calgary.

The well went to TD 8,646 ft in basement on the 144,670-acre Rio Magdalena block 1¼ miles from the 2006 Popa-1 noncommercial oil discovery that made 160 b/d, after which the company shot 89 line-km of 2D seismic.

A Monserrate DST at 7,770-90 ft yielded 1.4 MMcfd, and 85 b/d of 39.9° gravity condensate, and 370 b/d of water, natural, on a 16/64-in. choke.

A Monserrate DST at 7,730-60 ft yielded 3.186 MMcfd, 77 b/d of 61.3° gravity condensate, and a trace of water, natural, on a 1-in. choke.

An Upper Monserrate DST at 7,624-30 ft, 7,640-46 ft, and 7,662-66 ft yielded 3.953 MMcfd, 74 b/d of 61.7° gravity condensate, and a trace of water, natural, on a 48/64-in. choke.

Omega Energy Colombia will earn 60% of Gran Tierra Energy's 100% working interest by paying all well costs, and Ecopetrol SA has a 30% back-in right, split proportionally, in event the discovery proves commercial. The block has numerous other leads and prospects.

Iceland

Iceland's National Energy Authority and the Ministry of Industry organized an exploration conference Sept. 4-5 in Reykjavik in advance of the planned January 2009 tendering of licenses on the Jan Mayen ridge in the North Atlantic between Iceland the Jan Mayen Island (OGJ, Jan. 7, 2008, Newsletter).

Speakers will discuss geological aspects and taxation and other fiscal issues.

Seismic surveys and other geophysical measurements indicate that producible quantities of oil and gas could be found in the Dreki area as they have been in adjacent and geologically similar areas.

Kazakhstan

The AKK15 exploration well in western Kazakhstan flowed gas at a tubing restricted rate of 7.1 MMcfd from a 20-ft interval in the recently discovered Tasaran sandstone reservoir, said Tethys Petroleum Ltd., Guernsey, Channel Islands, UK.

A flow rate of 17 MMcfd is considered possible through larger tubing, the company said.

AKK15 is 5.4 miles east of and on a structure separate from AKK14, the area's first Tasaran discovery.

AKK15 topped the Tasaran, which underlies the area's thinner, primary Kyzyloi sand gas reservoir, at 1,791 ft. The well could go on line by yearend. Tasaran is of Lower Tertiary age.

Nicaragua

Infinity Energy Resources Inc., Denver, said the regional government council of the Autonomous Region of the North Atlantic ratified the company's Nicaraguan offshore exploration and development contracts on Aug. 13.

The regional government council of the Autonomous Region of the Southern Atlantic ratified the contracts on July 4.

The contracts now await final review and signature by Nicaragua's president.

The company holds the Perlas and Tyra concession blocks on 1.4 million acres in 100-300 ft of water in the Caribbean. Infinity said it has had contact from several potential partners.

Venezuela

The PetroCumarebo mixed company in the Falcon basin plans to drill the San Patricio exploration well later this year in a prospective area east of Cumarebo field, said PetroFalcon Corp., Caracas.

PetroCumarebo also plans to drill the La Cruz South prospect.

It is also reevaluating six wells—LV-12, 20, and 21, and CU-170, 171, and 173—in Cumarebo and La Vela fields for reperforation using high-penetration gun technology. Reperforating the first well, CU-170, yielded a production increase of 4.6 MMcfd of gas and 190 b/d of condensate.

The mixed company's gross production is 1,100 b/d of oil and 18.5 MMcfd of gas.

Pennsylvania

Southwestern Energy Co., Houston, has drilled its first two vertical wells to Devonian Marcellus shale in Bradford and Susquehanna counties and plans completions in the quarter ending Sept. 30.

The company, which has 105,000 net undeveloped acres on which it believes the formation is prospective, plans to drill at least two more wells to Marcellus, one of which will be horizontal, the rest of the year.

Texas

East

Meridian Resource Corp., Houston, completed a development well in Double A Wells North field in Polk County at one of the best initial rates seen in the area.

The 1 Blackstone Minerals A-507, 5 miles southeast of Leggett, Tex., tested at rates as high as 20 MMcfd of gas and 6,200 b/d of condensate with 1,300 psi flowing tubing pressure on an open choke from Cretaceous Austin chalk. The well has 5,400-ft and 6,200-ft laterals, and true vertical depth is 13,000 ft.

Meridian is preparing to test the 1 Davis A-388, another dual lateral well 2 miles northwest of the BSM A-507. The rig from BSM A-507 has moved to the 1 Sutton A-574 location, a planned dual lateral well 2 miles north of BSM A-507.

VOC EMISSIONS—1

Study evaluates storage-tank VOC emissions reduction

Ray McKaskle
Kevin Fisher
Katherine Searcy
Trimeric Corp.
Buda, Tex.

Curtis Rueter
Noble Energy Inc.
Denver

A 6-month on site evaluation of volatile organic compound (VOC) emissions controls and control strategies determined advantages and disadvantages of various equipment and methods.

Recent regulations in Colorado as well as other oil and gas producing states have begun to require operating companies to control flashing emissions from storage tanks at oil and gas production sites.

The Trimeric Corp. and Noble Energy Inc. 6-month study in 2007 evaluated multiple types of three-phase separators, enclosed flares, and vapor-recovery units. The study looked at a new type of separator designed to reduce VOC emissions and separator fuel use. It found advantages and disadvantages for using slug catchers upstream of separators and surge bottles downstream of separators to reduce peak and average VOC volumes requiring treatment.

The study also evaluated the benefits of changing operational practices, including keeping a small amount of backpressure on storage tanks and reducing the volume of separator dumps.

The first of a two part series discusses regulations, typical operations, and study objectives. Part 2 will cover field evaluations.

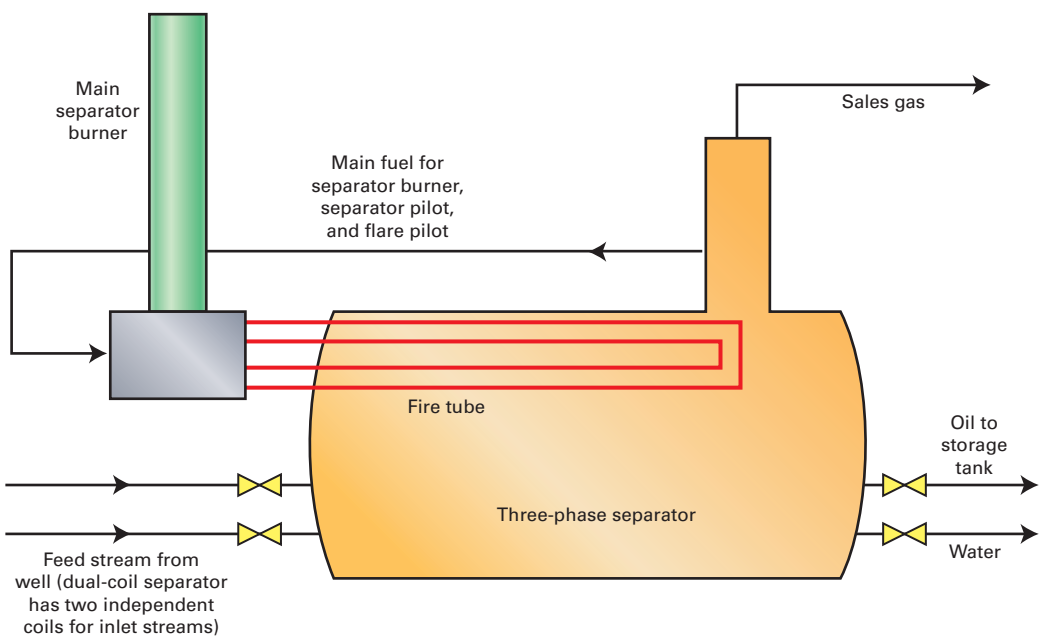
The main conclusions of this study are that:

- Operation of production separators is linked closely to the optimal operation and design of associated VOC emission-control equipment. Separators can be designed and operated to minimize the size of associated VOC controls while increasing revenue by reducing gas flared or burned as fuel gas.
- Field testing of separators to prove out the economics of various designs of operating strategies presents numerous operational difficulties, especially for accounting and normalizing declining production rates.
- Proper sizing of flares based on peak flow rates is critical for good emissions control. Peak flow rates of flash gases depend on the flow characteristics of producing wells and the separator process configuration and operating conditions.
- Vapor-recovery units offer the potential for improved economics and reduced emissions but are more complex to operate than flares.

Based on a presentation to the Gas Processing Association Annual Convention, Mar. 2-6, 2008, Grapevine, Tex.

Dual-coil separator

Fig. 1



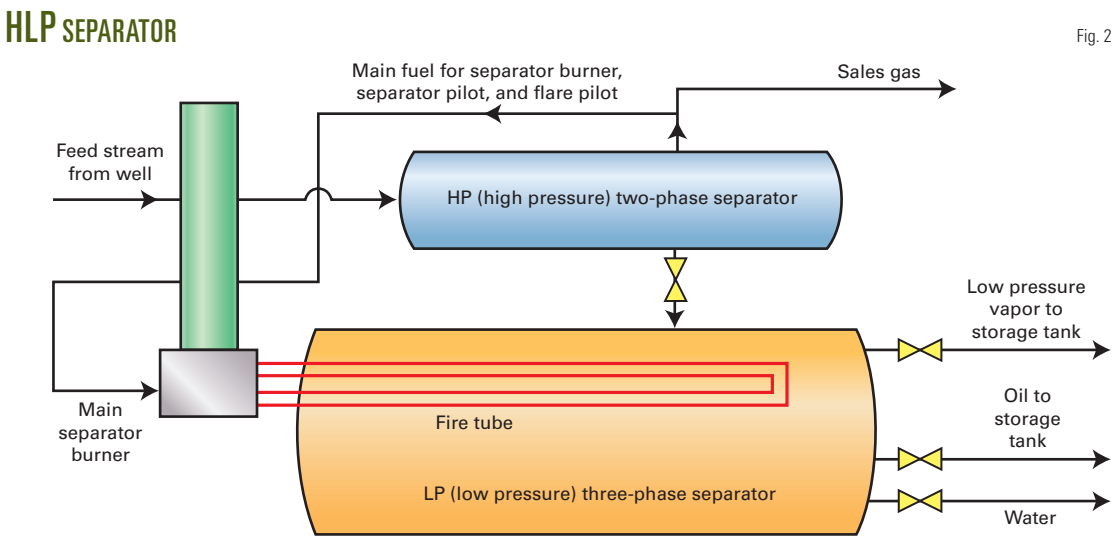


Fig. 2

• Surge bottles and slug catchers, while introducing some additional complexity to production operations, are options for reducing peak flows and size of emission-control equipment. They also offer some potential for increased oil production due to improved oil-gas separation and reduced flashing losses.

Regulations

The Denver area has faced increasing air-quality requirements during the past several years in meeting the 8-hr ozone standard. In an early action compact (EAC) agreement with the US Environmental Protection Agency (EPA), the Colorado Department of Public Health (CDPHE) required control of flash emissions from oil and gas storage tanks beginning in 2005 as part of an overall strategy that also included requirements for glycol dehydrators, engines, and a reduction in gasoline Reid vapor pressure.

In developing a control strategy for condensate tanks, CDPHE worked with the industry to develop an innovative regulatory approach that required companies to achieve a certain percentage reduction in their emissions across the entire ozone maintenance area, rather than a traditional threshold-based approach to regulations, such as controlling all sources over a certain size.

As a result, the regulations created an incentive for companies to exceed the percentage reduction required so that isolated upset conditions, for instance from control equipment failures, would not cause a company's overall percentage reduction to fall below the desired percentage target.

CDPHE's Regulation 7 initially required a 37.5% reduction in emissions from storage tanks in 2005 and a 47.5% reduction in 2006 and beyond. Due to faster-than-expected growth in production and therefore flash emissions, CDPHE increased the level of control to 75% for 2007 and will increase it to 78% in 2011. Additional changes to this regulation are contemplated as part of the ozone state implementation plan (SIP) being developed during 2008.

Currently, Regulation 7 requires that control devices at each site reach at least a 95% reduction in emissions. Although performance tests have shown that the burners at many sites typically may have destruction efficiencies exceeding 99.5%, the industry's concerns during the initial rulemaking in 2003-04 were about the potential for pressure relief valve venting at unmanned facilities as well as maintaining a tight seal around the hatch on the tank.

Because test measurements indicated that these possible leaks were relatively small in those limited instances where they did occur, the combined capture and destruction efficiency was set at 95% in the regulations.

Typical operations

This VOC study occurred at oil and gas production facilities in northern Colorado operated by Noble Energy Inc. To complete this study, Noble and Trimeric engineers worked closely with production personnel, emission-control equipment vendors, environmental staff, and others to carefully collect and analyze data on the operations of several types of separators, flare systems, vapor-recovery units, and associated strategies for reducing peak emission rates.

The work demonstrates that significant opportunities exist for improving and optimizing VOC emission controls, while in some cases even increasing revenue. The valuable lessons learned can serve as a useful resource for others with similar needs.

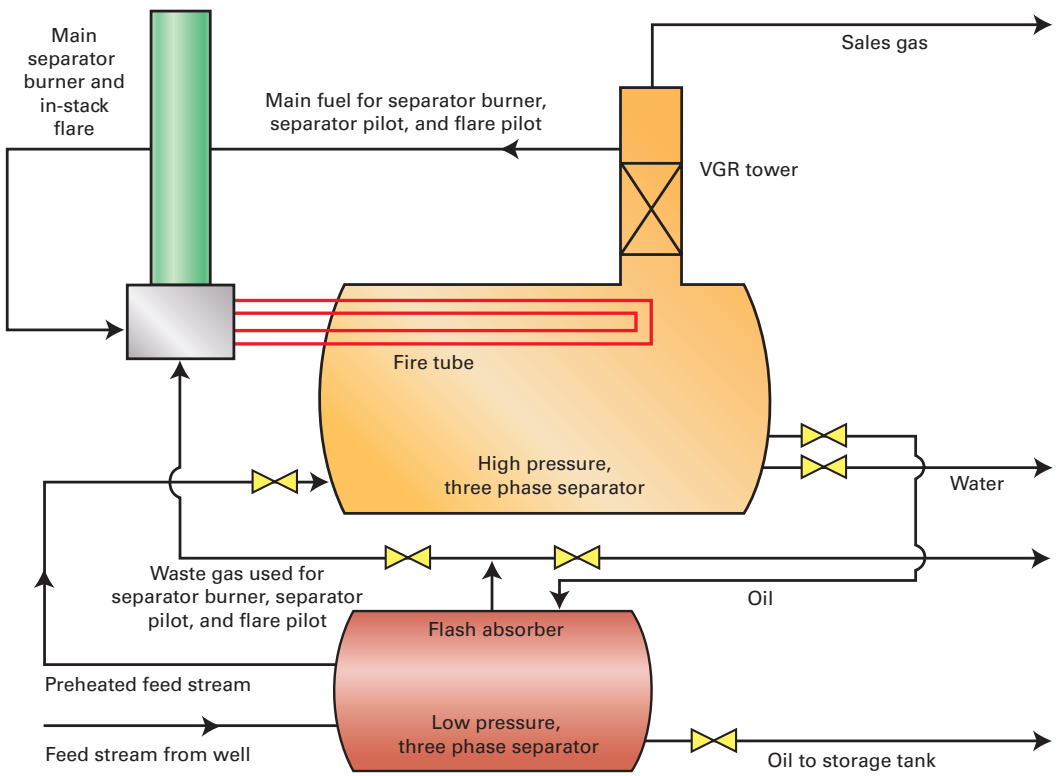
Noble's operations in the Wattenberg field northeast of Denver are typical of exploration and production facilities in the area. The operations produce sweet natural gas and condensate. The condensate's API gravity typically ranges from the mid-40s to the low 50s. This article refers to condensate as oil.

The wells typically have low average flow rates. The average production rate from all producers in Weld County in November 2006 was 36 Mscfd of gas and 2.6 bo/d. Production facilities only include separators, tanks, and emission controls. Wells at many of Noble's sites flow intermittently with the aid of wellbore plunger lift. A control valve shuts in the plunger downhole between cycles, allowing reservoir fluids to enter the tubing above the plunger.

At the beginning of the next cycle, the control valves toggle to let the plunger move freely.

Reservoir pressure causes the plunger to rise rapidly. When the plunger is moving, it forms a seal with the inside surface of the tubing wall. Thus, all fluid above the plunger arrives at the surface production equipment in a very short time (5-30 min). Because the fluid arrives in slugs to the separation equipment, the design and operation of any emission-control system must consider not only the average flow but also the peak flow.

VGR SEPARATOR Fig. 3



Separators at the sites typically are either dual coil or HLP (Figs. 1 and 2). The dual-coil separator is the simpler of the two designs, consisting of a single-stage, heated three-phase separator. Production from the wells first goes through a coil inside the separator that a fired heater heats during certain times of the year. Production fluid retained in the separator submerges the coil, and the high-pressure well stream fluid inside the coil receives heat before decreasing the pressure through a valve that feeds the stream into the three-phase separator.

The dual-coil separator has two separate inlet coils and pressure letdown valves to allow simultaneous processing of production from two wells that might operate at different pressures. Gravity separates the oil and produced water before the fluid level control valves discharge the fluid to separate storage tanks.

Gas from the separator enters the sales pipeline, with a portion used as fuel for the fire-tube heater inside the separator. The separator is heated seasonally, nominally October through April, to facilitate the oil-water separation step.

The HLP separator has two separation stages. The first stage is a two-phase separator for separating sales gas from the oil-water mixture. The first separation stage in the HLP typically operates at lower temperatures than the dual coil.

The oil-water mixture is then reduced in pressure and fed to the low pressure, three-phase separator. Flash gas produced in the low-pressure separator goes to the storage tank for disposal and then usually to an emission-control device. Oil and water from the low-pressure separator again are heated seasonally in the low-pressure separator with a fire tube to facilitate the oil-water separation step.

In both separators, the VOC emissions originate primarily from the flashing step, as the pressure is reduced between the separator pressure and atmospheric-pressure storage tank. Flashing losses are emissions that result as liquids flash to pressures below their bubblepoint pressure. The amount of flash emissions at a given location depends on many factors, including the type of unit operations (such as the number of stages of separation), the temperatures and pressures of the unit operations, and variations in flow rate and operating conditions.

The Colorado Oil and Gas Association (COGA), in conjunction with CDPHE, developed an average emission factor of 13.7 lb of VOC/bbl oil. This value is used commonly; however, site-specific emission factors may range from about 50% up to 200%+ of this average factor.

In addition to the flashing losses, working losses can occur as vapors that are displaced from the storage tank headspace as the tank fills. Breathing losses, also known as standing losses,

can occur as temperature and pressure in the storage tank fluctuate and volatilize lighter components. Often, these fluctuations in the storage tank result from daily temperature swings.

Study objectives

This study primarily focused on identifying reliable, field-proven, cost-effective methods for complying with the Regulation 7 VOC emission-control requirements for storage tanks. Project objectives were met by measuring, understanding, and evaluating flashing losses for different separator and emission-control configurations in operation at these facilities.

The options evaluated may be classified as follows:

- Separator modifications.
- Peak-flow management approaches.
- Improved flare technologies.
- Vapor-recovery units.

Separator modifications may include mechanical design changes as well as process optimization to reduce emissions. For process optimization, the temperatures and pressures in the high and low-pressure (HP and LP) vessels of the HLP separator may be varied within operational constraints to reduce emissions and increase revenue.

The feed to the separation equipment may limit the range of operating combinations in each separator; for example, feeds with high paraffin content require higher seasonal firing temperatures in the LP separator to break the paraffins. These high temperatures can reduce oil production and increase flashing losses when compared to a feed with lower paraffin content, which allows a lower temperature in the LP separator.

The largest stack in this facility is a 48-in. diameter enclosed flare (Fig. 4).

Noble has more than 100 of these packaged two-stage reciprocating compressor VRUs in service in Weld County operations (Fig. 5).

Mechanical design changes to the separator involved additional equipment, such as the VGR separator that was tested. Fig 3 shows a VGR separator that has two separation stages. The VGR has a packed tower on top of the high-pressure separator. This tower is one of the main design differences of the VGR compared with the HLP and dual-coil separators.

The packed tower sharpens the hydrocarbon separation in the produced oil and gas by sending more light hydrocarbons out with the sales gas and keeping more heavy hydrocarbons in the sales oil. In general, the heavier hydrocarbons are worth more when sold as oil than as natural gas. Similarly, the operator recovers more value from the methane and light ends when these components go into the sales gas and the flashing losses due to these components are reduced at the storage tank.

Another key difference in the VGR compared with the HLP and the dual-coil separators is that some gas from the low-pressure separator (called the flash absorber in the VGR) serves as fuel for the separator pilot, separator burner, and flare pilot. By contrast, the HLP low-pressure separator gas goes to the storage tank and then to the control device.

The dual-coil separator does not have a low-pressure separator.

The intent of peak-flow management approaches is to mitigate negative effects of flow variations on flashing losses. For example, slug catchers may be installed between the well and separation equipment. Additionally, surge bottles with appropriate controls may be installed between the separation equipment and the atmospheric storage tanks.

The slug catchers and surge bottles provide a buffer for the separation or control equipment and reduce capital requirements because the separation and control equipment can have a size for less than the peak-flow rate. Part 2 of this series will discuss appropriate strategies for the design and controls of surge bottles and slug catchers.

Once the facility generates emissions, two control approaches generally are

This VRU, integrated with a three-phase separator, was problem prone during several months of testing (Fig. 6).

used: combustion and vapor-recovery units (VRUs). Combustion may include open or enclosed flares, also referred to in the field as burners.

Enclosed flares have several advantages over open flares. These flares typically have a higher destruction efficiency than open flares, a flame not visible from outside the vessel, and easier combustion control.

Fig. 4 illustrates a typical enclosed flare. This enclosed flare has a 48-in. diameter and is the largest stack in the photo. Some key features of this flare are:

- Inlet gas enters from the back right and goes up through a flame arrestor and then to a matrix of burner manifolds.
- Proprietary air aspiration and mixing equipment, not seen, is inside the unit. Air mixing is crucial to obtain efficient combustion with a relatively rich gas (1.4 typical specific gravity), minimal inlet pressure (<1 psig), and no electricity to power a blower for air-fuel mixing.
- Separate burner manifolds use valves that open and close based on pressure of the feed gas to the flare. This acts as a staging mechanism in the flare that uses several burner manifolds. The number of manifolds in use is proportional to the inlet-gas pressure (feed rate). Staging the manifolds helps prevent vibration because the inlet-gas rate quickly rises up and down during the production cycle and helps prevent smoking at the end of the production cycle when the feed-gas rate to the burner is tapering off.

Combustion emission-control options typically have lower capital and operating costs than VRUs, are more reliable, require less maintenance, and do not risk oxygen contamination of sales gas.

Drawbacks to using flares in this application are loss of additional sales-gas revenue, which can be obtained with a VRU, and generation of combustion by-products, including NO_x, CO, and CO_2.

One must also evaluate safe work practices and concerns regarding high-temperature equipment when using enclosed flares in this application. While maintenance is lower with flares compared to other control strategies, the flares require regular service, including clearing condensate from the inlet-gas line, verifying pilot operation, ensuring that bird screens are clean and in place, and verifying that the flame arrestor on the feed-gas line and on the air inlet ports are clear.

VRUs come in many configurations that utilize single-stage or multistage compressors, eductors, and other configurations for operation with associated separation equipment. Figs. 5 and 6 show two types of VRUs evaluated in this study. Part 2 of this series will describe in more detail these VRU systems.

VRUs can generate revenue by capturing and compressing gas that otherwise would be vented or burned and then adding this high-btu gas into the sales-gas stream. Compared with flares, however, VRUs typically have higher capital and operating costs, are more complex, require more maintenance, can be less reliable, and may cause oxygen contamination of sales gas streams if storage tanks are not controlled and blanketed properly. ✦

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Refined product demand justifies Middle East refinery investments

Michael Corke
Purvin & Gertz Inc.
Dubai, UAE

Steadily rising refined product demand in the Middle East is inducing significant refinery investments in the region. These offsetting factors complicate the outlook for refined product exports and imports from countries in the Middle East.

Development of the Middle East's oil industry during the next few years will be crucial to the outlook for the global oil industry. The region is crucial from a crude oil supply perspective and appears likely to increase its current 31% share of global crude oil and condensate production.

The region, however, is also a substantial net exporter of refined products: in 2007, refineries produced about 6.5 million b/d compared with regional consumption of about 5.2 million b/d. Because regional oil product consumption is increasing steadily and a plethora of refinery developments are proposed, potential exists for a rapid and substantial change in this position.

The region comprises countries that are very different, and these differences have been reflected in their energy and industrial policies. Countries such as Iran and Saudi Arabia have substantial indigenous populations and low or moderate incomes on a per-capita basis; for these countries, the creation of employment and supply of low-cost energy have been priorities.

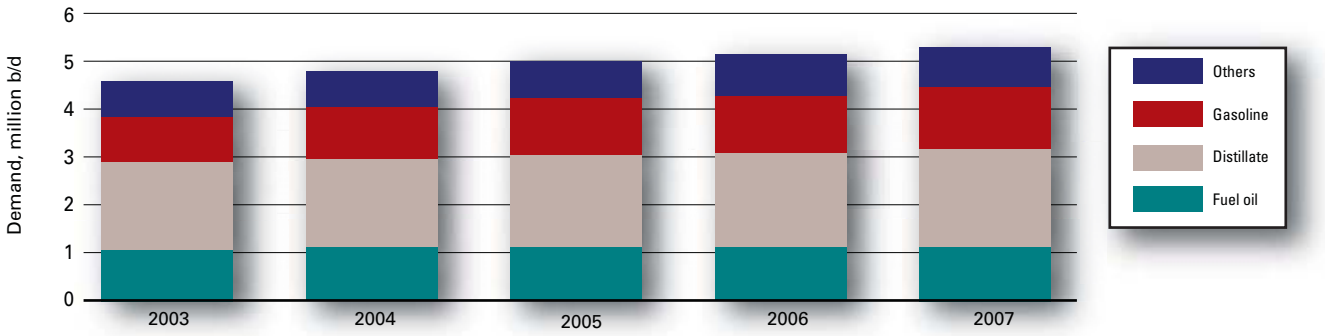
Most Middle East countries are rich in oil or natural gas resources and are benefiting from currently high prices; Jordan, Lebanon, and Israel are exceptions. For Qatar and UAE, substantial natural gas resources have displaced oil products in the power and industrial sectors. Iran, however, with the world's second-largest natural gas reserves, has been unable to produce sufficient natural gas to satisfy internal demand.

Wars and sanctions have also shaped the region's refining industries. Iran and Iraq particularly have suffered from the limited availability of foreign technology and expertise; Iraq's oil industry is currently struggling to recover from more than 15 years of underinvestment due to civil disorder. Despite efforts to boost local expertise, the region's oil and gas industry remains heavily dependent on foreign equipment, technology, and services.

Although there are differences amongst countries in the region, there are also similarities, including a general desire for supply security. This has been one of the key forces of historical refining industry developments.

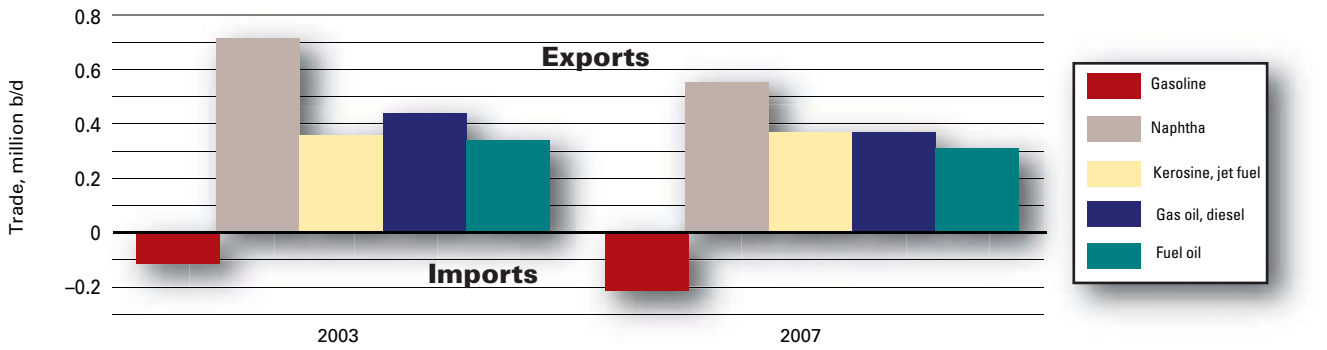
MIDDLE EAST PRODUCT DEMAND

Fig. 1



MIDDLE EAST NET PRODUCT TRADE

Fig. 2



Regional product demand

Since 2004, higher oil prices and associated revenues have stimulated economic growth in the Middle East.

Fig. 1 shows that regional GDP grew at an average of 5.5%/year during 2004-07, spurring steady growth in oil product demand.

Overall refined product consumption increased an average of 2.8%/year during 2005-07. Growth in gas oil-diesel averaged 3.3%/year, and gasoline 2.3%/year. Overall product consumption will remain close to 3%/year through the next decade, with light product growth somewhat stronger than that for heavy fuel oil.

This outlook is sensitive to many factors, including economic growth, oil prices, and availability of natural gas. If natural gas availability for power generation and desalination is less than expected, fuel oil demand could increase more rapidly.

MIDDLE EAST REFINING CAPACITY

Table 1

Country	Refineries	Capacity, 1,000 b/d	% of total
Saudi Arabia	8	2,090	28.2
Iran	9	1,661	22.4
Kuwait	3	898	12.1
UAE	5	723	9.7
Iraq	12	694	9.4
Others	11	1,352	18.2
Total	**48**	**7,418**	**100.0**

Regional product trade

The Middle East is a net exporter of most refined products. LPG, naphtha, and fuel oil are exported mainly to Asia. Middle distillates, jet fuel-kerosine, and gas oil-diesel are exported to Asia and Europe.

Europe is structurally short of middle distillates, although most of its gas oil-diesel is supplied from CIS, principally Russia. Middle East naphtha, including natural gasoline-type condensate, is mainly exported into Asia as an olefin plant feedstock.

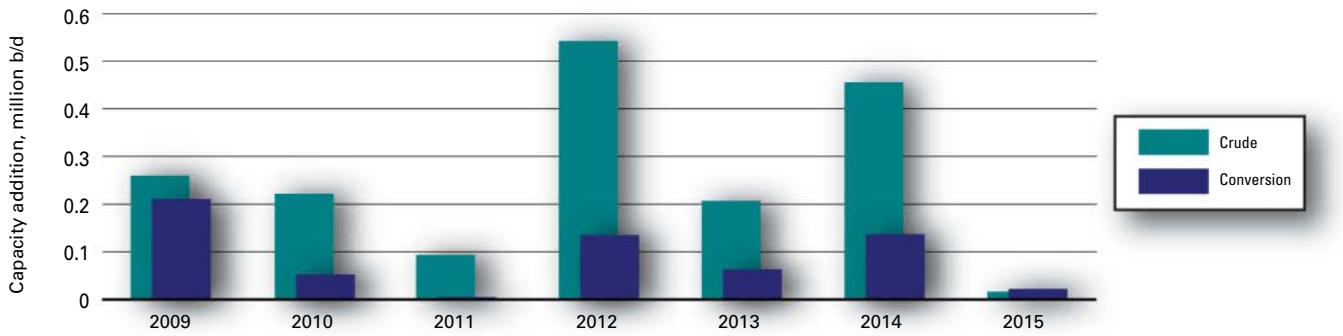
Fig. 2 shows how net trade has developed during the past 5 years for the main product groups.

The Middle East is short of gasoline, primarily because of Iran's appetite for imports. Iranian domestic gasoline prices are heavily subsidized, which has boosted domestic demand and led to unauthorized exports into adjacent markets.

Efforts to curtail such exports, including the introduction of rationing with the assistance of a smart card system, have cut import requirements; but recent indications are that imports are again rising. Higher domestic prices are needed in the longer term.

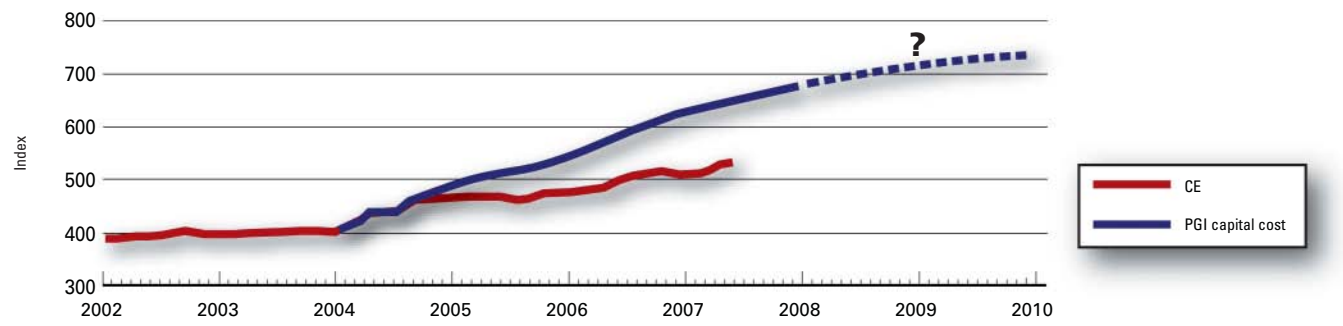
MIDDLE EAST CAPACITY ADDITIONS

Fig. 3



PURVIN & GERTZ CONSTRUCTION COST INDEX*

Fig. 4



*1959 = 100.

Middle East refined product demand will continue to rise. Future imports and exports will reflect demand trends, although considerable uncertainty surrounds the future development of the region's refining industry.

Refining industry profile

With 48 refineries and an aggregate nominal capacity of about 7.4 million b/d, the Middle East contains just more than 8% of global refining capacity (see table).

Saudi Arabia is the region's largest refiner, with Iran in second place. Kuwait, however, reflecting its relatively limited domestic market is the region's largest exporter. Refineries in Iran, Kuwait, and Saudi Arabia have been operating at full capacity. Sabotage of process facilities and crude pipelines has left Iraq's industry recently achieving only about 60% utilization, despite the country being short of product supplies.

Since 1991, refineries in Iraq have also suffered from a lack of new investment, modernization, and even adequate maintenance, essentially caused by two wars and sanctions. Many of the country's smaller facilities are reportedly inoperable.

Refinery projects

In the Middle East, as in other parts of the world, stronger margins since 2004 have sparked new refinery projects. When analyzing the industry's outlook, one must assess which of these projects will move forward with schedules more or less in-line with those announced.

We recently reviewed worldwide refinery projects—out of 275 announced refinery projects, we feel that about 60% of these, representing about 75% of capacity, are speculative.

Projects involving established, financially strong players with a local crude supply and designed to serve local markets are in most cases likely to be sound. Projects involving new entrants, without a local crude supply and focused on export markets may also succeed, but will be more difficult to implement.

Fig. 3 shows Purvin & Gertz's assessment of Middle East refinery projects likely to be implemented in the next 6-7 years. This shows projected additions to crude distillation capacity and fuel oil conversion capacity. Fuel oil conversion capacity additions include coking, catalytic cracking, and hydrocracking projects.

During 2008-15, about 1.8 million b/d will be added to the region's crude distillation capacity and, more crucially, about 175,000 b/d of coking, a similar amount of vacuum gas oil and residue catalytic cracking, and about 270,000 b/d of hydrocracking.

Many of these projects are designed

Practical solutions to slow global warming

Whilst the world discusses the climate change and its consequences, Linde has been developing concepts to significantly reduce energy consumption and greenhouse gas emission in existing ethylene plants.

One of Linde's innovative solutions is to replace the furnace section of a cracker during a turnaround and thus install state-of-the-art technology in an existing plant without any production loss.

This new Linde furnace technology reduces greenhouse gas emissions while increasing yields and substantially improving reliability and economic efficiency.

Other innovative concepts customized to individual plant requirements are available from Linde, the leading ethylene technology contractor.

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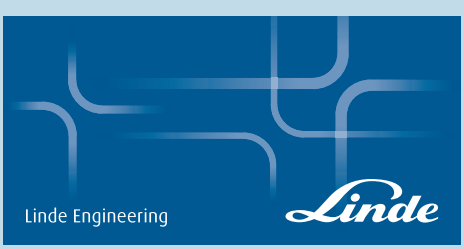
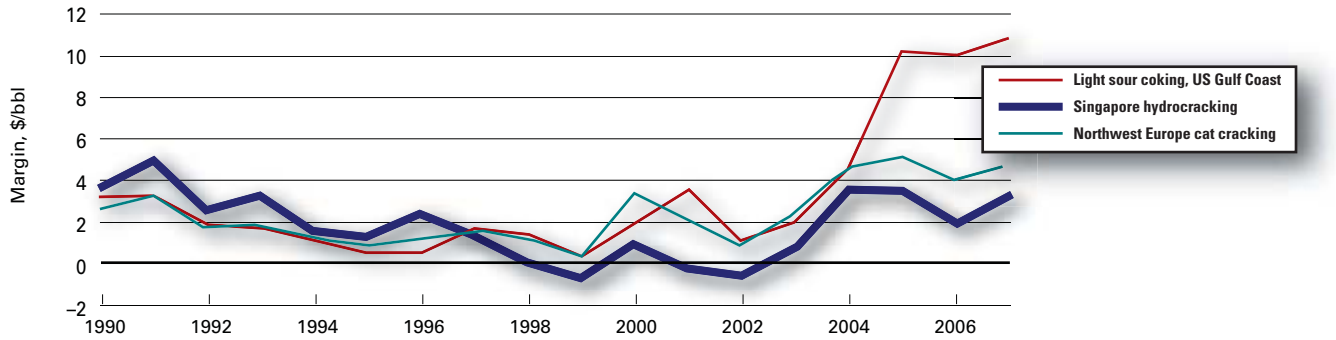


REFINING MARGINS

Fig. 5



to process heavier crudes and will make an important contribution to easing current pressure on fuel oil conversion capacity.

An uncertain future?

Any projection of refinery investments is imperfect. Projects will be delayed, some may be abandoned, and others, not currently viewed as likely, may be implemented. The views of project sponsors with regard to future capital cost trends and refining margin trends clearly differ and affect investment decisions accordingly.

Since 2003, refinery project costs have risen spectacularly. Prices of commodities such as steel and concrete have surged, mainly due to booming economies in Asia. Construction labor costs have similarly risen. Project costs, however, have risen even more strongly than commodity and labor costs.

Purvin & Gertz has developed a construction cost index to represent typical refinery and other similar downstream project cost escalations (Fig. 4). Lump-sum, turnkey project costs have risen by about 80% since 2003.

Pressure on the supply of materials and equipment has led to greater uncertainty with regard to availability and delivery timing of materials and equipment. Quality control problems have also escalated as new and less-experienced equipment manufacturers are being used.

EPC contractors have passed increased risks on to operating companies or project sponsors by increasing their prices. They have also been able to increase their margins from the depressed levels seen pre-2004.

It is difficult to predict where project costs will settle out. Materials and equipment supply industries and EPC companies are increasing capacity; prices and lead times for major equipment have in some cases stabilized or declined. It is likely that further cost increases will occur.

It is also likely that future demand for materials, equipment, and services will prevent supplier prices and project costs from falling back to pre-2004 levels. Although this may appear a somewhat negative view from the perspective of refining industry investments, in practice it is uncertainty regarding project costs rather than high costs that can be more damaging.

Fig. 5 shows historical margins for representative refineries in the US, Europe, and Singapore.

A common view is that refining margins are a function of oil prices. Even more mystifying is the common reaction to refinery capacity problems: an increase in crude oil prices.

The fact is that refining margins reflect supply-demand pressures in the context of refining capacity. A shortage of capacity leads to strong margins and low capacity utilization leads to margins languishing in the breakeven range for marginal types of capacity.

The surge in demand for refined products that initiated the rise in oil prices in 2004 also tightened refining capacity. Problems due to hurricanes in the US Gulf in 2005 aggravated the situation.

Product supply tightened and refining margins increased. In particular, increased production of heavy, sour crudes found the refining industry with insufficient fuel oil conversion capacity and, in some cases, desulfurization capacity. Light product supply tightened, heavy fuel oil supply increased and price differentials between light and heavy products, and consequently between light and heavy refinery feedstocks, increased.

Fig. 5 shows how complex refinery margins around the world reacted.

Not surprisingly, the surge in margins and light product spreads has led to renewed interest in refining investments. Substantial capacity additions are now being implemented.

Their effect will naturally depend on how product demand develops, but the balances that we analyzed suggest that refining capacity additions in general and fuel oil upgrading capacity additions expected during next 5-7 years will exceed requirements. This indicates a moderation of refining margins relative to levels seen in 2005-07.

Refining outlook

Expected Middle East refining capacity additions are part of the wider trend. Margins for export-oriented refineries will soften somewhat compared with recent levels. A collapse, however, will

not occur. Investment cost inflation has slowed the pace of capacity additions to some extent, and demand for refined products will continue to grow.

A key variable will be the future cost of refining industry investments. The refining industry is an essential part of the world's energy supply and, assuming that oil demand growth continues, new investments in refining capacity will be needed.

In most cases, these investments will be made only if supported by adequate returns. Poor returns would lead to a slowdown in investment, new capacity shortages, and an upward correction in margins and returns. In the longer term, high investment costs would not lead to a lack of investment, they would simply mean that margins had to be higher to generate adequate returns.

This is where uncertainty about future investment costs becomes an issue. If future investment costs were lower than recent levels, margins needed to support new investments would also be lower. An investment made in a high-cost environment could generate disappointing returns if future investment costs were lower. In refining, as in so many capital intensive industries, timing can be crucial.

Regional developments will also influence the economics of Middle East refining investments. On the supply side, rehabilitation and upgrading of Iraq's refining industry could have a significant effect, although timing is difficult to assess. Iranian refinery projects, if implemented as announced, would also have a major effect, particularly with regard to the region's gasoline balances.

The start-up later this year of Reliance's refinery expansion at Jamnagar in northwest India will increase regional gasoline supply substantially. Before 2005, Persian Gulf gasoline prices and trade data indicated that India was the region's marginal supply source, but during 2005-06 this position changed.

When Middle East import requirements increased, cost-insurance-freight prices strengthened and Asia and Mediterranean Europe became the region's marginal suppliers. The Reliance start-up will inject a large new gasoline supply stream into the region and may well reverse the changes seen since 2005.

Overall, the Middle East refining outlook appears sound, provided that capacity additions are not excessive. Global and regional growth in product demand will support new investments, although project timing will be important if returns are to be maximized.

The region's current gasoline supply deficit may encourage the development of gasoline-oriented projects. Gasoline market softness, however, could develop rather quickly as a result of demand and refining developments in Iran and India and more widely. This suggests that gasoline-oriented projects should be analyzed particularly carefully. ✦

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CMAI: Wave of new Mideast olefins capacity coming on line

An "unprecedented" wave of new olefins capacity is starting up in the Middle East, according to Chemical Market Associates Inc. (CMAI), Houston.

"An additional 20 million tonnes of new ethylene capacity is expected by 2012, more than doubling current capacity in this region," according to Tony Potter, director of olefins studies, Europe, Middle East, and Africa, speaking at CMAI's World Petrochemical Conference in March.

Potter said that 2008 would be a pivotal year because 9 million tonnes of capacity will start up; this will lower global operating rates towards bottom-of-cycle conditions in 2009 (Fig. 1).

"A staggering 9 million tpy of new ethylene capacity will start up" by second-quarter 2009, Potter said. "To put this in perspective, global ethylene demand growth is around 5 million tpy."

In 2008, two world-scale crackers in Iran started up and several are imminent in Saudi Arabia, Kuwait, and Qatar. Other than Iran, most petchem projects are on or ahead of schedule.

By yearend 2012, total regional ethylene capacity in the Middle East will be about 31 million tonnes/year (tpy), Potter told OGJ in July.

Because many of the new crackers will start up at yearend 2008 and early 2009, the average global operating rate in 2008 should not be much less than in 2007.

The Middle East and Africa will build 8.6 million tpy of new propylene capacity, Potter said. This will account for 38% of global capacity additions during 2007-12.

Asian demand for olefins will be insufficient to absorb the full increase in Middle East olefin derivative production. North America's net equivalent ethylene export position will decrease significantly; all other regions will become larger net importers, according to Potter.

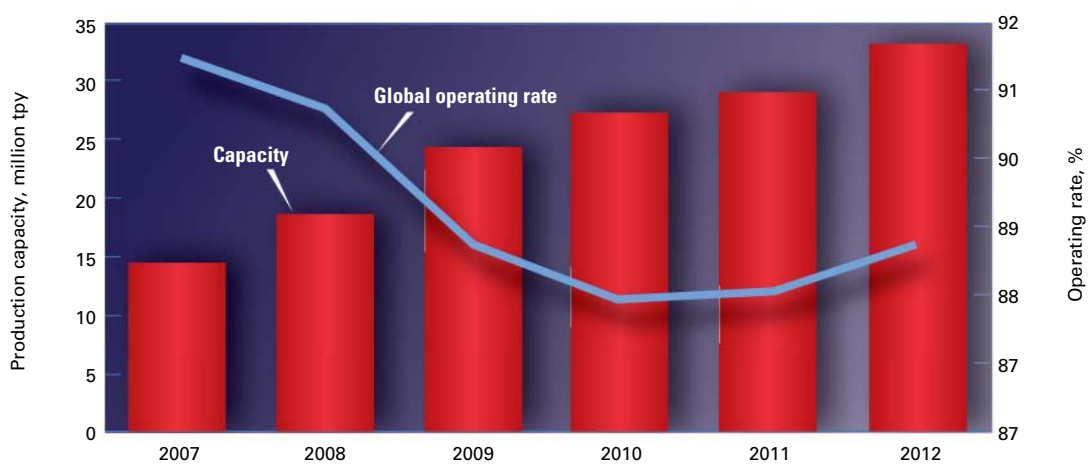
In addition, the Middle East will become a significant net propylene-derivative exporter for the first time. This will result in Europe becoming a net importer.

Although Middle East projects' costs have risen due to capital-cost inflation, high oil prices have increased the general level of petrochemical and polymer prices, which has increased substantially the profit margins of low cost, ethane-based complexes.

"The higher the oil price, the more

MIDDLE EAST ETHYLENE

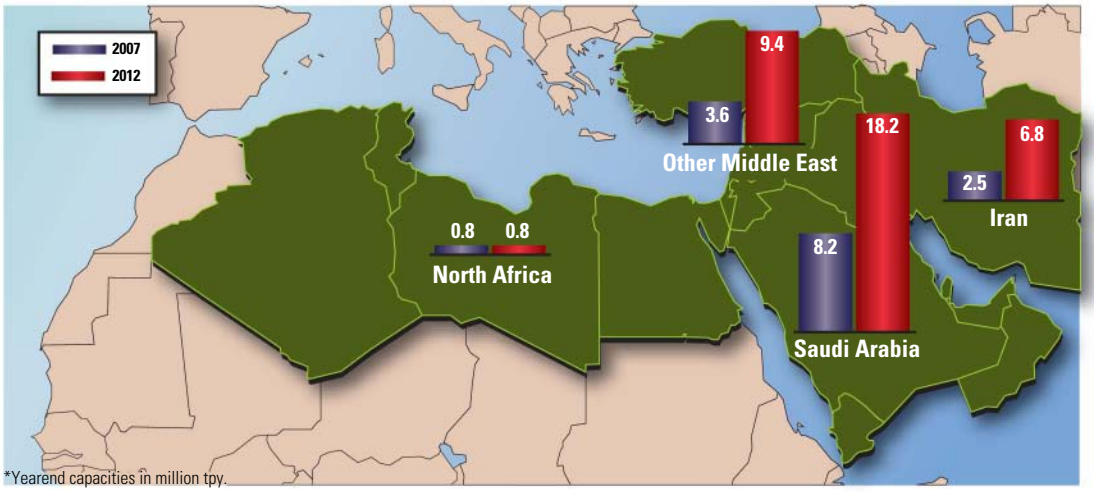
Fig. 1



profitable will be the Middle East olefins industry, a situation likely to attract further investments wherever attractively priced feed is made available," Potter said. "There is huge potential for further olefins investment post-2012."

Middle East ethylene projects*

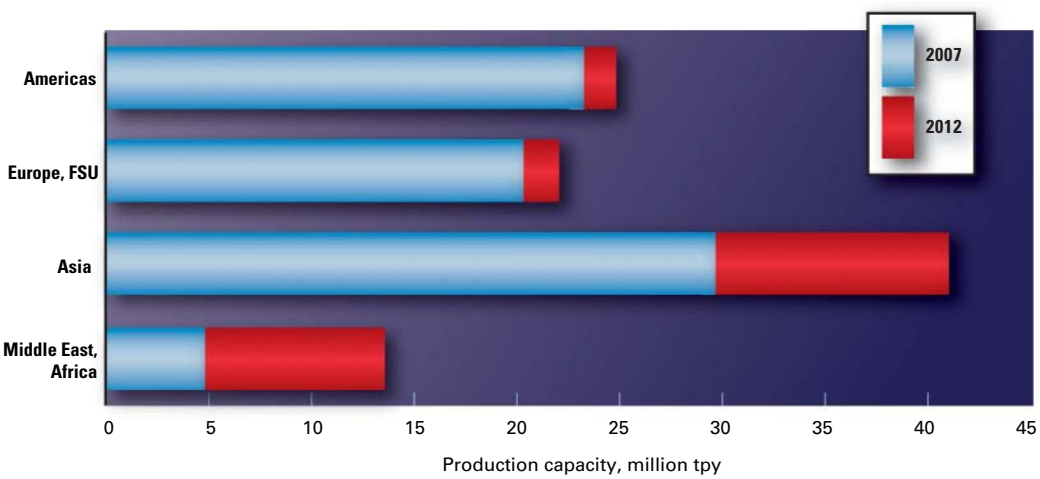
Fig. 2



*Yearend capacities in million tpy.

Propylene production

Fig. 3



Saudi Arabia olefins

Most new cracker capacity will be commissioned in Saudi Arabia, according to Potter. Total installed capacity will increase to more than 18 million tpy by 2012, from a current level of 10 million tpy (Fig. 2).

Saudi Arabia's projects will set new precedents in the coming years. Saudi Ethylene Polyethylene Co., a Tasnee-Sahara-Basell joint venture, will commission the first non-Saudi Basic Industries Corp. (SABIC) cracker. And Saudi Aramco will make its first move into petrochemical production via its partnership with Sumitomo in the Petro-Rabigh project.

According to Potter, the current round of new cracker projects will be completed when the Saudi Kayan project is commissioned beginning at the end of 2009.

After that, the next phase of projects includes:

- Saudi Polymers, formerly known as the National ChevronPhillips project, has awarded engineering, procurement, and construction contracts, and the project is scheduled to come on stream in 2011.
- Saudi Aramco and Dow have a massive joint-venture development at Ras Tanura, which will include an ethane-naphtha cracker currently scheduled for start-up in 2013.

Iran olefins

Potter said that Iran will add another 4.3 million tpy of capacity by yearend 2012, more than half of which has achieved commercial operations, although is not fully loaded because derivative capacity is lagging the crackers. Iran has plans for significantly more new capacity.

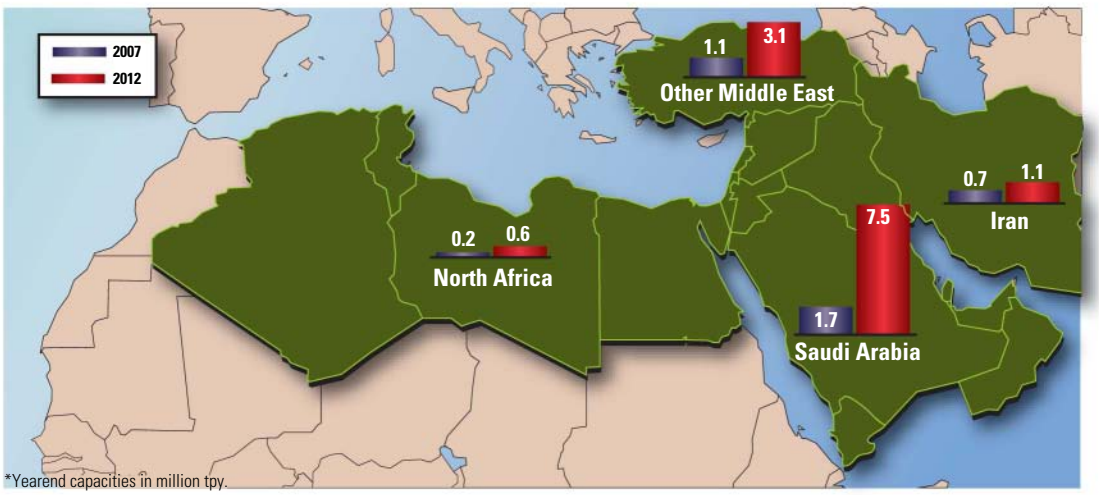
National Petrochemical Co.'s (NPC) Arya Sasol (Olefins 9) and Jam (Olefins 10) crackers have been commissioned at Bandar Assaluyeh. The Arya Sasol cracker actually produced ethylene commercially in December 2007, but its full market effect is a 2008 event due to delays in associated derivative units.

After 2008, Iran will have relatively little effect on the global capacity utilization curve, according to Potter:

- Morvarid (Assaluyeh Olefin) cracker will start up in 2009, followed by the Ilam cracker in 2010. Combined,

MIDDLE EAST PROPYLENE PROJECTS*

Fig. 4



*Yearend capacities in million tpy.

SAUDI ARABIA PROPYLENE PROJECTS

Unit	Capacity, 1,000 tpy	Start-up	Comment
Jubail ChevronPhillips	150	Second-quarter 2008	Condensate feed
SEPC	240	Third-quarter 2008	Ethane-propane feed
Yansab	360	Third-quarter 2008	Ethane-propane feed
Petro-Rabigh	100	Third-quarter 2008	Ethane-offgas feed
SHARQ	200	Fourth-quarter 2008	Ethane-propane feed
Kayan	660	Fourth-quarter 2009	Ethane-butane feed
Advanced PP	450	First-quarter 2008	Propane dehydrogenation
NATPET	420	Second-quarter 2008	Propane dehydrogenation
Ibn Zahr	250	Third-quarter 2008	Metathesis
Petro-Rabigh	800	Fourth-quarter 2008	High-severity FCC
Al-Waha	450	First-quarter 2009	Propane dehydrogenation

they amount to less than 1 million tpy of ethylene capacity, small by Middle East standards.

• Gachsaran Olefin, formerly the Arvand (Olefins 8) cracker, has pushed back its realistic start-up date to 2011 due to its relocation.

• The next round of "megacrackers," Olefins 11, 12, and 14, will not start up until after 2012.

Other areas

Outside of Iran, project delays are "largely a myth."

The Saudi, Kuwaiti, and Qatari projects are on or ahead of schedule. Potter said, it is possible "there will be minor variations as start-up deadlines approach, but it is equally likely we will be surprised by slightly early start-ups."

In Abu Dhabi, Borouge is building a 1.4-million-tpy ethane cracker, expected to start up in 2010. The net ethylene production in this plant, however, will only be 600,000 tpy, according to Potter. Ethylene product will be dimerized to butene; butene and more ethylene will be metathesized to propylene, ultimately producing 800,000 tpy of polypropylene.

In Qatar, a QP-Honam venture has awarded contracts for an ethane-naphtha cracker complex that will also use dimerization and metathesis to boost propylene-polypropylene production to 700,000 tpy. QP and ExxonMobil are developing an ethane-propane based complex.

"One day a cracker will no doubt be built in Oman, probably some time next decade," Potter said.

Although there will be little effect by 2012, there are also projects in North Africa that could eventually lead to significant export-oriented capacity, according to Potter. The only firm project is a joint venture of Sonatrach and Total to build an ethane cracker due to start up in 2013.

In Libya, Dow is working with National Oil Corp. to study the expansion of an existing naphtha cracker and explore the possibilities of a world-scale ethane cracker. According to Potter, the existing naphtha cracker has never been debottlenecked and a relatively inexpensive expansion of 100,000-200,000 tpy is possible by 2012. The world-scale ethane cracker idea, if implemented, would start up in 2015 at the earliest.

Egypt's petrochemical industry master plan is progressing slowly; companies are still exploring ethylene capacity options. A project of significance would appear to be a mid-next decade start-up also, Potter said.

Propylene

The Middle East will become a significant propylene region for the first time. According to Potter, the Middle East and Africa accounted for only 6% of global propylene capacity in 2007, but during the next 5 years, 38% of all new propylene capacity will be built there (Fig. 3).

More than 8.6 million tpy of additional propylene production capacity will be built in the Middle East, nearly tripling current capacity and bringing these regions' share of the global total to almost 13%.

Propylene capacity additions are concentrated in Saudi Arabia, where more than 4 million tpy will come on stream in 2008-09 (see table). According to Potter, "this new propylene capacity will include significant volumes of steam cracker coproduct, but more than half

will be produced via on-purpose routes propane dehydrogenation, metathesis, and high-severity FCC."

In other Middle East countries, Borouge in Abu Dhabi is developing the world's largest metathesis unit, slated for a 2010 start-up; and further metathesis capacity will start up in Qatar in 2012 (Fig. 4).

In Iran, new propylene capacity is essentially restricted to the Jam cracker, which is designed to process a mixed feed slate of ethane to aromatic raffinates and also C_3+ streams from other crackers planned for the Bandar Assaluyeh site, according to Potter.

Egypt's Oriental Petrochemicals is building an integrated propane dehydrogenation-polypropylene facility scheduled to start up in 2010.

Post-2012 forecast

After 2012, Saudi Arabia will have fewer new ethane projects. The recovery of NGLs from Shaybah field could produce enough ethane to produce another 1 million tpy of ethylene, which, if spread over two or three feed-flexible crackers with ethane as a minority feedstock, could yield several million tons of additional production, according to Potter.

Qatar's progress depends on the rate of development of North field. There is the potential for an additional ethane cracker in Kuwait if and when its own North field is developed. In Abu Dhabi, there could be a Borouge 3.

In North Africa, there could be new crackers in each of Algeria, Libya, and Egypt.

In Iran, Olefins 11, 12, 14, 15, and 16 are planned. And in Iraq, Potter assumes that any new capacity will start up after 2020. ✦

LNG emerges as Pakistani natgas supply alternative

Muhammad Farooque Ahsan
University of Dundee
Scotland

LNG will likely play a large role in supplying Pakistan's emerging gas market despite current pipeline plans. Pakistan's government is implementing an LNG investment policy friendly to private-sector participation and has established rules and regulations covering LNG terminal construction, and operation. Among the country's three options for importing gas through pipelines, meanwhile, each poses serious concerns as to implementation.

This article studies Pakistan's natural gas sector and analyzes its import possibilities and limitations.

Background

The economy of Pakistan has grown at an average 7.6%/year for the last 3 years,[1] pressuring the country's energy resources.

Oil and natural gas supply nearly 80% of Pakistan's primary energy.[2] With Pakistan's oil production able meet only about 20% of its demand,[3] its foreign exchange reserves are strained (Table 1). Mounting prices in the international oil market and growing environmental concerns have forced the government to substitute gas for oil where possible.

Pakistan 3 production of natural gas matched consumption through 2006 (Table 2). Seeing an impending shortage, however, Pakistan is increasingly interested in importing natural gas. The country can import gas through pipelines from Iran, Qatar, or Turkmenistan. Though it is considering all of these options, the Iran-Pakistan-India Pipeline project is the only one being actively negotiating. Pakistan must consider LNG if it is to meet its import needs.

Table 3 highlights Pakistan's primary energy supply mix through 2025, showing a large increase in the share for gas. Pakistan has emerged as the third largest user of compressed natural gas in the world, after Argentina and Brazil,[4] and this share is only expected to grow as oil prices strengthen. Natural gas' share of Pakistan's total primary energy supply mix will hover around 44% for the long term.

Consumption

Table 4 shows 2000-06 gas consumption by consumer category.

The Pakistani power sector's share of total gas consumption increased to 40% in 2006 from 32% in 2000, mainly due to substitution of natural gas for fuel oil in most power plants.

The government plans to privatize its Water and Power Development Authority's thermal power plants as part of liberalizing its power segment. Use of combined-cycle generating technology will also force the private sector in this direction, further increasing demand for gas.

The transport sector, though its share is not large, has also seen demand increase over the past few years. An average of more than 29,000 vehicles/month convert to CNG.[5]

Demand, supply

Pakistan's proven gas reserves total about 28 tcf (Table 2). Gas demand is increasing sharply due to its increased consumption in the power and trans-

PAKISTAN CRUDE OIL STATISTICS

Table 1

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	1,000 b/d									
Production	57	54.9	53	54.4	59.9	64.3	60	62	65.6	65.7
Consumption	333	346.8	368.6	365	360.1	355.9	336.6	326.8	345	345
Import	–274	–289	–312	–308	–297	–288	–272	–260	–277	–277
Proved reserves, billion bbl	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3

Source: US Energy Information Administration

port sectors. The country, however, is not expecting any short-term commercial discoveries of gas. Domestic production, currently at the same level as consumption, will not be able to meet rapidly growing demand.

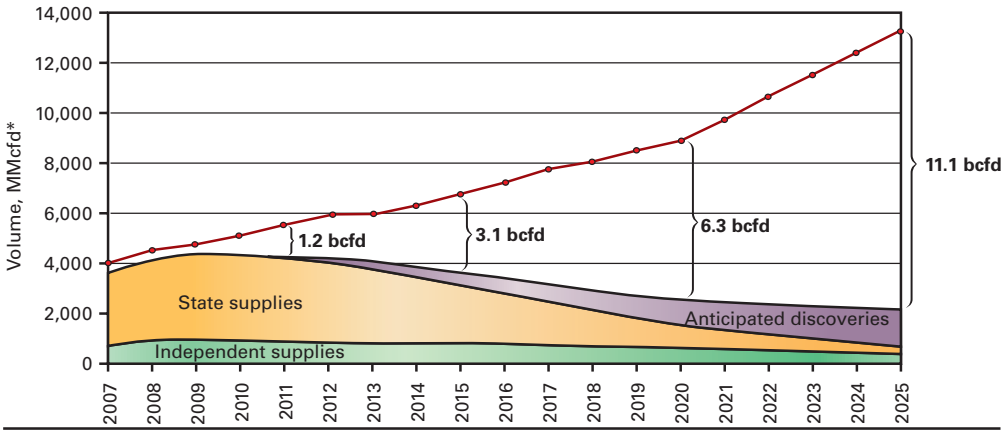
Demand forecasts assume a gross domestic product growth of 6.5%/year in a moderate-growth scenario. Using this scenario, gas demand will grow to 13,259 MMcfd in 2025 from 4,492 MMcfd in 2008 (Fig. 1). The power sector will remain Pakistan's major consumer of gas in the future.

Supply forecasts use data obtained from the government and exploration and production companies regarding production from existing fields as well as anticipated supply from new sources, including already discovered fields not yet connected to the national utility's network. Indigenous production of 4,184 MMcfd in 2008 will decline to 2,167 MMcfd by 2025 (Fig. 1).

Pakistan will have an estimated gas shortfall of 0.8 bcfd in 2010, increasing to 3 bcfd by 2015 and 11 bcfd by 2025, clearly showing the need for increased imports.

PAKISTAN NATURAL GAS SUPPLY-DEMAND

Fig. 1



	2007	2008	20010	2011	2012	2013	2014	2015	2020	2025
Demand, MMcfd	4,013	4,492	5,086	5,516	5,921	5,912	6,305	6,763	8,854	13,259
Supplies, MMcfd	3,666	4,184	4,308	4,313	4,181	4,065	3,815	3,674	2,521	2,167
Shortfall	**(346)**	**(308)**	**(778)**	**(1,203)**	**(1,740)**	**(1,847)**	**(2,490)**	**(3,089)**	**(6,333)**	**(11,092)**

*At 950 btu/scf.
Source: PriceWaterhouseCoopers-Hagler Bailly Pakistan

PAKISTAN NATURAL GAS STATISTICS

Table 2

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	bcf									
Production	699	710	784	856	775	809	890	968	1,088	1,112
Consumption	699	710	784	856	775	809	890	968	1,088	1,112
Import	—	—	—	—	—	—	—	—	—	—
Proved reserves, tcf	22	21	22	22	22	25	26	27	27	28

Source: US EIA

Pipeline imports

Pakistan is considering three options for pipeline imports of gas from neighboring countries (Fig. 2).

- *Turkmenistan-Afghanistan-Pakistan pipeline.* The Turkmenistan-Afghanistan-Pakistan pipeline calls for construction of a 1,680-km transmission pipeline to transport about 3 bcfd of gas from the Daulatabad gas fields in Turkmenistan via Afghanistan to Pakistan, and could be extended to India. The pipeline's transit through Afghanistan stands as a major hurdle due to security problems.

A completed feasibility study on the project, funded by the Asian Development Bank, also shows the Daulatabad field will only be able to supply a portion of Pakistan's future demand.

- *Qatar-Oman-Pakistan pipeline.* Pakistan's second option for importing gas by pipeline is the Qatar-Oman-Pakistan pipeline. This pipeline would deliver gas from the Qatar's North field via subsea pipeline from Oman. Pakistan has signed a preliminary agreement eventually to purchase gas from Qatar, but the pipeline project itself remains undefined.

- *Iran-Pakistan-India pipeline.* Pakistan's third option is the Iran-Pakistan-India pipeline. The project involves construction of more than 2,700 km (1,843 km to Pakistan) of pipeline from Iran's South Pars gas field through Pakistan's Baluchistan province and eventually to India. The three countries have met many times to resolve technical and financial issues regarding the pipeline.

Supporters of the project believe it will prevent Pakistan from needing to import LNG until 2015, but this view ignores many of the pipeline's potential problems. One concern is potential sabotage in unsettled Baluchistan. Continued tension between the US and Iran concerning the latter's nuclear programs also stands as a potential impediment.

The historically fragile nature of Pakistan's relationship with India also

PAKISTAN POTENTIAL IMPORT PIPELINES

Fig. 2

Source: Penspen, British Gas International, and Crescent Petroleum

plays into the project's risk analysis. India also plans to increase its coal consumption and is interested in promoting nuclear power as an energy source. The combination of these factors has so far prevented this project from moving out of the finalization stages.

LNG

Recognizing these difficulties, the Pakistani government has begun implementing an LNG policy first announced in 2006. The policy encourages private participation in the sector by offering various fiscal incentives. The government will actively assist private LNG investors in obtaining land and port facilities for an LNG terminal at a reasonable cost and within reasonable time frames. The government will also help investors negotiate Pakistan's regulatory infrastructure.

Pakistan's Oil and Gas Regulatory Authority, established in 2002, regulates the country's midstream and downstream oil and gas sector. It is responsible for issuing licenses for design, construction, operation, and ownership of LNG terminals subject to technical, financial, health, safety, and environment, and siting criteria.

OGRA will decide on LNG terminal applications within 90 days of filing and will ensure investors have access to the Sui Northern Gas Pipelines Ltd. and Sui Southern Gas Co. Ltd. gas distribution networks at a regulated cost-plus tariff basis even after these two entities are privatized.

PAKISTAN PRIMARY ENERGY MIX

Table 3

	Actual				Projections			
	2003	2004	2005	2006	2010	2015	2020	2025
	% share							
Oil	38.3	30.2	29.8	28.7	26.1	27.1	25.6	22.7
Gas	23.8	49.5	51.3	50.1	49.1	44.1	43.9	45.0
Coal	5.4	6.5	6.0	7.0	9.0	12.0	14.0	15.0
Hydropower	11.3	12.7	11.3	12.7	13.9	13.6	12.1	11.9
Nuclear	0.9	0.8	1.2	1.0	0.9	1.9	2.7	3.2

Source: Government of Pakistan, Planning Commission, 2005

PAKISTAN NATURAL GAS CONSUMPTION

Table 4

	2000	2001	2002	2003	2004	2005	2006
	% by sector						
Residential	20	18	17	18	15	15	14
Commercial	3	3	3	3	2	2	2
Cement	1	1	1	0.3	1	1	1
Fertilizer	25	23	22	21	18	16	16
Power	32	37	38	38	45	44	40
Industrial	19	18	18	19	18	20	23
Transport-CNG	0.3	0.6	0.9	1.3	1.5	2.1	3.2

Source: Hydrocarbon Development Institute of Pakistan

Outlook

Only 26% of internationally traded gas moved as LNG in 2005 despite worldwide LNG trade expanding at an average 7.3%/year between 1995 and 2005.[6] Eight countries exported LNG in 1995; 13 in 2005. The number of LNG importing countries increased to 15 from 9 during the same period. The International Energy Agency expects LNG trade to continue to grow by 6.6%/year, with LNG making up 50% of internationally traded gas by 2030.[7]

Countries currently supplying LNG have large gas reserves relative to current production rates, supporting the projected expansion of LNG supply over the next 25 years.[7] The world fleet of LNG carriers will grow to 350 ships in

2010, from about 200 ships in 2006, and reach about 550 ships by 2020,[8] further supporting prospects for LNG as a viable gas alternative for Pakistan. ✦

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New drive for well pumping operations

A new Vector drive, designed specifically for pumping applications, features an easy-to-use operator control panel that includes a large, high-resolution, full-color graphics display that is easy to read in bright light.

The Vector VII's software integrates operating information, downhole well parameters, and graphical data into a common display, eliminating the time it takes to scroll through several screens to retrieve data. A digital circular ammeter is displayed on the operator panel; therefore, the use of a mechanical circular ammeter for chart recording is no longer needed, the firm notes. Twenty operating parameters are periodically sampled and stored in memory and can be shown graphically on the operator panel or downloaded and saved for future analysis. Remote user interface and monitoring and control functions are also supported.

In addition, the Vector VII comes in a Nema 3R-rated outdoor enclosure. All electronic components are located inside a sealed (Nema 4) section of the drive enclosure with no exchange of outside cooling air. Vector VII is suitable for arctic, desert, and rain forest climates, operating in temperature ranges of –40° C. to +50° C. (–40° F. to +122° F.).

Source: **Wood Group ESP,** 17420 Katy Freeway, Suite 300, Houston, TX 77094.

Vibration transmitter monitors, warns continuously

The new CSI 9330 vibration transmitter continuously monitors critical rotating machinery for early detection of developing mechanical issues.

It's the latest in this firm's line of vibration transmitters, which include multi-sensor as well as wireless solutions.

The CSI 9330 can be deployed on any asset, but is typically installed on motor-fan, motor-pump, motor-compressor, and cooling tower applications.

Once installed, it converts the analog output of an integrated circuit piezoelectric accelerometer into a 4-20 ma signal, proportional to monitored vibration and also delivers patented PeakVue measurements that provide additional insight into the condition of rotating element bearings and gearboxes.

The CSI 9330 is available in two configurations. The CSI 9330VP provides overall vibration and PeakVue data when connected to a standard accelerometer. The CSI 9330VT provides vibration and temperature data when connected to an accelerometer with an embedded temperature capability.

Source: **Emerson Process Management,** 12301 Research Blvd., Bldg. III, Austin, TX 78759.

Compressor Engineering Corp. (CECO),

Houston, has announced a celebration of 60 years of service to the gas compression industry by James R. Hutton, CECO vice-president. The CECO veteran is also marking his 50th anniversary as a professional engineer. Hutton joined CECO in 1986, after he retired as president of Dresser Machinery's international division, where he worked for 38 years. He is also the author of How to Sell Technical Equipment and Services (2005), which is available from PennWell Books at http://store.pennwellbooks.com/howtoseltecs.html. Hutton served as a chief engineer in the US Navy during World War II and holds a BS in engineering and a BBA from the University of Texas at Austin.

Hutton

CECO is the world's largest independent manufacturer of engine and compressor replacement parts for gas pipelines, gathering and processing companies, and petrochemical, industrial, and refrigeration plants worldwide. In addition, CECO Pipeline Services provides new construction and a variety of maintenance services to pipeline operators.

Weatherford International Ltd.,

Houston, has acquired International Logging Inc. (ILI), also of Houston. ILI provides mud logging, formation evaluation, and drilling-related services at the well site in more than 55 countries. In addition to its fleet of surface logging units, ILI provides an advanced gas chromatograph system, GCTracer. This service will be linked with a number of existing drilling- and production-related services that Weatherford currently offers. ILI also brings a newly designed electronic drilling recorder for unmanned monitoring of drilling data and one of the most advanced communication and information management services in the industry. Terms of the deal aren't disclosed.

Weatherford is one of the largest global providers of mechanical solutions, technology, and services for the drilling and production sectors of the oil and gas industry, operating in more than 100 countries.

Elliott Co.,

Jeannette, Pa., has announced that it will build the compressor train for the world's largest hydrogen peroxide-to-propylene oxide (HPPO) plant, a facility SCG-Dow Group plans to build near Map Ta Phut, Thailand. The HPPO plant will produce propylene oxide using new, proprietary hydrogen peroxide-to-propylene oxide technology that Dow Chemical Co. and BASF AG jointly developed. The new process technology eliminates the need for a complex, integrated petrochemical facility to produce propylene oxide. Elliott said its four-stage, double-flow design was chosen for its ability to handle the state-of-the-art vapor compression steps that HPPO process technology requires. In addition to the compressor and gear, Elliott will also provide a buffer gas system and a lube oil system for the plant. Delivery is scheduled for late 2009.

SCG-Dow Group is a joint venture of Siam Cement Group and Dow Chemical.

Elliott is a global leader in the design, manufacture, and service of technically advanced centrifugal compressors and steam turbines used in the petrochemical, refining, oil and gas, and other process industries, as well as in power applications. Elliott is a wholly owned subsidiary of Tokyo-based industrial conglomerate Ebara Corp.

Geotrace,

Houston, has announced its participation as a 3-year sponsor in the Edinburgh Anisotropy Project (EAP). This sponsorship will allow Geotrace to further enhance its four-component processing technology and participate in research into new anisotropic capabilities. EAP is a consortium-supported research team working under the Seismology and Geomagnetism Program at the British Geological Survey. The principal objective is to investigate the application of seismic anisotropy to the oil industry.

Geotrace is an independent, integrated, reservoir services company that provides subsurface imaging solutions to the oil and gas industry worldwide.

TechCorr USA LLC,

Pasadena, Tex., has acquired J&V Electric, Spring, Tex., merging the latter into its new Electrical & Instrumentation (E&I) Division. The new division will focus on providing residential, commercial, and industrial clients a wide range of electrical contracting and instrumentation services. Terms of the deal aren't disclosed.

J&V Electric is a privately held company that has been providing electrical contracting services to the residential and commercial building industries for over 25 years.

TechCorr is a leading supplier of engineering, inspection, nondestructive testing, and industrial cleaning services to the oil and gas production, refining, petrochemical, and power generation industries worldwide.

Swire Oilfield Services,

Aberdeen and Stavanger, has acquired Australia's Maritime Products & Services. Terms of the deal aren't disclosed, apart from being described as a multimillion-pound acquisition. MPS was founded in 2001 and quickly established itself as Australia's leading supplier of chemical tanks, pump, and filtration equipment. Operators in the Australia region now will have access to Swire Oilfield Services' extensive suite of products and services that include chemical tank, basket, and container rental; chemical handling; and aviation fuel services. The acquisition will also enhance the range of Swire services on offer to the rest of the industry, most notably taking the company into the new area of pump and filtration units specifically designed for high-pressure, low-flow well applications. Over the past 9 months, Swire has acquired businesses in Norway, Angola, Nigeria, the US, and now Australia for a total of £35 million. In addition to the acquisitions, £18 million has been invested to improve and enhance the company's fleet across its global locations.

Meanwhile, Swire Oilfield Services has opened a new base at Yutzhno in Sakhalin Island to serve growing demand for containers, tanks, and baskets in a region with strong offshore oil and gas field development under way.

In addition, ConocoPhillips has decided to make use of its option to renew its con-

tract with Swire for the hiring of tanks and containers. The contract period will be for 5 years and covers the Norwegian part of the North Sea. Swire is currently supplying a full range of equipment to fulfill ConocoPhillips's varied demand for containers, tanks, and baskets. The two companies will also further integrate on the system side and will actively pursue the use of RFID (radio frequency identification) as a part of the contract. The contract will continue with a strong focus on all health, safety, and environmental quality matters related to the lifting equipment covered by the contract.

Swire Oilfield Services, part of the Swire Group, is the world's largest supplier of specialist offshore cargo carrying units to the global energy industry and is a leading specialist in helicopter fuel systems and chemical handling services.

Aker Solutions,

Oslo, has been awarded two contracts totaling a value of about 150 million kroner (Nor.) for the design and supply of on-vessel mooring systems. The contracts were awarded by Bluewater Industries Inc. and Daewoo Shipbuilding & Marine Engineering. The Bluewater contract consists of eccentric fairlead chain stoppers and roller RamWinches for a deep draft production unit owned by ATP Oil & Gas Corp. The hull for the deep-draft production unit of Moss Maritime's Octabuoy design will be built by Cosco Shipyard in China. After completion, it will be located in Cheviot field in the UK North Sea. The Daewoo contract consists of eccentric fairlead chain stoppers for the Pazflor FPSO (floating production, storage, and offloading vessel) destined to operate in Angolan waters. Daewoo is building the FPSO in South Korea. Pazflor field, operated by Total E&P Angola, is located about 200 km off the coast of Angola in nearly 800 m of water.

Aker Solutions, through its subsidiary Aker Pusnes AS, has developed the eccentric fairlead chain stoppers design, which is an innovative on-vessel mooring solution with several advantages. With the eccentric fairlead chain stoppers, the mooring load is secured at keel level, thereby increasing the fatigue life of the chain. The design eliminates the need for reinforcements at the deck level, thereby decreasing the overall weight. The equipment will be manufactured in Europe and South Korea, with delivery to take place during 2009.

Aker Solutions ASA is a leading global provider of engineering and construction services, technology products, and integrated solutions to the oil and gas, refining and chemicals, mining and metals, and power generation industries.

Aker Solutions RamWinches work aboard the Independence Hub in the Gulf of Mexico.

Siemens Energy & Automation Inc.,

Alpharetta, Ga., has achieved a world record with the introduction of an 8-MW variable frequency drive (VFD), the world's largest. The newest Siemens Robicon Perfect Harmony Drive operates with an output frequency of 500 Hz. While basic VFD topologies have been limited to output frequencies of 120–200 Hz, Siemens has previously manufactured and installed drives that operate at frequencies of 315–400 Hz. This latest VFD will be used to drive permanent-magnetic motors, such as those found in natural gas processing and transportation applications that require high-speed compression.

Siemens Energy & Automation, one of Siemens AG's operating companies in the US, manufactures and markets one of the world's broadest ranges of electrical and electronic products, systems, and services to industrial and construction market customers. Its technologies range from circuit protection and energy management systems to process control, industrial software, and totally integrated automation solutions. The company also has expertise in systems integration, technical services, and turnkey industrial systems.

Energy Ventures,

Stavanger, a venture capital firm specializing in upstream oil and gas technology, has invested $19 million as the financier behind NovaDrill, a new company that will commercialize state-of-the-art drilling technologies. Provo, Utah-based Novatek International Inc. will partner with Energy Ventures in the new enterprise, contributing proprietary advanced technologies related to various downhole drilling and logging tools. Novatek has been a leader in industrial diamonds and polycrystalline-diamond compact cutter designs and developed the IntelliServe system for downhole telemetry.

Established in 2002, Energy Ventures is a leading venture capital firm providing competent capital to high-growth

oil and gas technology companies. Energy Ventures manages and advises three oil and gas venture funds with a combined capital base in excess of $410 million.

Expro,

Reading, UK, has been awarded a well testing services and production clean-up contract from StatoilHydro ASA. The 2½-year contract is considered to be one of the largest contract structures for these services worldwide. This is the third consecutive time that Expro has secured this contract structure, which will fully execute the company's capabilities, including drill stem testing, surface well testing, memory gauges, subsea equipment, and tubing supplies. It will involve exploration work in Norway, plus production clean-ups in the North Sea, as well as production clean-ups in the Norwegian Sea and, potentially, in the Barents Sea. The contract gives Expro a firm foundation to expand its service offering and enhance its staffing levels in the region. The initial contract is expected to be completed in December 2010, and if options are secured, the contract will run until the end of 2014.

Expro is a market leader in providing services and products that measure, improve, control, and process flow from high-value oil and gas wells. It markets in the areas of well testing and commissioning, production systems, wireline intervention, connectors and measurements, and drilling choke systems.

O'Brien Oil Pollution Service Inc. (OOPS),

Brea, Calif., and Response Management Associates (RMA), Spring, Tex., are holding the annual Practical Response to Oil Spills (PROS) Course Sept. 17–18, 2008, at the Sheraton Houston Brookhollow in Houston. The PROS Course is designed for senior executives, facility managers, incident commanders, and qualified individuals and their alternates, as well as first responders and section chiefs.

OOPS provides QI (Qualified Individual) and SMT (Spill Management Team) services to over 150 oil and gas companies and 350 shipping companies, representing in excess of 5,000 oceangoing vessels operating in US territorial seas.

RMA is a highly specialized professional consulting firm that provides safety, environmental, and regulatory compliance services to the energy industry.

Innovation Fuels,

New York City, has shipped the first cargo of biodiesel from a New York Harbor producer bound for Rotterdam. This initial shipment of 15,000 bbl is bound for European customers through Innovation Fuels Europe, a joint venture of Innovation Fuels and Arpadis Group. The shipment follows the company's recent closure on a $15.5 million financing round led by Credit Suisse Customized Fund Investment Group on behalf of New York Common Retirement Fund, RNK Capital, and Lyrical Partners. Innovation Fuels is the first biodiesel refinery company supported by all three institutional investors.

Innovation Fuels is a vertically integrated, producer of renewable, environmentally friendly fuels with a global reach and a verified 950,000 bbl/year refinery at New York Harbor. It recently acquired North American Biodiesel, a company that was founded 2 years ago for the purpose of developing a biodiesel production facility in Milwaukee and that provides Innovation Fuels with direct, deepwater international access via leasehold at the Port of Milwaukee on the western shore of Lake Michigan.

Pacific Maritime Institute,

Seattle, has announced the graduation of the first class from its Workboat Academy Workboat Mate program. The Workboat Mate Program takes 2 years to complete, with 25 weeks of shore-based instruction and 52 weeks of onboard training. Upon graduation, the trainee receives a Mate 500-1600 Gross Tons license, with Towing Endorsement (if serving on tugs); STCW-95 Officer in Charge of a Navigational Watch; and an Able-Bodied Seaman Limited endorsement. PMI has 80 cadets in the program today.

AgustaWestland,

Cascina Costa di Samarate, Italy, has sold 14 AW139 helicopters to Saudi Aramco, serving the Saudi Arabian state oil company's offshore oil and gas operations, security surveillance, and VIP transportation needs. The AW139 is a next-generation rotor-wing aircraft that features an advanced avionics system and four-axis autopilot and is able to perform offshore and hoist loads with high safety margins and endurance. AgustaWestland, a Finmeccanica company, is a provider of rotorcraft transport and lift solutions to military and commercial operators around the world.

Agusta Westland's AW139 helicopter.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	8/8 2008	8/1 2008	8/8 2008	8/1 2008	8/8 2008	8/1 2008	*8/10 2007
	1,000 b/d						
Total motor gasoline	785	858	—	6	785	864	1,213
Mo. gas. blending comp.	675	743	—	6	675	749	848
Distillate	136	292	—	—	136	292	232
Residual	311	341	—	—	311	341	173
Jet fuel-kerosine	69	54	5	5	74	59	231
Propane-propylene	158	190	8	7	166	197	121
Other	443	559	12	79	455	638	430
Total products	**2,577**	**3,037**	**25**	**103**	**2,602**	**3,140**	**3,248**
Total crude	**8,262**	**8,918**	**1,393**	**1,275**	**9,655**	**10,193**	**9,873**
Total imports	**10,839**	**11,955**	**1,418**	**1,378**	**12,257**	**13,333**	**13,121**

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

Purvin & Gertz LNG netbacks—August 15, 2008

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	9.74	7.19	8.70	7.05	7.94	8.61
Everett	7.19	4.67	6.73	4.72	5.35	7.55
Isle of Grain	9.07	7.56	8.26	7.57	7.57	8.29
Lake Charles	5.22	3.09	4.95	3.28	3.60	5.99
Sodegaura	8.58	11.35	8.82	10.97	10.07	7.66
Zeebrugge	10.76	8.31	9.94	8.14	8.91	9.94

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

Crude and product stocks

District	Crude oil	Motor gasoline		Jet fuel, kerosine	Fuel oils		Propane-propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	14,630	57,647	33,833	10,712	48,109	13,637	3,936
PADD 2	64,420	47,968	16,910	6,972	29,923	1,337	20,880
PADD 3	148,626	65,036	31,615	13,672	37,354	16,549	22,129
PADD 4	14,028	6,107	1,837	572	3,158	267	[1] 2,078
PADD 5	54,843	26,064	20,300	8,858	13,043	4,645	--
Aug. 8, 2008	**296,547**	**202,822**	**104,495**	**40,786**	**131,587**	**36,435**	**49,023**
Aug. 1, 2008	**296,863**	**209,216**	**106,616**	**41,429**	**133,346**	**36,545**	**47,196**
Aug. 10, 2007[2]	**335,228**	**201,940**	**91,964**	**41,400**	**127,669**	**36,977**	**51,719**

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

Refinery report—Aug. 8, 2008

District	REFINERY OPERATIONS		REFINERY OUTPUT				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils: Distillate	Fuel oils: Residual	Propane-propylene
	1,000 b/d						
PADD 1	1,368	1,372	2,060	61	515	107	53
PADD 2	3,126	3,096	2,307	225	928	44	198
PADD 3	7,287	7,106	2,817	758	2,119	256	682
PADD 4	550	541	277	22	175	12	[1]92
PADD 5	2,793	2,708	1,391	495	604	166	—
Aug. 8, 2008	**15,124**	**14,823**	**8,852**	**1,561**	**4,341**	**585**	**1,025**
Aug. 1, 2008	**15,311**	**15,039**	**9,061**	**1,559**	**4,630**	**536**	**1,052**
Aug. 10, 2007[2]	**16,021**	**15,783**	**9,271**	**1,423**	**4,100**	**654**	**1,058**
	17,606 Operable capacity		**85.9 utilization rate**				

[1]Includes PADD 5. [2]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

	*8-15-08	*8-17-07	Change $/bbl	Change, %
SPOT PRICES				
Product value	123.58	84.84	38.74	45.7
Brent crude	111.27	70.03	41.24	58.9
Crack spread	12.31	14.82	–2.50	–16.9
FUTURES MARKET PRICES				
One month				
Product value	124.89	83.60	41.28	49.4
Light sweet crude	114.45	72.06	42.39	58.8
Crack spread	10.44	11.54	–1.10	–9.5
Six month				
Product value	126.52	82.61	43.91	53.2
Light sweet crude	115.67	70.47	45.20	64.1
Crack spread	10.85	12.15	–1.29	–10.6

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

OGJ GASOLINE PRICES

	Price ex tax 8-13-08	Pump price* 8-13-08	Pump price 8-15-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	339.0	383.4	278.8
Baltimore	338.7	380.6	270.1
Boston	340.8	382.7	267.3
Buffalo	319.7	379.3	283.4
Miami	328.5	380.1	288.0
Newark	338.9	371.8	264.4
New York	319.0	378.6	283.3
Norfolk	336.4	374.4	262.6
Philadelphia	330.1	380.8	281.9
Pittsburgh	328.0	378.7	278.1
Wash., DC	343.5	381.9	281.7
PAD I avg	333.0	379.3	276.3
Chicago	345.1	403.0	347.7
Cleveland	321.9	368.3	291.6
Des Moines	322.3	362.4	280.8
Detroit	323.8	378.2	301.0
Indianapolis	318.1	368.2	287.8
Kansas City	325.9	361.9	294.6
Louisville	335.3	372.2	297.5
Memphis	321.4	361.2	289.1
Milwaukee	326.0	377.3	316.2
Minn.-St. Paul	328.8	369.2	296.5
Oklahoma City	321.4	356.8	286.8
Omaha	329.3	371.6	300.4
St. Louis	327.2	363.2	296.3
Tulsa	319.5	354.9	282.9
Wichita	314.5	357.9	289.0
PAD II avg	325.4	368.4	297.2
Albuquerque	325.6	362.0	298.8
Birmingham	329.9	368.5	290.8
Dallas-Fort Worth	329.0	367.4	292.9
Houston	326.6	365.0	291.9
Little Rock	328.3	368.5	290.0
New Orleans	330.1	368.5	292.3
San Antonio	328.9	367.3	285.0
PAD III avg	328.4	366.8	291.7
Cheyenne	339.3	371.7	289.5
Denver	358.9	399.3	297.8
Salt Lake City	355.2	398.1	294.7
PAD IV avg	351.1	389.7	294.0
Los Angeles	347.9	411.8	322.9
Phoenix	341.4	378.8	291.2
Portland	343.4	386.8	305.1
San Diego	346.0	409.9	331.7
San Francisco	356.8	420.7	329.9
Seattle	341.4	395.8	318.0
PAD V avg	346.2	400.7	316.5
Week's avg.	**332.7**	**377.1**	**301.8**
July avg.	**361.3**	**405.7**	**295.2**
June avg.	**360.2**	**404.2**	**288.4**
2008 to date	**308.0**	**351.8**	—
2007 to date	**228.4**	**271.9**	—

*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

	8-8-08 ¢/gal		8-8-08 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	284.40	New York Harbor	308.73
Gulf Coast	292.90	Gulf Coast	307.85
Los Angeles	303.90	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	283.99	ARA	323.54
Singapore	277.36	Singapore	315.83
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	288.90	New York Harbor	218.76
Gulf Coast	288.90	Gulf Coast	231.86
Los Angeles	309.90	Los Angeles	295.88
		ARA	247.47
		Singapore	245.09

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

BAKER HUGHES RIG COUNT

	8-15-08	8-17-07
Alabama	8	4
Alaska	10	4
Arkansas	54	50
California	45	38
Land	45	37
Offshore	0	1
Colorado	120	117
Florida	2	1
Illinois	1	1
Indiana	2	4
Kansas	10	14
Kentucky	11	9
Louisiana	190	178
N. Land	80	58
S. Inland waters	28	24
S. Land	29	31
Offshore	53	65
Maryland	0	1
Michigan	2	3
Mississippi	14	12
Montana	13	19
Nebraska	1	0
New Mexico	81	86
New York	7	6
North Dakota	75	42
Ohio	12	14
Oklahoma	208	190
Pennsylvania	26	17
South Dakota	2	3
Texas	931	837
Offshore	7	6
Inland waters	1	1
Dist. 1	18	25
Dist. 2	38	33
Dist. 3	63	57
Dist. 4	95	83
Dist. 5	181	186
Dist. 6	126	135
Dist. 7B	31	33
Dist. 7C	72	57
Dist. 8	134	113
Dist. 8A	34	18
Dist. 9	40	33
Dist. 10	91	57
Utah	50	35
West Virginia	26	32
Wyoming	77	68
Others—OR-1; TN-2; VA-8; WA-1	12	10
Total US	**1,990**	**1,795**
Total Canada	**426**	**321**
Grand total	**2,416**	**2,116**
Oil rigs	395	309
Gas rigs	1,586	1,480
Total offshore	66	73
Total cum. avg. YTD	**1,845**	**1,754**

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	8-15-08 Percent footage*	Rig count	8-17-07 Percent footage*
0-2,500	87	3.4	59	8.5
2,501-5,000	140	47.1	109	52.2
5,001-7,500	236	13.9	233	23.6
7,501-10,000	468	2.9	437	4.1
10,001-12,500	468	1.9	428	0.9
12,501-15,000	334	—	279	0.3
15,001-17,500	148	—	106	—
17,501-20,000	93	—	70	—
20,001-over	32	—	35	—
Total	**2,006**	**6.2**	**1,756**	**7.9**
INLAND	32		43	
LAND	1,917		1,643	
OFFSHORE	57		70	

*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]8-15-08	[2]8-17-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	15	21
Alaska	717	652
California	653	660
Colorado	56	53
Florida	5	5
Illinois	28	27
Kansas	97	105
Louisiana	1,325	1,239
Michigan	16	15
Mississippi	55	57
Montana	94	94
New Mexico	162	160
North Dakota	123	125
Oklahoma	170	170
Texas	1,342	1,331
Utah	47	54
Wyoming	149	149
All others	62	82
Total	**5,116**	**4,999**

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

US CRUDE PRICES

	8-15-08 $/bbl*
Alaska-North Slope 27°	127.45
South Louisiana Sweet	116.75
California-Kern River 13°	100.55
Lost Hills 30°	108.70
Wyoming Sweet	101.77
East Texas Sweet	109.75
West Texas Sour 34°	102.75
West Texas Intermediate	110.25
Oklahoma Sweet	110.25
Texas Upper Gulf Coast	106.75
Michigan Sour	103.25
Kansas Common	109.25
North Dakota Sweet	101.50

*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]	8-8-08
United Kingdom-Brent 38°	120.15
Russia-Urals 32°	115.36
Saudi Light 34°	114.95
Dubai Fateh 32°	118.37
Algeria Saharan 44°	119.99
Nigeria-Bonny Light 37°	121.64
Indonesia-Minas 34°	124.04
Venezuela-Tia Juana Light 31°	116.93
Mexico-Isthmus 33°	116.82
OPEC basket	118.96
Total OPEC[2]	116.46
Total non-OPEC[2]	117.74
Total world[2]	117.03
US imports[3]	115.62

[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]

	8-8-08	8-1-08	8-8-07	Change, %
	bcf			
Producing region	736	745	923	-20.3
Consuming region east	1,473	1,418	1,565	-5.9
Consuming region west	358	354	410	-12.7
Total US	**2,567**	**2,517**	**2,898**	**-11.4**
	May 08	**May 07**	**Change, %**	
Total US[2]	**1,836**	**2,179**	**-15.7**	

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

Statistics

World oil balance

	2008 1st qtr.	2007 4th qtr.	2007 3rd qtr.	2007 2nd qtr.	2007 1st qtr.	2006 4th qtr.
	Million b/d					
DEMAND						
OECD						
US & Territories	20.15	21.00	21.03	20.97	21.07	21.09
Canada	2.35	2.34	2.38	2.28	2.34	2.29
Mexico	2.02	2.08	1.98	2.07	2.05	2.00
Japan	5.41	5.22	4.67	4.61	5.39	5.29
South Korea	2.32	2.31	2.06	2.12	2.35	2.32
France	1.96	2.00	1.93	1.85	1.97	1.95
Italy	1.60	1.72	1.63	1.67	1.69	1.71
United Kingdom	1.72	1.73	1.75	1.78	1.80	1.81
Germany	2.48	2.55	2.56	2.38	2.38	2.71
Other OECD Europe	7.37	7.60	7.52	7.25	7.35	7.55
Australia & New Zealand	1.09	1.12	1.09	1.07	1.09	1.10
Total OECD	**48.47**	**49.67**	**48.60**	**48.05**	**49.48**	**49.82**
NON–OECD						
China	7.72	7.87	7.59	7.52	7.33	7.45
FSU	4.34	4.32	4.22	4.32	4.25	4.36
Non-OECD Europe	0.86	0.79	0.73	0.78	0.85	0.78
Other Asia	8.81	8.93	8.64	8.83	8.74	8.80
Other non-OECD	15.48	15.18	15.47	15.16	14.87	15.47
Total non-OECD	**37.21**	**37.09**	**36.65**	**36.61**	**36.04**	**36.86**
TOTAL DEMAND	**85.68**	**86.76**	**85.25**	**84.66**	**85.52**	**86.68**
SUPPLY						
OECD						
US	8.64	8.58	8.36	8.50	8.38	8.40
Canada	3.35	3.40	3.48	3.37	3.45	3.39
Mexico	3.30	3.35	3.46	3.61	3.59	3.52
North Sea	4.46	4.57	4.28	4.49	4.80	4.76
Other OECD	1.54	1.57	1.56	1.54	1.50	1.55
Total OECD	**21.29**	**21.47**	**21.14**	**21.51**	**21.72**	**21.62**
NON–OECD						
FSU	12.60	12.66	12.55	12.60	12.61	12.48
China	3.93	3.86	3.87	3.96	3.92	3.81
Other non-OECD	10.89	11.17	11.25	11.06	10.73	11.22
Total non-OECD, non-OPEC	**27.42**	**27.69**	**27.67**	**27.62**	**27.26**	**27.51**
OPEC*	**36.69**	**36.18**	**35.44**	**35.07**	**34.98**	**36.49**
TOTAL SUPPLY	**85.40**	**85.34**	**84.25**	**84.20**	**83.96**	**85.62**
Stock change	**–0.28**	**–1.42**	**–1.00**	**–0.46**	**–7.56**	**–1.06**

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

OECD total net oil imports

	Apr. 2008	Mar. 2008	Feb. 2008	Apr. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	–1,304	–1,310	–1,335	–1,369	65	–4.7
US	11,498	10,728	10,531	12,583	–1,085	–8.6
Mexico	–1,335	–1,390	–1,160	–1,497	162	–10.8
France	1,716	1,862	1,681	2,284	–568	–24.9
Germany	2,210	2,358	2,079	2,053	157	7.6
Italy	1,528	1,496	1,328	1,484	44	3.0
Netherlands	818	1,225	912	992	–174	–17.5
Spain	1,627	1,521	1,558	1,662	-35	–2.1
Other importers	3,805	3,947	3,826	3,547	258	7.3
Norway	–2,069	–1,842	–2,206	–2,275	206	–9.1
United Kingdom	115	142	29	-204	319	–156.4
Total OECD Europe	**9,750**	**10,709**	**9,207**	**9,543**	**207**	**2.2**
Japan	5,077	5,359	5,426	4,802	275	5.7
South Korea	2,055	2,084	2,111	1,875	180	9.6
Other OECD	1,064	1,051	1,096	742	322	43.4
Total OECD	**26,805**	**27,231**	**25,876**	**26,679**	**126**	**0.5**

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

OECD* total gross imports from OPEC

	Apr. 2008	Mar. 2008	Feb. 2008	Apr. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	453	399	542	403	50	12.4
US	6,262	5,934	5,850	6,136	126	2.1
Mexico	10	10	30	21	-11	-52.4
France	650	800	616	821	-171	-20.8
Germany	495	475	409	467	28	6.0
Italy	1,176	1,206	1,100	1,187	-11	-0.9
Netherlands	554	668	391	679	-125	-18.4
Spain	559	703	671	637	-78	-12.2
Other importers	1,154	1,169	1,210	1,283	-129	-10.1
United Kingdom	267	283	316	264	3	1.1
Total OECD Europe	**4,855**	**5,304**	**4,713**	**5,338**	**-483**	**-9.0**
Japan	4,634	4,497	4,567	4,024	610	15.2
South Korea	2,263	2,292	2,280	2,136	127	5.9
Other OECD	709	739	762	743	-34	-4.6
Total OECD	**19,186**	**19,175**	**18,744**	**18,801**	**385**	**2.0**

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

US petroleum imports from source country

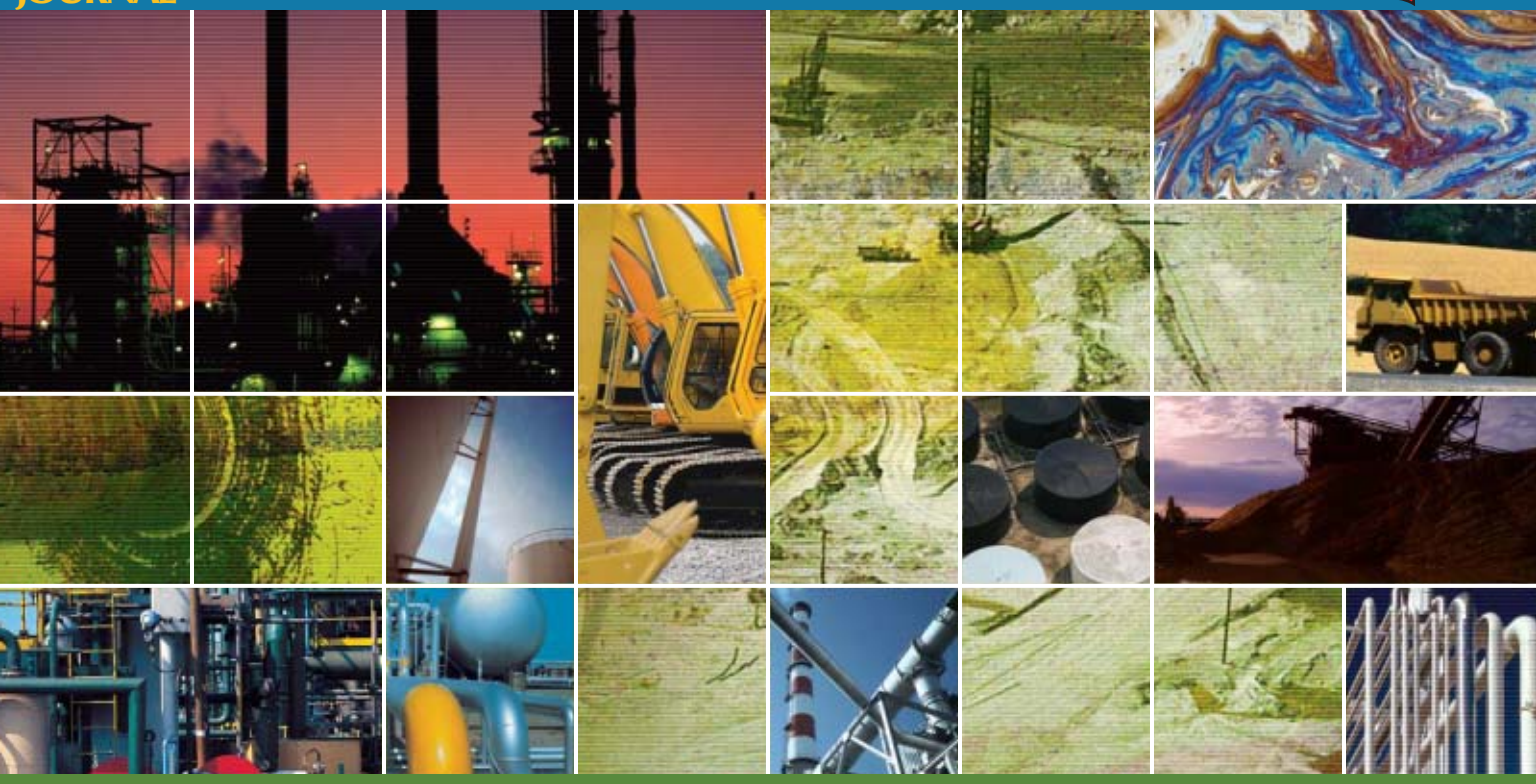
	Apr. 2008	Mar. 2008	Average YTD 2008	Average YTD 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	1,000 b/d					
Algeria	632	441	525	718	–193	–26.9
Angola	597	388	478	571	–93	–16.3
Kuwait	181	203	222	196	26	13.3
Nigeria	1,221	1,174	1,154	1,135	19	1.7
Saudi Arabia	1,462	1,542	1,533	1,379	154	11.2
Venezuela	1,189	1,033	1,161	1,311	–150	–11.4
Other OPEC	980	1,153	1,045	631	414	65.6
Total OPEC	**6,262**	**5,934**	**6,118**	**5,941**	**177**	**3.0**
Canada	2,534	2,542	2,533	2,425	108	4.5
Mexico	1,364	1,358	1,339	1,601	–262	–16.4
Norway	137	80	100	150	–50	–33.3
United Kingdom	229	218	204	285	–81	–28.4
Virgin Islands	340	290	340	353	–13	–3.7
Other non-OPEC	2,386	2,129	2,344	2,667	–323	–12.1
Total non-OPEC	**6,990**	**6,617**	**6,860**	**7,481**	**–621**	**–8.3**
TOTAL IMPORTS	**12,551**	**12,603**	**12,889**	**13,264**	**–444**	**–3.3**

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

Oil stocks in OECD countries*

	Apr. 2008	Mar. 2008	Feb. 2008	Apr. 2007	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million bbl					
France	173	177	176	179	–6	–3.4
Germany	280	282	277	290	–10	–3.4
Italy	134	131	129	135	–1	–0.7
United Kingdom	97	100	95	105	–8	–7.6
Other OECD Europe	678	693	679	667	11	1.6
Total OECD Europe	**1,362**	**1,383**	**1,356**	**1,376**	**–14**	**–1.0**
Canada	202	201	203	187	15	8.0
US	1,665	1,653	1,662	1,688	–23	–1.4
Japan	610	610	605	619	-9	–1.5
South Korea	141	143	149	149	-8	–5.4
Other OECD	102	108	111	107	-5	–4.7
Total OECD	**4,082**	**4,098**	**4,086**	**4,126**	**–44**	**–1.1**

*End of period.
Source: DOE International Petroleum Monthly Report
Data available in OGJ Online Research Center.



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Energy backfires again as tool of foreign policy

As Arab oil exporters learned after their targeted embargo of 1973-74, energy has its drawbacks as a tool of foreign policy.

The US must take that point now as it reacts to Russia's bloody bullying of Georgia.

No one should forget the maneuvering behind the Baku-Tbilisi-Ceyhan (BTC) oil pipeline and South Caucasus gas line, which parallels BTC as far west as Erzurum, Turkey.

The BTC route was not the most economical outlet for Caspian production.

But it had a geopolitical advantage: It didn't transit Russia, which controls other Caspian pipelines; Iran, with which the US for long has been at odds; or Armenia, which has longstanding animosities with Azerbaijan and Turkey.

The US government promoted the pipeline aggressively, often touting the benefits of a route that avoided troublesome territory.

By that it meant Iran. The cheerleading occurred in the early years of this decade, when the US thought it had cordial relations with Moscow. From the US perspective, it was easy to see avoidance of Russian transit as an appeal mostly to the Caspian's formerly Soviet, non-Russian producers.

Russia, then still economically wobbly, was powerless to stop the BTC and South Caucasus projects, the strategically significant geography of which is their arc through Georgia.

Today, only Prime Minister Vladimir Putin knows the extent to which the pipelines motivated Russia's march into Georgia.

But BTC has represented a palpable rebuke to Russia since the starts of construction in 2003 and of operations in 2006. Its role as a token of independence by formerly Soviet countries and of US influence in what Russia calls its near-abroad must be a long-festering irritation to the Kremlin.

And if Russia, as many expect it to do, replaces Georgia's West-leaning government with one that will do its bidding, it gains control of pipelines built with something quite different in mind.

None of this excuses Russian brutality. But it would be a mistake to pretend that the Georgian segment of the BTC and parallel gas pipelines didn't work as a provocation to an authoritarian regime newly fortified by oil money—if not an outright prize.

(Online Aug. 15, 2008; author's e-mail: bobt@ogjonline.com)

The Editor's Perspective

by Bob Tippee, Editor

Market Journal

by Sam Fletcher, Senior Writer

OPEC cuts demand growth estimate

In its August report, the Organization of Petroleum Exporting Countries reduced its 2008 estimate of global economic growth to 3.9%, down from 4% from the previous month and one percentage point lower than the same period in 2007. It lowered its 2009 estimate by 0.1 of a percentage point to 3.8%, due primarily to downward revisions in all major regions of the Organization for Economic Cooperation and Development.

In contrast, the expected 2009 growth rate for developing countries was unchanged at 5.6%. India's growth was revised up to 7.7% while China's was unchanged at 9.2%. "US economic expansion next year is now projected at 1.3%, down 0.3 percentage points from the previous month, but still higher than the prospect of 1.1% growth in Japan and the Eurozone," OPEC said.

"The dollar strengthened on the perception that the rest of the world—mainly other OECD regions—were facing increasing headwinds and were slowing down fast, while the US is seen to have been more proactive in resolving economic and financial sector problems. Japan is on the brink of recession after second quarter real gross domestic product fell at an annualized rate of 2.4%," said OPEC officials.

OPEC's basket of 13 reference crudes peaked at $140.73/bbl July 4 on a weak dollar and geopolitical tensions. But later in the month, the basket price fell $13.55 or almost 10%.

Reduced demand, increased OPEC oil exports, and a recovering dollar helped calm the market in August, said cartel officials. "Although the uptrend revived following recent supply disruptions in the Caucasus, the momentum was short-lived as speculative funds continued to exit the crude oil futures market," they said. As a result, OPEC's basket price plunged to a 3-month low of $109/bbl Aug. 12.

Seven-year low

In the Houston office of Raymond James & Associates Inc., analysts said, "OPEC has left its forecast for 2009 demand growth at its lowest levels in 7 years and has warned that consumption could fall further. Obviously, we've found a price that slows oil demand, but in our view, long-term oil fundamentals remain strong."

A slowing economy and high oil prices have cut US oil demand this summer. Transport and industrial fuels declined the most, pushing total US oil demand down by 3.8% or 800,000 b/d in the first 7 months. US gasoline has been on the decline all year, and strong summer demand, and growth in China, the Middle East, and Asia has not been enough to offset the huge decline in OECD oil demand in the second quarter.

The recent sharp fall in crude prices may improve refining economics and cap discretionary cuts by refiners. The only major risk for product markets would be possible refinery outages due to hurricane activity in the Gulf of Mexico, OPEC said.

"Deteriorating demand in the OECD countries, particularly in the US, along with costly crude oil significantly undermined refining economics across the world in July," said OPEC officials. That may be exacerbated with the approaching end of driving season. "This weaker trend is likely to be enhanced by new refinery capacities coming onstream in coming months," they said.

"World oil demand in 2008 is forecast to grow by 1 million b/d with a slight 30,000 b/d revision from the previous forecast. In 2009, world oil demand is forecast to grow by 9 million b/d, unchanged from the previous forecast and 100,000 b/d lower than demand growth in 2008," OPEC said. "With growth expected at 1.2 million b/d, non-OECD countries will account for all of the world oil demand growth next year. Due to a major slowdown in transport and industrial fuel consumption not only North America but also in OECD Europe and Pacific, oil demand growth will be on the decline in 2009, which will take the world oil demand growth the lowest since 2002," OPEC said.

OPEC expects non-OPEC oil supply to increase by 580,000 b/d in 2008, unchanged from the previous outlook, with upward supply revisions in the US, Mexico, UK, and China generally offsetting downward adjustments for Canada, Norway, Australia, India, Malaysia, Vietnam, Brazil, Russia, Kazakhstan, and Azerbaijan.

In July, total OPEC crude output averaged 32.6 million b/d, representing a gain of 235,800 b/d over the previous month due to higher production from Saudi Arabia, Iraq, Nigeria, Kuwait and the UAE. Preliminary global oil supply figures—combining non-OPEC supply, OPEC production, and OPEC NGLs and non-conventional oils—indicate a July increase of 600,000 b/d in world oil supply from June. In 2009, non-OPEC oil supply is expected to grow steadily by 900,000 b/d.

(Online Aug. 18, 2008; author's e-mail: samf@ogjonline.com)

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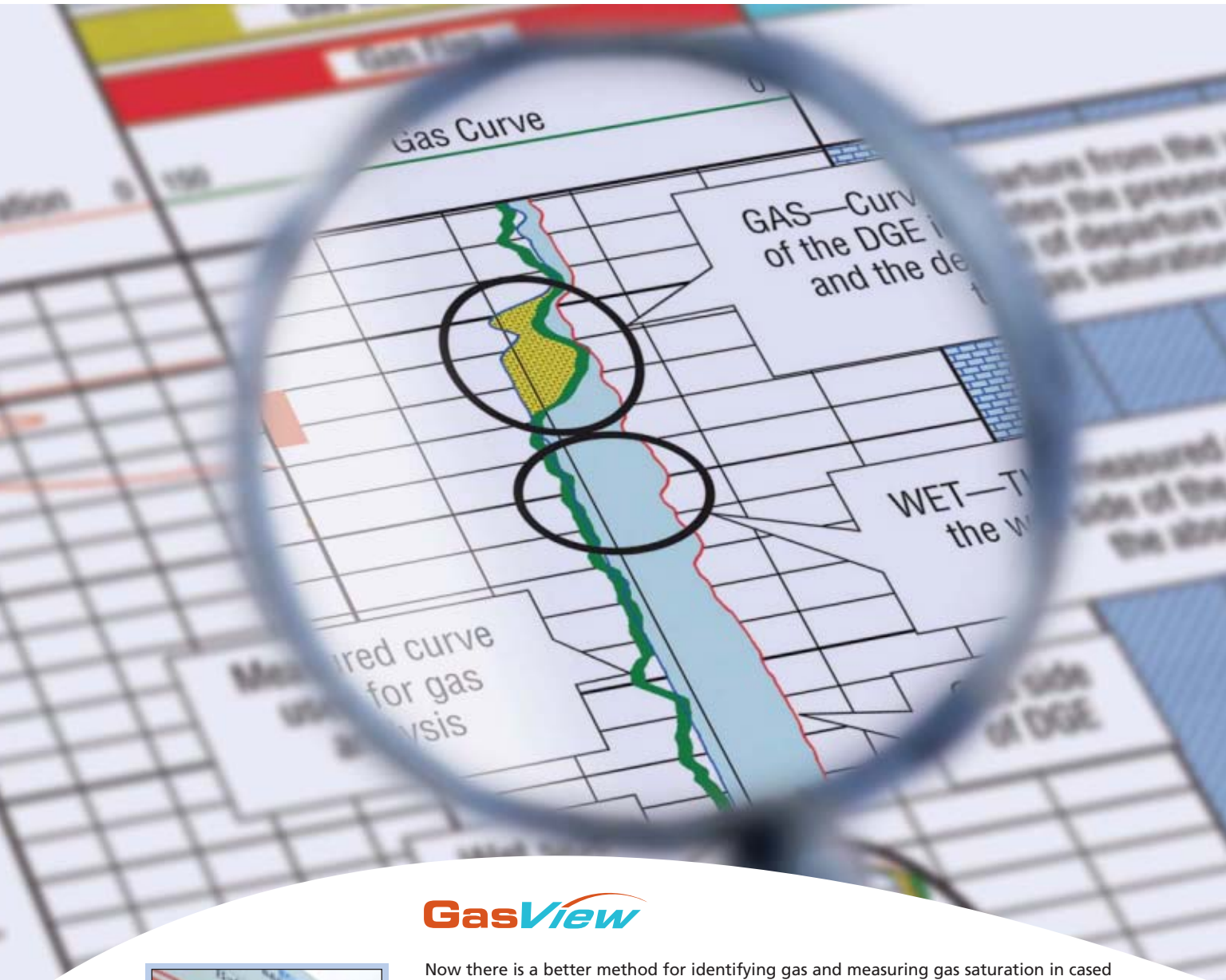

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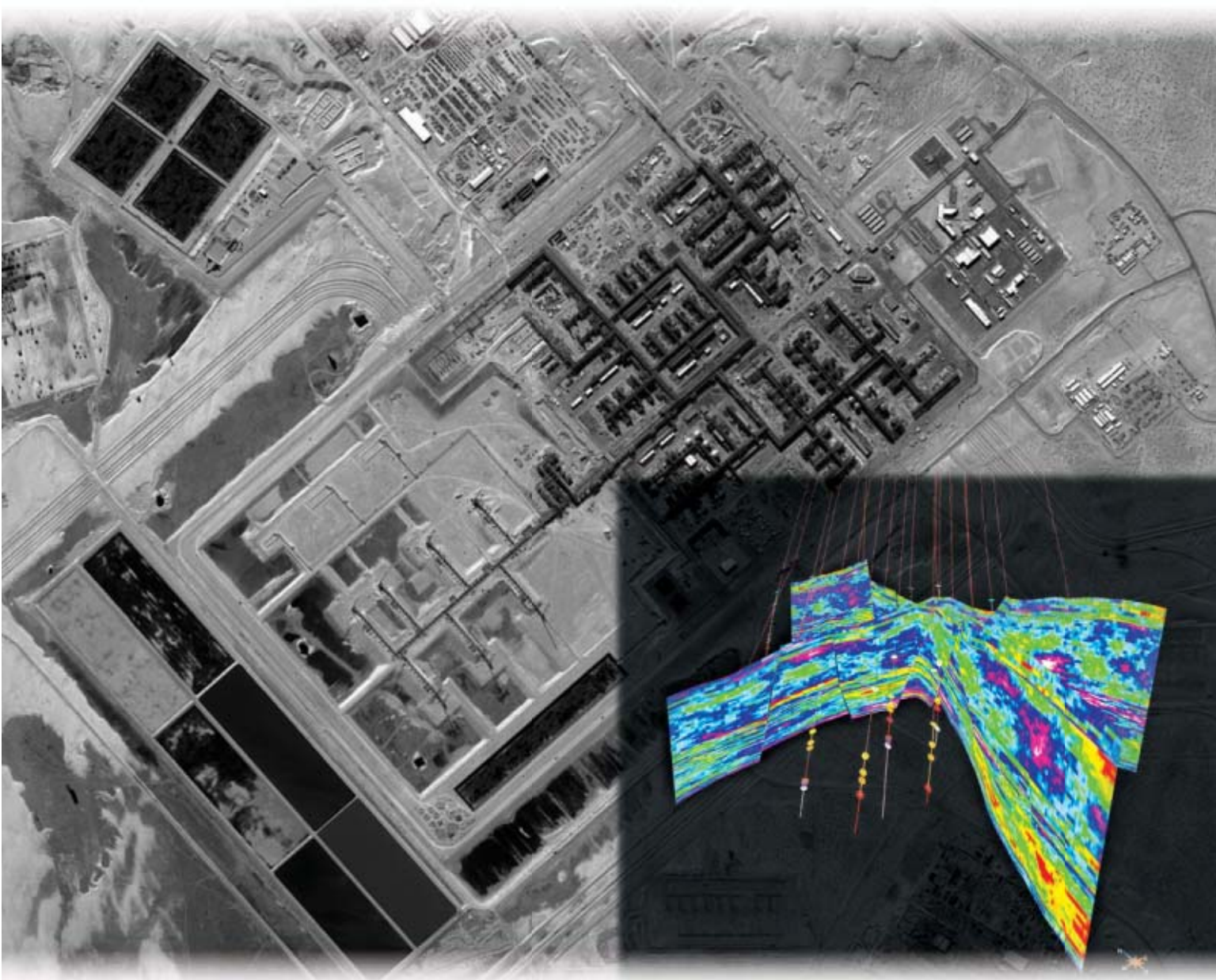

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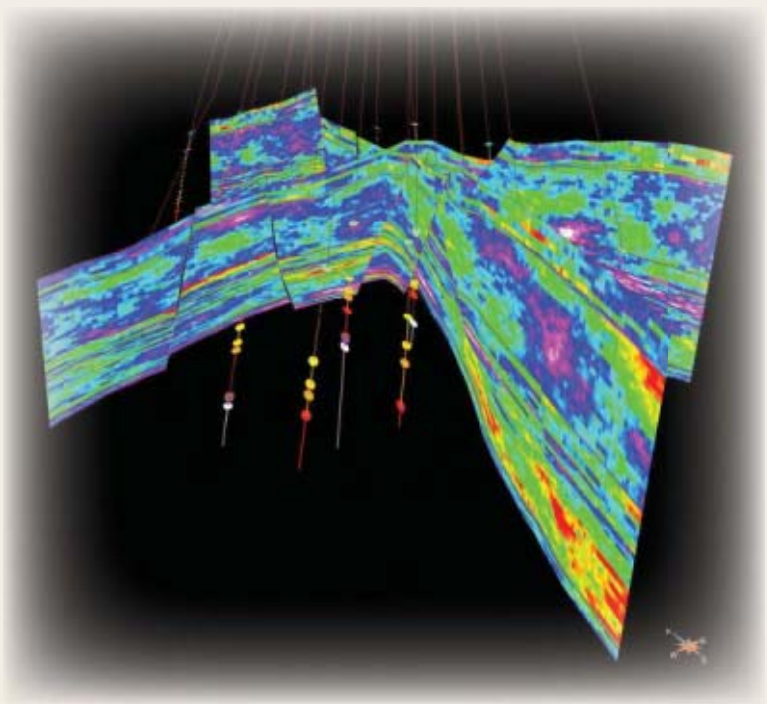

Continuing progress in data management and utilization and communications technologies marks the oil and gas industry's relentless march toward the "digital oil field of the future." The satellite photo shows a view of Saudi Aramco's Khursaniyah oil field development project facilities near Jubail on Saudi Arabia's Persian Gulf coast. The field will eventually produce 500,000 b/d of oil and 300 MMcfd of natural gas. The satellite image is courtesy of DigitalGlobe. The 3-D computer model, which represents cell geometry inside a geologic grid and fault throw, was generated by Paradigm's SKUA 2008 3-D geology-driven modeling software. The computer image is courtesy of Paradigm.

Oil & Gas Journal's Technology Forum series, produced by the OGJ Group Publisher, supplements the magazine with topical features on cutting-edge technology, services, and equipment, all expertly written from the technology provider's perspective. Inquiries should be directed to Bill Wageneck, Group Publisher, at billw@pennwell.com.

Upstream IT advances enabling 'digital oil field' of future to become reality today

The "digital oil field" of the future is fast becoming a reality today, even if industry experts can't agree on what the term really means.

Whatever the definition, it's spurring a massive amount of spending in the information technology (IT) sector and creating a new way of working in the oil and gas industry. Achieving the digital oil field requires innovation in computer software and hardware and in telecommunications to effectively "smarten up" and "wire" almost every aspect of upstream oil and gas activity into an integrated, real-time operation.

"The digital oil field is taking on an immense investment for the industry, and every major private sector oil company has a digital oil field initiative to achieve total asset awareness and maximize automated performance," notes Marc Tremblay, general manager of Digital Globe's commercial business unit. "The expected cost to achieve 'nirvana' will reach $1 billion over the next 5 years in technology investment in hardware, software, and services alone."

What is the digital oil field?


Irani

The digital oil field is a strategy for improving a specific area of an oil company's business by deploying people, technology, and knowledge effectively, says Barry Irani, president and CEO of The Information Store.

"It is, in essence, a vision of how the company wants to optimize a particular business process, such as managing operations of a mature field, discovering new reserves, developing an offshore deepwater discovery, or coordinating a joint venture project," he explains. "The digital oil field initiative, however, is transforming the way people work." A key ingredient of the digital oil field is quick, easy, and timely access to quality data, Irani notes.

"To achieve a truly effective digital oil field, companies must shift the burden of orchestrating data from people to systems," he contends. "Even today, most geoscientists and engineers spend over 50% of their time simply handling data, keeping them from activities they specialize in to generate business value."


Mehta

The biggest hurdle that Mayank Mehta sees in achieving the digital oil field of the future is effective integration of emerging technologies that help E&P companies gain business insight from field data in real time.

"They need technologies that enable real-time decision support, continuous yield tracking, and enhancing ROI," says Mehta, global industry manager for oil and gas for GE Fanuc Intelligent Platforms.

Another area confronting many E&P companies is the ability to track changes on critical control and software assets, primarily as part of the ever-increasing requirement for regulatory compliance, he adds.

For Tremblay, in order to achieve the true digital oil field threshold, "IT has to take on the complete centralization of information sources and content—and automation—into a central hub of global connectivity and knowledge to manage the technical foundation."

Complete process reengineering and labor transition come along with the technical hurdles, he adds.


Simonson

Concurs Ray Simonson, Software Innovation Inc. CEO: "It isn't enough to focus on technology in achieving the true digital oil field—industry needs to get the people and processes right too."

The end goal of the digital oil field should be to improve reservoir recovery, lower costs, and increase production, he adds.

"Much has been said about personnel shortages, e.g., the graying workforce in oil and gas, which means more must come out of the processes and technology," Simonson says.

"On the technology side, vendors should focus on a services-oriented design and adhere to interoperability standards so as to avoid creating digital silos of information. Data should go in once and be usable throughout the asset's lifecycle and by various applications. Customers should be freed from older enterprise software approaches that required standardization on a single vendor just to make everything work.

"On the processes side, players should not be afraid to benefit from the past experiences of innovative companies that have the budgets to experiment. The first stages of oil field digitization have involved the generation and capture of massive amounts of data. The challenge is now in managing it effectively. We've seen projects that generate 100,000-500,000 engineering documents and another 1 million administrative documents, each undergoing five revisions as it is updated, reviewed, and improved."

Cost concerns


Stack

While the digital oil field concept has enormous appeal in an industry faced with an ever-tightening labor pool, the issue of its cost-effectiveness remains critical.

"First and foremost, there is the obstacle of translating the current business and operational model to a digital form at a reasonable cost, and whereas many ideas and applications are commendable, production considerations are paramount, and all innovation must pass the litmus test of practicality," says Larry Stack, president of Telvent's energy division. "Seeking the benefits of technology will forever be weighed against their costs, and these are challenges managers the world over face."


Perlbach

Having said that, Stack avers, "Still, information management, in real time, clearly allows for business processes to evolve or be created that capitalize on optimization gains from that information. For example, a full information set will allow a more optimized asset utilization scheme.

"Primarily, the immediate benefit of 'digitizing' the oil field is largely based in the optimization of reservoir production. At the hands of an experienced engineer, the benefit of real-time feedback is nearly instantaneous."

Then again, optimizing reservoir production via digitization and automation can in itself be a significant opportunity to cut costs.

Karen Perlbach, marketing communications manager for Data-Linc Inc., posits a more specific operations fix: "There exists a need for real-time remote monitoring and control of pump, pump activity, and production data to decrease downtown and unnecessary travel to remote sites, thus reducing costs and increasing productivity."

Workflow hurdles


Miller

Education, standards, and security are three major hurdles to achieving the true digital oil field, according to Mark Miller, Cisco Systems director of enterprise operations.

"Redesigning workflows is a fairly rigorous paper exercise, and putting it into practice is even more challenging," he says. "Educating the work teams on new technological capabilities is one of the first steps of change management. With the speed of technology development, education plays an even more critical role to accelerate technology adoption that creates value."

Meanwhile, there is no shortage of standards in the industry, as getting to a common communications infrastructure that runs on standard internet protocol (IP) vastly improves the ease of integrating new people, devices, and applications onto the network, Miller points out: "In the digital oil field, the network is the platform that connects all three—people, devices, and applications."

Finally, security, both physical and virtual, is an essential element of digitizing the oil field and remains a hurdle today, Miller contends.

"There remains a perception that security through obscure communication protocols is a desired path," he suggests. "Yet study after study confirms that security through obscurity is a myth. Too many old process control networks have insecure designs that allow intrusion, obstruction, and corruption of essential operating systems."

Management challenges

Oil and gas company senior management faces serious challenges in moving to a digital oil field model, not the least of which is their own sometimes archaic approaches to managing the process of change itself.

"Many oil companies are impeded in implementing their digital oil field strategies by a cumbersome deployment approach," Irani contends. "In other words, progressing through phases of requirements analysis, testing, and deployment is time-consuming, often requiring years to complete, and ultimately falls short

of fulfilling ongoing business needs as the underlying requirements change over time.

"The digital oil field is an evolving process in itself. Often, an organization cannot at the outset define all its needs. We have found that the best approach is one that embraces the digital oil field as an iterative process. This approach is agile, iterative, and emphasizes face-to-face involvement of solution developers, data users, and decision makers. Requirements are identified through the process, and new solutions quickly implemented to meet the current needs of the organization. Doing so also requires intimate knowledge of the E&P business. As such, delivering fit-for-purpose digital oil field solutions entails drawing on the synergy of process iteration and domain expertise."


Machnizh

Jorge Machnizh, Paradigm COO, sees a significant hurdle in the integration of all available data and workflow, at the right time, with appropriate analysis, in order to support a decision and improve results.

"The industry has made significant progress in the advancement of communication systems that enable real-time data flow," he notes. "However, due to the vast amount of data types and the continued increase in data volumes, scalability becomes a challenge."

In addition, IT leadership at oil and gas companies must overcome the myriad technical analytical applications and operating systems to support the business, Machnizh says.

"The digital oil field has different meanings depending on the desired result; a solution needs to be crafted depending on the situation, and I believe that starting from the desired outcome and architecting a decision support system with clear objectives becomes critical," he adds.

However, the biggest hurdle continues to be people and their ability to change, Machnizh contends: "The industry will have to rely more and more on digital systems to accomplish its goals, and over the next few years, productivity gains are going to be achieved by improvements in system automation and multidisciplinary workflow integration, leveraging all data types into the workflow."

One change in managing personnel that will expedite the transition to the digital oil field is to emulate the younger generation by embracing advanced collaborative networking tools, suggests Arshad Matin, Seismic Micro-Technology Inc. president and CEO.


Matin

"Our industry needs to learn from and leverage the incredible growth of social networking websites," he says. "The younger generation probably spends more time on their computers interacting with each other than in person. We need to consider technologies that make collaboration in the oil and gas arena easier. We still have companies where geoscientists are unable to collaborate with the engineers, and each of them does his/her work in a silo.

"Our challenge is to build workflows where the interpreters and engineers can collaborate and reiterate their workflow easily and effectively."

Essentially, the technology to deliver the digital oil field is already at hand—the challenges that remain are in integrating the technologies with workflow processes.

"The bottom line is that we are not too far away from an integrated, digital oil field—a world where reservoir models are kept evergreen as production data arrives, with the models being rapidly updated in real time," notes Dr. Steve Webb, Roxar AS principal advisor for integrated reservoir and production management. "New production data can then be quickly assimilated into the reservoir model through continuous, computer-assisted history matching. The result is that the most updated information is available for making important decisions about the reservoir."


Webb

The technology is now available, he points out, but probably the single biggest obstacle remains the aligning of the technologies with the people using them.

"It is my belief that the most successful oil and gas companies of the future will be those that maintain a balance over the development of both their physical and people assets facilitated through the adoption of advanced technology solutions," Webb says. "This will require a streamlining and simplifying of operations with greater automation; more usable, right-time technology; a streamlined and integrated workflow; and the deploying of new technologies that can lead to a greater simplification of operations and a change in traditional ways of working."

Seismic challenges

A true digital oil field will involve the integrated use of data obtained and analyzed in as near real time as possible, says Geoffrey Dorn, CEO of TerraSpark. These data include production data, a wide variety of measurements in the borehole, and 4-D seismic data.


Dorn

"The one portion of this suite of data that is the farthest from being real time is the acquisition, processing, and analysis of 4-D seismic—both repeated 3-D seismic surveys and repeated 3-D VSP surveys," he contends. "For these surveys to be useful in active reservoir management, the data must be acquired, processed, and interpreted in as short a time as possible."

Acquisition of seismic data has been substantially improved, both in quality and in the speed of acquisition by moving to the use of permanently emplaced receivers over the surface of the reservoir, Dorn notes, adding that processing throughput can be improved by improved algorithmic efficiency and by advances in computational speed made possible through the use of multicore processors and programmable GPUs.

"Substantial improvements are necessary in the efficiency and speed of interpretation and analysis," he says. "Interpretation remains a very human-time-intensive process, where most of the approach to interpretation of the seismic data is based on approaches to interpreting horizons, faults, depositional systems, etc., that have not changed significantly in the last 10–20 years.

"Techniques such as horizon autotracking from seed points, manual interpretation of fault cuts to create a fault surface, and even less advanced approaches to interpreting depositional elements are fundamentally 2-D or 2½-D approaches to interpretation and are simply not efficient enough to produce results in the timeframe needed for real-time reservoir management.

"New approaches based on the interpretation, manipulation, and editing of complete 3-D surfaces through the entire interpretation workflow (such as those being developed by TerraSpark Geosciences) will be necessary to produce results needed from repeated 3-D seismic and 3-D VSP surveys in the time needed to have an impact on the management of the digital oil field."

Hardware, software needs

Odell

Successfully achieving the digital oil field also means that it is necessary for hardware to keep pace with software advances, says Mike Odell, CEO, Geomodeling Technology Corp.

"In order for software to be used to its full potential, it is absolutely necessary for companies to ensure their hardware can properly support the applications," he contends. "A key component is the inclusion of high-performance, high-resolution graphics cards for advanced visualization usage. These cards often come standard with home-based gaming systems, and it continues to amaze me that large energy companies don't make it a standard practice to order them when they buy new high-performance PCs for their users."

Odell notes that, with respect to processors, "we are seeing a major movement toward Linux 64-bit platforms and even large Linux clusters for advanced simulation and visualization applications.

" As disk space continues to become less expensive, these systems are being configured with the larger amounts of memory needed for advanced applications," he adds.

It all adds up to an overarching need to make the process of finding oil and gas automated, Odell continues: "It is important to continue the process of developing more 'expert' systems—systems designed to ask the right questions in order to provide the user with the most relevant information more quickly (e.g., What area are you in? What workflows do you need?).

"Ideally, the software should recognize which workflow the user is attempting to follow, and, as will soon be the case with Geomodeling's product, present the interpreter with the top three attributes most appropriate for use in his or her specific workflow and geographic/geologic problem.

"Furthermore, the software should be smart enough to understand when certain attributes or tools are not appropriate for the current interpretation (e.g., X attribute cannot be used on a carbonate field) and inform the user. In this way, the application can help those geophysicists who may not necessarily know what all attributes (or other tools) are used for."

The integration of data between vendors is the key to improving the whole process of data loading and data management for the interpreter, Odell says.

"The interpreter should not have to spend 30% to 40% of his time moving data and reformatting it for each application," he explains. "Fortunately, the market is responding to this problem by creating tight integration between the tools that an interpreter uses daily. Geomodeling is currently working to provide improved data loading for interpreters by more tightly integrating our advanced attribute analysis tools with popular seismic interpretation systems."

Grinshtein

Outsourcing some IT functions is one solution to the challenge of how to invest in hardware and software, according to Xvand Pres. and Managing Partner Victor Grinshtein.

"Increasing demand for oil has produced an ultracompetitive marketplace," he says. "This makes it imperative for organizations in the oil and gas sector to have the ability to increase their IT infrastructure capabilities on-demand, instead of overinvesting to meet it.

"Fortunately, IT has evolved to the point to which investing in and managing complex onsite infrastructures is no longer necessary. Innovations such as utility computing or on-demand computing allow for oil and gas companies to transfer the onus of IT responsibility to the utility computing provider. Termed for its parallels to the delivery model of standard utilities such as electricity, utility computing is the packaging of computing resources, such as computation and storage. This system has the advantage of a low or no capital cost to make use of hardware. Client companies with very large computations or a sudden peak in demand can also avoid the delays that would result from physically acquiring and integrating a large number of computers."

Data concerns

Gregory

Another concern for observers of the industry's evolution to IT-dominated workflows is managing the volume and quality of the massive amounts of data involved.

"The upstream oil and gas sector has some of the largest unmanaged repositories of vertically specialized data of any industry," notes Paul Gregory, president and managing partner of Intervera. "Improving access to and confidence in these data is a key concern for CIOs. According to a survey of CIOs

conducted by Deloitte Consulting—regardless of business strategy, i.e., whether growth came from acquisition, exploration, or development—CIOs in the upstream E&P sector are recognizing that data accuracy and quality is one of the most critical pain points hampering movement to the digital oil field of the future.


Farid

"Other significant impediments included the ability to accommodate the need for M&A integration, work process complexity, authentication and audit tracking, and regulatory constraints. In addition, aging demographics of oil field workers and professionals indicates that much of the domain knowledge will be lost within the next 10 years as senior G&G professionals retire."

The major IT hurdles E&P companies face en route to the digital oil field are the integration and validation of data, according to Merrick Systems Inc. Pres. and CEO Kemal Farid.

"Whereas in previous years companies were challenged to gather enough data to track and understand their operations, today there is a great deal of data available," he notes. "In fact, there is so much data that the challenge is how to handle all this massive data and make use of it. Companies have at their disposal a plethora of data sources, variety of different computing applications and systems, and numerous engineering applications that can all contribute valuable information to help accomplish better surveillance and visibility into the company's operations and assets and allow for optimization of operations. Searching the various separate data sources, locating and gathering the relevant data, compiling it to a workable source, then validating it and utilizing it for optimization is very time-consuming and labor-intensive.


Wee

"With little time and staff available, there is a critical need for applications that will help with locating, gathering, and validating data and assumptions and alert the user of exceptions so that users will use their scarce time effectively, dealing with real issues and not with routine data management."

Reuben Wee, IDS chief technology officer, cites five main hurdles to overcome in data management in order to achieve the true digital oil field of the future:

- Data availability. "Satellite communications have come a long way; however, their reliability and availability will need to be improved to ensure that the 'digital oil field' can maintain its heterogeneous levels of use."
- Accessibility. "Ease of use—in most cases, very few people actually send out data entry personnel to the rigs; the system has to be user-friendly to the operators."
- Information aggregation. This is "to ensure that the global situation awareness is provided, for the operator to facilitate proper flow of information so as to allow the service companies to work closer and thus to reduce human data entry where possible."
- Information availability. "Users may be geographically dispersed and will require remote delivery methods (web technology) to get at the data they will need to make decisions or to report on."
- Flexibility. "The oil field operates with many variables that affect the operational progress for each project. The IT system has to deal with changes from the field without losing its place on the map. It's a well known grunt that a 7-day look-ahead plan is only good for the next 24 hr at best."

Grinshtein cites a handful of obstacles to achieving the true digital oil field of the future, chief among them handling the nearly overwhelming volume of datasets resulting from the drive to digitize itself:

- "Data storage. The oil and gas sector is one of most capital-intensive on the planet, and the stakes are high to produce quicker and more accurate data sets. Each new technological advancement prompts the need for organizations to overinvest in computer hardware to meet the growing demand for data storage. This hardware must also be backed, verified, and managed, exponentially increasing the capital investment."
- "Data management. All the data in the world is useless if not properly managed. Organizations must create processes for managing their data, or they run the risk of having it misplaced or lost. In a world of real-time accessibility, inaccessibility of any magnitude can cause great damage. The damage is compounded if the data is corrupt or falls into the wrong hands. This leads to a third issue: federal legislation."
- "Federal legislation: Many organizations are mandated by law to report to federal organizations, such as the Minerals Management Service. If data is compromised or lost, this can result in serious complications. Furthermore, publicly traded companies or those that conduct business with them have the added responsibility of complying with legislation such as Sarbanes-Oxley, further increasing the risk."

In the end, adds Grinshtein, IT infrastructure is at the core of the digital paradigm shift in the oil and gas industry.

"For example, the increased demand for oil has organizations scrambling to redevelop old oil fields," he notes. "This can comprise years' worth of data. Companies are now housing thousands of different datasets, exponentially more than any other time in history. Each discipline within the organization—whether it's a geophysicist or a drilling engineer—must have easy access to the data to efficiently process, manage, and optimize it. The systemization of the data management process is crucial and requires a sound IT infrastructure. In addition, improved communication between remote drilling locations and the office allow companies to more efficiently fix problems as they arise."]

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Satellite technology advances key to progress toward 'digital oil field'

All of the advances in data management, processing, and utilization solutions would be of limited impact in the march to the digital oil field of the future if they weren't accompanied by equally powerful progress in telecommunications technology, chief among them satellite communications technologies and the tools that they support.

Yet hurdles remain in this area as well, notes Bob Baker, COO Vizada Americas.


Baker

"The biggest hurdle to overcome has to do with bandwidth," he contends. "In the past few years, bandwidth significant enough to support the extension of the home office network to the field office could be provided only by terrestrial connections or VSAT technology. This meant that smaller or remote fields or sites, as well as vehicles and vessels, were excluded from 'the digital office.'

"With the advent of Inmarsat BGAN and Fleet Broadband, mobile terminals are able to bring full network connectivity to almost any location."

LEO vs. GEO


Thoma

Don Thoma, executive vice–president, marketing, Iridium Satellite, however, points to the advantages of communications solutions via low-earth orbit (LEO) satellites vs. geostationary earth orbit (GEO) satellites such as Inmarsat's.

"While a GEO satellite offers obvious advantages for fixed antenna sites, there are tradeoffs in terms of latency, coverage, and size of user equipment for mobile communications. Since Iridium is a LEO satellite system, voice delays are typically unnoticeable, whereas with GEO systems, latency can be quite high, causing speakers to have to wait for each other to finish. Importantly, the footprint of the GEO satellites does not cover the high-latitude arctic…regions (a major area of focus in today's oil and gas industry) because the curvature of the Earth disrupts message transmission when attempted at the edge of a GEO satellite's footprint. Further, due to the fact that GEO systems are so much further away from the Earth, they generally require larger antennas in order to receive the satellite signals."

Iridium uses a constellation of 66 operational satellites and several in-orbit spares, notes Thoma. A single satellite completely circles the Earth once every 100 minutes, traveling at a rate of 16,832 mph and crossing from horizon to horizon in about 10 minutes. The orbital paths of the satellites intersect over the North and South poles, and each Iridium satellite is cross-linked to four other satellites—two satellites in the same orbital plane and two in an adjacent plane.

"These links create a dynamic network in space, so that calls and data are routed among Iridium satellites without touching the ground, creating a highly secure and reliable connection," Thoma says. "When you place a call, whether voice or data, the call is uploaded to a satellite passing overhead, and then, as a satellite moves out of reach, the call is seamlessly handed over to the next satellite coming into view. The result is virtual real-time connections with extremely low latency. The network architecture provides seamless, gap-free coverage over the entire surface of the globe, including the polar regions."

While mobile telephony remains an important part of Iridium's service offerings, the M2M (machine-to-machine) mobile data sector is Iridium's fastest growing market, driven by emerging requirements for remote asset tracking and monitoring, says Thoma.

"Major oil and gas producers, as well as their contractors and suppliers, are increasingly turning to Iridium to provide low-cost standardized solutions for applications such as equipment tracking, pipeline telemetry, and worker safety."

Oil producers and contractors are now using Iridium-enabled tracking devices to provide a critical safety lifeline for lone workers in Canada's oil fields.

"An Iridium VAR [value-added reseller] developed the system to meet Canadian Occupational Health and Safety Laws requiring lone workers to be monitored when working in potentially hazardous locations," Thoma explains. "The worker wears a small, brightly colored fob on a lanyard. The fob communicates wirelessly with a vehicle-mounted base station, which contains a GPS receiver and Iridium data modem. If the worker remains motionless for more than 3 minutes, the fob sends a signal asking the worker to press a reset button. If the reset button is not activated within a preset time limit, the Iridium modem sends an alert to the company of a possible 'man-down' situation."

In addition, a number of Iridium VARs have developed black-box devices with embedded GPS and Iridium SBD modems for vehicle and heavy equipment tracking, typically using IP-based infrastructure for map-based monitoring. One of the VAR systems is being used by the Royal Canadian Mounted Police to facilitate recovery of stolen vehicles and equipment in the oil and gas fields of Alberta and British Columbia. Another Iridium VAR recently validated its all-satellite mobile resource management

systems with a major provider of geophysical services on the North Slope of Alaska.

"This system transmits engine and asset trouble codes, fuel consumption, hard-braking, power take-offs, engine RPMs, oil pressure, engine and coolant temperatures, and other parameters through the Iridium satellite modem, and also uses geofencing technology to provide alarms whenever a vehicle tries to enter a prohibited area, such as a pipeline right-of-way or well pad."

Thoma also notes that large corporations in the oil and gas sector are deploying Iridium satellite phones at global crisis centers around the world under their enterprise-wide emergency preparedness plans.

"These contingency plans typically include redundant layers of public and mobile communication systems, voice-over-IP systems, and satellite communications to ensure key staff can be located and contacted across the global supply chain," he adds.

Thoma also cites the growing demand for his company's products from helicopter fleets serving offshore and onshore oil and gas facilities: "A number of VARs have developed Iridium-enabled devices for voice communications and automatic flight following (AFF). In many cases, these devices can also be used for transmitting standard messages and flight plans as well as AFF position data."

Geospatial/GIS opportunities

There are also opportunities for utilizing satellite-supported geospatial and related GIS (geographic information system) technologies effectively if an oil and gas company wants to create a real-world perspective for upstream assets, prospects, and operations as it seeks to achieve a digital oil field status.


Tremblay

"Much of the IT initiative is currently focusing on how to automate, monitor, and connect data models into a centralized knowledge hub," points out Marc Tremblay, general manager of Digital Globe's commercial business unit. "One key component not readily addressed by IT is the role of geospatial imagery. Yet it is the most readily available and tangible data asset that can reduce the operational start-up and monitoring costs for keeping old reserves operational while searching for new reserves, especially as those new reserves are springing up from some of the world's most remote and physically restrictive areas."

He contends that an E&P company's IT efforts should include geospatial imagery layers as the base context for any digital oil field initiative.

"If you look at the subsea operations in the North Sea, with wells that sprawl over hundreds of square miles of seabed, linked by pipelines and fiber optic cables to a single platform buffeted by severe weather, the most accessible way to monitor the condition of corresponding assets from the external view is from a high-resolution, sub-meter satellite orbiting the earth," Tremblay says. "With the clarity to pinpoint critical subsea operational assets, companies have a key tool within their grasp to automate the external monitoring and control for any eventuality for risk management, leak detections, or preventative operational maintenance. The ground-truth of satellite imagery increases operational outcomes by providing real-time accurate information to facilitate decision-making."

Many IT organizations are still novices at the purchase and integration of geospatial imagery, Tremblay notes, because it has tended to be a project-based purchase and has not been seen as an interactive landscape for operational planning.


Wade

"Over recent years, the satellite imagery market has shifted to wider accessibility and availability," he says. "Some of this is driven by the Virtual Globe (Google Earth and Microsoft Virtual Earth) entry into the marketplace, but also by new satellites, such as Worldview-1, with faster, greater collection capabilities dramatically changing the amount of current high-resolution imagery immediately available from digital content stores at far lower economic terms.

"With reduced economic terms and wider accessibility, satellite imagery has shifted from a higher-cost, annual or 2-year pictorial review into the potential for real-time perspectives within digital oil field initiatives."

Tremblay contends that since much of the surface cultural, land, and production data is extracted from optical imagery, "it benefits oil and gas IT departments to leverage a consistent worldwide imagery source for these data, such as DigitalGlobe's world imagery solutions, and which are now easily integrated into current [digital oil field] initiatives through web services and online imagery platforms.

"Ultimately, if imagery and other geospatial data can be used to model the physical environment more thoroughly, then more of the early-stage planning and design can be done within the confines of the office environment—a key goal of the digital oil field. This saves time and money and limits the need to send field crews out to remote and or dangerous areas."

One of the greatest challenges of managing the digital oil field of the future is dealing with the complexities of the field infrastructure and information overload of real-time data feeds in an appropriate context of whole-field management, asserts Geoff Wade, ESRI petroleum industry manager.

"Many companies are discovering that GIS technology can help manage, model, and reduce the overwhelming data volumes and provide an intuitive context for critical workflows that have a significant positive effect on whole-field management efficiency," he says. "Some of the greatest benefits are currently being realized in injection modeling, electrical supply optimization, gathering system design improvement, field logistics and maintenance scheduling, and real-time information management dashboards, such that operations management can view the whole system as a working machine in a true spatial context."]

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