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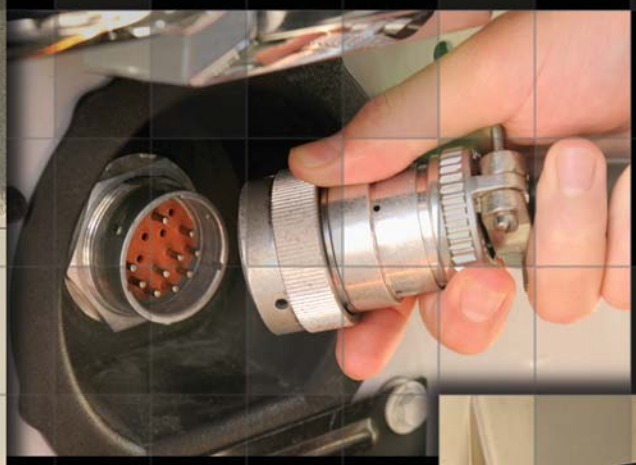

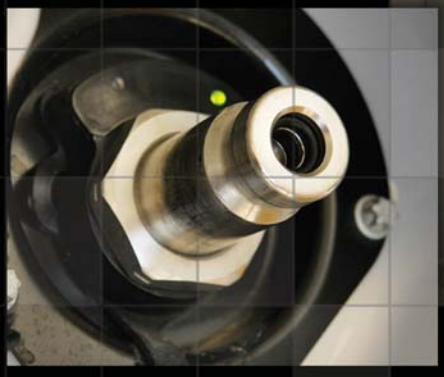

Oil Companies and Energy Alternatives

Ghana's latest discovery hints at growing potential
Tests prove out self-powered, wireless, pump torquemeter
Study compares C_2 recovery for turboexpander, GSP
China seeks oil security through fleet expansion

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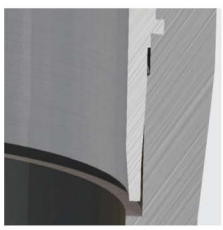

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OIL&GAS JOURNAL®

Dec. 8, 2008
Volume 106.46

OIL COMPANIES AND ENERGY ALTERNATIVES

REGULAR FEATURES

COVER

Oil companies are developing alternatives to fossil fuels to help meet future energy demand. Royal Dutch Shell's mosaic of options includes hydrogen. Earlier this year, Shell opened a combined hydrogen and gasoline refueling station in western Los Angeles. The cover shows a hydrogen pump and its attachments: a plug to ground the car in case of static electricity (top center) and an opening for the hydrogen nozzle (bottom center). In the special report that starts on p. 26, Shell Future Fuels and CO_2 Vice-Pres. Duncan Macleod suggests commercialization of hydrogen fuel cell vehicles could start in 2020. Cover photos by John C. Luker II for Photographic Services, Shell International Ltd.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

 Oil & Gas Journal (ISSN 0030-1388) is published 48 times per year by PennWell Corporation, 1421 S. Sheridan Rd., Tulsa, Okla., Box 1260, 74101. Periodicals postage paid at Tulsa, Okla., and at additional mailing offices. Oil & Gas Journal and OGJ are registered trademarks of PennWell Corporation. **POSTMASTER:** send address changes, letters about subscription service, or subscription orders to P.O. Box 3497, Northbrook, IL 60065, or telephone (800) 633-1656. Change of address notices should be sent promptly with old as well as new address and with ZIP code or postal zone. Allow 30 days for change of address. Oil & Gas Journal is available for electronic retrieval on Oil & Gas Journal Online (www.ogjonline.com) or the NEXIS® Service, Box 933, Dayton, Ohio 45401, (937) 865-6800. **SUBSCRIPTION RATES** in the US: 1 yr. $89; Latin America and Canada: 1 yr. $94; Russia and republics of the former USSR, 1 yr. 1,500 rubles; all other countries: 1 yr. $129, 1 yr. premium digital $59 worldwide. These rates apply only to individuals holding responsible positions in the petroleum industry. Single copies are $10 each except for 100th Anniversary issue which is $20. Publisher reserves the right to refuse non-qualified subscriptions. Oil & Gas Journal is available on the Internet at http://www.ogjonline.com. (Vol. 106, No. 46) Printed in the US. GST No. 126813153. Publications Mail Agreement Number 602914. Return Undeliverable Canadian Addresses to: P.O. Box 1632, Windsor, ON N9A 7C9.

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OGJ News
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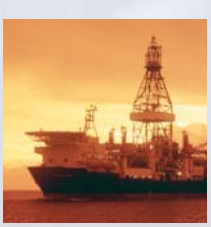

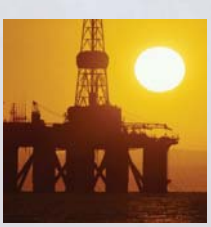

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OGJ Newsletter

Dec. 8, 2008

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General Interest — Quick Takes

MMS issues assessment of hurricane damage

In its final assessment of damage to Gulf Coast oil and gas operations by Hurricanes Gustav and Ike, the US Minerals Management Service said a total of 60 offshore platforms was destroyed.

"Some platforms that had been previously reported as having extensive damage were reassessed and determined to be destroyed," MMS said. "The destroyed platforms produced 13,657 b/d of oil and 96.5 MMcfd of natural gas, or 1.05% of the oil and 1.3% of the gas produced daily in the Gulf of Mexico."

MMS estimated 127 of the more than 3,800 oil and gas production platforms in the gulf were exposed to hurricane conditions, with winds greater than 74 mph from Hurricanes Gustav and Ike. Gustav made landfall Sept. 2 in Louisiana, while Ike came ashore Sept. 13 in Galveston, Tex.

In its final assessment, MMS concluded 93 platforms suffered moderate damage from the storms and would take as long as 3 months for repairs. Another 31 platforms had extensive damage that could take as long as 6 months to repair.

Motions filed to repeal CAC's Egyptian gas verdict

The Cairo Court for Urgent Cases plans to hold a hearing Dec. 15 to consider a motion by the State Judicial Authority to repeal a decision by the Cairo Administrative Court (CAC) to halt Egypt's exports of natural gas to Israel.

In addition to the court, some 30 individual lawyers have filed six separate motions—to be reviewed on Dec. 15, 16, 18, and 20—all aimed at repealing CAC's Nov. 18 verdict.

The underlying appeal is that CAC's verdict against the government cannot be sustained, as there is no contractual relationship between the state of Egypt and the state of Israel concerning exportation of natural gas.

Instead, the contract is between the Egyptian General Authority for Petroleum and Eastern Mediterranean Gas, a private energy consortium co-owned by Egyptian businessman Hussein Salem and the Israeli Merhav Group.

The 30 lawyers thus claim that the export of gas does not fall under CAC's jurisdiction because the agreement is a purely commercial affair.

CAC had ruled that the export of Egyptian gas to Israel cannot be carried out without parliamentary approval and ordered its halt, saying, "National resources belong to current and future generations, and the executive must first get parliament's approval."

CAC's ruling came after opposition groups sued to suspend exports, arguing that the 15-year fixed-price agreement—rumored to be as low as $1.50/btu—lacks any mechanism for Egypt to adjust prices to reflect current markets.

Dissatisfaction in Egypt, fueled also by Israeli actions in Palestine, is especially high as gas for December delivery last week closed at $6.53/Mcf on the New York Mercantile Exchange.

The agreement to supply Egyptian gas to Israel was signed in June 2005 by Egyptian oil minister Sameh Fahmi and Israeli infrastructure minister Binyamin Ben Eliezer (OGJ, Oct. 20, 2008, p. 34).

The gas being supplied to Israel goes to Israel Electric Corp., which has estimated that 20% of the electricity produced in Israel over the next decade will be from Egyptian gas.

EU to seek 'observer status' on Arctic Council

A communique released Nov. 20 by the European Commission, "The European Union and the Arctic Region," takes a position on a part of the world the EU calls "in rapid transformation."

The EU will apply for permanent observer status on the Arctic Council, a high-level intergovernmental forum promoting cooperation among its members—Canada, Denmark (including Greenland and the Faroes Islands), Finland, Iceland, Norway, the Russian Federation, Sweden, and the US—and involving indigenous communities.

The commission calls for a "coordinated action" of all stakeholders in order "to protect the Arctic in unison with its population, to promote sustainable use of resources, and contribute to enhanced Arctic multilateral governance."

It recognizes that exploitation of the Arctic hydrocarbon resources and the opening of new navigation routes can be beneficial, providing it is done "in full respect of the highest environmental standards."

Describing the Arctic as "a unique region of strategic importance, located in [Europe's] immediate vicinity," the commission sets out policy objectives and recommends a series of steps in the fields of research, environment, indigenous peoples, fisheries, hydrocarbons, shipping, legal and political framework, and cooperation with regional organizations. ✦

Exploration & Development — Quick Takes

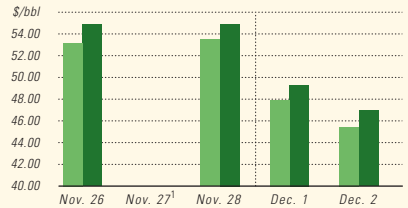
Shell Australia finds gas with Libra-1 wildcat

The Shell Australia-operated Libra-1 wildcat, which was drilled in Browse basin in Permit AC/P41 off Western Australia, has found natural gas in a series of thick sand packages over a 180-m gross vertical section, according to Melbourne-based partner Nexus Energy Ltd.

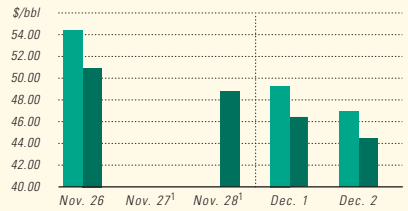
Further wireline logging and pressure data is required to con-

Industry Scoreboard

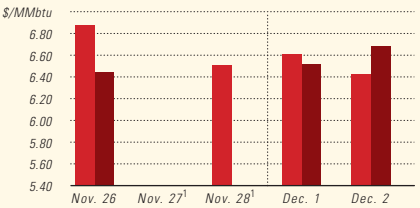
IPE BRENT / NYMEX LIGHT SWEET CRUDE



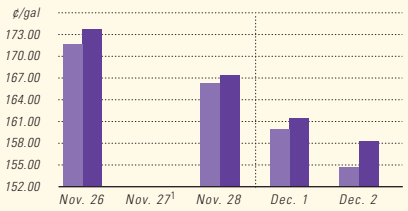
WTI CUSHING / BRENT SPOT



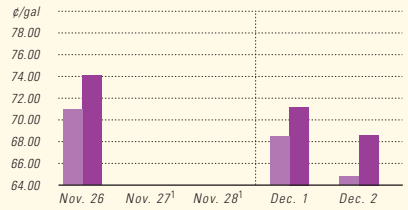
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



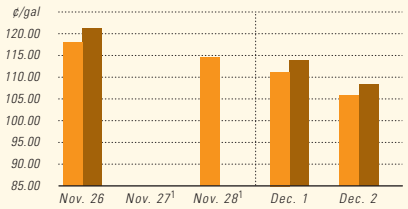
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

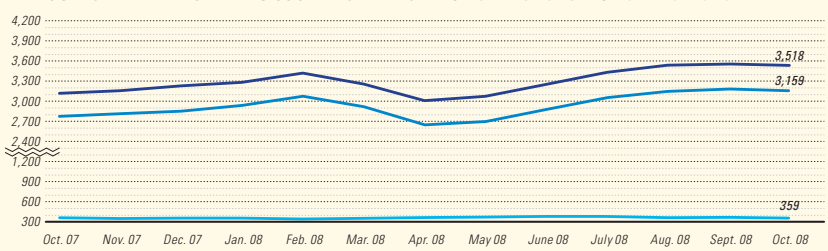
US INDUSTRY SCOREBOARD — 12/8

Latest week 11/21	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	8,976	9,231	–2.8	9,007	9,291	–3.1
Distillate	4,024	4,114	–2.2	3,956	4,200	–5.8
Jet fuel	1,326	1,611	–17.7	1,526	1,625	–6.1
Residual	457	728	–37.2	586	727	–19.4
Other products	4,386	4,834	–9.3	4,623	4,818	–4.1
TOTAL DEMAND	19,169	20,518	–6.6	19,511	20,681	–5.7
Supply, 1,000 b/d						
Crude production	4,903	5,025	–2.4	4,947	5,066	–2.3
NGL production[2]	2,394	2,606	–8.1	2,267	2,400	–5.5
Crude imports	10,076	9,913	1.6	9,817	10,043	–2.3
Product imports	2,879	3,188	–9.7	3,144	3,483	–9.7
Other supply[3]	1,264	918	37.7	1,364	1,026	32.9
TOTAL SUPPLY	21,516	21,650	–0.6	21,539	22,018	–2.2
Refining, 1,000 b/d						
Crude runs to stills	14,656	15,097	–2.9	14,656	15,152	–3.3
Input to crude stills	14,908	15,439	–3.4	14,908	15,441	–3.5
% utilization	84.9	88.5	—	84.9	88.5	—

Latest week 11/21	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	320,828	313,548	7,280	313,153	7,675	2.5
Motor gasoline	200,476	198,634	1,842	196,628	3,848	2.0
Distillate	126,694	126,880	–186	130,916	–4,222	–3.2
Jet fuel–kerosine	38,005	38,127	–122	38,899	–894	–2.3
Residual	38,842	39,085	–243	38,752	90	0.2
Stock cover (days)[4]			Change, %		Change, %	
Crude	21.9	21.4	2.3	20.8	5.3	
Motor gasoline	22.3	22.0	1.4	21.2	5.2	
Distillate	31.5	31.6	–0.3	29.6	6.4	
Propane	48.5	49.5	–2.0	48.3	0.4	
Futures prices[5] **11/28**			Change		Change	%
Light sweet crude ($/bbl)	53.54	52.50	1.04	97.04	–43.50	–44.8
Natural gas, $/MMbtu	6.67	6.52	0.15	7.63	–0.96	–12.6

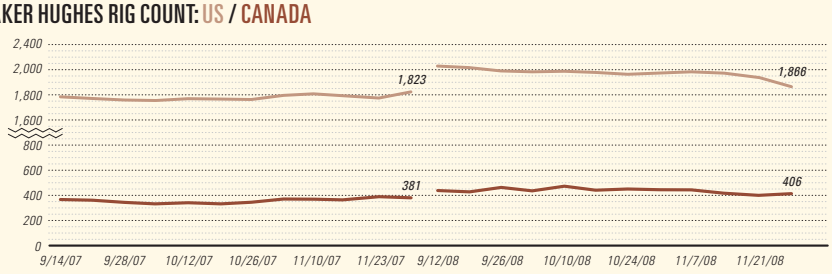
[1]Based on revised figures. [2]Includes adjustments for fuel ethanol and motor gasoline blending components. [3]Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. [4]Stocks divided by average daily product supplied for the prior 4 weeks. [5]Weekly average of daily closing futures prices.
Sources: Energy Information Administration, Wall Street Journal

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



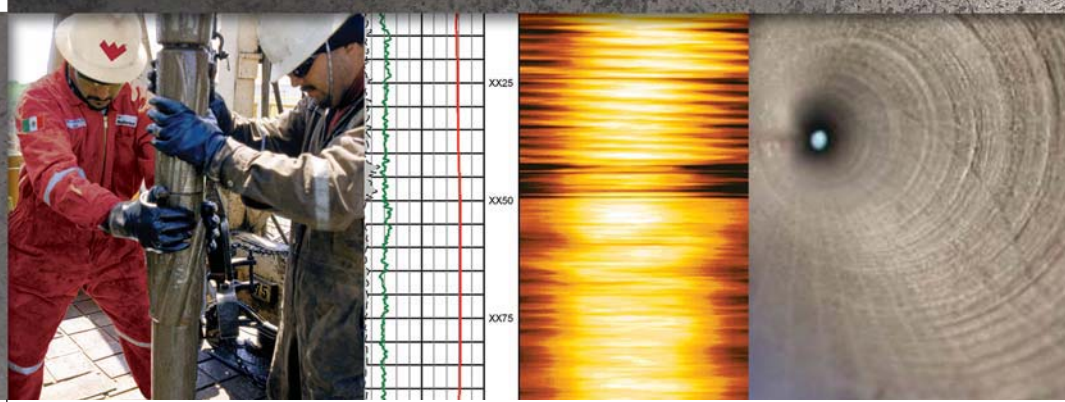
Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

Build better boreholes.



Weatherford's Revolution Rotary-Steerable Service helped BP Indonesia achieve better than anticipated production, incident-free, from a multi-well, shallow-gas, extended-reach project while saving more than $1.25 million.

Better boreholes mean better wells. Weatherford's **Revolution® Rotary-Steerable** Service integrates point-the-bit rotary-steerable technology with the industry's most robust MWD and LWD tools, global real-time operations and drilling optimization support. So, you can steer precisely and efficiently to target and leave a borehole that is smoother, cleaner and easier to case and complete. That means you can get production on line faster, with fewer problems. And, the Revolution system's compactness and design simplicity reduce cost and ease logistics – all to help you build **better recovery, better profit and better value** for your asset.

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firm reservoir quality, column height, and hydrocarbon composition, Nexus said.

Libra-1 was spudded in early November by Diamond Offshore Drilling Inc.'s Ocean Epoch semisubmersible rig in early November and has reached a depth of 3,918 m.

The well is evaluating the exploration potential surrounding Crux field in the adjoining permit.

Shell holds 65%. Partners are Mitsui with 20% and Nexus with 15%.

New Brunswick gets flowing oil discovery

Corridor Resources Inc., Halifax, NS, plans to appraise an oil discovery 3 km southeast of its McCully gas field in southern New Brunswick.

The South Branch G-36 well flowed clean, 45° gravity oil at the rate of 59 b/d without water through production tubing after 10 days' clean-up of frac fluid.

Producing interval is the Hiram Brook member of the Mississippian Albert formation at 1,574-1,612 m. The frac job placed 30 tonnes of proppant before being prematurely ended due to a frozen water line, which Corridor said may have reduced the frac's effectiveness. A pump will be installed for long-term test.

Corridor also ran a frac in Hiram Brook at 1,757-1,840.5 m, resulting in a show of oil and no measurable gas. This interval is considered tight, but another 31 m of potential oil pay previously reported as gas pay in the Upper Hiram Brook have not yet been completed.

TD is 2,642 m, nearly 500 m into the Fredrick Brook shale.

The well is on the southern flank of the Elgin subbasin, where Corridor recently completed a $2.5 million 3D seismic program around the well.

After interpreting the new seismic, the company will drill an offset in early 2009 to G-36, named Caledonia field in recognition of the southern bounding basement rocks of the Caledonia highlands.

Meanwhile, Corridor expects to achieve 2008 yearend production of 35-40 MMscfd of gas from McCully field depending on results of clean-up at the J-47 well and the outcome of a multistage frac at the I-47 horizontal well.

In the Elgin area 20 km east of McCully field, Corridor has drilled Green Road G-41 to 1,118 m and run intermediate casing before deepening to core and run two fracs in the Frederick Brook shale. It is drilling Mapleton N-11 to core a full section of the shale.

Total makes oil find off Congo (Brazzaville)

Total SA tested 3,000 b/d of 18° gravity oil from its Moho Marine Nord-3 appraisal well, which was drilled 80 km off Congo (Brazzaville).

Total said the oil well produced from a 60 m column of good-quality Upper Miocene sands. The well reached 2,300 m TD in 1,030 m of water.

The discovery confirms the Tertiary Miocene resource cluster in the northern part of the Moho-Bilondo license, Total said.

Total made the Moho Nord Marine-1 and 2 finds in 2007. The latest well is 1.7 km northwest of Moho Nord Marine-2 and 2.7 km north of Moho Nord Marine-1.

Total started oil production from Phase 1 on the southern part of Moho-Bilondo in April using 14 subsea wells tied back to a floating production unit.

Output, which will gradually increase to a plateau of 90,000 b/d, is exported to the Djeno terminal.

Total E&P Congo holds a 53.5% interest in the license, with Chevron Overseas Congo Ltd. holding 31.5% and Societe Nationale des Petroles du Congo with 15%.

CNPC signs framework agreement with Cuba

China National Petroleum Corp., eyeing competition from a variety of other nations, has signed a framework agreement with Cuba's state-owned Cubapetroleo SA (Cupet) on expanded cooperation in oil and gas development.

The agreement, signed by CNPC Vice-Pres. Wang Dongjin and Cupet Pres. Fidel Rivero Prieto, involves the provision of engineering and technical services along with related equipment for oil and gas field development.

The agreement with CNPC is the latest in Cuba's efforts to create interest in the development of its offshore oil reserves, which the Cuban government recently estimated at some 20 billion bbl of oil in its portion of the Gulf of Mexico.

Cuba's estimate is considerably higher than the recent US Geological Survey's estimate of up to 9 billion bbl of oil reserves, but Cupet officials claim their data is more reliable.

"We have more data. I'm almost certain that if [the USGS] asks for all the data we have, [its estimate] is going to grow considerably," Cupet Exploration Manager Rafael Tenreyro Perez said in October.

Tenreyro said Cupet's estimate was based largely on a comparison with oil production from similar geological structures in the US and Mexican areas of the Gulf of Mexico.

Cuba's offshore geology is similar to that of Mexico's giant Cantarell oil field in the Bay of Campeche, Tenreyo said.

Industry observers have cast doubt on the Cubans' claims, saying they would like to see the findings verified by independent experts. Still, a number of oil companies have expressed interest in exploring Cuban waters.

Last month, Russia's ambassador to Cuba, Mijail Kamynin, speaking ahead of a visit by Russian President Dmitri Medvedev on Nov. 27, said that Russian oil companies could soon begin exploring for oil off Cuba.

Kamynin, who said Russian oil companies have "concrete projects" for drilling off Cuba, added that Russian firms also would like to help build storage tanks for crude oil, modernize pipelines, and help with Venezuelan efforts to refurbish the Soviet-built Cienfuegos refinery.

In October, Brazil's Petroleo Brasileiro SA, building on agreements signed with Cuba earlier this year, announced plans to explore Block 37 in the Florida Straits, in 500-1,600 m of water between Havana and Matanzas and 90-95 miles south of Key West, Fla. (OGJ Online, Oct. 31, 2008). ✦

Shell sets record with Perdido completion

Shell Oil Co. has set a world water depth record in drilling and completing a subsea well 9,356 ft below the water's surface.

The SA001 well was drilled to 16,300 ft TD in Silvertip field at the Perdido regional development project, 200 miles from Houston. Silvertip field is on Alaminos Canyon Block 815 in OCS lease G19409 in the Gulf of Mexico (see map, OGJ, Sept. 8, 2008, p. 35).

The Noble Clyde Boudreaux double-derrick, dual-activity semisubmersible drilled and completed the record well. The semisub used 16 mooring lines on this project.

As an oil well, the Silvertip record is 35% deeper than the previous oil well record of 6,950 ft, also set by Shell in Fourier field in the gulf.

At Perdido, Shell intends to drill an even deeper well in Tobago field at 9,627 ft on Alaminos Canyon Block 859. Shell operates Perdido on behalf of partners Chevron Corp. and BP PLC.

Shell and its partners will drill 35 wells at Perdido—22 direct vertical access and 13 remote—in the Great White, Tobago, and Silvertip fields in Alaminos Canyon.

Moored in 8,000 ft of water, the drilling and production facility will be the deepest in the world. Nine polyester mooring lines averaging more than 2 miles in length now hold the spar in place. The floating structure will weigh 50,000 tons and will be nearly as tall as the Eiffel Tower when fully operational.

First production from Perdido is expected in early 2010, with the facility capable of handling 130,000 boe/d.

Oil flow starts from North Duri Area 12 field

PT Chevron Pacific Indonesia reported start of oil production Nov. 14 from Area 12 of Indonesia's North Duri field, where Chevron produces nearly half the nation's oil.

Oil production from Area 12 is expected to rise to 34,000 b/d by 2012, Chevron said. Initial production from Area 12 will increase with the application of steamflood technology next year, the company said.

Area 12 represents the latest expansion of Duri field, which is the largest producing field Chevron operates in Indonesia and one of the world's largest steamflood projects. The field, which was discovered in 1941 on the island of Sumatra, currently produces 200,000 b/d of oil.

Steamflooding, Chevron reported, has more than tripled oil production from Duri field and has resulted in recovery of more than 2 billion bbl of oil.

North West Shelf JV approves oil redevelopment

The Woodside Energy Ltd.-operated North West Shelf joint venture has approved a $1.8 billion (Aus.) redevelopment of Cossack, Wanaea, Lambert, and Hermes oil fields to support production beyond 2020.

The work centers on the purchase and conversion of the SBM-owned Okha floating storage and offloading facility to a floating production, storage, and offloading vessel to replace the on-site Cossack Pioneer FPSO in 2010. The conversion entails addition of topside production facilities to Okha.

The JV also will refurbish the existing riser turret mooring system and selected subsea facilities.

The aim is to produce additional oil from the region by extending the life of the four existing fields—about 135 km northwest of Karratha off Western Australia in 75-135 m of water—and adding production from nearby yet-to-be-drilled exploration prospects.

The timetable calls for the facilities to be completed and fully operational by early 2011.

Cossack and Wanaea came on stream in 1995, while Lambert and Hermes were later additions. Total production is just under 400 million bbl.

The JV—Woodside 33.33%, BHP Billiton 16.67%, BP Developments Australia 16.67%, Chevron Australia 16.67%, and Japan Australia LNG (MIMI) 16.67%—anticipates that the refurbishment will generate more than 60 million bbl of oil.

Horizon confirms Maari budget increase

Horizon Oil Ltd., Sydney, a minority interest holder in the Maari oil field development off New Zealand's Taranaki basin, has confirmed another 18% capital expenditure increase for the project, which now stands at $600 million. This latest cost blowout is due primarily to a 3-month delay in the start of development drilling.

At the final investment decision for Maari in late 2005, expected outlays were pegged at $365 million. In April, that figure rose to $508 million. The latest estimate is further, although anticipated, bad news for the development consortium, which is led by OMV of Austria.

Horizon also lowered its expectation of revenue from the project in the initial years following the fall in world oil prices. The company said if the $50-55/bbl prices continue, project returns will likely be about $540 million in the first year and $1.31 billion over 4 years.

Oil production is now expected to begin in February 2009 and to rise to 35,000 b/d by August 2009.

The field has estimated reserves of 68 million boe. The nearby, yet-to-be-drilled Manaia structure has potential for a further 25 million boe.

Interest holders in the Maari mining license (PMP 38160) and the Manaia exploration license (PEP 38413) are OMV 69%, Todd Energy 16%, Horizon 10%, and Cue Energy Resources 5%.

Giant Grand Bay field's output climbing

Saratoga Resources Inc., Houston, is increasing oil and gas production from giant Grand Bay oil and gas field in Plaquemines Parish, La., and believes that only about one third of the field's reserve potential has been evaluated.

The company has begun gas production from shallow Pliocene sands with the QQ15 well, completed Nov. 25, producing 1.063 MMcfd of gas and 3 b/d of water on a 19/64-in. choke.

Discovered in 1938, Grand Bay has only three wells drilled deeper than 15,000 ft. The shallow Pliocene gas has never been exploited although it shows up on 3D seismic and well logs.

The field, which has produced from more than 30 stacked sands

at 3,000-13,500 ft, averaged 1,200 b/d of oil and 1.3 MMcfd of gas from 60 wells in late 2008, up from 562 b/d and 575 Mcfd in July. Well density is relatively light across the field's 16,000 net acres.

Saratoga Resources, with 100% working interest in nearly the entire field, owns a 90 sq mile 3D seismic survey. The company believes the field has at least 50 proved developed workover or recompletion opportunities in 37 wellbores and one proved undeveloped drilling opportunity. ✦

Processing — *Quick Takes*

PDVSA: Ecuadorian refinery still 'on track'

Venezuela's state-owned Petroleos de Venezuela SA (PDVSA), contradicting earlier remarks by a senior company official, has no plans to change its schedule for the construction of a refinery in Ecuador.

The statement, issued by the Ecuadorian oil and mines ministry, followed a meeting between Ecuadorian oil minister Derlis Palacios and Venezuelan energy and oil minister Rafael Ramirez, who confirmed his country's commitment to execute the project.

Work on the joint-stock Refineria del Pacifico, held 51% by Ecuador's state-owned Petroecuador and 49% by PDVSA, is scheduled to start in 2010, and operations are expected to begin by 2013.

The Ecuadorian statement followed media reports concerning a revision of the projected investments of PDVSA abroad due to the fall of international oil prices. The media reports specifically mentioned the refinery project in Ecuador and another one in Nicaragua.

Elogio Del Pino, a PDVSA vice-president, told the Venezuelan newspaper El Nacional, in comments published on Nov. 29, that PDVSA would reevaluate funding for some international projects, while its investment in the domestic oil industry would remain unchanged.

"The idea is to maintain investment in the country, because our idea is to have between 300,000 and 400,000 b/d (of oil) of potential so that when the rebound in oil prices comes…we can then open up that production," Del Pino told El Nacional.

"International investments like the refineries in Ecuador and Nicaragua are under evaluation," Del Pino said, adding that, "We're asking to look for financing" to help pay for the 300,000 b/d refinery in Ecuador and the 150,000 b/d facility in Nicaragua.

Nicaraguan officials issued no comment concerning Del Pino's remarks about the planned facility in their country. But his statement about the need for additional financing was in line with earlier remarks by officials involved in the Ecuadorian project.

In September, reports said that PDVSA and Petroecuador would jointly finance just under one third of the estimated $6-10 billion cost of the Ecuadorian refinery, expecting that the outstanding amount would be financed by other countries.

Carlos Albuja, head of Petroecuador unit Petroindustrial, said the two state firms would "finance 30% of the cost," adding, "Countries such as England and China, among others, are interested in financing the remainder." Since then, a memorandum of understanding has been forged between Iran and Ecuador for the revamp and modernization of Ecuador's refineries. Under the MOU, a refinery will be constructed, to be cofinanced by Iran, Ecuador, and Venezuela (OGJ Online, Sept. 22, 2008). ✦

Transportation — *Quick Takes*

Shell to supply PetroChina with LNG

Shell Eastern LNG has agreed to sell as much as 2 million tonnes/year of LNG to PetroChina International under a 20-year supply agreement.

Shell said LNG supplies will come from various company projects, including Western Australia's Gorgon gas project, in which it holds 25% interest.

Shell did not outline when deliveries of supplies would begin or detail any other projects that might provide supplies.

The current agreement builds on one signed in November 2007 under which Shell was to supply 1 million tonnes/year of LNG to PetroChina, which is building three regasification facilities on China's Pacific seaboard: one in Jiangsu province, one in Dalian city, and a third in Tangshen city.

According to analyst BMI, PetroChina's decision to double the volume under the final contract demonstrates the Chinese firm's confidence in ongoing strong demand for LNG in China.

In addition, the analyst said, the increased supply may reflect PetroChina's desire to source more long-term LNG supply contracts from Asia Pacific as a less risky strategy than boosting LNG imports from the Middle East, "particularly as the upsurge in piracy increases transit risks and shipping costs along the route."

Earlier this month, China and Myanmar signed an agreement for the supply of gas that also came amid growing concerns about the safety of shipping through the Malacca Strait, especially following the rise of hijackings and attacks on oil tankers by Somali pirates operating in and around the Gulf of Aden (OGJ Online, Nov. 20, 2008).

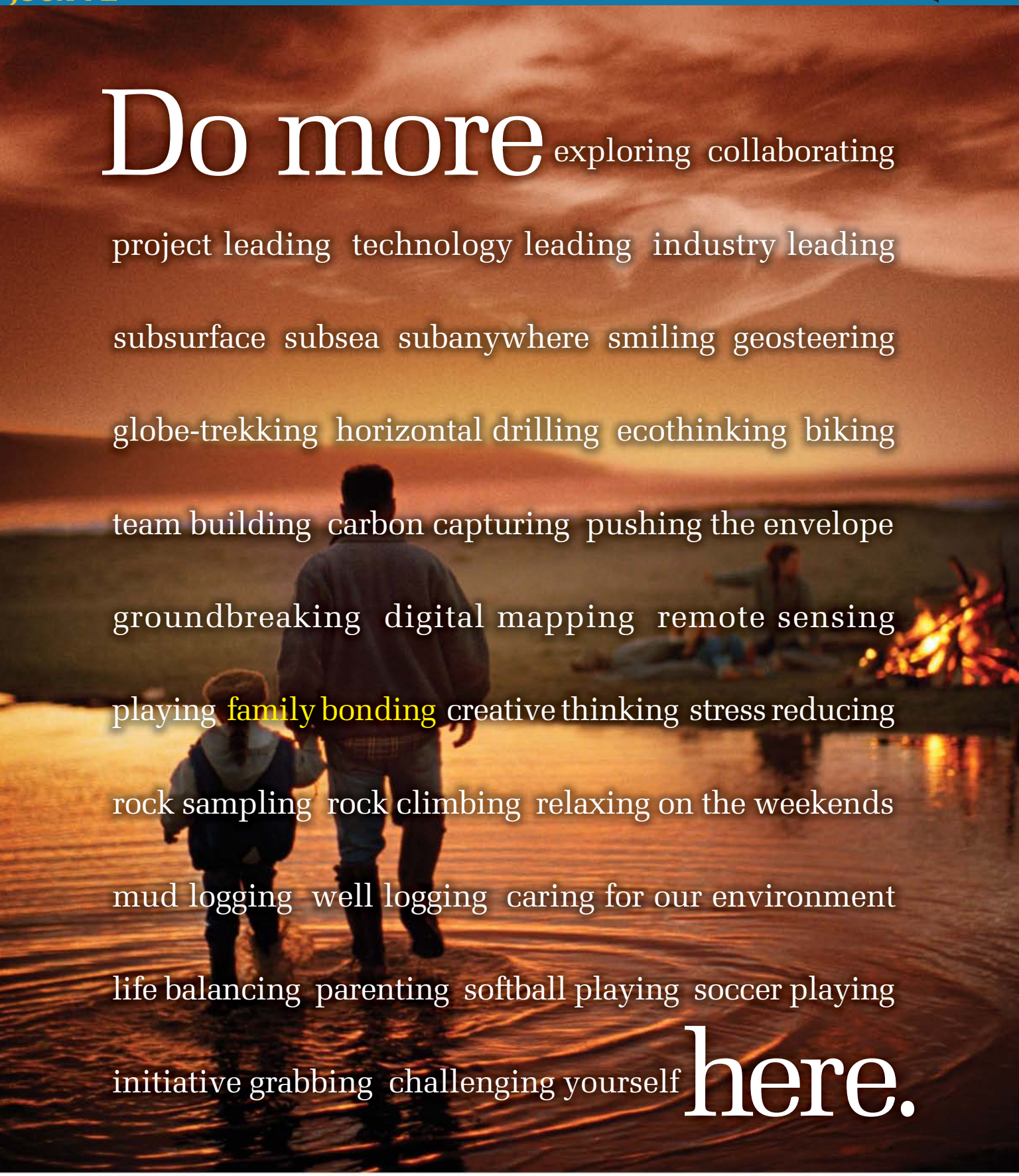
Woodside lets contract for Pluto LNG project

Woodside Petroleum Ltd. has awarded service contracts totalling $5.2 million (Aus.) to Finnish consulting and engineering firm Poyry for the Pluto LNG project off Western Australia.

The awards cover the concept phase of different development options for the proposed second LNG train for Pluto.

Poyry says the long tie-back from the offshore field to the plant on the Burrup Peninsula means that flow assurance studies for Pluto are vital to ensure there is an acceptable fluid flow under all operating conditions.

The studies in the contract include an evaluation of the thermal and hydraulic performance of the Pluto production system from the undersea reservoir through 27 km of subsea flowlines to the production platform and then along 180 km of subsea trunkline to the onshore Burrup plant. ✦



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Letters

Response to responses

You have published two responses in recent Journals to my letter on global warming (OGJ, July 7, 2008, p. 12). One is from Donald E. Hibbard (OGJ, Oct. 6, 2008, p. 14). The other is from David Archibald (Oct. 27, 2008, p. 12). You also published a letter from Gerald Westbrook that did not respond directly to my letter (OGJ, Nov. 3, 2008, p. 12). I would in turn like to comment on these three letters.

There is no doubt that the debate over the existence of global warming gets emotional as it touches the heart of our business. It is my contention, however, that these above communications are clouding the debate, not being based on sound science.

Let us take Mr. Hibbard's letter first. His sole argument was, "An article by Arthur B. Robinson, Noah E. Robinson, and Willie Soon published in the December 2007 Journal of American Physicians and Surgeons reports research that strongly rejects the theory that hydrocarbons are primarily responsible for global warming. Their research is backed by the endorsement of 31,072 American scientists."

The referred article originates from the Oregon Institute of Science and Medicine. I looked them up on the web. The Chemical & Engineering News, in their editorial of June 9, 2008, refused to carry a letter which quoted this same reference published in the Journal of American Physicians and Surgeons.[1] The editorial said that this journal "is not indexed by Chemical Abstracts Service, Pubmed, or ISI's Web of Science, and articles published in this journal have argued that the Food and Drug Administration and Centers for Medicare and Medicaid Services are unconstitutional, that 'humanists' have conspired to replace the 'creation religion of Jehovah' with evolution, that HIV does not cause AIDS, and that the 'gay male lifestyle' shortens life expectancy by 20 years, etc."

The only reference of the institute's work on climate change on their web site is to this paper and a petition. The paper itself is full of errors, cherry-pick-

ing of data, and omissions. I invite readers to make their own judgment by reading the review by Michael MacCracken, past-president of the International Association of Meteorology and Atmospheric Sciences.[2]

On their web site this institute lists just eight faculty members (of whom two are dead), no classrooms, or student body. As concerns the petition, despite being frequently cited by global warming critics as showing that thousands of scientists disagree with the consensus on global warming, it contains almost no people with relevant expertise, and its vetting was so lax that it included many fictional signatories.

Now for Mr. Archibald's letter. I note that he did not counter the points I raised in my previous letter concerning his cherry-picking of data in his work nor to his abuse of the climate change model. I took a look at the most recent reference supplied with his letter, from March 2008.[3] In this 30-page paper he gives no references to the majority of his data, which is a good thing for him since examination shows he has cherry-picked to the extreme again. The first figure, which is claimed to be "The 29 years of high quality Satellite Data," does not say which satellite; the vertical axis is missing a label; and the title does not match the data, while the next graph shows sea ice, with no source reference, but while claiming that no changes are happening is mislabeled, while it does indeed show a trend. In the third figure we see data for five rural sites around Georgia. Archibald then asserts, without any attempt at proof, that the variation seen is due to solar effects and then suddenly jumps his conclusion from these five stations to cover the whole of planet Earth! These five stations are all in a small region, while there were hundreds of stations available. Guess what? They all show the same trend down. The possibility that these five stations were representative is so small to be insignificant, and yet from this Archibald draws one of his major conclusions. I am only up to Fig. 3 and could go on, but I will save readers the pain. This non-peer reviewed article does not qualify as science.

The last letter was from Mr. Westbrook. He started by asking what three distinguished physicists have in common and tells us that they are all sceptics of global warming (note the "are," as if in the present; one of them is dead), while ignoring the many thousands of physicists who accept global warming as a reality. In fact, none of the three named have ever authored a testable theory, produced data, or presented papers explaining the current global temperature trend. Mr. Westbrook denigrates the 0.6° C. temperature increase seen in the 20th century and in doing this shows he does not understand climate science since small changes in mean global surface temperature do indeed matter, and this temperature increase is continuing. He says that increasing CO_2 levels help plant growth, but he ignores the hundreds of millions of people who will be affected by rising sea levels [as though] sudden changes to habitat will have many knock-on consequences. Mr. Westbrook says, "Physicists might hold the key to this diagnosis," and he then places the blame fairly on solar warming (ignoring the massive evidence from the increase in CO_2 levels and the known physics). Direct observations tell us that solar forcing has not changed substantially in at least 30 years, and important though it is, physics without an understanding of climate science is pretty worthless in a debate over the climate. His letter also includes a number of political points, which should have no place in a debate over science.

Debate is at the heart of science. None of the aforementioned pieces stands up to independent review. Reading the letters column of OGJ, one could easily get the impression that the debate has not reached a conclusion on whether we have climate change or not and the reasons for it. The science, as well as the empirical results, are all now well-established and recognized.

The Intergovernmental Panel on Climate Change, which produced the definitive work on climate change, has now produced a number of reports. Although much maligned by the skeptics, the process the IPCC goes through is highly scientific, contains much advanced statistical analysis, and many checks and balances. The rules are that the work may present only previously published research, based on

Letters

peer-reviewed scientific papers. The IPCC reports are essential reading for those interested in climate change.[4] No one else has come up with a scientifically credible reason (i.e., passes the test under peer analysis and review) to explain away the changes happening to our climate.

Scientific skepticism and scrutiny are welcome parts of any discussion, of course. They are an important part of the overall process. But unscientific and highly dubious writings, such as those referred to here, should be understood to be just that.

Jeff Temple
PetroKazakhstan Oil Products
Shymkent Oil Refinery
Kazakhstan

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2. http://www.climatesciencewatch.org/file-uploads/Comment_on_Robinson_et_al-2007R.pdf.
3. http://www.lavoisier.com.au/articles/greenhouse-science/solar-cycles/ArchibaldLavoisierAGM.pdf.
4. The Synthesis report from the International Panel for Climate Change (IPCC) Report can be seen on http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

Calendar

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

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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.

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

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JANUARY

Petrotech International Oil & Gas Conference & Exhibition, New Delhi, +91 11 2436 4055, +91 11 2436 0872 (fax), e-mail: convenor_petrotech@iocl.co.in, website: www.petrotech2009.org/registration.aspx. 11-15.

Expandable Technology Oil & Gas Conference, Abu Dhabi, +44 (0) 1 483 598000, e-mail: sally.marriage@otmnet.com, website: www.expandableforum.com. 14.

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

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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.

World Future Energy Summit, Abu Dhabi, +971 2 444 6011, +971 2 444 3987 (fax), e-mail: sales@turretme.com, website: www.worldfutureenergysummit.com. 19-21.

API Exploration & Production Winter Standards Meeting, San Antonio, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 19-23.

API/AGA Oil and Gas Pipeline Welding Practices Conference, San Antonio, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 21-23.

International Process Analytical Technology Forum (IFPAC), Baltimore, (847) 543-6800, (847) 548-1811 (fax), e-mail: info@ifpacnet.org, website: www.ifpac.com. 25-28.

Global E&P Summit, Madrid, +44 (0)20 7202 7500, +44 (0)20 7202 7600 (fax), e-mail: info@wtgevents.com, website: www.epsummit.com. 26-28.

Offshore West Africa Conference, Abuja, (918) 831-9160, (918) 831-9161 (fax), e-mail: attendOWA@pennwell.com, website: www.offshorewestafrica.com. 27-29.

The European Gas Conference, Vienna, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 27-29.

SIHGAZ International Hydrocarbon & Gas Fair, Hassi Messaoud, + 213 21 21 58 74, + 213 21 21 58 72/76 (fax),e-mail: contact@foirex.com, website: www.sihgaz2009.com. 28-31.

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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.

IADC Health, Safety, Environment & Training Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 3-4.

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.

Global Petrochemicals Conference & Annual Meeting, Cologne, +44 (0) 1242 529 090. +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 3-5.

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CERAWeek, Houston, (617) 966-5992, e-mail: info@cera.com, website: www.cera.com. 9-13.

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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.

EnerCom's The Oil & Services Conference, San Francisco, (303) 296-8834, e-mail: kgrover@enercominc.com, website: www.theoilandservicesconference.com/index.html. 18-19.

International Downstream Technology & Catalyst Conference & Exhibition, London,

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ASEG/PESA International Geophysical Conference & Exhibition, Adelaide, +61 8 8352 7099, +61 8 8352 7088 (fax), e-mail: ASEG2009@sapro.com.au, website: www.sapro.com.au/aseg.htm. 22-25.

Laurance Reid Gas Conditioning Conference, Norman, Okla., (405) 325-2248, (405) 325-7164 (fax), e-mail: bettyk@ou.edu, website: www.engr.outreach.ou.edu. 22-25.

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International Pump Users Symposium, Houston, (979) 845-7417, (979) 847-9500 (fax), e-mail: inquiry@turbo-lab.tamu.edu, website: http://turbolab.tamu.edu. 23-26.

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ARTC Annual Meeting, Kuala Lumpur, +44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 10-12.

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NACE Corrosion Conference & Expo, Atlanta, (281) 228-6200, (281) 228-6300 (fax), website: www.nace.org/c2009. 22-26.

PIRA Understanding Global Oil Markets Seminar, Dubai, 65 6581 4122, e-mail: jay@pira.com, website: www.pira.com. 23-24.

SPE Americas E&P Environmental and Safety Conference, San Antonio, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website; www.spe.org. 23-25.

API Spring Petroleum Measurement Standards Meeting, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 23-26.

Asian Biofuels Roundtable, Kuala Lumpur, +44 (0) 207 067 1800, +44 207 430 0552 (fax), e-mail: a.ward@theenergyexchange.co.uk, website: www.wraconferences.com/FS1/AB1register.html. 24-25.

SPE Western Regional Meeting, San Jose, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website; www.spe.org. 24-26.

Offshore Mediterranean Conference & Exhibition (OMC), Ravenna, +39 0544 219418, +39 0544 39347 (fax), e-mail: conference@omc.it, website: www.omc2009.it. 25-27.

NPRA International Petrochemical Conference, San Antonio, (202) 457-0480, (202) 457-0486 (fax), e-mail: info@npra.org, website: www.npra.org. 29-31.

Petroleum Geology Conference, London, +44 (0)20 7434 9944, +44 (0)20 7494 0579 (fax), e-mail: georgina.worrall@geolsoc.org.uk, website: www.geolsoc.org.uk. Mar. 30-Apr. 2.

SPE/ICoTA Coiled Tubing & Well Intervention Conference & Exhibition, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Mar. 31-Apr. 1.

Offshore Asia/Multiphase Pumping & Technologies Conference & Exhibition, Bangkok, 918) 831-9160, (918) 831-9161 (fax), e-mail: attendingOA@pennwell.com, website: www.offshoreasiaevent.com. Mar. 31-Apr. 2.

APRIL

Georgian International Oil, Gas, Energy and Infrastructure Conference & Showcase (GIOGIE), Tbilisi, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 2-3.

SPE Production and Operations Symposium, Oklahoma City, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 4-8.

SPE Digital Energy Conference, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 7-8.

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Rocky Mountain Unconventional Resources Conference & Exhibition, Denver, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.RMURconference.com. 14-16.

GPA Mid-continent Annual Meeting, Oklahoma City, (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 16.

Middle East Petroleum & Gas Conference, Dubai, 65 62220230, 65 62220121 (fax), e-mail: info@cconnection.org, website: www.cconnection.org. 19-21.

ERTC Coking & Gasification Conference, Budapest, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 20-22.

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IADC Drilling HSE Middle East Conference & Exhibition, Abu Dhabi, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 21-22.

API Pipeline Conference, Fort Worth, Tex., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 21-22.

Pipeline Transport Conference & Exhibition, Moscow, +43 1 230 85 35 33, website: www.expopipeline.com. 21-23.

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Instrumentation Systems Automation Show & Conference, (ISA), Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 22-23.

CPS/SEG International Geophysical Conference & Exposition, Beijing, (918) 497-5500, (918) 497-5557 (fax), e-mail: semery@seg.org, website: www.seg.org. 24-27.

AIChE Spring National Meeting, Tampa, (203) 702-7660, (203)

775-5177 (fax), website: www.aiche.org. 26-30.

API Spring Refining and Equipment Standards Meeting, Denver, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 27-29.

EAGE European Symposium on Improved Oil Recovery, Paris, +31 88 995 5055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.org. 27-29.

ENTELEC Conference & Expo, Houston, (972) 929-3169, (972) 915-6040 (fax), e-mail: blaine@entelec.org, website: www.entelec.org. Apr. 29-May 1.

MAY

EAGE International Petroleum Conference & Exhibition, Shiraz, +31 88 995 5055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www.eage.org. 4-6.

Offshore Technology Conference (OTC), Houston, (972) 952-9494, (972) 952-9435 (fax), e-mail: service@otcnet.org, website: www.otcnet.org. 4-7.

GPA Permian Basin Annual Meeting, Austin, (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 5.

Interstate Oil and Gas Compact Commission Midyear Meeting (IOGCC), Anchorage, (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state.ok.us, website: www.iogcc.state.ok.us. 10-12.

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International School of Hydrocarbon Measurement, Norman, Okla., (405) 325-1217, (405) 325-1388 (fax), e-mail: lcrowley@ou.edu. Website: www.ishm.info. 12-14.

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Gastech International Conference & Exhibition, Abu Dhabi, +44 (0) 1737 855000, +44 (0) 1737 855482 (fax), website: www.gastech.co.uk. 25-28.

APPEA Conference & Exhibition, Darwin, +61 7 3802 2208, e-mail: jhood@appea.com.au. website: www.appea2009.com.au. May 31-Jun. 3.

SPE Latin American and Caribbean Petroleum Engineering Conference, Cartagena, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. May 31-Jun. 3.

JUNE

Caspian International Oil & Gas/Refining & Petrochemicals Exhibition & Conference, Baku, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 2-5.

Asia Oil & Gas Conference, Kuala Lumpur, 65 62220230, 65 62220121 (fax), e-mail: info@cconnection.org, website: www.cconnection.org. 7-9.

AAPG Annual Meeting, Denver, (918) 560-2679, (918) 560-2684 (fax), e-mail: convene@aapg.org, website: www.aapg.org. 7-10.

PIRA Scenario Planning Conference, Houston, (212) 686-6808, (212) 686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 8.

ILTA Annual International Operating Conference & Trade Show, Houston, (202) 842-9200, (202) 326-8660 (fax), e-mail: info@ilta.org, website: www.ilta.org. 8-10.

International Oil Shale Symposium, Tallinn, Estonia, +372 71 52859, e-mail: Rikki.Hrenko@energia.ee. 8-11.

SPE EUROPEC/EAGE Conference and Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 8-11.

PIRA Understanding Global Oil Markets Seminar, Houston, (212) 686-6808, (212) 686-6628 (fax), website: www.pira.com. 9-10.

GO-EXPO Gas and Oil Exposition, Calgary, Alta., (403) 209-3555, (403) 245-8649 (fax), website: www.petroleumshow.com. 9-11.

Happy accidents

Judy R. Clark
Senior Associate Editor

Thanks to "a guy working on hydraulic pressure in Italian Renaissance water gardens, we have the combustion engine," said James Burke in his book "Connections."[1]

In this passage, Burke was illustrating the roundabout way innovation often occurs, with some improvements resulting from decades of gradual enhancements, usually building on the ideas of countless other people.

John Lienhard, in his daily essays "The Engines of Our Ingenuity," on National Public Radio and in his book by the same title, also espouses that opinion, saying that by the time Rudolf Diesel built and improved his automobile engine during 1890-97, Carl Benz's internal combustion engine-powered auto had been on the road since 1885, Austrian Siegfried Marcus' since 1864, and Frenchman Beau de Rochas' since 1862. In 1826, English engineer Samuel Brown "adapted an old Newcomen steam engine to burn gas to power his auto" in London, Lienhard explained.[2]

"The first steam-powered road vehicles were made in the 18th Century," he wrote. Prior to that, inventors had experimented with cars powered by springs, compressed air, even windmills. Leonardo da Vinci sketched and Homer, in remote antiquity, wrote about such self-powered vehicles.

Accidents happen

Other discoveries occur quite by accident, however, when the discoverer is astute enough to recognize the significance of the discovery, according to Royston M. Roberts in his book "Serendipity, Accidental Discoveries in Science."[3]

For example, chemists Charles Friedel and James M. Crafts, working together in Paris in 1877, were trying to prepare amyl iodide by treating amyl chloride with aluminum and iodine. Their process instead produced large amounts of hydrogen chloride and, unexpectedly, hydrocarbons. Using aluminum chloride instead of aluminum produced the same unexpected results, showing that the presence of the metal chloride was essential to the process.

This laboratory accident eventually resulted in development of many products, including a superior aviation gasoline. It contained toluene and other alkylated aromatic hydrocarbons that made it instrumental in the success of British and American pilots in World War II, giving them "a critical performance edge" despite the superiority of Germany's fighter planes.

Two other accidental discoveries in gasoline technology resulted in major improvements, one in the early days of its development and the other more recent.

Charles F. (Boss) Kettering was seeking a gasoline additive to prevent knocking in the 1912-16 Cadillac engines. He and Thomas Midgley, a research associate with Delco Co., thought the knock was a delayed explosion caused by incomplete gasoline combustion. They thought coloring the gasoline a deep red would cause it to absorb radiant energy more quickly and vaporize early enough to prevent the knock.

In December 1916, Midgley went to the chemical laboratory for some red dye, but found none so he used iodine for the gasoline colorant. The iodine stopped the knocking but was expensive and too corrosive, Roberts said, so the men continued searching for an additive and "after many trials and failures," in 1921 discovered tetraethyl lead, which, when dissolved in gasoline, constitutes ethyl fluid. It worked well as an antiknock agent for more than 60 years but has since been discontinued because of the danger it poses to the environment.

Methane to gasoline

A serendipitous discovery by two Mobil Oil Co. research chemists led to the production of gasoline from natural gas in New Zealand in 1986. The plant is enabling New Zealand to become 50% self-sufficient in liquid fuels.

The conversion is a two-step process whereby the first step is to convert methane to methanol by adding one atom of oxygen to a molecule of methane, and the second step is conversion of methanol to gasoline. Although Step 2 would appear to be more complicated than the first, it is not because of an accidental discovery.

On Mar. 10, 1972, William H. Lang and Clarence Chang were trying to make neopentane from isobutane (C_4H_{10}) and methanol using a crystalline silica-alumina catalyst ZSM-5. Lang wrote: "All of the methanol and part of the isobutane were converted to liquid hydrocarbons but no detectable neopentane. Having previously conducted research in the reforming of naphtha, I immediately recognized the composition of the hydrocarbon products as high-octane gasoline."

The long-term success of the process might depend on improvements to the first step to reduce its cost, Roberts wrote.

But what a helpful accident developing Step 2. ✦

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LONGFORZA CORPORATION

Editorial

Obama and climate change

The problem with being president of the United States is that the holder of the office must balance priorities, make ultimate compromises, and still lead. No president gets it all right. So here's a tip for President-elect Barack Obama: Keep the nation engaged by respecting dissent.

Obama made a video address to the Bipartisan Governors Climate Summit in Los Angeles this month that sounded like a harangue from the back benches of the Senate's liberal wing. "Few challenges facing America—and the world—are more urgent than combating climate change," he said. "The science is beyond dispute, and the facts are clear."

Mischaracterizing science

Well, no. To assert that the science of any subject is beyond dispute is to mischaracterize science. Dispute exists over many facets of climate change, although supporters of vigorous precaution want to pretend otherwise. Some scientists, for example, note the poor correlation between temperature and greenhouse-gas records and argue that the gases can't have caused much of the observed warming. They tend to attribute observed warming more to solar activity than to greenhouse gases. Other scientists say energy flux, not temperature, is what really matters and discount the effects of solar radiation. The former group sees problems with how the latter group calculates the discount. This is a scientific dispute—and hardly the only one at play in this subject.

Statements about indisputable climate-change science thus conflict with observable reality. They are propaganda tricks, attempts to foreclose discussion, tactics unbecoming the US presidency. They also provide reason to be suspicious about appeals for urgent political response.

Nor are facts about climate change as clear as the president-elect makes them out to be. Here's just one example, from an August report on low and high-latitude climate sensitivity by David Rind of the Goddard Institute for Space Studies: "Skeptics feel the warming itself, and therefore the consequences, will be small. Most scientists, however, feel that significant warming is pretty much assured unless we limit the growth of greenhouse gases. But even researchers in the field cannot specify with confidence impacts that will arise outside of providing some generalizations." This is from someone who believes the uncertainty "should make us even more cautious about disturbing the system."

To brush aside the uncertainty and rush into expensive climate remedies offering limited hope for warming mitigation would be historically irresponsible, especially now. Obama will inherit a calamitous economy. The aggressive cap-and-trade program he espouses would be extremely costly. The "green" jobs he promises wouldn't replace jobs lost to the economic problems his program would create. He must broaden his view of the climate-change issue and its relationship to economic health. He's not a junior senator from Illinois anymore.

And he must, if he's to live up to his promise to be a unifier, recognize the alienating effects of condescension. To the governors in Los Angeles he declared, "Denial is no longer an acceptable response." Dissent thus becomes a psychological impairment. Like assertions about indisputable science, this is a distortion, not an argument suitable to serious conversation.

It is not denial to worry that the US can't afford the aggressive climate-change remedies with which Obama the candidate wooed environmental supporters. It's legitimate concern for national prosperity. And it won't be denial to question the judgment behind hundreds of billions of dollars of federal spending on commercially weak and quantitatively unpromising energy forms. It will be responsible resistance to potentially massive waste.

Degraded debate

The climate-change debate has been degraded by the type of rhetorical smack-down Obama employed for the crowd in Los Angeles: argumentative dodges aimed at turning a complex and important issue into a simplistic joust between believers and infidels. Politically, the strategy has worked. Obama has profited from it.

But he's not a candidate anymore. He won't be a senator much longer. He'll soon have executive responsibility for the welfare of a nation. He's smart enough to adapt isolated positions to the enmeshed urgencies that define his new job. He also must learn to articulate his stances without seeming to want to quash discourse. ✦

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Oil industry ramps up for hydrogen vehicles

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In the coming decades, demand for energy in the world will increase significantly, while access to "easy oil" will become more difficult, and the threats of global warming will continue to grow. Given this reality and the mobility challenge linked to this, energy companies are looking at solutions that go beyond fossil fuels.

While petroleum will remain a primary energy source well into this century, alternatives will also play an important role.

The solution to our energy crisis is not a silver bullet but a mosaic. One of the pieces will be biofuels, which are already being blended into gasoline and diesel in many countries. As the largest distributor of biofuels in the world, Royal Dutch Shell is actively involved in this industry, seeing the production and distribution of first-generation biofuels as a bridge to the development and commercialization of the next generation. Shell is also investing heavily in the research and development of "next-generation" biofuels that are derived from nonfood crops such as wood chips and wheat straw.

Hydrogen is another alternative source of energy that Shell is developing. Automakers are under intense pressure to come up with vehicles that run on clean, abundant, and convenient fuels. Fuel cell vehicles (FCVs) powered by hydrogen are getting a lot of attention. FCVs give off just water vapor and heat so local emissions produced by the vehicles are zero.

Although hydrogen could occupy an important share of the energy mix, it will need to be used alongside other sources of fuels: again, the mosaic. This will include conventional fuels such as diesel and gasoline, biofuels of all kinds, and the increasing availability of electric vehicles.

Shell's hydrogen strategy

Based on the current development plans of automobile manufacturers, Shell estimates that the commercialization of hydrogen FCVs could start as early as 2020. However, a great deal will depend on market demand and overcoming a number of technological, financial, and political obstacles.

Shell has developed a clear strategy to provide infrastructure that addresses these challenges and since 1999 has been working closely with the automotive industry, local and national governments, academics, and NGOs to create the infrastructure necessary to bring hydrogen into a retail setting as a fuel.

To be able to market hydrogen within the foreseeable future, Shell is operating along two channels. First, broadening our own expertise in order to provide hydrogen infrastructure and second, building public awareness around subjects such as usability and safety with hydrogen fuel demonstration projects around the world.

Shell's retail demonstration projects have been developed in all three major hydrogen markets—Asia, North America, and Europe (Tokyo, Reykjavik, Shanghai, and the US cities of Washington, DC, White Plains, NY, and Los Angeles). They include building new hydrogen fuel stations or adapting existing locations for that purpose. A number of supply options have been tested, including liquid hydrogen, compressed gaseous hydrogen by trailer, and on site production through electrolysis and steam methane reforming.

As part of this plan, Shell recently opened the first combined hydrogen and gasoline refueling station in California. In addition to forming part of the "California Hydrogen Highway," this station is also part of a program with the US Department of Energy and General Motors through which FCVs are being introduced to the Los Angeles market and other cities around the country. This public-private initiative allows the auto and energy industry to test vehicles and fueling infrastructure under "real-world" conditions.

At a Shell retail gas-hydrogen station in West Los Angeles, hydrogen fuel is produced on site by an electrolyzer on top of the station canopy. Photo from Photographic Services, Shell International Ltd.

As part of this partnership, GM conducted in-depth market research to arrive at a vehicle demand model per zip code, using real-market and consumer behavior in its analysis. Shell, in turn, modeled the supporting hydrogen infrastructure that deals with the associated changing hydrogen demand over time by minimizing the total cost of supply under different scenarios for the design of refueling station networks.

The cost of hydrogen

Industry needs to focus on the deployment of an infrastructure at the lowest cost of supply for the safe delivery of hydrogen to the consumer. While the government and automakers want to deploy hydrogen vehicles as soon as technical and economic obstacles are removed, both stakeholders must not push for a costly and underutilized roll out of hydrogen stations that drives up hydrogen supply costs.

The cost of hydrogen needs to be reduced to become competitive with conventional fuels, even when using currently available hydrogen and existing infrastructure. A kilogram of hydrogen in an FCV is about twice as efficient as a gallon of gasoline in an internal combustion engine, and it is estimated that the market price for each kilogram would be about twice the cost of a gallon of gas.

The retail end of the supply chain seems to have the biggest cost reduction potential, and there are options available to help reduce those costs. These include integration into existing retail sites, avoiding overcapacity through coordinated roll out, and government incentives that account for an increase in supply costs when new assets must be built.

With important lessons being learned from demonstration projects, industry is now looking to take the next step, moving from low-use stand-alone stations to higher-use, long-term, mini-retail networks. These consist of at least four gasoline-hydrogen stations in one urban center. Shell has been working closely with automakers from the US, Europe, and Asia to build retail facilities in cities that are showing the greatest interest in cleaner transportation fuels. Such networks will play a crucial role in bridging the gap between demonstration and commercialization.

The jury on refueling pressure of hydrogen is still out. Some of the automotive manufacturers want to see the adoption of 700 bar (10,000 psi) refueling dispensers rather than 350 bar (5,000 psi). However, the Honda Clarity has shown that it's possible to extend the driving range without increasing the pressure from the 350 bar level.

The groundwork for hydrogen FCVs is clearly being laid, but how do we speed up the process, and who should take the initiative: automakers or energy companies? This in the past has been seen as the chicken and egg dilemma. The automakers are reluctant to manufacture direct-hydrogen FCVs if energy companies will not create the infra-

During 2008, Shell opened its first combined hydrogen and gasoline station in California. Photo from Photographic Services, Shell International Ltd.

structure to support hydrogen refueling. On the other hand, energy companies will not invest in infrastructure if car companies do not manufacture and sell enough FCVs.

Partnerships are therefore key. Shell actively sought collaboration with automotive manufacturers (Daimler, GM, Honda, and Toyota) at an early stage. This way, we can share information on numbers, dates, and locations where FCVs will be introduced to trigger the right level of infrastructure investment.

Clean to green hydrogen

Hydrogen's contribution to reducing CO_2 emissions will depend on how hydrogen is produced in the future. Currently 95% of hydrogen is manufactured using natural gas. While CO_2 emissions from this method are less than those associated with gasoline production, industry needs to look at how to transition fossil-based hydrogen into clean and then green hydrogen.

One way to reduce CO_2 emissions in the manufacturing process today is through carbon capture and storage (CCS). Shell is committed to investigating CCS as part of a suite of actions to address climate change and manage emissions from hydrocarbons. Shell is a partner in several CCS joint ventures aimed at establishing best practices and securing public acceptance. This includes the CO_2 SINK project in Germany and the Australian Otway project, which will inject 100,000 tonnes of CO_2 into a depleted natural gas reservoir 2 km beneath the surface. Together with Qatar Petroleum, Shell signed a $70 million research collaboration with Imperial College London to provide the foundation for new CO_2 technologies that can be applied in Qatar and beyond.

While CCS remains one solution for the production of large-scale, clean hydrogen, there are also other things that can be done to reduce CO_2 emissions in the manufacturing process. Since last spring, Shell has been operating a forecourt reformer from H_2Gen at our Westhollow research and technology facility in Houston, where feedstock options such as biomaterials are being evaluated.

Working towards a green hydrogen future, Shell is forging partnerships with cutting edge businesses like Virent Energy Systems Inc. Last year, Shell entered into a 5-year joint development agreement to further commercialize its BioForming technology, which enables hydrogen to be produced economically from renewable glycerol and sugar-based feedstocks.

Also at the Shell retail gas-hydrogen station in West Los Angeles, hydrogen fuel is produced on site by an electrolyzer above the station canopy. Electrolysis separates the hydrogen molecules from the oxygen molecules found in plain water. The oxygen is released into the air while the hydrogen is stored in a gaseous state. A portion of this hydrogen uses "green electricity" from the Los Angeles City Department of Water and Power, which comes from solar, wind, and other alternative energy sources.

Hydrogen at pivotal juncture

Hydrogen is the most abundant element in the universe and is not harmful to the environment. It is nontoxic, noncarcinogenic, and cannot contaminate groundwater or air. With social, economic, and technological challenges being addressed, the hydrogen industry now stands at a pivotal juncture: investment is rising, costs are falling, and technology is rapidly advancing. Increasing numbers of FCVs have been tested successfully, and more hydrogen refueling stations are being put in place.

But while there is broad consensus that the widespread use of hydrogen FCVs by 2020 is achievable, no outcome can be guaranteed. It will take considerable cooperation between automotive manufacturers, the energy industry, and governmental bodies to ensure that hydrogen becomes an established part of the energy mosaic. Only by aligning goals and sharing experience can we maximize impact and accelerate technology development that will lead to transforming ideas into the ultimate goal: commercial reality. ✦

The author

In January 2006, Duncan Macleod became vice-president in charge of Shell Hydrogen, a Shell business created in 1999 to develop hydrogen as a future fuel for mobility and power. Macleod has a Shell career spanning 3 decades working in Venezuela, the Caribbean, Nigeria, Japan, and the Netherlands. He has held key positions in supply-trading, mergers and acquisitions upstream, strategy, and government relations. Macleod was also instrumental in setting up Shell's biofuels technology ventures with Iogen in Canada and Choren in Germany. Since October 2008, he has taken additional responsibility for Shell's GTL business. Macleod is a member of the advisory council for the EU Hydrogen & Fuel Cell Technology Platform, the California Hydrogen Highway Network advisory panel, the California Fuel Cell Partnership steering team, and the board of Icelandic New Energy. His personal vision is that for Shell to be successful for another 100 years, substantial new energy businesses such as hydrogen must be developed now, steadily building on Shell's many capabilities while collaborating with governments, industry partners, and customers. Macleod is Scottish-born, and he studied economics and geography at Birmingham University.

Industry high grading alternative energy assets

Paula Dittrick
Senior Staff Writer

Oil companies are rearranging and fine tuning their alternative energy assets to determine which ones they want to pursue for pilot demonstration projects and eventual commercialization, an industry consultant believes.

Arthur Hanna, industry managing director of Accenture's energy practice in London, said oil companies completed what he calls the investigative stage—reviewing new technologies and new energy sources in the search for alternates to fossil fuels.

"When you look back 2-3 years, we saw many in the oil and gas industry investigating energy alternatives in the new energy space," Hanna said. "With the exception of one or two, we saw most of the majors putting together programs looking at biofuels and looking at other substitute sources of energy such as wind or solar."

During that period, companies considered a wide range of alternative energy options.

"I think what you are seeing now is a move from the investigative to the pilot stage of developing new energy businesses," Hanna said. "Oil companies are getting ready for full-scale ramp-up into some of the businesses that they have decided to move into."

Some oil companies are discarding certain alternate energy assets as they decide which ones they intend to concentrate upon for the medium to longer term.

"Instead of a broad-based portfolio, we now have companies starting to focus on a few types of assets," Hanna said.

Investment decisions

BP PLC in early November announced a decision that it would not invest in the UK's wind energy sector as planned but instead will focus on US wind projects.

The company said it remains committed to investing in a range of renewable energy worldwide.

Regarding carbon capture and storage (CCS), BP pulled out of bidding to build a demonstration CCS project in the UK. BP still plans to build demonstration CCS plants in Abu Dhabi and California through its Hydrogen Energy joint venture with Rio Tinto.

BP also plans to close its solar photovoltaic cells and panels factory in Sydney, Australia, by Mar. 31, 2009, because it wants to concentrate on larger-scale ventures, noting modern solar PV manufacturing plants are much larger than the Sydney plant.

Regarding biofuels, Hanna said BP has made some joint venture investments in Brazil that give it exposure to the agricultural side of the biofuels value chain. "The extension of their businesses into sourcing sugarcane has been a development," he said. "In addition we have also seen a number of developments by a number of oil companies in their investment in second-generation biofuels."

Biofuels and government policy

Hanna said it's difficult to say which alternative energy sources ultimately are going to be a winner or a loser because alternative energy remains associated with government policy and government incentives.

"Some of the argument for BP moving investment to the US was that some people felt that the way the US government incentivizes wind now makes this market a better bet for a number of the wind providers compared with other parts of the world," Hanna said.

Meanwhile, the emergence of alternative energy assets remains subject

"What you are seeing now is a move from the investigative to the pilot stage of developing new energy businesses. Oil companies are getting ready for full-scale ramp-up into some of the businesses that they have decided to move into."
—Arthur Hanna, managing director of Accenture's energy practice, London

to change, partially because of the economy.

"When the recession bites, which it will do in the next 3-6 months, we are likely to see government responses to that," Hanna said. "Not just in terms of what they are doing in response to the turmoil in the financial markets, but we're likely to see governments announcing investment programs to stimulate demand locally.

"That investment creates jobs, which is obviously what they are looking to do…but it can be an investment into the future as well," Hanna said. "We are seeing a number of governments getting ready for infrastructure investment announcements. It will be interesting to see if some of this investment is channeled into…the alternative energy industry." Meanwhile, oil companies are making strategic choices about their alternative energy options based upon where they see their competitive advantages and also based upon different government incentives.

"For example, StatoilHydro has a history of investment in carbon sequestration," Hanna said. "Because of this legacy, we would assume they have some potential advantage in their knowledge around this key technology of the future."

NOCs involved

National oil companies are looking at alternative energy. In January, Abu Dhabi announced it will invest $15 billion in the Masdar Initiative, which will focus on developing and commercializing renewable, alternative, and sustainable energy.

Masdar is driven by the Abu Dhabi Future Energy Co., which the government of Abu Dhabi owns through the Mubadala Development Co. Masdar acquired 20% interest in the London Array, a 1,000 MW wind project to be built off the UK. Masdar got its stake from Germany's E.On.

E.On and Denmark's Dong Energy became 50-50 partners in the project after Royal Dutch Shell dropped out. E.On retains a 30% stake in the offshore wind farm.

Meanwhile, Chinese companies are investing in biofuels. Ching National Petroleum Corp. and Sinopec dominate ethanol distribution and the retail network, a trend expected to continue, Accenture said in its biofuels study (OGJ, Sept. 22, 2008, p. 44).

"We definitely see the NOCs moving into the space," Hanna said. "The NOCs are not shy of moving forward into their area. They recognize that this is going to be part of the new energy fuels mix." ✦

CGES: Russia grappling with faulty oil export tax system

Sam Fletcher
Senior Writer

Russian producers and the government have been hit hard by a crude export tax system that has proven incapable of coping with the rapid drop in oil prices that started in early July.

Since October, the government has been forced to make unscheduled reductions in the export tax rate, twice cutting tax rates for November and December. "Had they not done so, oil producers in the country during October would have received just $1.43/bbl on average to cover production and transportation costs and pay mineral extraction taxes," said analysts at the Centre for Global Energy Studies in London.

"In November the situation would have been even worse, with the formula derived export tax exceeding the average price of Urals by more than $15/bbl during the first half of the month," CGES said.

Lowered export tax rates have improved the situation "somewhat," the analyst said. But the high cost of transporting oil from West Siberian fields to export terminals on the Baltic and Black seas has many producers still operating at a loss, even after the export tax has been reduced. Reductions have at least kept the tax "only just below" the monthly average Urals prices. "The margin in October was $17/bbl and fell to less than $12/bbl during the first half of November," CGES said.

Faulty formula

"The problem for Russian oil producers lies in the formula adopted by the government for calculating oil export taxes," CGES analysts reported. Under the current system, taxes are changed every 2 months based on the average price of Urals crude over a 2-month period prior to the effective date of the new tax rate. Thus, the tax rate for October and November was based on the average level of Urals oil prices during July and August.

"This meant that, according to the formula, producers would have been required to pay $485.80/tonne ($66.60/bbl) in October and November 2008, but this rate was initially cut for both months to $372.20/tonne ($51/bbl), with the November rate subsequently cut again to $287.30/tonne ($39.40/bbl). Crude oil export tax for December and January was originally set at $306.50/tonne ($42/bbl), was first cut for December to $287/tonne ($39.30/bbl), and then again to $192.10/tonne ($26.30/bbl)," analysis reported.

Under pressure from Prime Minister Vladimir Putin, the Russian government is revising the methodology for calculating the oil export tax. As proposed, the new export duty will be based on the average Urals price over a 30-day period ending in the middle of the month prior to implementation. Thus, the January export duty would be based on the average Urals price over the period from Nov. 16 to Dec. 15, said CGES.

"Putin wants the new export duty rules approved and in place by the beginning of December, allowing them to take effect in time for the beginning of 2009, although by then it is hoped that oil prices will have stopped falling quite as fast as they have been in recent months," the analysts reported.

Changes to the export duty may provide short-term relief for Russia's oil producers but "will do little to boost investment in the new exploration and production that is needed to reverse this year's decline in the country's oil output, which now looks likely to be around 0.5% down on last year," CGES analysts said.

"Although new fields have been brought into production in East Siberia and Timan Pechora, they have yet to have much impact on overall production levels. Rising production from Surgutneftegaz's Talakan field and the TNK-BP-operated Verkhnechonsk, both in East Siberia, and the Lukoil-Conoco Yuzhno-Khlyuchu (YK) field in Timan-Pechora, together with the expected startup of Rosneft's Vankor field and TNK-BP's Uvat development and the beginning of year-round production from the Gazprom-led Sakhalin-2 project should all help to stabilize Russian production next year and return the country to year-on-year output growth," the analysts said. However, they added, "The next stage of the country's oil development requires massive investment in East Siberia and much greater changes to the oil taxation regime."

ESPO pipeline link

In an Oct. 29 report, CGES noted that most of the new fields that Russia hopes to bring on stream are in East Siberia and will be linked to the new East Siberia-Pacific Ocean (ESPO) pipeline that will transport oil to Skovorodino for delivery by rail to an export terminal on Russia's Pacific coast near Nakhodka.

In that report, CGES said oil production data from the central dispatching unit of Russia's Ministry of Industry and Energy showed a year-on-year drop of 370,000 tonnes (90,000 b/d), a fall of 1%, in August. Aggregate Russian oil production over the first 8 months of 2008 was reported a little above 325 million tonnes, equivalent to 9.73 million b/d, using a conversion factor of 7.3 bbl/tonne for Russian oil. Production during January-August was 1.4 million tonnes lower this year than last, a dip of 0.42%. Allowing for an extra day as a result of 2008 being a leap year, daily production was down by 80,000 bpd, a fall of 0.8% compared with the same period in 2007.

Protracted slowdown

Russia's oil production growth has shown previous signs of faltering, most notably in early 2005 when production

rates fell from peak levels reached in the third quarter of 2004. However, CGES analysts said the recent slowdown has been more protracted, extending from a month-on-month decline in production to the first year-on-year drop since the revival of the Russian oil industry in the late 1990s.

The Russian government expects its total 2008 oil production to be up 1% (4.9 million tonnes) above last year's 491 million tonnes total. "It will be helped, of course, by the extra day this year, which is worth an additional 1.34 million tonnes of oil at the current average rate of production. Were this rate to be maintained for the rest of the year, aggregate oil production for 2008 would be just short of 489 million tonnes, 2.2 million tonnes down on last year's level," said CGES analysts. However, they said prospects for a surge in Russian output in the last quarter of this year are mixed. ✦

WoodMac: Natural gas to trade at $5-6/MMbtu to 2013

US natural gas is expected to trade at $5-6/MMbtu over the next 5 years, said an executive of Wood Mackenzie Ltd., Edinburgh, at a recent energy forum sponsored by that firm in Houston.

Jen Snyder, head of WoodMac North American Gas Research, told forum participants that the industry's successful development of shale gas plays has positioned the market for "significant potential over-supply." Snyder rejects a popular theory that gas prices will settle eventually at the marginal cost of the most expensive shale plays. That represents "a mistaken reading of the current and future environment," she said. "Simply stated, there is no requirement for the rapid near-to-midterm development of some of the more expensive or challenging shales such as the Marcellus or Horn River; the market can be adequately supplied without these volumes."

She sees "sufficient volumes available at a development break-even price of $5.50/MMbtu or below." That conclusion is based on declining demand due to "a prolonged recession" to fourth-quarter 2010, new wind and coal-fired capacity coming online to generate electricity, and "a significant drop in drilling activity" because of a lower commodity price. "We have also factored in the positive impact on break-even costs due to cost reductions associated with this drilling slow-down and continued optimization of drilling solutions at those plays that will continue to be aggressively developed," Snyder said.

Furthermore, she said, "The results of our Global Gas Optimization Model point to significant import volumes of LNG over the next few years, despite the recent growth in unconventionals." Existing offtake agreements for some suppliers "make diversions from North America unlikely," Snyder said. "In addition, other suppliers with flexible LNG will want to avoid jeopardizing long-term contract prices in Europe and Asia, through a further weakening of spot prices in these areas." Qatar in particular will likely direct some of its new LNG volumes to the US market "where there are no long-term contract implications and a large and liquid market to absorb the volumes," Snyder said.

WoodMac's projected gas price of $5-6/MMbtu would not be a floor price, as near-term market weakness could force prices below that range, Snyder said.

"Our near-term forecast is predicated on a normal winter. While a severe winter could tighten up the market and provide some near-term support, equally a mild winter could exacerbate the current position of over-supply and lead to prices into the $4/MMbtu range in the near term," Snyder added. "We have also assumed that gas demand benefits from a 1.5 bcfd switch from coal to gas-fired power generation. If this fails to materialize due to collapsing coal prices, this would further add to short-term price weakness." ✦

Analyst sees Libya's oil, gas production rising

Eric Watkins
Oil Diplomacy Editor

Libya will supply 17.37% of Africa's regional oil supply by 2012, while accounting for about 7.45% of African oil demand, according to a recent BMI analyst report.

BMI said African regional oil production, which reached 7.84 million b/d in 2001 and averaged 10.13 million b/d in 2007, is set to rise to 12.66 million b/d by 2012.

It said regional oil use, which stood at 2.98 million b/d in 2001 and rose to 3.58 million b/d in 2007, should average 3.66 million b/d in 2008 before increasing to around 4.05 million b/d by 2012.

In terms of natural gas, the region in 2007 consumed 100 billion cu m (bcm), with demand of 171 bcm targeted for 2012, representing growth of 71.1%.

"Production of 193 bcm in 2007 should reach 331 bcm in 2012 (+71.6%), which implies net exports rising to 161 bcm by the end of the period, up from 94 bcm in 2007," BMI said.

Libya in 2007 consumed 6.33% of the region's gas, with its market share forecast at 4.29% by 2012. It contributed 7.87% to 2007 regional gas production and by 2012 will account for 9.66% of supply.

OPEC price up 24%

In the second quarter of 2008, BMI estimates that the OPEC basket price averaged just under $115/bbl—up about 24% from the first quarter level. The OPEC basket price exceeded $127 on May 22, slipping back towards $121/bbl later in the month.

In June, BMI assumed an average of about $120 to deliver its quarterly estimate of $114.98/bbl. The estimated second-quarter 2008 average prices for the main marker blends are now $118.63 for Brent, $119.61 for WTI, and $115.89/bbl for Russian Urals (Mediterranean delivery).

"Our projections for 2008 as a whole have been revised upwards from the last quarterly report," the analyst said, adding, "We are now assuming an OPEC basket price average of $106/bbl for 2008, compared with the $81 estimate provided by our last quarterly report."

Based on recent price differentials, this implies Brent at $109.71, WTI averaging $110.64/bbl, and Urals at $106.88/bbl.

Libyan real gross domestic product growth is now forecast by BMI at 7% for 2008, following 5.6% in 2007. The analyst is assuming 6.6% growth in 2009, followed by 6.8% in 2010-12.

Oil demand to rise

BMI expects oil demand to rise to 302,000 b/d in 2012 from 260,000 b/d in 2007, representing 3% annual growth. Libya's state-owned National Oil Corp. in 2006 accounted for 45% of oil production and all gas production, but it has a growing number of international oil company partners contributing to a forecast rise in oil production to 2.20 million b/d by 2012 from 1.85 million b/d in 2007.

"The state itself has far more ambi-

WATCHING THE WORLD

Eric Watkins, Oil Diplomacy Editor

Blog at www.ogjonline.com

Cash flows to ice floes

No one can be sure if Santa Claus exists, but oil and gas companies may soon find out as more of them head toward the North Pole in the search for new reserves.

Cairn Energy PLC plans to delay oil and gas exploration activity in the Mediterranean for a year to focus on operations in India, Greenland, and other areas.

Two Mediterranean wells Cairn had planned in the next 12 months will be deferred until 2010, says Cairn exploration chief, Mike Watts.

The deferral is partly because Cairn, which has exploration licenses in Tunisian waters, didn't like the prices it was offered for drilling rigs, and wanted to focus efforts on other areas.

In India, Cairn is leading a development to export oil from several fields in Rajasthan, which will start up next year and are expected to reach plateau production of 175,000 b/d of oil.

India's cash flows

But that's not all. Cairn plans to use its cash flow from India to pay for drilling off Greenland starting in 2011. It expects to drill 10 exploration wells over 5 years at a cost of $1 billion.

If that sounds a little like a gamble, keep in mind that the US Geological Survey estimates there could be 50 billion bbl of oil and gas equivalent in Greenland's largely unexplored waters.

Watts made his own optimism clear at a recent signing ceremony for two oil and gas exploration blocks off southern Greenland, saying the country represents a true frontier.

"There are many technical, operational, and environmental challenges ahead, yet the available evidence suggests that the offshore contains the geological ingredients necessary for finding hydrocarbons," Watt said.

"In essence," said Watt, "we are here today because we both recognize and believe in the potential of Greenland, and Cairn wants to play an active and catalytic role."

Greenland's ice floes

Watt is not alone in his thinking, as voters in Greenland recently backed a move for greater independence from Denmark, a move that includes national ownership of the island's oil, gas, and other mineral resources.

Under the plan, Greenlanders will have more control over their natural resources by getting the first 75 million kroner ($12.6 million) of annual oil revenue. Any income beyond that would be shared equally between Greenland and Denmark.

The current agreement states that the first 500 million kroner ($84 million) of oil revenue should be shared equally, and that the division of any amount beyond that must be negotiated.

"The tears are running down my cheeks," Greenland Premier Hans Enoksen said, adding that "We have said 'yes' to the right of self-determination, and with this we have accepted a great responsibility."

"Our future is bright," said Enoksen.

Who knows? Perhaps there really is a Santa Claus. ✦

WATCHING GOVERNMENT

Nick Snow, Washington Editor

Blog at www.ogjonline.com

Republicans on the rise

Two congressional Republicans are poised to move into important positions for the oil and gas industry as the US Senate and House change committee assignments. Lisa Murkowski (Alas.) is in line to be the Senate Energy and Natural Resources Committee's new ranking minority member, and Darrell E. Issa (Calif.) will likely be the top Republican on the House Oversight and Government Reform Committee.

Democrats will continue to set the agendas for both committees. Republican leaders nevertheless could have an impact, especially in developing bipartisan solutions.

Murkowski would succeed Pete V. Domenici (NM), who worked for years with Democrat Jeff Bingaman (NM) in developing substantive energy legislation before retiring at the end of this session. Larry E. Craig (Ida.) had more seniority but did not run for re-election.

Concise questions

At Senate Energy committee hearings, Murkowski has asked concise, relevant questions (in contrast to other committee members who tend to ramble). Moreover, Murkowski's points usually aren't overtly partisan but seem to be genuine attempts to get more information. She and Bingaman should work well together.

Issa, who is the sole candidate so far to succeed Thomas M. Davis III (Va.) as the House Oversight and Government Reform Committee's ranking minority member, is in a different situation.

As ranking minority member of the Domestic Policy Subcommittee, which he became when the GOP lost its majority in the 2006 elections, Issa and Davis tried several times to bring issues to the attention of committee chairman Henry A. Waxman (Calif.).

Issa seemed particularly frustrated that Waxman and other committee Democrats did not continue the deepwater oil and gas royalty investigation, which the Energy and Resources Subcommittee began during the 109th Congress.

Missing thresholds

That inquiry examined the absence of price thresholds in deepwater leases issued by the US Minerals Management Service in 1998-99. The Government Accountability Office estimated this could cost the government more than $10 billion.

If Issa becomes the committee's ranking minority member, he must work with a new chairman; Waxman replaces John D. Dingell (Mich.) at the helm of the Energy and Commerce Committee. Democrats have not chosen Waxman's successor on the Oversight and Government Reform panel.

Natural Resources Committee Chairman Nick J. Rahall (W.Va.) also has taken the lead in examining federal natural resources management the past 2 years in the House and has raised other questions about royalties.

Issa could decide to move on to other issues, or could continue his attempts to revive the deepwater royalty relief investigation. In either case, the US Department of the Interior might want to investigate long-time parking on Capitol Hill for officials who will be called before committees there. ✦

tious volume goals that may be frustrated by OPEC quota policy," BMI said.

Libya's gas production should reach 32 bcm by 2012, up from 15.2 bcm in 2007, while its consumption is expected to rise to 7.3 bcm by the end of the forecast period, from 6.3 bcm, allowing exports of 24.7 bcm.

During 2007-18, BMI is forecasting an increase in Libyan oil and gas liquids production of 40.7%, with volumes rising steadily to 2.6 million b/d by the end of the 10-year forecast period.

Oil consumption during 2007-18 is set to increase by 46.7%, with growth slowing to an assumed 4%/year towards the end of the period and the country using 382,000 b/d by 2018.

Gas production is expected to rise to 60 bcm by the end of the period. With demand rising by almost 47% during 2007-18, there should be export potential increasing to about 51 bcm, via pipeline and in the form of LNG. ✦

BLM Utah head defers leases in response to NPS concerns

Nick Snow
Washington Editor

US Bureau of Land Management Utah State Director Selma Sierra agreed on Nov. 25 to defer from a Dec. 19 oil and gas lease sale all parcels of concern to the US National Park Service (NPS) following 2 days of discussions between the agencies.

NPS Intermountain Regional Director Rick Snyder expressed concern to Sierra in October about lease parcels near Arches and Canyonlands national parks in southeastern Utah and Dinosaur National Monument in eastern Utah. Snyder, who is based in Denver, flew to Salt Lake City on Nov. 24 as representatives of the two US Department of the Interior agencies held their discussions.

The two agencies also agreed to renew their 1993 memorandum of

understanding regarding how BLM's Utah offices and NPS will work together on prospective oil and gas lease offerings, Sierra said in an announcement issued in Salt Lake City. BLM and NPS are developing a draft of the renewed agreement, she said.

"This constructive dialogue between our agencies has resulted in a positive outcome. Ongoing discussions with [NPS] will continue to strengthen our collaboration and coordination. This is important for two sister agencies with environmental stewardship missions," Sierra said. The agencies were able to reach an agreement despite having different land stewardship approaches, she said. BLM has a complex multiple use mission while NPS strives to preserve unimpaired national parks' natural and cultural resources, the Utah BLM director observed.

'The process worked'

"I recognize that NPS had requested that I defer the parcels the day they were posted, but I wanted to have the opportunity to engage in dialogue to discuss the newly approved resource management plans and the much stricter environmental protections included in our decisions before making an arbitrary decision to defer parcels. Moreover, the process we are currently following allows for dialogue and I believe in our case, the process worked as intended," she said in a Nov. 25 letter to Snyder.

Sierra said she also would consult with other partners which BLM works with regularly. "As you know, based on BLM's regulatory requirements, we also maintain a consulting agency relationship with state and county agencies directly affected by land management decisions on public land. These state and county officials also participated in formulating the resource management plans on which leasing decisions are based and they have invested much time and effort in the decisions these documents represent," she told Snyder.

Environmental organizations in the region said on Nov. 26 that NPS actually is being forced to accept leasing on land that the agency contends will damage the parks' air and water, and compromise the parks' "natural quiet."

Stephen Bloch, conservation director for the Southern Utah Wilderness Alliance in Salt Lake City, said, "Despite public protests and the concerns of its own park service, the outgoing Bush administration is using this sale to push its extreme drill everywhere agenda, and America's national parks and other spectacular public lands will be the worse for it."

Maria Cantwell (D-Wash.) and seven other US senators urged US Interior Secretary Dirk A. Kempthorne on Nov. 25 to postpone the lease sale because NPS and other stakeholders were not given enough time initially to outline their concerns. ✦

Saudi Aramco delays fourth development project

Eric Watkins
Oil Diplomacy Editor

Saudi Aramco, continuing to review and delay development projects in the light of the global financial crisis, has cancelled plans for a $1.2 billion project to restart production from its historic Dammam oil field.

"We were told it is not a priority in the current environment," said one international contracting executive, who added that, "It has been cancelled for the time being but may be looked at again in the future."

Apart from general financial considerations, Dammam oil field development project was considered to be especially expensive due to its location under the highly populated city of Dhahran, which added environmental and safety concerns.

"I'm sure also that due to the area being populated, the cost for redevelopment was excessive," said another industry source, who noted that the project could be rebid at a later date.

Oil was first discovered in Saudi Arabia in 1938 at what is now known as the Prosperity well in Dammam field. The field has never produced more than 10,000 b/d of oil.

However, following recent seismic studies lasting 18 months, Aramco had been looking to produce 100,000 b/d of oil and 100 MMcfd of gas from Dammam field, possibly by yearend 2012.

Industry sources said the project involved drilling at least two new production wells along with water injection facilities and laying 100 km of pipeline.

Aramco had invited companies to express their interest in a front-end engineering and design study to be awarded in early 2009.

The study was expected to take 9 months and construction 3 years, putting startup in late 2012 or early 2013, at the earliest.

Contractors were expected to bid for a contract to perform the feasibility study, but after a number of contractors prequalified, Aramco told interested companies it had cancelled the bidding process.

It did not say which firms had prequalified, but most major contracting firms, including France's Technip, Foster Wheeler and Fluor of the US, and Canada's SNC Lavalin, were expected to bid for the contract.

Aramco has chosen to delay several other projects in the wake of the global financial problems: the 400,000 b/d Yanbu refinery, the 900,000 b/d Manifa oil field development, and the 400,000 b/d refinery project at Jubail. ✦

US, Canadian producers post strong 3Q results

Marilyn Radler
Senior Editor-Economics

Laura Bell
Statistics Editor

Record oil prices in July and strong refining margins in September resulted in a surge in earnings for a group of US-based oil and gas producers and refiners for the third quarter of this year.

The sample of companies recorded a combined 103% spike in earnings for the period.

For the first 9 months, the group's collective profits climbed 39%.

OGJ also looked at a sample of producers and pipeliners based in Canada. These companies' earnings during the third quarter increased 155% from a year earlier, while their profits in the first 9 months moved up 67%.

Meanwhile, the combined earnings for a group of service and supply firms was little changed from a year earlier for both the 3-month and the 9-month periods.

Prices, margins

The peak near-month futures closing price of crude on the New York Mercantile Exchange was $145.29/bbl, set on July 3. The same day, the near-month natural gas futures contract closed at $13.577/MMbtu. Through the remainder of the quarter, the closing prices of each of these commodities declined, with oil falling 31% by the end of September and gas down 45%.

An active Gulf of Mexico hurricane season, which curtailed imports of crude and shut down power at refineries along the upper Texas coast, drove refining margins much higher in September from a month earlier.

With a September average of $21.29/bbl, the Gulf Coast cash refining margin in the third quarter averaged $10.95/bbl, according to Muse, Stancil & Co. For Midwest refineries, the cash margin averaged $16.18/bbl in the third quarter. The average cost of imported and domestic crude for US refiners during the third quarter was $115.55/bbl. This compares with the third-quarter 2007 average of $71.41/bbl, as reported by the US Energy Information Administration.

US operators

A group of US-based oil and gas producers and refiners doubled their earnings in the third quarter from a year earlier, largely as a result of strong oil and product prices. The group's combined revenues were up 46% from

third-quarter 2007.

Most of the independent producers as well as the integrated firms posted improved results in the recent quarter compared with a year earlier. Only 9 of the companies in the sample of 77 US operators recorded a net loss for the most recent quarter.

ExxonMobil Corp. reported record earnings of $14.8 billion for the third quarter on revenues of $137.7 billion. The company's upstream earnings, excluding the gain related to the sale of a German natural gas transportation business, were $9.35 billion, up $3 billion from third-quarter 2007.

Higher oil and gas realizations increased earnings about $4.4 billion, while lower sales volumes decreased earnings about $1.3 billion. During the third quarter, ExxonMobil's total worldwide production declined 8% from the third quarter of 2007.

As a result of higher margins, ExxonMobil's downstream earnings of $3 billion were up $1 billion from third-quarter 2007. Unfavorable foreign exchange effects were a partial offset, and product sales of 6.7 million b/d were 413,000 b/d lower than in third-quarter 2007, reflecting asset sales and lower demand.

Chevron Corp. reported net income of $7.9 billion for this year's third quarter, compared with $3.7 billion a year earlier, as upstream and downstream earnings soared. Chemicals earnings declined in the recent quarter.

While upstream earnings benefited from much higher oil prices than during the 2007 third quarter, earnings for the most recent quarter were tempered by the effects of hurricanes in the gulf in September, Chevron said.

Like many of the independent producers in the sample, Petrohawk Energy Corp. reported improved results for the recent quarter. Petrohawk's third-quarter earnings of $305.5 million were up from $26.8 million a year earlier. The company's net gain on derivatives contracts was $388.2 million in the recent quarter vs. $20.3 million in third-quarter 2007.

Similarly, Carrizo Oil & Gas Inc. reported a surge in earnings to $66.2 million from $4.2 million a year earlier, mostly due to an $81.8 million mark-to-market gain on derivatives.

Cabot Oil & Gas Corp. posted $67

US OIL AND GAS FIRMS' THIRD QUARTER 2008 REVENUES, EARNINGS (CONTINUED ON P. 38)

Table 1

	Revenues		Net income		Revenues		Net income	
	3rd quarter				Nine months			
	2008	2007	2008	2007	2008	2007	2008	2007
	Million $ (US)							
Anadarko Petroleum Corp.	6,149.0	2,995.0	2,165.0	481.0	11,913.0	12,830.0	2,475.0	3,516.0
Apache Corp.	3,364.9	2,505.0	1,190.8	613.3	10,452.8	6,980.4	3,657.6	1,739.8
Apache Offshore Investment Partnership	2.0	1.9	1.3	1.3	6.9	5.6	4.9	3.5
Approach Resources Inc.	22.0	8.3	19.8	2.1	65.2	27.4	23.5	4.5
Atlas America Inc.	780.7	411.5	24.1	7.1	1,617.5	841.3	22.8	37.2
ATP Oil & Gas Corp.	119.4	118.1	36.5	2.3	540.0	401.2	71.5	35.9
Aurora Oil & Gas Corp.	9.4	7.2	(16.7)	(3.3)	23.9	20.8	(18.6)	(3.8)
Basic Earth Science Systems Inc.[1]	6.1	3.5	2.3	0.7	2.8	1.8	0.9	0.4
Berry Petroleum Co.	240.8	133.5	53.3	26.9	641.6	430.2	145.5	97.7
Bill Barrett Corp.	165.2	82.9	36.1	0.2	472.8	283.0	100.8	24.3
Brigham Exploration Co.	47.2	31.4	15.3	4.2	97.5	93.3	18.3	8.4
Cabot Oil & Gas Corp.	244.8	170.8	67.0	35.5	713.3	538.3	167.6	125.4
Carrizo Oil & Gas Inc.	58.6	30.4	66.2	4.2	179.7	86.4	48.3	9.8
Chaparral Energy Inc.	101.8	156.0	5.3	78.5	259.5	361.6	1.3	45.5
Cheniere Energy Inc.	7.6	21.4	(67.4)	(53.5)	24.4	66.7	(249.7)	(129.1)
Chesapeake Energy Corp.	7,491.0	2,028.0	3,313.0	372.0	8,648.0	5,723.0	1,584.0	1,148.0
Chevron Corp.	78,867.0	55,173.0	7,893.0	3,718.0	227,802.0	159,494.0	19,036.0	13,813.0
Cimarex Energy Co.	576.5	343.8	(232.1)	73.2	1,670.0	992.7	147.0	216.5
Clayton Williams Energy Inc.	147.0	101.8	94.6	1.0	475.1	266.9	80.6	(2.5)
CNX Gas Corp.	216.9	110.7	67.4	31.3	583.4	359.7	181.6	105.8
Comstock Resources Inc.	169.8	83.3	224.6	16.4	491.1	236.7	348.3	47.2
ConocoPhillips	71,373.0	47,933.0	5,188.0	3,673.0	201,278.0	140,197.0	14,766.0	7,520.0
Continental Resouces Inc.	293.6	156.8	105.3	56.4	824.7	423.2	320.5	(32.3)
Credo Petroleum Corp.[2]	5.7	3.8	3.3	2.4	14.4	11.8	4.0	5.0
Delta Petroleum Corp.	60.8	43.9	49.8	(5.0)	186.5	119.5	7.7	(118.7)
Denbury Resources Inc.	410.3	253.5	157.5	68.0	1,145.6	650.2	344.6	147.2
Devon Energy Corp.	5,978.0	2,763.0	2,618.0	735.0	12,501.0	8,165.0	4,668.0	2,290.0
Dorchester Minerals LP	24.5	14.7	18.6	9.5	74.7	47.0	57.2	30.7
El Paso Corp.	1,598.0	1,166.0	445.0	155.0	4,020.0	3,386.0	855.0	950.0
Encore Acquisition Co.	337.5	195.0	206.3	12.0	967.7	515.2	201.8	(2.3)
Energy Partners Ltd.	95.0	110.7	34.4	(4.0)	318.5	341.4	40.8	(6.5)
EOG Resources Inc.	3,219.5	986.2	1,556.3	204.0	5,353.0	2,925.9	1,975.4	728.7
Equitable Supply	297.8	226.8	96.2	32.9	1,167.6	976.6	222.1	196.9
Exco Resources Inc.	1,331.5	333.4	(146.3)	56.5	1,119.8	712.1	(522.1)	51.7
ExxonMobil Corp.	137,737.0	102,337.0	14,830.0	9,410.0	392,663.0	287,910.0	37,400.0	28,950.0
Fidelity Exploration & Production Co.	116.7	76.8	57.5	33.2	336.0	200.0	179.8	99.0
Forest Oil Corp.	474.2	313.0	429.0	58.0	1,365.9	750.3	356.3	141.7
Frontier Oil Corp.	2,199.4	1,392.6	72.3	137.2	5,155.3	3,886.8	177.6	455.7
Gasco Energy Inc.	28.3	4.0	21.0	(35.1)	40.8	16.6	15.8	(101.6)
Helix Energy Solutions Group Inc.	616.2	460.6	61.5	83.8	1,607.4	1,267.2	228.5	199.2
Hess Corp.	11,388.0	7,504.0	775.0	395.0	33,843.0	22,424.0	2,434.0	1,322.0
HKN Inc.	5.6	6.0	(3.2)	1.0	19.0	18.0	0.3	2.8
Holly Corp.	1,719.9	1,208.7	49.9	58.1	4,943.7	3,351.5	70.0	284.3
Kinder Morgan CO_2 Co. LP	305.2	210.6	203.3	138.0	900.2	601.7	619.7	392.3
Lucas Energy Inc.[1]	1.0	0.5	(0.5)	0.1	2.3	1.0	0.9	0.1
Marathon Oil Corp.	23,446.0	16,954.0	2,064.0	1,021.0	63,771.0	46,843.0	3,569.0	3,288.0
Murphy Oil Corp.	8,186.0	4,780.7	584.4	199.5	23,081.9	12,829.2	1,612.6	560.4

US OIL AND GAS FIRMS' THIRD QUARTER 2008 REVENUES, EARNINGS (CONTINUED FROM P. 37)

	Revenues		Net income		Revenues		Net income	
	3rd quarter				Nine months			
	2008	2007	2008	2007	2008	2007	2008	2007
	Million $ (US)							
Newfield Exploration Co.	680.0	419.0	724.0	83.0	1,887.0	1,384.0	416.0	137.0
Noble Energy Inc.	1,098.0	814.0	974.0	223.0	3,328.0	2,350.0	1,045.0	644.0
Occidental Petroleum Corp.	7,119.0	5,055.0	2,271.0	1,324.0	20,413.0	14,442.0	6,414.0	3,948.0
Parallel Petroleum Corp.	56.2	29.5	58.7	0.3	156.3	80.1	26.7	3.7
Penn Virginia Corp.	385.6	215.8	123.7	17.1	995.2	624.4	123.9	45.4
Petrohawk Energy Corp.	305.0	213.3	305.5	26.8	824.5	656.1	157.1	53.0
PetroQuest Energy Inc.	78.4	65.5	18.0	8.0	248.1	196.3	56.5	28.5
Pioneer Natural Resources Co.	615.8	490.1	(3.0)	101.9	1,865.6	1,299.7	285.5	168.0
Plains Exploration & Production Co.	719.5	299.0	493.1	32.9	2,075.3	779.2	859.6	78.7
Questar Corp.	773.4	512.9	204.2	113.3	2,603.3	1,992.7	562.6	376.6
Quicksilver Resources Inc.	236.3	159.2	(2.7)	28.7	591.8	412.2	91.9	83.3
Range Resources Corp.	622.7	242.4	285.3	58.9	978.1	638.7	252.5	196.3
Rex Energy Corp.	18.8	13.3	36.8	(0.8)	53.5	37.5	(8.4)	(5.6)
Rosetta Resources Inc.	130.6	90.0	(99.4)	12.7	414.0	253.9	(32.6)	39.8
Southwestern Energy Co.	683.0	297.6	218.2	51.0	1,811.5	852.4	463.7	149.5
St. Mary Land & Exploration Co.	324.3	247.0	88.0	57.7	1,043.5	715.5	217.6	156.8
Stone Energy Corp.	174.6	183.7	34.1	34.1	645.5	558.6	179.2	116.5
Sunoco Inc.	16,109.0	11,497.0	549.0	216.0	45.0	31.6	572.0	900.0
Swift Energy Co.	213.8	171.3	61.9	42.3	675.4	457.8	192.2	101.4
Tesoro Petroleum Corp.	8,698.0	5,902.0	259.0	47.0	23,983.0	15,382.0	181.0	606.0
Toreador Resources Corp.	17.7	12.4	0.1	(20.7)	51.5	29.2	(70.1)	(54.6)
Ultra Petroleum	297.7	117.4	149.0	37.4	877.4	405.5	349.2	153.1
Unit Corp.	375.6	286.3	92.3	64.1	1,067.1	850.2	263.5	194.1
VAALCO Energy Inc.	56.1	35.9	22.3	8.8	155.0	91.0	37.2	17.1
Valero Energy Corp.	35,960.0	23,699.0	1,152.0	1,274.0	100,545.0	66,656.0	2,147.0	4,667.0
W&T Offshore Inc.	289.8	255.2	78.2	36.3	1,107.3	774.3	292.6	94.9
Warren Resources Inc.	34.2	17.2	15.8	3.1	92.6	41.4	43.0	7.3
Whiting Petroleum Corp.	388.4	233.5	112.4	47.7	998.3	586.4	255.2	84.9
Williams Cos. Inc.	3,267.0	2,860.0	366.0	198.0	10,220.0	8,052.0	1,303.0	765.0
XTO Energy Inc.	2,125.0	1,421.0	521.0	412.0	5,734.0	3,919.0	1,561.0	1,227.0
Total	**451,890.0**	**309,808.5**	**53,544.7**	**26,446.3**	**1,208,867.4**	**853,160.8**	**115,690.3**	**83,180.2**

[1]2nd quarter. [2]3rd quarter July 31.

million in third-quarter earnings, up 89% from a year earlier. The Houston-based producer reported higher realized prices and higher gas production levels. Realized gas prices grew 27%, and crude realizations increased 40% from third-quarter 2007.

Refiners

For the first 9 months of this year, most US refiners posted lower earnings from a year earlier as a result of high crude costs. For the most recent quarter, the refiners in the sample posted varied results.

Holly Corp. and Valero Energy Corp. recorded lower net income compared with third-quarter 2007, but Sunoco Inc. and Tesoro Petroleum Corp. reported jumps in their earnings for the same quarter vs. a year earlier.

Valero's earnings declined 10% to $1.15 billion in the recent quarter, as the San Antonio-based refiner posted $35.96 billion in revenues for the 3 months. This includes a pretax gain of $305 million on the sale of the Krotz Springs, La., refinery, which was effective July 1. Bill Klesse, Valero chairman and chief executive officer, said conditions were volatile for third-quarter product margins.

"Low gasoline margins in July were

CANADIAN OIL AND GAS FIRMS' THIRD QUARTER 2008 REVENUES, EARNINGS

Table 2

	Revenues		Net income		Revenues		Net income	
	3rd quarter				Nine months			
	2008	2007	2008	2007	2008	2007	2008	2007
	Million $ (Can.)							
Bow Valley Energy Ltd.	29.3	12.9	(2.4)	7.7	99.4	21.5	4.2	3.5
Canadian Natural Resources Ltd.	4,583.0	3,073.0	2,835.0	700.0	13,662.0	9,343.0	3,215.0	1,810.0
Enbridge Inc.	4,368.5	2,634.0	150.1	79.8	12,207.8	8,720.9	1,062.5	456.7
EnCana Corp.	11,408.7	5,930.1	3,765.1	989.8	24,827.7	16,579.0	5,157.6	3,048.8
Gentry Resources Ltd.	63.1	31.5	15.2	(0.4)	138.5	85.7	21.5	2.2
Husky Energy Inc.	8,175.6	4,610.8	1,347.9	814.9	21,194.0	11,400.3	3,732.3	2,267.8
Imperial Oil Ltd.	9,515.0	6,430.0	1,389.0	816.0	25,637.0	18,703.0	3,218.0	2,302.0
Ivanhoe Energy Inc.	35.6	8.8	10.1	(7.2)	44.0	27.7	(20.2)	(20.4)
Nexen Inc.	2,344.0	1,672.0	886.0	403.0	6,541.0	4,758.0	1,896.0	892.0
Pennwest Energy Trust	1,174.0	507.0	1,062.0	138.0	3,409.0	1,470.0	817.0	48.0
Petro-Canada	8,286.0	5,497.0	1,251.0	776.0	22,518.0	15,816.0	3,825.0	2,211.0
Suncor Energy Inc.	8,946.0	4,802.0	815.0	627.0	22,893.0	13,380.0	2,352.0	1,941.0
Talisman Energy Inc.	2,822.0	1,870.0	1,425.0	352.0	7,964.0	5,573.0	2,317.0	1,422.0
TransCanada Corp.	2,137.0	2,187.0	390.0	324.0	6,287.0	6,639.0	1,163.0	846.0
Total	**63,887.8**	**39,266.0**	**15,339.1**	**6,020.6**	**167,422.4**	**112,517.1**	**28,760.8**	**17,230.5**

SERVICE-SUPPLY COMPANIES' THIRD QUARTER 2008 REVENUES, EARNINGS

Table 3

	Revenues — 3rd quarter		Net income — 3rd quarter		Revenues — Nine months		Net income — Nine months	
	2008	2007	2008	2007	2008	2007	2008	2007
	Million $ (US)							
Baker Hughes Inc.	3,009.6	2,677.6	428.9	389.1	8,677.5	7,687.9	1,203.2	1,113.4
Bronco Drilling Co. Inc.	73.0	76.7	(0.9)	11.1	209.3	230.6	11.6	31.2
Cameron International Corp.	1,514.4	1,192.2	166.3	150.7	4,346.9	3,345.6	444.6	375.0
CB&I Co.	1,565.5	1,180.1	8.6	58.7	4,438.8	3,064.8	(89.7)	121.4
Deep Down Inc.	11.7	4.9	1.6	0.2	25.9	12.1	(3.4)	1.0
Diamond Offshore Drilling Inc.	903.4	652.7	310.7	205.5	2,651.2	1,927.1	1,017.6	681.6
Dril-Quip Inc.	132.7	132.8	27.6	27.4	368.8	410.4	75.8	80.5
Fluor Corp.	5,673.8	4,115.2	183.1	93.7	16,254.4	11,978.6	530.4	273.9
Foster Wheeler Ltd.	1,730.8	1,312.3	127.9	129.1	5,250.3	3,666.0	426.7	315.8
Grey Wolf Inc.	235.8	227.3	24.3	35.6	658.5	703.6	87.9	135.9
Gulfmark Offshore Inc.	125.0	75.5	45.4	31.2	290.8	217.3	124.5	86.3
Halliburton Co.	4,859.0	3,954.0	(21.0)	727.0	13,404.0	11,185.0	1,070.0	2,809.0
Hornbeck Offshore Services Inc.	109.2	98.8	33.5	28.9	312.4	253.8	82.0	69.0
Nabors Industries Ltd.	1,440.3	1,225.5	210.3	218.0	4,065.3	3,631.5	635.2	708.5
Noble Corp.	864.3	798.2	382.5	318.3	2,543.4	2,172.3	1,142.4	858.6
Oceaneering International Inc.	516.1	485.7	55.0	53.9	1,452.2	1,262.0	148.4	134.9
Parker Drilling Co.	227.5	172.2	18.6	22.7	617.5	473.7	65.0	69.5
Patterson-UTI Energy Inc.	609.1	525.1	108.7	98.2	1,640.8	1,595.6	267.6	353.5
Pioneer Drilling Co.	174.5	107.2	24.2	11.8	441.2	315.1	55.2	42.1
Pride International Inc.	607.2	520.0	189.1	401.5	1,688.9	1,469.1	617.4	649.3
Rowan Cos. Inc.	528.1	507.8	114.1	130.8	1,605.1	1,488.0	333.3	345.3
RPC Inc.	237.2	162.0	25.8	14.9	649.2	504.1	63.0	66.8
Schlumberger Ltd.	7,258.9	5,925.7	1,526.4	1,354.0	20,294.9	17,028.8	4,246.8	3,793.3
Smith International Inc.	2,850.0	2,246.2	209.8	166.8	7,716.8	2,470.0	568.1	480.0
Transocean Inc.	3,199.0	1,545.0	1,106.0	973.0	9,434.0	4,317.0	3,402.0	2,075.0
Weatherford International Inc.	2,540.8	1,972.0	370.6	292.7	6,965.9	5,640.2	1,005.8	739.6
Total	**40,996.9**	**31,892.7**	**5,677.1**	**5,944.8**	**116,004.0**	**87,050.2**	**17,531.4**	**16,410.4**

followed by higher margins in August as production adjusted to demand," Klesse said, adding, "When the hurricanes hit the Gulf Coast and reduced refinery production, gasoline inventories fell to historically low levels, and margins responded, which increased average margins for the third quarter. In contrast to the volatile movement of gasoline margins, distillate margins remained very good throughout the third quarter as global supply and demand balances were tight."

Canadian operators

A sample of producers and pipeline operators based in Canada posted a combined surge in third quarter net income to $15.3 billion (Can.), up from $6 billion (Can.) a year earlier.

Nearly all of the firms in this group improved on third-quarter 2007 results, with the larger producers turning in much stronger earnings vs. year-earlier results. EnCana Corp., Talisman Energy Corp., and Canadian Natural Resources Ltd. each recorded net income for the recent quarter of about four times that from a year earlier. EnCana reported that its third-quarter gas, oil, and natural gas liquids production increased 6% from a year earlier, led by a 16% rise in production from key natural gas resource plays and an 8% increase in total gas production. The company's oil and NGL production declined 2% year-on-year during the quarter.

But the majority of EnCana's earnings increase related to unrealized mark-to-market accounting gains, which were due to a large decrease in commodity prices during the recent quarter. The gain essentially reversed unrealized mark-to-market losses that were included in net earnings earlier in the year when gas prices were rising, EnCana said.

Talisman Energy's net income was a record $1.4 billion (Can.), up 305% from a year earlier, driven by increased netbacks, mark-to-market gains on derivative contracts, and stock-based compensation recovery. Production averaged 443,000 boe/d during the recent quarter, 1% above the third quarter of 2007, despite the sale of 40,000 boe/d of noncore assets during the past year. Production also climbed 3% from the previous quarter.

Service, supply firms

In a sample of 26 oil and gas service, supply, and engineering firms, only two recorded a net loss for the recent quarter, and another two companies posted a loss for the first 9 months of this year.

Collectively, the group's net income declined for the recent quarter as a result of Halliburton Co.'s $21 million net loss. The group of firms posted a combined 29% increase in third-quarter revenues.

Halliburton reported that the loss in the quarter was the result of hurricanes in the gulf and a $693 million nontax deductible loss on the cash-settled portion of a premium on convertible debt.

Revenues climbed 23% for the recent quarter and 20% in the first 9 months of this year, Halliburton reported. The company said that its North American market experienced revenue growth of 22% year-over-year, as unconventional resource activity throughout the US and Canada accelerated.

Meanwhile, offshore drilling contractor Transocean Inc. posted a 107% jump in revenue and a 14% increase in earnings for third quarter compared to a year earlier, as the company's costs and expenses more than doubled from the 2007 period. ✦

Ghana's latest discovery hints at growing potential

Tullow Oil PLC ("Tullow") said its recent shallow-water Ebony discovery in the Gulf of Guinea off Ghana could be an indication of further prospectivity in deeper water.

The UK company said the Ebony-1 exploration well on the 983 sq km Shallow Water Tano license intersected two hydrocarbon bearing intervals in Late Cretaceous turbidite sands.

Tullow said the Ebony discovery improves its chance of success at the large Tweneboa downdip prospect to the south (see map).

Meanwhile, Mitsui E&P Ghana Keta Ltd. took a farmout from Afren Energy (Ghana) Ltd. to earn a 20% stake in the Keta Block in the Eastern basin off Ghana.

Ebony discovery

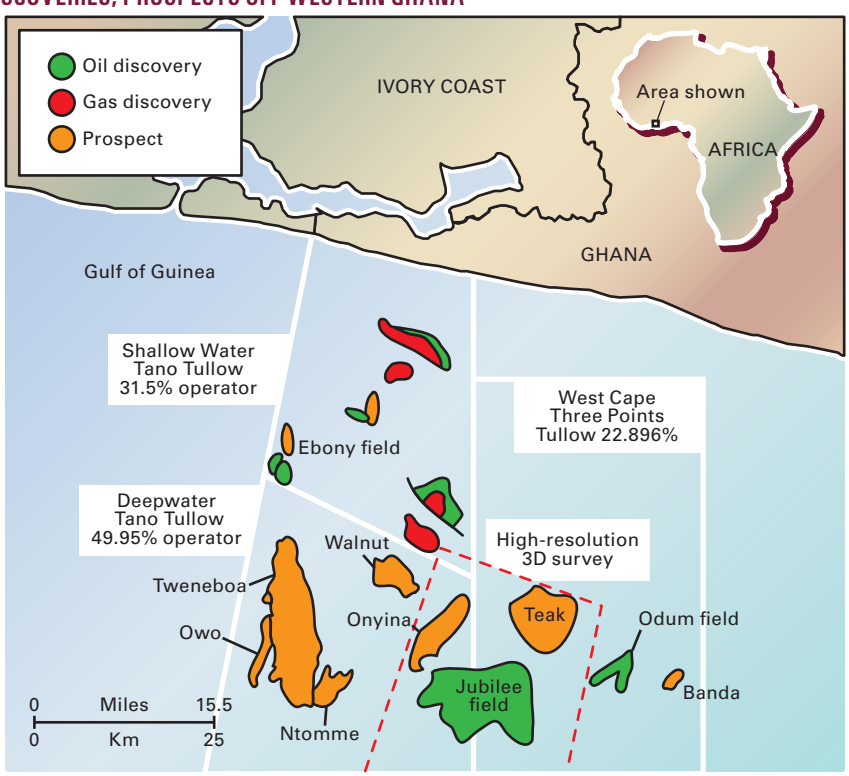
Ebony-1 spudded on Oct. 22 and reached a total depth of 2,640 m. The well lies in the southwest part of the Shallow Water Tano block in 86 m of water and is the second commitment well on this license.

Successful logging and sampling operations confirmed a 4-m oil bearing interval at 2,053 m and a 2-m high-pressure gas-condensate interval at 2,570 m.

Log and sample data from the high-pressure gas-condensate sands and a regional seismic interpretation indicate there may be a connection between these pinched-out sands and the material downdip Tweneboa oil prospect which lies mainly in the Deepwater Tano license. Other possible interpretations for the high-pressure cannot however be excluded at this stage, and this is subject to ongoing evaluation, Tullow said.

Tullow with 31.5% interest operates the Shallow Water Tano license on behalf of partners Interoil Exploration & Production ASA 31.5%, Al Thani Corp. 22.5%, Sabre Oil & Gas Ltd. with a 4.5% carried interest, and Ghana

DISCOVERIES, PROSPECTS OFF WESTERN GHANA



Source: Tullow Oil PLC

National Petroleum Co. with a 10% carried interest.

Tweneboa, a stratigraphic trap prospect, is set for drilling in the first quarter of 2009.

Espoir and Baobab fields off Ivory Coast are in an Albian play. Off Ghana, the Teak, Tweneboa, Onyina, Walnut, and Banda prospects and the Ebony and Odum discoveries are in a Campanian play. The Teak, Ntomme, Owo, and Tweneboa prospects and Jubilee's Mahogany and Hyedua discoveries are in a Turonian play.

The Odum discovery drilled in February 2008 is considered commercial because it is 13 km from Jubilee. Odum, in 955 m of water, went to 3,387 m and cut 22 m of net pay in a 60-m gross column of 29° gravity oil. It opened a second new play fairway in the Tano basin.

Jubilee development

Tullow plans to invest $3.2 billion to develop nearby Jubilee field and produce the first oil there in the second half of 2010.

It intends to develop the field in phases and supply the first associated gas from Jubilee to Ghana in 2011.

Ghana has no onshore oil or gas infrastructure. Jubilee field is 9 hr by boat and 45 min by helicopter from a supply base being upgraded at Takoradi, Ghana, which in turn is 4-5 hr by road from the international airport at Accra.

Jubilee's reservoir lies in 900-1,700 m of water and 2,100 m below the sea bed. The field will be developed using a subsea production and control system tied back to a turret-moored floating production, storage, and offloading vessel.

The development plan is for 17 wells with water injection from the start.

Besides its oily nature, Ghana's offshore has the potential to be a major gas province, Tullow said.

The peak oil rate of 120,000 b/d of oil is expected to yield 120 MMcfd of gas. The produced gas volume is to be split between reinjection and pipelining to shore.

The gas is also expected to yield 3,000-5,000 b/d of natural gas liquids in the first phase and 10,000-15,000 b/d of NGL in future phases.

A commercial discovery at Tweneboa could confirm a new production hub west of Jubilee field, Tullow indicated.

Tullow estimates 4 billion bbl of oil and gas resources in the Gulf of Guinea offshore Ghana and Ivory Coast.

Interest holders in 1,108 sq km Deepwater Tano are Tullow, Anadarko Petroleum Corp., Kosmos Energy Inc., GNPC, and Sabre. Kosmos operates 1,761 sq km West Cape Three Points on behalf of itself and Anadarko, GNPC, E.O. Group, and Sabre.

Eastern Ghana offshore

In the Keta basin off eastern Ghana, Mitsui will share the cost of the Cuda-1X exploration well spudded on Nov. 16.

It targets a prospect estimated large enough to hold as much as 325-642 million bbl of oil. The play type is similar to the Jubilee and Odum discoveries that Tullow and Kosmos Energy are developing.

"There are also a number of additional identified prospects, which are currently in the process of being assessed by the partners on the Keta Block," Afren said.

The consortium is using the Transocean Deepwater Discovery drillship to target the Upper Cretaceous deepwater sandstones in a combined structural and stratigraphic trap. The vertical Cuda-1X well will reach a TVD of 15,750 ft within 50 days, Afren said. Cuda-1X will be drilled 5,577 ft of water. There are no plans to perform drill stem testing on the well. Ten wells have been drilled in the Keta basin.

Osman Shahenshah, chief executive of Afren, said: "Following the Jubilee discoveries, Ghana is an emerging and significant West African hydrocarbon province. We…believe the block contains a number of exciting prospects."

Once the deal is completed, Afren will hold 68% interest, and other partners' shareholdings will be Mitsui 20%, GNPC 10%, and Gulf Atlantic Energy 2%.

The transaction is subject to government approvals. ✦

Research sought on unconventional gas

Research Partnership to Secure Energy for America (RPSEA), Sugar Land, Tex., has requested industry proposals for projects on gas shales, coalbed methane water management, and tight sands.

The full text of the RFPs is on the RPSEA web site. The proposals are due Jan. 12, 2009, for projects to start around April 2009.

The focus of the gas shales proposal is on the challenges associated with development of the shale resource from the Permian basin through the Fort Worth basin and in southern Appalachian shale gas basins.

Concepts may include characterization of parameters that differentiate high-performing wells and development of methods to assess production potential, model production results, delineate the fracture system, develop extra-extended lateral drilling techniques, develop steerable hydraulic fracs, and a host of other concepts.

Another request is for development of tools, techniques, and methods to greatly reduce the cost and environmental impact of CBM and shale gas development through more effective management of water used and produced in drilling, completion, stimulation, and production.

The tight sands solicitation seeks proposals for development of tools, techniques, and methods to increase commercial production and ultimate recovery from established tight gas sand formations and accelerate development of emerging and frontier tight gas plays. This work is to be focused on the Rocky Mountain region. ✦

India

Gujarat State Petroleum Corp. has drilled 15 exploration wells and two appraisal wells on the Sanand/Miroli block in India's Cambay basin, said partner GeoGlobal Resources Inc., Calgary.

The M-1, M-6, SE-2, SE-4, and SE-8 wells have been reported as discoveries. The SE-11 well went to TD 2,500 m and awaits testing, and SE-10 went to 1,900 m and is being logged.

The SE-8-A1 appraisal well, aimed at evaluating the Kalol pay zone encountered in SE-8, went to TD 1,450 m and is under test.

Indonesia

Niko Resources Ltd., Calgary, plans to earn a 25% nonoperated working interest from an affiliate of Black Gold Energy LLC in a nearly 5,000 sq km deepwater exploration block off southeast Sulawesi, Indonesia.

The block was awarded recently to a group led by Marathon Oil Co. (OGJ Online, Oct. 22, 2008).

Peru

BPZ Resources Inc., Houston, has spud the CX11-15D well in Corvina field on Block Z-1 in the Pacific off northwestern Peru.

Targeting known oil and gas sands updip, the well is likely to be drillstem tested for gas and be dually completed. Oil production would begin, and gas would await start-up of the company's gas-to-power project.

The next step is to begin redeveloping Albacora field by April 2009.

Petrominerales Ltd., Bogota, will acquire a 55% working interest in and become operator of Block 126 in Peru's Ucayali basin.

A 1988 discovery well on the block tested oil and was plugged due to completion problems. The 105,000 sq km block has 1,200 line-km of recently reprocessed seismic.

Petrominerales will acquire 45% interest from Veraz Petroleum Ltd. and 10% from a third party for a combined $600,000.

Pennsylvania

Range Resources Corp., Fort Worth, said seven wells totaling 30 MMcfd from the Marcellus shale are connected to Pennsylvania's first large-scale gas processing plant, operated by MarkWest Energy Partners LP.

Range plans to begin flowing more wells as two more gas processing plants are completed next year (OGJ Online, Oct. 22, 2008).

The company plans to enter 2009 with three horizontal rigs and boost that to six by the end of the year. It expects yearend 2009 production to reach a net 80-100 MMcfed.

Talisman Energy Inc., Calgary, deferred a five-well Marcellus shale pilot in New York pending environmental and regulatory reviews and shifted its focus to Pennsylvania.

The company's Fortuna Energy Inc. unit holds almost 120,000 acres of state controlled land in north-central Pennsylvania and is drilling a pilot in an area where it owns 19,200 net acres prospective for development. It was completing its first operated horizontal well this month.

Talisman Energy's holding totals 640,000 net acres in both states in the emerging overpressured Marcellus play. It estimates gas in place in the Marcellus at 20-100 bcf/sq mile at 2,500-6,000 ft.

Texas

East

GMX Resources Inc., Oklahoma City, said its Callison-9H well in Harrison County, Tex., stabilized at 7.7 MMcfd of gas on a $^{22}/_{64}$-in. choke with 5,200 psi flowing casing pressure from Jurassic Haynesville/Bossier shale.

The company ran an eight-stage frac in the well's 2,200-ft lateral, its shortest planned lateral in the play. GMX has 100% working interest.

GMX is drilling the Bosh-11H and Baldwin-17H wells and expects to spud a fourth well within 2 weeks. The next 16 wells are expected to average 3,800-ft laterls and 11-12 frac stages. The company plans to drill 45 wells in 2009.

The Belin-1 well in the Hilltop area of the deep Bossier play has the potential to be Gastar Exploration Ltd.'s best well to date in terms of flow rate and reserves, the company said.

Logs indicated 150 net ft of pay in the middle and lower Bossier formations. TD is 18,800 ft.

The well's three Lower Bossier pay zones have the highest measured porosity, up to 25%, of any well drilled by Gastar in the play.

Belin-1 also encountered two middle Bossier sands, including the Lanier sand, in a downdip location in a new fault block with indicated pay based on log analysis. The well, to be on line within 30 days, is to be completed in the two deepest zones first.

The Lanier sand has been shown to be productive in a downthrown fault block from the Wildman Trust-3 well, where Lanier was recently recompleted at an initial 21 MMcfd.

Wyoming

Devon Energy Corp. started production at the 5-3 Horseshoe Basin Unit well in the Vermillion Creek area of the Greater Green River basin in Sweetwater County, Wyo.

Output from Cretaceous Baxter shale totaled 21.7 MMcf of gas and 3,836 bbl of condensate in the first 6.5 days on line, and the current rate is 2.19 MMcfd and 412 b/d of condensate, said 50% working interest owner Kodiak Oil & Gas Corp., Denver. TD is 13,534 ft.

Three wells have been drilled, and Devon is acquiring 25 sq miles of 3D seismic in the area. The outlook for 2009 is for horizontal drilling in the Baxter, said Kodiak.

Tests prove out self-powered, wireless, pump torquemeter

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Universidade Federal da Paraíba
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Laboratory tests and a field trial in Carmopolis field in northeastern Brazil verified that a self-powered, wireless torquemeter provided a new and better method for determining the reducer torque in a beam pumping unit.

The API recommended calculation for determining torque,[1] used for decades, has a 10% uncertainty. This precision has not prevented torque reducer breakage.

The tested instrument measures torque in the reducer shaft with a less than 1% uncertainty, allowing effective control of torque. This torquemeter includes a strain gauge, electronic transduction, telemetry, and LabView software for transmitting the torque signal from a remote unit, fixed in a rotation shaft, to a base unit.

The wireless communication uses the ZigBee standard, which is popular in monitoring applications and industrial control.

Hundreds of experimental tests showed that the system provided high precision, low cost, strength, and high noise immunity, even in environments with strong vibration.

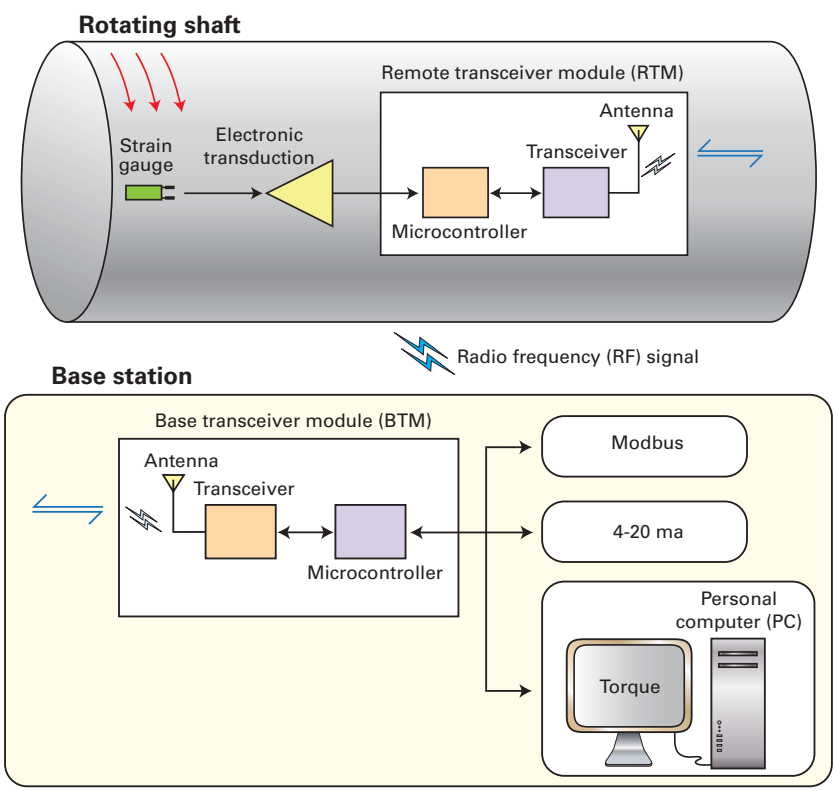
Calculating torque

Beam pumping units, which are the world's most used method for oil extraction (80% of the world's wells),[2] can have problems with exceeded torque in the output shaft of the reducing gear. When the torque exceeds a certain value, it damages the gearbox whose price can equal 50% of the total cost of a mechanical pumping unit (MPU), rendering it useless.[3]

Besides the high cost of the gearbox, one also has to consider the lost production during the several days in may take to replace the gearbox.

INSTRUMENTATION

Fig. 1



The method used during decades for calculating reducer output torque in the majority of the pumping units, suggested by API,[1] has an uncertainty of 10% for the best operating conditions. This error, however, can be much larger because of decalibration problems of the load cell and accumulation of the error in the sizing of the pumping unit's parts that enter in API calculation. For the case of ultrahigh-slip engines, errors in computed torque can reach 70%, if one does not consider the inertial effects in a pumping unit's braking gear calculation.[4]

The API calculation for determining torque in the shaft does not take into account the structural misbalance with changes in crank angle and the inertial effects of the beam, balance beam, crankshaft, crank counterweight weight, and bearing attrition. The calculation involves 16 variables with each one having a measurement error. The torque calculation reflects the propagation of these errors.

All current studies involving torque measurement in the speed reducing gear of a pumping unit use, in some form, API's method.[4-8]

Besides the predictive effect, torque measurement in pumping units also allows one to obtain energy efficiency indexes,[5 9 10] bearing in mind that the energy costs represent 20-35% of the operating cost of oil production.[11]

The wireless measurement of torque in the reducer shaft eliminates errors in the API calculation method and provides a safe and essential method for monitoring a pumping unit.

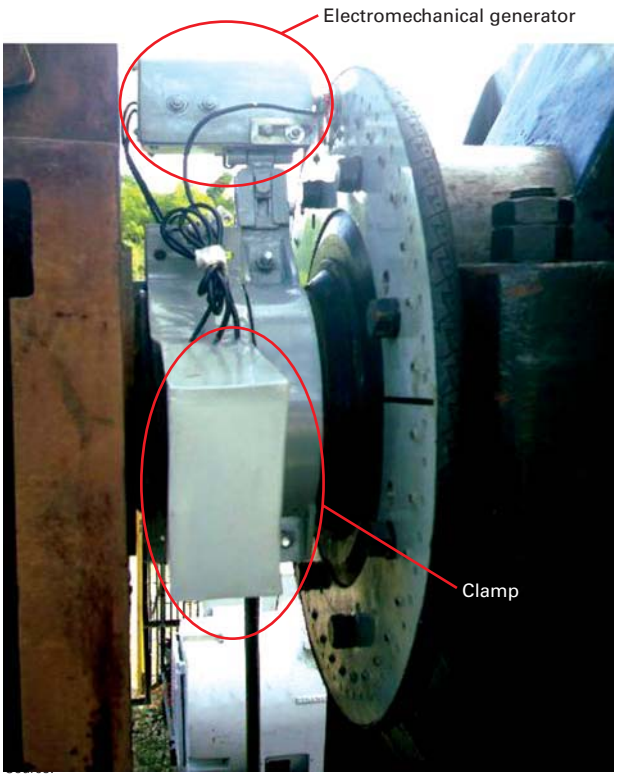
Fig. 1 diagrams the process. The electronic transduction circuit processes and amplifies the signal from the shaft deformation picked up by the strain gauge. The signal then goes to the remote transceiver module (RTM) where a microcontroller converts the analog signal to digital. The transceiver chip then modulates the signal in phase, phase shift keying (PSK), and excites the full duplex antenna, radiating the signal by radio frequency (RF).

The helical antenna in the base transceiver module (BTM) picks up the RF signal, which then is filtered through the transceiver chip (narrow-band filter), demodulated, amplified, and made available for reading.

One can access the measurements with a personal computer (PC),

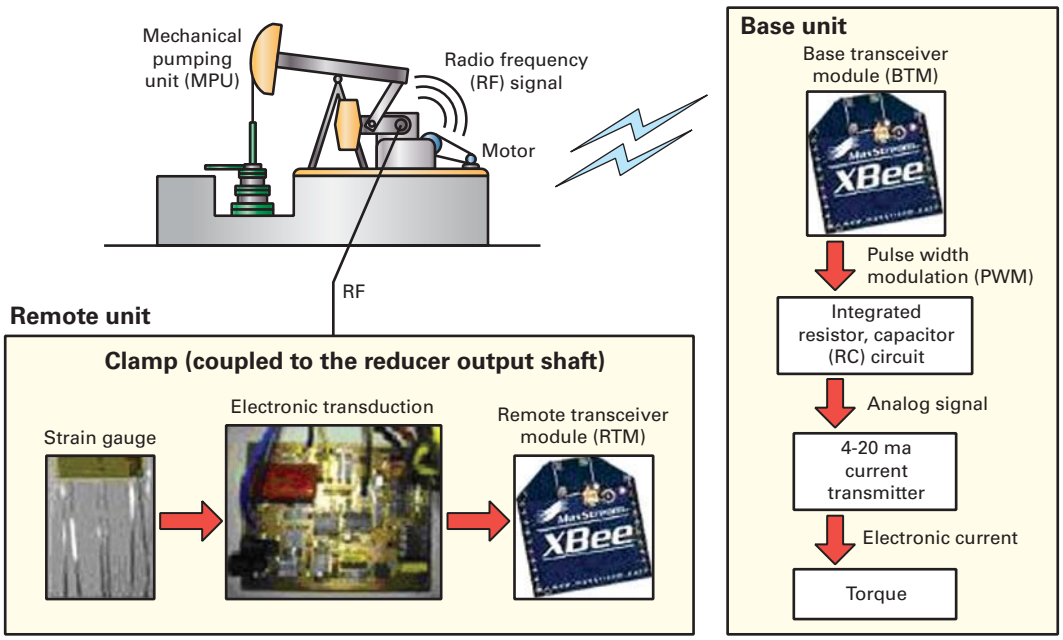
Torquemeter on shaft

Fig. 2



Installed system

Fig. 3



Equations

$$T = \frac{\pi G c^3}{SR} dR \quad (1)$$

$$T = \frac{0.87 \pi G c^3}{SR} \Delta V_s \quad (2)$$

$$E = NwBA \cos wt \quad (3)$$

$$E_{max} = NwBA \quad (4)$$

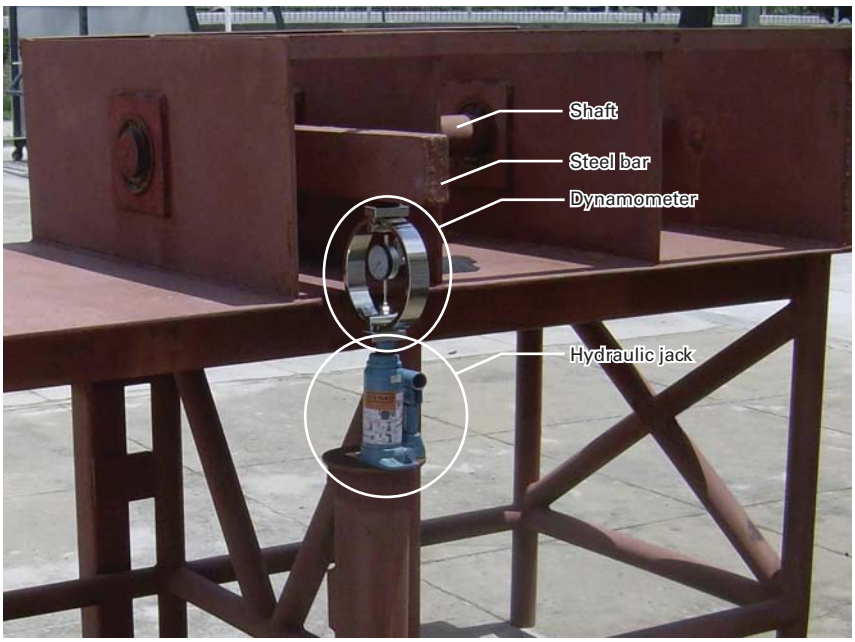
$$T_{ref} = LP\cos(\theta) \quad (5)$$

Nomenclature

- T - Torque submitted to shaft, Newton-m
- G - Transversal stretch module of the material, Pa
- dR - Variation of resistance in the sensor, in ohms
- S - Sensitivity of the strain gauge
- c - Shaft radius, m
- ΔV_s - Variation of tension proportional to the resistance variation of the strain gauge torque measurements
- N - Number of turns
- B - Magnetic flux density, Tesla
- A - Turn area, sq m
- w - Shaft angular acceleration, radians/sec
- t - Time, sec
- T_{ref} - Reference torque
- L - Length of arm
- P - Reference weight
- θ - Rotational angle

Bench test

Fig. 4



embedded or conventional, or make them available with the 4-20 ma standard (high immunity to noise) or Modbus protocol in industrial applications.

The system uses the shaft movement to generate the energy for the remote unit, which is in continual rotation.

Remote unit

Data acquisition starts in the remote unit with a strain gauge reading the deformation in the shaft. For a solid cross-section shaft of radius c, Equation 1 (see equation box) determines the torque.

To facilitate the processing the signal from the strain gauge, a Wheatstone bridge in the electronic transduction circuit generally converts the resistance to tension. For strain gauge circuit solutions, analog devices provide a synchronous demodulation and supply an ac signal to the Wheatstone bridge.[12]

Grupo de Pesquisa em Instrumentacao e Controle em Estudo de Energia e Meio Ambiente (GPICEEMA)—Group of Research in Instrumentation and Control in Energy and Environmental Study—developed a circuit with a concept different from the analog devices. Its circuit has similar performance with lower power consumption, greater integration, and lower cost.[13]

The signal conditioner circuit includes easily available components without needing instrumentation amplifiers as in References 14-17, without applying linearization techniques as in Reference 18, and with temperature autocompensation without adding a sensor element as in Reference 14.

For an 80° C. temperature, tests obtained a thermal drift of only 0.01%, an R-squared equal to 1, and a linearity error less than 0.07% of bottom of scale.

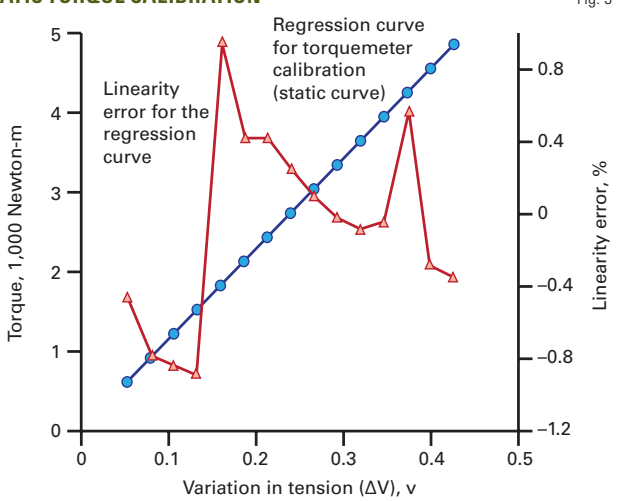
After adjustment of the circuit, Equation 2 calculates the torque.

In Equation 2, ΔV_s is the variation of tension proportional to the resistance variation of the strain gauge caused by the torque.

For transmitting the signal from the transduction circuit of the remote unit (ΔV_s), the system uses a radio frequency with a ZigBee communication protocol.[19] The ZigBee was selected because of its viability for embedded applications that demand low energy consumption and its low cost. ZigBee

Static torque calibration

Fig. 5



sensors are important in the industrial sector.[20] Among other factors, this is due to Zigbee technology having a low cost and supporting a large number of nodes, more than 65.000.[21]

The remote unit set (strain gauge, electronic transduction, and RTM) has sensitive integrated-circuit technology. Because of its sensitivity to climatic conditions and the possibility of shaft rotation, GPICEEMA developed a clamp with a fiberglass flexible sealer for protecting and fixing this circuit. The clamps will not affect the measurements.

An electromechanical generator, developed by GPICEEMA, supplies power to the remote unit, eliminating the need for batteries and making the system energy self-sufficient.

The mechanical energy from the rotating shaft generates sufficient electricity for the remote unit. The electromechanical generator's rotor has magnets of alternating polarity that provide an electromotive force (Equation 3).

The signal change of the electromotive force changes its polarity, stimulating an alternating electric current. This induced electromotive force complies with a harmonic law whose amplitude is given by Equation 4.

A rectifier changes the sine signal to a direct signal for the remote unit.

Fig. 2 shows the remote unit installed on a pumping unit.

Base unit

The base unit receives the torque signal from the remote unit and makes the signal available as standard 4-20 ma signal with one of the pulse width modulation (PWM) channels of the ZigBee module. A resistor connected to a capacitor in series (RC) integrator circuit converts the PWM signal from digital to analog and makes it available to the current transmitter.

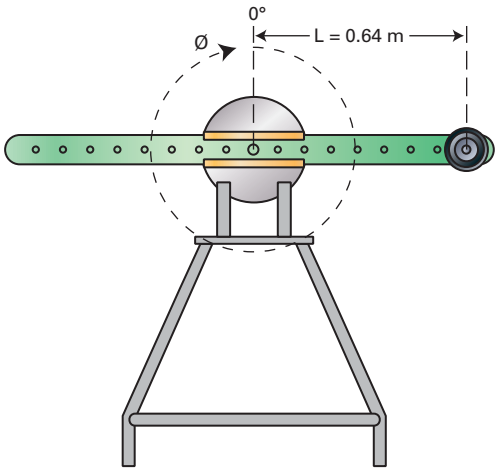
The transmitter provides a practically noise-immune current, in the 4-20 ma standard, whose signal is integrated to the position of the position sensor on the pumping unit.

For studying the torque signal vs. crank position, LabView software provides concatenation of the signals transmitted from the output shaft of the reducer.

Fig. 3 illustrates the general system.

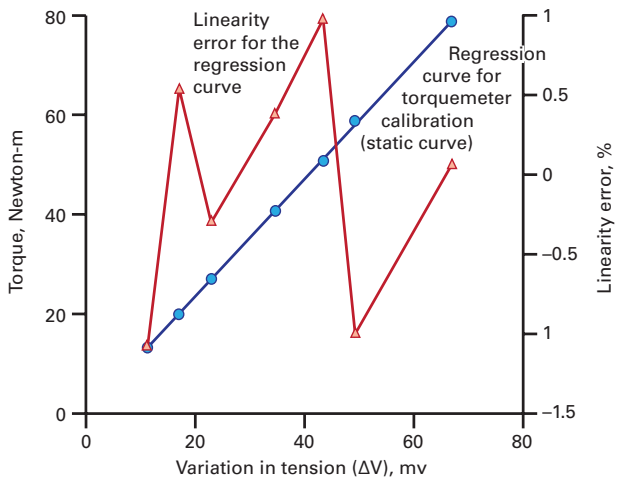
REFERENCE TORQUE CALCULATION

Fig. 6



DYNAMIC TORQUE CALIBRATION

Fig. 7



Lab tests

Torque calibration with all the mechanical variables verified is not practicable according to the state of the art; therefore, the torquemeter must be calibrated before installing it directly in the structure and estimating future dynamic behavior under the work conditions.[22]

To eliminate this limitation, tests aimed at a design that calibrated the torquemeter directly in the pumping unit, taking into account the dynamic variables of the system.

Two bench tests analyzed the system's performance. One measured static torque for calibrating the telemetric dynamic torquemeter (batteries replaced the electromechanical generator). It evaluated the behavior of the devices in the remote unit. Another test simulated the torque due to the MPU's counterweight.

Fig. 4 shows the setup for testing the static torque with the steel bench, which is the material for the shaft of the reducer. The setup has a circular section shaft made of steel welded into one of the extremities of the bench. Near the end of the other extremity is a rigid transversal shank welded to the shaft.

To make the applied torque have pure shear tension, or worthless normal tension, the test used a shaft connected to a bearing made of three plates welded to the table. This eliminated the influence of torsion.

Through a metallic arm welded to the shaft, a hydraulic jack provided the torque to the shaft. A dynamometer obtained the torque in the metallic arm for input to LabView software. Fig. 5 illustrates the reference torque provided by the dynamometric ring

and the signal sent by the remote unit, proceeding from the torque.

Table 1 relates the torque obtained through the reference instrument (dynamometric ring), the torque provided by the torquemeter idealized by this work (acquisition by LabView), and the error observed between them.

The data from Fig. 5 and Table 1 lead to a 0.54% (standard deviation of the errors) linearity error and less than a 0.3% bottom scale error between the torque value obtained through the dynamometric ring and the value transmitted from the remote unit to the base unit.

The prototype that simulates the torque due to the counterweight of an MPU consists of a 550-w engine, with rotational speed of 1,680 rpm connected to a reducer that provides an output rotation of about 15 rpm (equal to a size 912 MPU).

With the engine in motion, the disc turns a metallic arm that has reference weights in its extremity. The torque due to the reference weight complies with Equation 5 (Fig. 6).

In Equation 5, T_{ref} is the reference torque due to the weight in the metallic arm extremity of the curve, P is the reference weight placed in the arm extremity, and θ is the rotation angle.

The tests obtained the calibration curve for the dynamic torquemeter (Fig. 7) from the relationship between the peak values of the electric tension sinusoids, provided by the torquemeter visualized by the LabView, and the reference torque obtained from Equation 5.

An analysis of the results from Fig. 8 and Table 2 of the torquemeter under dynamic behavior provides a 0.78% (standard deviation of the errors) linear error for low values of torque and less than a 0.7% maximum error of the measurements carried out regarding the reference torque provided by Equation 5.

Even with the vibration of the bench, the instrument uncertainty is 0.78% for the dynamic torque compared with the state of the art dynamic torquemeters whose uncertainty oscillates between 1 and 2%.[23]

The torquemeter preformed well during fields trial on the C-456D-305-144 pumping unit in Carmopolis field (Fig. 8).

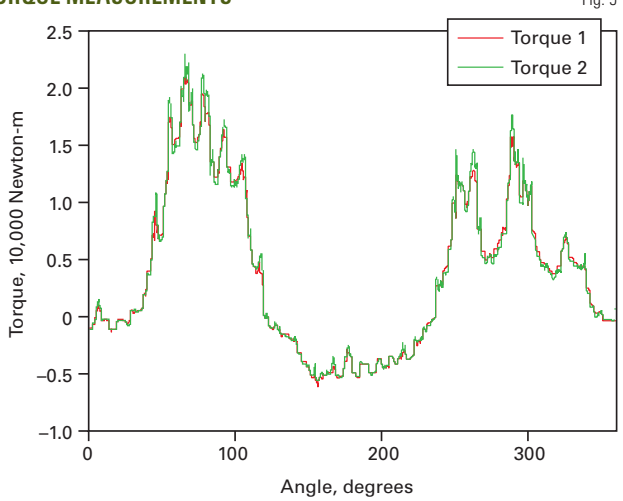
Field tests

Field tests of the torquemeter verified the lab results. The tests took place from May 25 to June 25 in Carmopolis field, Sergipe state, in northeastern Brazil.

DYNAMIC TORQUEMETER READINGS IN STATIC BENCH Table 1

ΔV, mv	Torque reference, Newton-m	Torque torquemeter, Newton-m	Error, %
0.079102	0.906803	0.905446	–0.15
0.105469	1.207528	1.207258	–0.02
0.131836	1.508253	1.509069	0.05
0.161133	1.842396	1.844419	0.11
0.1875	2.143121	2.146231	0.15
0.213837	2.443504	2.447699	0.17
0.240234	2.744571	2.749854	0.19
0.266602	3.045307	3.051677	0.21
0.292969	3.346032	3.353488	0.22
0.319336	3.646757	3.6553	0.23
0.346103	3.952044	3.96169	0.24
0.375	4.281625	4.292461	0.25
0.398437	4.548933	4.560734	0.26
0.424805	4.849669	4.862557	0.27

TORQUE MEASUREMENTS Fig. 9



The data, stored on an embedded PC, indicate that the instrument did not have any problems during the test period. The torquemeter currently is still on the unit and continues to monitor the pumping unit's torque.

The Petrobras (Petroleo Brasilerio SA) pumping unit (Fig. 8) is a model C-456D-305-144. It pumps from 700 m and produces 110 cu m/day of oil and water.

During the tests, two pairs of strain gauges glued in diametrically opposed axes provided measurements of the torque. The relationship between the two curves generated from the strain gauge measurements indicates efficiency of the calibration method.

Fig. 9 illustrates the two curves of the torque obtained. The curves have a 99.78% correlation coefficient and an average 1.251%.

The results show that torque obtained from the strain gauge detects even a vibration in the direction of the torque in the shaft, which the API method neglects.

The self-powered wireless torquemeter is efficient and generates low noise. Therefore, one can install this instrument in any rotation shaft.

Previously available torquemeters cannot be placed in pumping units because they are coupled through flanges or sockets, and torque calculations have about a 10% error for the best machine operating conditions.

MEASURED AND REFERENCE TORQUE COMPARED Table 2

ΔV, mv	Torque reference Newton-m	Torque torquemeter Newton-m	Error, %
11.38151	12.53059	12.61566	0.67
17.18151	18.99509	19.04458	0.26
23.08151	25.57105	25.58435	0.05
34.78151	38.61152	38.55304	–0.15
43.58151	48.41974	48.30726	–0.23
49.48151	54.9957	54.84703	–0.27
67.06151	74.58984	74.33331	–0.35

Acknowledgments

The authors thank the National Council of Scientific & Technological Development (CNPq) for the financial support and also Petrobras for providing the pumping unit, supporting the visits to its facilities, and financial support. ✦

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Study compares C_2-recovery for conventional turboexpander, GSP

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Among the various ethane-recovery processes, the turboexpander process is the most widely used. Proponents of the gas subcooled process (GSP), however, claim it achieves higher recovery than the conventional turboexpander process.

Several new processes based on modifications to the GSP have appeared: cold residual recycle (CRR), IPSI LLC's Enhanced NGL Recovery, Fluor's Recycle Split Vapor (RSV), and RSV with enrichment (RSVE).

This article presents results of a comparison of the two processes for ethane recovery: the GSP and the conventional turboexpander process. To perform a fair comparison, we selected four different feeds, ranging from lean to rich gas, with C_{2+} contents ranging 6-30%.

Also, comparing the two processes using only one choice for the design (also called "decision") variables (i.e., those independent variables over which the engineer has some control for each process) does not yield a fair comparison.[1] We therefore determined the design variables for both processes and changed them in order to achieve the maximum ethane recovery for each process.

We employed the HYSYS optimizer tool for each level of the demethanizer pressure. The results were confirmed by sensitivity analysis. In it, the design variables were changed manually in each simulation run while covering the entire range of allowable values in the design variables to ensure that for each process, the optimum reached is a global one ("the best for all allowable values of the decision variables") and not only local ("a point from which no small, allowable change in decision variables in any direction will improve the objective function").[1] The pressure range in the demethanizer covers the full typical range: 100 to 450 psia.

The results obtained show higher ethane recovery with the GSP under two conditions: lean feed and low demethanizer pressure. In all other cases, conventional turboexpansion yields either higher or equivalent ethane recovery.

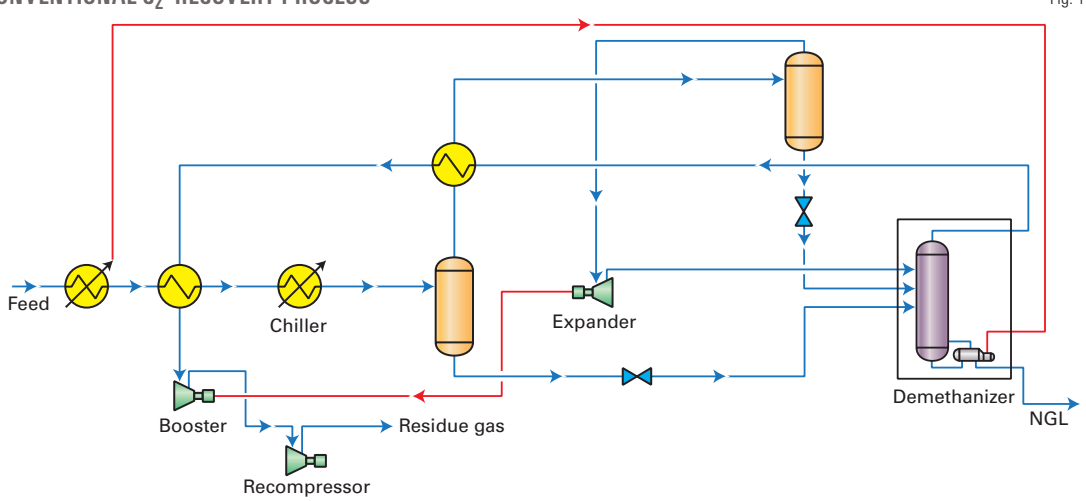
Choosing ethane recovery processes, therefore, must be carefully considered. Feed compositions and demethanizer pressure can favor one process or the other.

Ethane extraction

Several NGL extraction methods have been proposed. Ethane, a valuable

CONVENTIONAL C_2-RECOVERY PROCESS

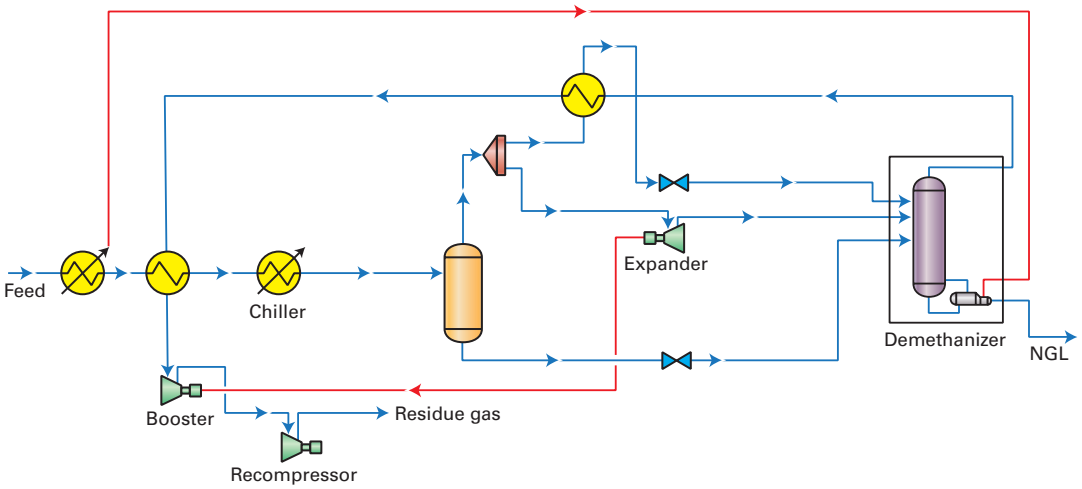
Fig. 1



petrochemical feedstock, is the most volatile NGL component and the most difficult to recover. Recovery of a large fraction of C_2 guarantees recovery of significantly larger fractions of C_{3+}. References 2-6 review and discuss the different options and provide the advantages and disadvantages.

GAS SUBCOOLED PROCESS

Fig. 2



The Joule Thompson valve expansion requires high feed-gas pressure and can be the method of choice for small feed-gas rates and moderate ethane recovery.[5] If the gas pressure is not high enough, refrigeration[7] can be added to enhance recovery.[5]

Obtaining high ethane recovery requires a turboexpander process. Typically, a turboexpander is used in combination with JT expansion and propane refrigeration. Cascade refrigeration is complex and requires high compression cost.[2] The use of mixed refrigerant is another alternative[2 8] and is commonly used in LNG processes but much less in NGL recovery.[2]

In contrast to the previous processes in which recovery is obtained by cooling through expansion or mechanical refrigeration, oil absorption and refrigerated lean-oil absorption have been used to recover NGL. Although the pressure drop of the gas stream is minor, the process is expensive in terms of equipment and energy requirements and hard to operate.[3 5] Mehra and Gaskin discuss guidelines for choosing cryogenics or absorption.[9]

McKee summarizes the evolution in design for the "old" generation of turboexpander process.[10] The simple plant consists of turboexpansion. Reboiling with inlet gas is used to recover some level of refrigeration. In the cold liquid separator process, the liquid from the higher pressure separator is expanded and the cold liquid is used for feed-gas refrigeration. The other options include the use of side reboiler, refrigeration, and two stages of expansion.[10]

Chebbi et al. compared five different turboexpander ethane-recovery processes, using the HYSYS optimizer tool to determine the maximum possible ethane recovery.[11] The study showed that more complex processing scheme may yield the same or less ethane recovery.

The next generation of ethane recovery processes uses the idea of a reflux to condense more ethane in the demethanizer. The residue recycle (RR) process cools a fraction of the recompressed residue gas, then flashes it by JT expansion, and then sends it to the demethanizer as a reflux.[5]

The gas subcooled process (GSP) splits the gas stream leaving the cold separator into two streams, one of them feeding the turboexpander and the second one subcooled by the demethanizer overhead stream, flashed in a valve, and then sent to the demethanizer as a reflux.[5 12]

The CRR process has one addition to the GSP: A fraction of the demethanizer overhead stream is compressed, partially condensed, expanded through a valve, and then sent back to the demethanizer as additional reflux.[5 12] The CRR process is reported to achieve high ethane recovery.[12] The cryogenic compressor cost, however, may be prohibitive.[4]

The IPSI process is another modification of the GSP.[4 5] A side stream flows from the demethanizer column, is expanded through a valve, used as a mixed refrigerant to cool a fraction of the feed gas, then returns to the demethanizer (and used for stripping) after separation and compression.[4 5] Combining the GSP with the liquid subcooled process (LSP) provides higher recoveries than the GSP and LSP used individually, according to simulation for eight different feeds.[13]

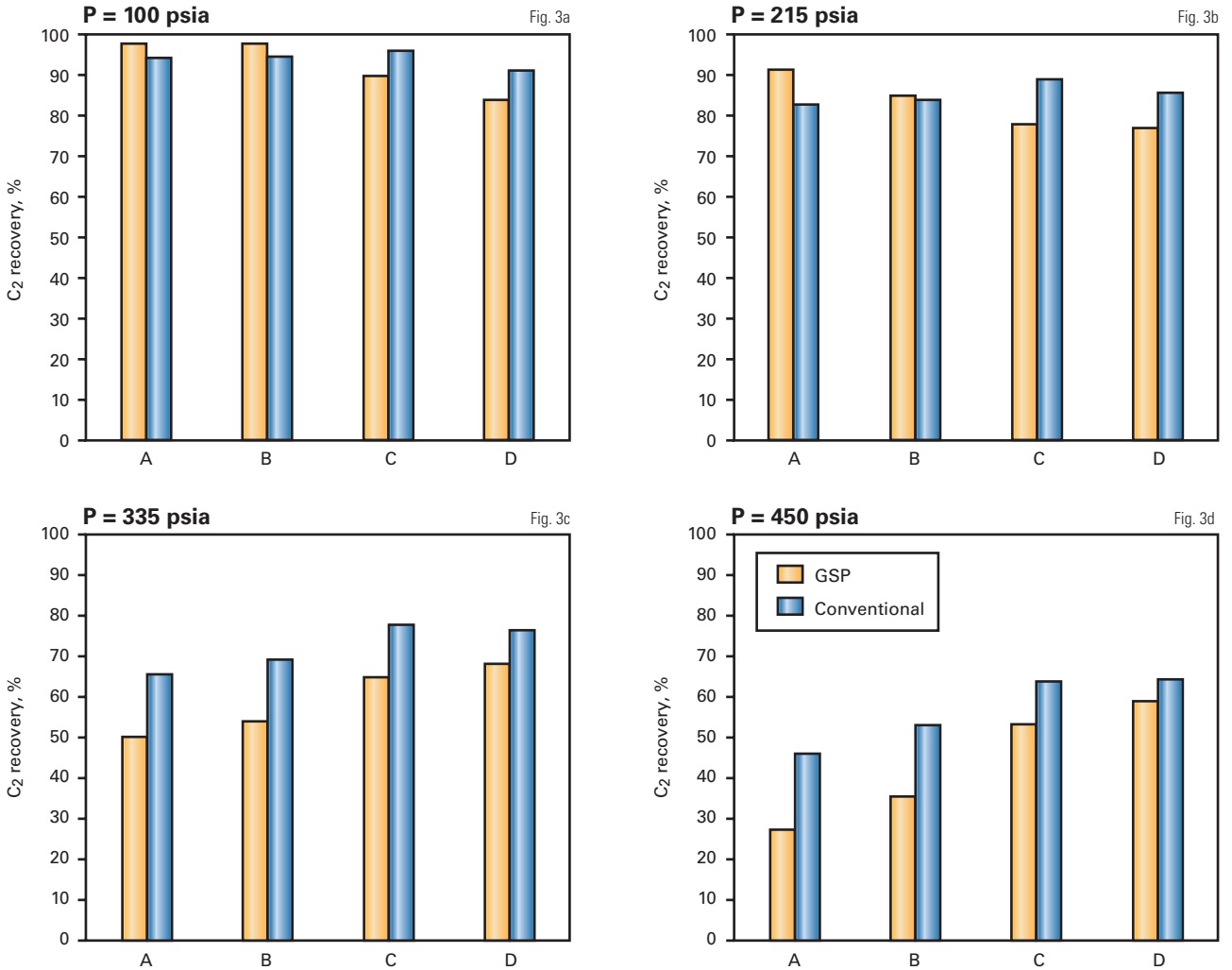
The RSV process is another modification of the GSP.[12] Sending a small fraction of the recompressed residue gas to the demethanizer after condensation and subcooling and then to JT

FEED-GAS COMPOSITION

Component	A	B	C	D
Nitrogen	0.01	0.01	0.01	0.01
Methane	0.93	0.89	0.76	0.69
Ethane	0.03	0.05	0.13	0.15
Propane	0.015	0.025	0.054	0.075
Butanes	0.009	0.015	0.026	0.045
Pentanes	0.003	0.005	0.010	0.015
Hexanes	0.003	0.005	0.010	0.015
% C_{2+}	6.0	10.0	23.0	30.0

EFFECT OF FEED COMPOSITION ON C_2 RECOVERY

Fig. 3



expansion yields an additional reflux in the demethanizer. A modification of the RSV process is the RSVE (recycle split-vapor with enrichment) process.[12] Mixing with a portion of the gas leaving the cold separator occurs before condensation and subcooling, therefore requiring a lower capital cost.

Maximizing recovery

We considered four different feeds: A to D. The table (previous page) shows their compositions.[14]

The feeds range from lean gas to rich gas with C_{2+} content ranging 6-30%. The four demethanizer pressures considered are 100, 215, 335, and 450 psia. In all cases, the feed gas is at 100° F. and 882 psia (60 atm). The residue gas is recompressed to 882 psia and, in the NGL stream, the molar ratio of C_1 to C_2 is set at 0.02.[2] In all cases the feed-gas rate is 10,980 lb-mole/hr.

In the conventional process (Fig. 1), the feed is first cooled while providing the reboiler duty, then cooled further by heat exchange with the residue gas, followed by heat exchange with propane in a chiller to reach a temperature of –31° F.

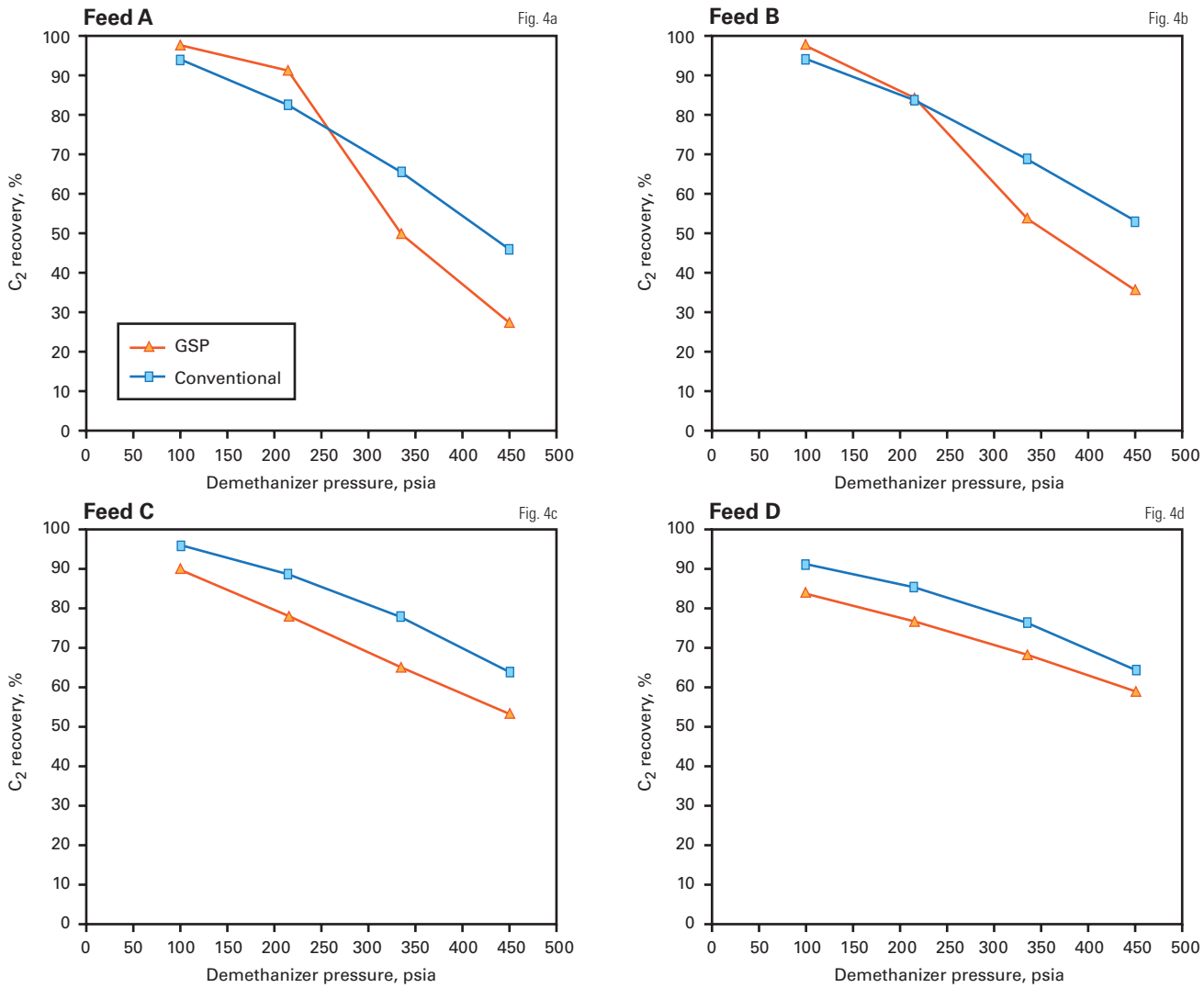
After separation from the liquid, the gas from the separator is cooled by heat exchange with the overhead stream from the demethanizer. It is then separated from the liquid in the cold separator, expanded in a turboexpander, and sent to the demethanizer.

The liquids from the two separators undergo JT expansion and flow to the demethanizer at lower levels. The turboexpander provides part of the power needed to recompress the residue gas. The recompressor provides the other portion.

The temperatures after cooling by heat exchange with the residue gas from the demethanizer are design variables that are changed in the optimization process to maximize ethane recovery for different demethanizer pressures. The constraints are condi-

Effect of demethanizer pressure on C_2 recovery

Fig. 4



tions preventing temperature cross (a situation in which "the cold-fluid outlet temperature" would be "higher than that of the warm fluid" in these two heat exchangers).[2]

In the gas subcooled process (Fig. 2), the gas undergoes cooling as in the previous case, and after chilling and separation, the entire gas stream does not flow to a turboexpander. Rather, it is split, with a portion condensed and subcooled by the overhead stream from the demethanizer then expanded through a valve to provide a cold reflux after feeding the column.

The design variables include those mentioned for the conventional turboexpander process as well as the flow ratio in the splitter splitting the gas stream leaving the separator and sending a portion to the subcooler. The constraints are the same as in the previous process.

Feed; pressure

For HYSYS simulation, we selected the Peng-Robinson equation of state as the thermodynamic model. After ethane-recovery maximization for each case, we compared results.

Figs. 3a to 3d show the maximum percent C_2 recoveries for the four feeds (A to D) at four different demethanizer pressures: 100, 215, 335, and 450 psia. It is clear that the GSP provides higher C_2 recoveries in the cases 100 psia for feeds A and B and at 215 psia for Case A. Ethane recoveries are about the same for the GSP and the conventional turboexpander process for Feed B at 215 psia.

The effect of pressure on the maximum ethane recovery appears in Figs. 4a to 4d for feeds A to D, respectively. As expected, decreasing the demethanizer pressure enhances C_2 recovery for Feeds A to D.

The trend for the variation of maximum C_2 recovery with the demethanizer pressure depends on the feed selected. For Feeds A and B, at low pressure, the GSP allows a higher maximum

recovery than that of the conventional turboexpander process, whereas the maximum ethane recovery with the GSP is less at higher pressure.

For feeds C and D, the maximum ethane recovery with the GSP is less than for the conventional turboexpander process at all pressures.

Optimization results show that the GSP provides higher maximum ethane recoveries, provided that two conditions are satisfied: The demethanizer pressure is low and the feed gas is lean. In all the other cases, the conventional turboexpander process provides a higher or an equivalent maximum ethane recovery.

Simulation results show that the temperature of the feed gas after the first heat exchange with the overhead stream from the demethanizer does not affect ethane recovery, which is expected since the next cooling is by refrigeration that brings the temperature to –31° F. no matter the temperature after cooling with the overhead gas stream.

The second cooling with the overhead stream has an effect on ethane recovery. A lower temperature enhances condensation of ethane and ethane recovery, which is expected. The maximum ethane recovery is obtained with the lowest possible temperature without temperature cross in the heat exchanger in question. The HYSYS optimizer tool confirms these results.

Acknowledgment

This work was supported by the American University of Sharjah under grant No. FRG07-040. ✦

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China seeks oil security through fleet expansion

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Shou-de Li
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China's push for energy security has prompted a program for building 70 additional very large crude carrier (VLCC) tankers.

The recent drop in oil price reduces the financial burden placed by oil imports on Chinese industry, but ensuring adequate supplies remains a concern for the country. China is the world's most populous country and second largest oil consumer and importer, just behind the US. The Chinese economy relies heavily on consuming natural resources, including oil.

This article examines China's efforts to increase its energy security by taking more direct control of its supply.

Background

China imported 90.53 million tonnes of crude oil in first-half 2008, an increase of 11.04% from the same period last year.[1]

Regional imports totaled 50% from the Middle East, 22% from Africa, and 12% from Southeast Asia, accounting for 84% of total imported oil (Fig. 1). All of these regions are far from China and oil from them can only be transported to China by sea.

More than 90% of China's imported oil, however, is transported by foreign oil tankers, a situation the government views as both economically and strategically unsound. Leading global marine transportation companies from Europe, North America, and Asia—Maersk of Denmark, NYK Group, Kawasaki Kisen Kaisha Ltd., and Mitsui O.S.K. Lines Ltd. of Japan, as well as companies from South Korea and Singapore—supply the bulk of this shipping.

This dependence on foreign carriers makes oil supply vulnerable to both increases in transportation costs and uncertainties such as war. Shipping rates have increased dramatically in recent years, and the lack of its own crude transportation alternatives places China in a negative position when negotiating rates.

The current situation also poses a potential strategic threat to oil security. Wars, terrorist attacks, diplomatic conflicts, and political factors can all threaten oil transportation by sea. China is hard-pressed to send its military to locations like the Strait of Hormuz and the Malacca Strait to guard oil being shipped on foreign vessels.

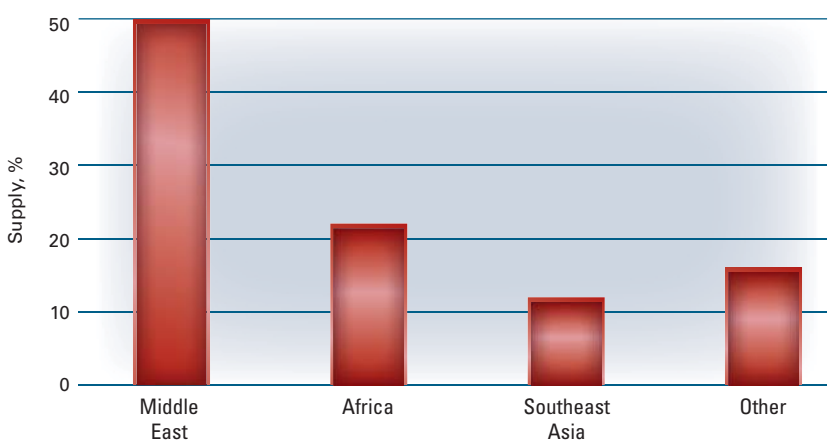
Domestic limits

China's tanker fleet has a capacity of about 10 million tonnes/year, or 5-6% of current oil imports. China's tankers average 20 years old, and the fleet has few large tankers, placing it at a disadvantage in terms of economies-of-scale. China should possess at least 90 million tonnes/year of shipping capacity for even half its imported oil to be transported by its own fleets and needs at least 70 more VLCC to reach this target.

Pipelines are under construction to bring oil imports from Russia, Kazakhstan, and other neighboring countries, but the bulk of China's supplies will still

CHINA, IMPORTED OIL SOURCES

Fig. 1



COSCO-OPERATED VLCCS

Table 1

Name	Delivery	Displacement, dwt
Cosgreat Lake	2003	300,000
Cosgrace Lake	2006	300,000
Cosbright Lake	2003	300,000
Yuansheng Lake	2006	300,000
Cosmerry Lake	2006	300,000
Cospearl Lake	2008	300,000
Dali Lake	2004	160,000
Daming Lake	2003	160,000

CHINA, VLCC PROGRAMS

Table 2

Company	In service	Under construction
CMSNC	6	7
COSCO	8	5
CSCO	4	15
Yangtze Transportation Co. Ltd.	2	11
Petrotitan	7	2
Others	8 (est.)	10 (est.)
Total	**36**	**49**

Sources: Company web sites

The Panamanian-flagged 298,930-dwt VLCC Cosmerry Lake was designed and built in China by Nantong Cosco KHI Ship Engineering Co. Ltd. Launched in 2006, Cosmerry Lake is operated by COSCO and is part of China's drive toward increased domestic transportation of its crude supplies (Fig. 2).

have to travel by water. Zhiming Zhao, executive president of China Petroleum and Petrochemical Industry Association, estimates China will increase its imports of oil and gas from Africa by 35-40% in the next 5-10 years, with the oil shipped entirely by marine transport.

Expansion

By expanding domestic transportation capacity for imported oil China hopes to improve its supply security. This strategy, dubbed "nation's oil, nation's fleet,"[2] has strong support in both the Chinese government and industry.

Some Chinese shipyards can build VLCC and other oil carriers, with the new strategy also serving to support and promote China's shipbuilding industry (Fig. 2). The Chinese government is encouraging domestic shipping companies to order VLCCs from domestic shipbuilding companies and has promised financial support to ship yards building VLCCs.

Almost all of China's major shipping companies have carried out plans to increase their oil transportation capacities. China Shipping Development Co. Ltd., for example, signed a contract with China's largest shipbuilder, Dalian Shipbuilding Industry Co. Ltd. (DSIC) in September 2008 for four oil carriers with a total value of $228 million. DSIC was China's first shipyard to build a 300,000-dwt VLCC, delivered to the National Iranian Tank Co. in August 2002.

At the end of 2002 the only Chinese company operating VLCCs was China Merchants Steam Navigation Co. Ltd. (CMSNC), which used four of them. By October 2008 this list had expanded to include China Ocean Shipping (Group) Co. (COSCO; Table 1), China Shipping (Group) Co. (CSCO), Titan Petrochemicals Group Ltd. (Petrotitan), a Hong Kong-listed company, and others, operating a total of about 36 VLCCs. COSCO also operates 11 Panamax tankers.

About 49 more VLCCs are already under construction and will be in service in the near future (Table 2); five joining CMSNC's fleet in 2009.

The strategy of building tankers for domestic oil transportation will also stimulate the nation's steel industry, suffering low demand due to the recent weakening of the global economy.

Strategic steps

The Chinese government is implementing the new strategy. Early in 2002, China's Ministry of Transportation promulgated "Strategy of Reviving the Nation through Enlarged Marine Transportation Capacity," calling for the establishment of strong domestic fleets. The Ministry of Finance grants subsidized loans to shipyards building supertankers.

The government is also encouraging domestic oil companies to use domestic shippers. In the past, the bulk of even the small domestic shipping capacity served foreign oil companies. In 2002 CMSNC, holding half of China's tanker capacity and its only VLCCs, delivered only 7.3% of its cargoes to China. Only 3.78% of crude China imported from the Middle East was carried by domestic fleets. Domestic shippers carried more than half of China's crude imports from Southeast Asia in 2002, but none of its imports from Africa.

The government now encourages domestic shipping companies and domestic oil companies to enter long-term transportation contracts with one another in an effort to reverse this trend. The four major oil transporters, CMSNC, COSCO, CSCO, and Yangtze Transportation Co. Ltd., have all contracted with China Petroleum & Chemical Corp. (SINOPEC) for crude oil transportation, while Petrotitan has signed a long-term transportation contract with Zhuhai Zhenrong Co. Ltd., a crude oil importer in Guangdong province. ✦

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Fugro Gravity & Magnetic Services,

Houston, the business development arm of Fugro Airborne Surveys and Fugro Ground Geophysics, has named a business development team to lead its Western Hemisphere efforts. The team includes Dave Schwartz and Brenda Robinson in the US; Jeff Rowe, Doug McConnell, and Ian Davies in Canada; Ricardo Fernandez in Mexico; and Antonio Sousa Neves in Brazil.


Schwartz

Schwartz, vice-president of marketing for Fugro Gravity & Magnetic Services, received a bachelor's in geophysical engineering from the Colorado School of Mines. He is a member of the Society of Exploration Geophysicists (SEG) and the Petroleum Exploration Society of Great Britain and has worked in geophysics for more than 35 years.


Robinson

Robinson, a marketing representative, received a bachelor's in marketing from the University of Houston. She joined Fugro in 2007. Prior to joining the company, she worked in the petroleum and petrochemical industry for 15 years.


Rowe

Rowe, vice-president and senior geophysicist, leads Fugro's Canadian operations and has 35 years of experience in the industry. He received a bachelor's in geology from Temple University and is a licensed professional geoscientist (geophysics). He is an active member of SEG and the American Association of Petroleum Geologists.

McConnell, general manager and senior geophysicist in Canada, received an MBA from York University in Ontario and a bachelor's in engineering and geophysics from Queen's University, also in Ontario. He has 22 years' experience in the geophysics field and has worked in seven countries.


McConnell

Davies, business development manager in Canada, has been with Fugro for 19 years. He received a master's in marine geotechnics from the Marine School of Ocean Sciences in North Wales and a bachelor's in geology from Exeter University. Davies has held a wide variety of marketing and business development roles with Fugro around the world.


Davies

Fernandez, a senior geophysicist and business development manager in Latin America, received a PhD in engineering geophysics, a master's in exploration geophysics and engineering geophysics, and a bachelor's in physics. He has 27 years' experience in the geophysics industry and has worked across Latin America.


Fernandez

Neves, a senior geoscience consultant based in Brazil, earned a PhD and a bachelor's in geophysics at Massachusetts Institute of Technology. His experience includes digital mapping and prospecting, technology development, and airborne surveys. He has 43 years' experience in the industry and has worked in South America, Europe, and Africa. He is involved in SEG, American Geophysical Union, and Soc. Brasileira de Cartografia and is a founding member of Soc. Brasileira de Geofisica.


Neves

Fugro Gravity & Magnetic Services is a part of Fugro, which provides advanced surveying, seismic, oceanographic, meteorological, and positioning services. Fugro interprets and processes data collected at sea, on land and from the air.

Wave Imaging Technology Inc.,

Houston, has named Joseph H. Higginbotham chairman, chief technology officer, and director and Morgan P. Brown president, CEO, and director.

Higginbotham is a 25-year industry veteran who worked for Texaco, Chevron, and 3DGeo and is a recognized world expert in wave equation depth imaging. He developed the SeisPak processing system, which is used for both land and marine seismic processing and in virtual simulations. He holds a PhD in theoretical physics from the University of Toledo.

Brown is a PhD graduate of the Stanford Exploration Project. He has held R&D positions at Hess Corp. and 3DGeo, working in wave imaging technology, reflection tomography, and automated seismic interpretation.

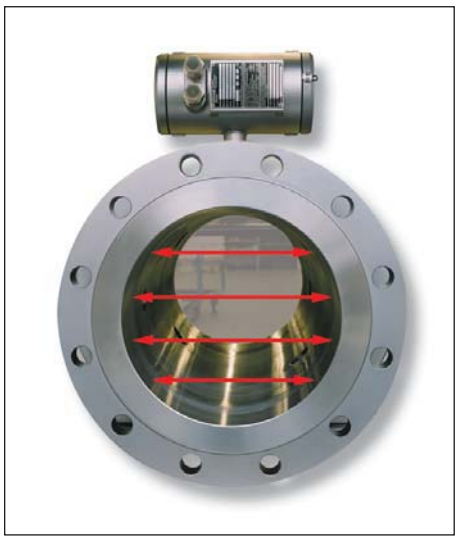
Wave Imaging Technology was recently formed as a Texas corporation to provide new, patent-pending analysis to extract information from seismic data in oil and gas exploration and production. The company's first three assignments have come from Petrobras America Inc., Aera Energy, and BHP Billiton.

PAS Technologies,

Kansas City, Mo., has been selected as the winner of a Global Six Sigma & Business Improvement award in the category of "best emerging business improvement deployment." The Global Six Sigma & Business Improvement awards are given to companies and individuals who demonstrate the most outstanding organizational achievements through the deployment of business improvement programs.

A privately held corporation, PAS Technologies specializes in providing cost-effective repair and overhaul solutions for the oil field, aerospace, and industrial markets. It services a broad range of components, including gates and seats used in oil fields and components used in other industrial high-wear, high-heat, and highly corrosive environments.

Equipment/Software/Literature



New custody transfer ultrasonic flowmeter

The ALTOSONIC III, a three-beam custody transfer ultrasonic flowmeter, is intended to replace turbines and other type meters in the fiscal measurement of light liquid hydrocarbons.

The company says its unit meets the need for an ultrasonic flowmeter for single products with the features of ultrasonic flowmeters plus the custody transfer metering requirement of the industry. For custody transfer, the meter offers 0.2% accuracy and is compliant with OIML R-117. With no moving parts, the meter promises to eliminate problems with clogging, scaling, or blockage.

With no pressure loss, the need to upsize pumps is avoided, the firm notes. The meter is bidirectional, while the three beams offer built-in redundancy in the event of a sensor failure. Retrofitting is easy, as the unit slots directly into the position taken by a turbine with a simple flow straightener.

Source: **Krohne Inc.,** 7 Dearborn Rd., Peabody, MA 01960-3803.

Indicator/totalizer has HART communications protocol

The HRT1, an upgrade to the HIT-2A rate indicator/totalizer, incorporates HART communications protocol.

The HRT1 rate and total indicator works with this firm's turbine flowmeters and other frequency producing flowmeters. The new unit enables users to communicate to a processor via software or even a hand-held communicator if desired using the HART protocol. Thus, they can adjust settings in the unit and check diagnostics. Features include rate, total and grand total display, two optional alarm outputs configurable for rate and total, 20 point linearization, scaled pulse output, and 4-20 ma loop powered analog output. The HRT1 incorporates the latest HART software Version 7. This software provides an upgrade and migration path to HART wireless for future product enhancement.

Source: **Hoffer Flow Controls Inc.,** Box 2145, Elizabeth City, NC 27906.

Imports of crude and products

	Districts 1–4		District 5		Total US		
	11-21 2008	11-14 2008	11-21 2008	11-14 2008	11-21 2008	11-14 2008	*11-23 2007
	1,000 b/d						
Total motor gasoline	954	860	26	0	980	860	835
Mo. gas. blending comp.	894	623	17	0	911	623	396
Distillate	234	122	0	0	234	122	203
Residual	235	241	157	0	392	241	215
Jet fuel–kerosine	62	69	15	19	77	88	220
Propane–propylene	233	146	20	18	253	164	159
Other	153	444	48	119	201	563	1,039
Total products	**2,765**	**2,505**	**283**	**156**	**3,048**	**2,661**	**3,067**
Total crude	**9,744**	**8,915**	**1,215**	**956**	**10,959**	**9,871**	**10,354**
Total imports	**12,509**	**11,420**	**1,498**	**1,112**	**14,007**	**12,532**	**13,421**

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

Purvin & Gertz LNG netbacks—Nov. 28, 2008

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	11.83	9.97	11.02	9.87	10.32	10.94
Everett	6.13	4.11	5.80	4.21	4.60	6.39
Isle of Grain	7.68	5.92	7.17	5.83	6.42	7.17
Lake Charles	4.23	2.49	4.01	2.64	2.82	4.82
Sodegaura	8.99	12.03	9.26	11.73	11.02	8.35
Zeebrugge	11.87	9.22	11.04	9.11	9.81	11.07

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

Crude and product stocks

District	Crude oil	Motor gasoline		Jet fuel, kerosine	Fuel oils		Propane–propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	13,440	52,044	29,311	9,313	51,839	13,480	4,243
PADD 2	69,169	48,773	18,588	6,888	25,749	1,215	21,707
PADD 3	170,915	64,109	31,775	11,846	32,952	19,497	31,695
PADD 4	14,594	7,482	2,669	584	2,765	245	[1]2,714
PADD 5	52,710	28,068	22,927	9,374	13,389	4,405	—
Nov. 21, 2008	**320,828**	**200,476**	**105,270**	**38,005**	**126,694**	**38,842**	**60,359**
Nov. 14, 2008	**313,548**	**198,634**	**103,764**	**38,127**	**126,880**	**39,085**	**60,415**
Nov. 23, 2007[2]	**313,153**	**196,628**	**92,324**	**38,899**	**130,916**	**38,752**	**61,513**

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

Refinery report—Nov. 21, 2008

District	REFINERY OPERATIONS		REFINERY OUTPUT				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane–propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,270	1,269	2,106	84	434	104	79
PADD 2	3,314	3,280	2,195	170	1,133	48	225
PADD 3	7,219	7,133	2,870	679	2,301	275	576
PADD 4	555	552	327	33	160	12	[1]172
PADD 5	2,815	2,604	1,464	481	581	116	—
Nov. 21, 2008	**15,173**	**14,838**	**8,962**	**1,447**	**4,609**	**555**	**1,052**
Nov. 14, 2008	**14,953**	**14,558**	**8,816**	**1,385**	**4,410**	**582**	**1,037**
Nov. 23, 2007[2]	**15,606**	**15,470**	**9,020**	**1,409**	**4,302**	**703**	**1,114**
	17,610 Operable capacity		**86.2% 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

	*11–28–08	*11–30–07	Change $/bbl	Change, %
SPOT PRICES				
Product value	58.90	102.61	–43.71	–42.6
Brent crude	49.77	93.65	–43.88	–46.9
Crack spread	9.13	8.96	0.17	1.9
FUTURES MARKET PRICES				
One month				
Product value	57.70	102.35	–44.65	–43.6
Light sweet crude	53.54	92.49	–38.96	–42.1
Crack spread	4.17	9.86	–5.69	–57.7
Six month				
Product value	66.24	103.95	–37.71	–36.3
Light sweet crude	59.11	89.30	–30.20	–33.8
Crack spread	7.13	14.65	–7.52	–51.3

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

OGJ GASOLINE PRICES

	Price ex tax 11-26-08	Pump price* 11-26-08	Pump price 11-28-07
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	152.3	198.8	312.2
Baltimore	149.1	191.0	304.2
Boston	152.5	194.4	301.8
Buffalo	130.8	191.7	324.4
Miami	146.4	198.0	326.6
Newark	164.0	196.6	292.0
New York	141.9	202.8	306.3
Norfolk	153.3	191.7	296.6
Philadelphia	151.2	201.9	311.5
Pittsburgh	155.8	206.5	310.5
Wash., DC	172.7	211.1	308.3
PAD I avg	151.8	198.6	308.6
Chicago	132.5	196.9	344.6
Cleveland	134.2	180.6	314.5
Des Moines	137.7	178.1	302.3
Detroit	131.2	190.6	322.2
Indianapolis	127.5	186.9	309.7
Kansas City	134.0	170.0	293.2
Louisville	142.0	182.9	305.4
Memphis	136.5	176.3	303.9
Milwaukee	131.7	183.0	315.0
Minn.-St. Paul	137.1	181.1	305.1
Oklahoma City	134.4	169.8	300.8
Omaha	126.4	171.7	292.7
St. Louis	145.9	181.9	303.8
Tulsa	136.0	171.4	296.1
Wichita	132.7	176.1	299.8
PAD II avg	134.7	179.8	307.3
Albuquerque	153.7	190.1	307.6
Birmingham	142.5	181.8	304.2
Dallas-Fort Worth	137.6	176.0	300.1
Houston	132.8	171.2	291.6
Little Rock	145.2	185.4	304.1
New Orleans	152.2	190.6	297.6
San Antonio	152.5	190.9	292.3
PAD III avg	145.2	183.7	299.6
Cheyenne	145.2	177.6	299.8
Denver	157.1	197.5	307.5
Salt Lake City	138.8	181.7	303.0
PAD IV avg	147.0	185.6	303.4
Los Angeles	150.5	217.6	333.0
Phoenix	170.1	207.5	294.9
Portland	179.1	222.5	317.0
San Diego	160.4	227.5	342.6
San Francisco	156.5	223.6	358.9
Seattle	161.6	217.5	330.3
PAD V avg	163.0	219.4	329.5
Week's avg.	**145.9**	**191.5**	**309.2**
Nov. avg.	**169.9**	**215.5**	**307.6**
Oct. avg.	**272.3**	**317.6**	**280.9**
2008 to date	**294.8**	**339.0**	—
2007 to date	**233.2**	**276.8**	—

*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

	11-21-08 ¢/gal		11-21-08 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	113.63	New York Harbor	170.67
Gulf Coast	104.25	Gulf Coast	163.30
Los Angeles	95.00	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	97.16	ARA	168.81
Singapore	94.52	Singapore	147.98
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	108.88	New York Harbor	86.02
Gulf Coast	104.75	Gulf Coast	85.79
Los Angeles	101.00	Los Angeles	105.54
		ARA	100.86
		Singapore	82.48

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

BAKER HUGHES RIG COUNT

	11-28-08	11-30-07
Alabama	4	5
Alaska	12	10
Arkansas	57	52
California	40	40
Land	40	38
Offshore	0	2
Colorado	121	114
Florida	1	0
Illinois	1	0
Indiana	2	2
Kansas	10	15
Kentucky	3	8
Louisiana	190	162
N. Land	98	61
S. Inland waters	21	27
S. Land	22	26
Offshore	49	48
Maryland	0	1
Michigan	1	1
Mississippi	17	8
Montana	7	10
Nebraska	0	0
New Mexico	69	73
New York	4	4
North Dakota	86	52
Ohio	12	13
Oklahoma	176	203
Pennsylvania	27	17
South Dakota	1	0
Texas	890	872
Offshore	7	12
Inland waters	1	0
Dist. 1	27	20
Dist. 2	34	34
Dist. 3	68	66
Dist. 4	88	81
Dist. 5	166	184
Dist. 6	124	115
Dist. 7B	28	44
Dist. 7C	66	62
Dist. 8	127	120
Dist. 8A	29	25
Dist. 9	47	44
Dist. 10	78	65
Utah	39	41
West Virginia	11	36
Wyoming	76	71
Others—NV-8; WA-1	9	13
Total US	**1,866**	**1,823**
Total Canada	**406**	**381**
Grand total	**2,272**	**2,204**
Oil rigs	412	354
Gas rigs	1,443	1,463
Total offshore	61	63
Total cum. avg. YTD	**1,887**	**1,764**

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	11-28-08 Percent footage*	Rig count	11-30-07 Percent footage*
0–2,500	82	3.6	58	6.8
2,501-5,000	134	54.4	112	60.7
5,001-7,500	244	13.9	227	25.1
7,501-10,000	448	2.6	448	1.5
10,001-12,500	415	1.9	448	3.5
12,501-15,000	374	—	282	—
15,001-17,500	165	—	113	—
17,501-20,000	76	—	63	—
20,001-over	34	—	32	—
Total	**1,972**	**6.5**	**1,783**	**8.5**
INLAND	29		37	
LAND	1,893		1,696	
OFFSHORE	50		50	

*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]11-28-08	[2]11-30-07
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	19	20
Alaska	707	743
California	669	666
Colorado	63	68
Florida	7	6
Illinois	29	26
Kansas	109	106
Louisiana	1,157	1,150
Michigan	15	14
Mississippi	61	61
Montana	98	92
New Mexico	166	163
North Dakota	128	131
Oklahoma	180	175
Texas	1,320	1,322
Utah	54	54
Wyoming	151	150
All others	65	70
Total	**4,998**	**5,017**

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

US CRUDE PRICES

	11-28-08 $/bbl*
Alaska-North Slope 27°	93.39
South Louisiana Sweet	56.50
California-Kern River 13°	39.90
Lost Hills 30°	48.15
Wyoming Sweet	39.43
East Texas Sweet	50.50
West Texas Sour 34°	46.50
West Texas Intermediate	51.00
Oklahoma Sweet	51.00
Texas Upper Gulf Coast	47.50
Michigan Sour	44.00
Kansas Common	50.00
North Dakota Sweet	38.00

*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]	11-21-08
United Kingdom-Brent 38°	49.15
Russia-Urals 32°	46.55
Saudi Light 34°	48.02
Dubai Fateh 32°	46.87
Algeria Saharan 44°	50.80
Nigeria-Bonny Light 37°	52.68
Indonesia-Minas 34°	54.83
Venezuela-Tia Juana Light 31°	46.09
Mexico-Isthmus 33°	45.98
OPEC basket	49.32
Total OPEC[2]	47.85
Total non-OPEC[2]	46.03
Total world[2]	47.04
US imports[3]	44.57

[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]

	11-21-08	11-14-08	11-21-07	Change, %
	bcf			
Producing region	965	974	1,073	-10.1
Consuming region east	1,990	2,041	1,981	0.5
Consuming region west	467	473	477	-2.1
Total US	**3,422**	**3,488**	**3,531**	**-3.1**
	Sept. 08	**Sept. 07**	**Change, %**	
Total US[2]	**3,163**	**3,316**	**-4.6**	

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

Statistics

WORLDWIDE CRUDE OIL AND GAS PRODUCTION

	Sept. 2008	Aug. 2008	9 month average production 2008	9 month average production 2007	Change vs. previous year Volume	Change vs. previous year %	Sept. 2008	Aug. 2008	Cum. 2008
	Crude, 1,000 b/d						Gas, bcf		
Argentina	628	628	604	629	–25	–3.9	126.8	133.7	1,133.61
Bolivia	40	40	40	44	–4	–8.7	41.0	43.0	377.60
Brazil	1,857	1,840	1,807	1,752	55	3.1	37.0	39.0	332.00
Canada	2,600	2,663	2,565	2,624	–59	–2.2	420.0	450.1	4,186.76
Colombia	590	600	575	523	52	9.9	22.0	24.0	203.00
Ecuador	500	500	500	500	—	—	1.0	1.0	9.00
Mexico	2,722	2,759	2,822	3,127	–305	–9.7	210.6	216.0	1,864.40
Peru	85	75	73	75	–2	–2.7	11.2	11.4	86.10
Trinidad	115	115	113	122	–9	–7.2	113.0	117.0	1,034.72
United States	4,025	4,895	4,979	5,073	–94	–1.9	1,603.0	1,859.0	15,988.00
Venezuela[1]	2,370	2,310	2,359	2,389	–30	–1.3	75.0	75.0	669.00
Other Latin America	83	83	83	83	—	0.1	5.5	5.5	49.16
Western Hemisphere	**15,615**	**16,508**	**16,521**	**16,941**	**–420**	**–2.5**	**2,666.1**	**2,974.7**	**25,933.34**
Austria	16	16	16	17	–1	–7.5	5.0	5.0	45.20
Denmark	280	285	289	313	–24	–7.7	22.0	25.0	248.83
France	19	20	20	19	1	3.2	1.8	2.8	25.44
Germany	59	54	61	68	–8	–11.3	40.0	41.6	402.78
Italy	94	96	101	109	–8	–7.3	24.0	26.0	226.00
Netherlands	35	32	35	40	–5	–13.2	130.0	130.0	2,010.00
Norway	2,057	2,057	2,151	2,273	–123	–5.4	224.7	210.0	2,507.75
Turkey	42	43	41	41	—	0.1	—	—	—
United Kingdom	1,416	1,106	1,409	1,514	–105	–7.0	197.7	172.8	1,915.69
Other Western Europe	4	4	4	4	—	–9.6	0.6	0.6	14.80
Western Europe	**4,022**	**3,713**	**4,126**	**4,400**	**–274**	**–6.2**	**645.8**	**613.7**	**7,396.48**
Azerbaijan	900	700	933	817	116	14.1	35.0	35.0	291.00
Croatia	14	16	15	16	–1	–5.6	5.2	5.6	50.23
Hungary	14	14	15	16	–2	–9.4	7.7	8.2	66.24
Kazakhstan	1,380	1,400	1,380	1,078	302	28.0	90.0	85.0	718.00
Romania	90	90	93	99	–6	–5.7	18.0	18.0	159.00
Russia	9,810	9,760	9,747	9,884	–138	–1.4	1,750.0	1,650.0	17,000.00
Other FSU	400	400	400	453	–53	–11.8	450.0	400.0	4,140.00
Other Eastern Europe	46	46	48	48	1	1.4	15.4	15.9	148.14
Eastern Europe and FSU	**12,655**	**12,426**	**12,631**	**12,412**	**219**	**1.8**	**2,371.3**	**2,217.6**	**22,572.61**
Algeria[1]	1,370	1,370	1,379	1,348	31	2.3	270.0	280.0	2,475.00
Angola[1]	1,788	1,897	1,905	1,662	243	14.6	4.5	5.0	44.10
Cameroon	85	85	86	84	2	2.3	—	—	—
Congo (former Zaire)	25	25	25	25	—	—	—	—	—
Congo (Brazzaville)	240	240	240	240	—	—	—	—	—
Egypt	690	690	672	643	29	4.5	130.0	135.0	1,210.00
Equatorial Guinea	320	320	320	320	—	—	0.1	0.1	0.54
Gabon	240	240	233	230	3	1.4	0.3	0.3	2.75
Libya[1]	1,700	1,650	1,726	1,698	28	1.6	35.0	34.0	305.00
Nigeria[1]	1,980	1,980	1,953	2,166	–212	–9.8	82.0	85.0	715.00
Sudan	500	500	487	470	17	3.5	0.0	0.0	0.00
Tunisia	91	90	84	97	–13	–13.1	8.4	8.0	54.27
Other Africa	221	221	221	222	—	–0.2	8.7	9.1	80.00
Africa	**9,251**	**9,308**	**9,332**	**9,204**	**128**	**1.4**	**538.9**	**556.5**	**4,886.66**
Bahrain	170	170	170	172	–3	–1.5	24.0	25.0	217.88
Iran[1]	3,910	3,920	3,943	3,916	28	0.7	290.0	300.0	2,640.00
Iraq[1]	2,160	2,330	2,388	2,008	381	19.0	20.0	20.0	175.20
Kuwait[1,2]	2,610	2,615	2,609	2,417	192	7.9	44.0	45.0	372.00
Oman	700	720	720	713	7	0.9	58.0	60.0	524.00
Qatar[1]	860	870	857	800	57	7.1	180.0	190.0	1,625.00
Saudi Arabia[1,2]	9,310	9,365	9,152	8,523	629	7.4	210.0	225.0	1,955.00
Syria	390	390	387	391	–4	–1.1	17.0	18.0	158.00
United Arab Emirates[1]	2,650	2,610	2,638	2,571	67	2.6	130.0	130.0	1,185.00
Yemen	300	300	309	342	–33	–9.7	—	—	—
Other Middle East	—	—	—	—	—	2.8	10.7	12.0	95.78
Middle East	**23,060**	**23,290**	**23,173**	**21,854**	**1,318**	**6.0**	**983.7**	**1,025.0**	**8,947.86**
Australia	477	464	445	454	–9	–2.1	101.5	116.9	995.80
Brunei	150	163	160	180	–20	–11.2	37.1	34.0	303.55
China	3,798	3,784	3,799	3,754	45	1.2	217.3	224.0	2,131.50
India	654	683	673	683	–10	–1.5	84.7	87.2	766.97
Indonesia[1]	860	870	861	841	20	2.4	220.0	230.0	2,070.00
Japan	15	15	17	17	—	2.3	9.5	9.9	96.29
Malaysia	750	770	752	749	3	0.4	140.0	150.0	1,305.00
New Zealand	47	57	58	29	29	97.3	13.0	14.0	115.90
Pakistan	66	65	67	68	–2	–2.5	119.8	120.8	1,103.19
Papua New Guinea	40	40	42	48	–7	–14.0	0.9	1.0	8.60
Thailand	235	240	228	212	15	7.3	39.0	45.0	396.00
Vietnam	250	250	281	313	–32	–10.3	14.5	15.0	134.50
Other Asia–Pacific	40	42	40	35	5	15.6	95.5	99.5	879.56
Asia–Pacific	**7,382**	**7,443**	**7,421**	**7,384**	**37**	**0.5**	**1,092.8**	**1,147.3**	**10,306.87**
TOTAL WORLD	**71,985**	**72,688**	**73,203**	**72,195**	**1,008**	**1.4**	**8,298.6**	**8,534.8**	**80,043.83**
OPEC	32,068	32,287	32,270	30,338	1,932	6.4	1,561.5	1,620.0	14,239.30
North Sea	3,771	3,467	3,867	4,119	–253	–6.1	483.2	446.5	5,272.32

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

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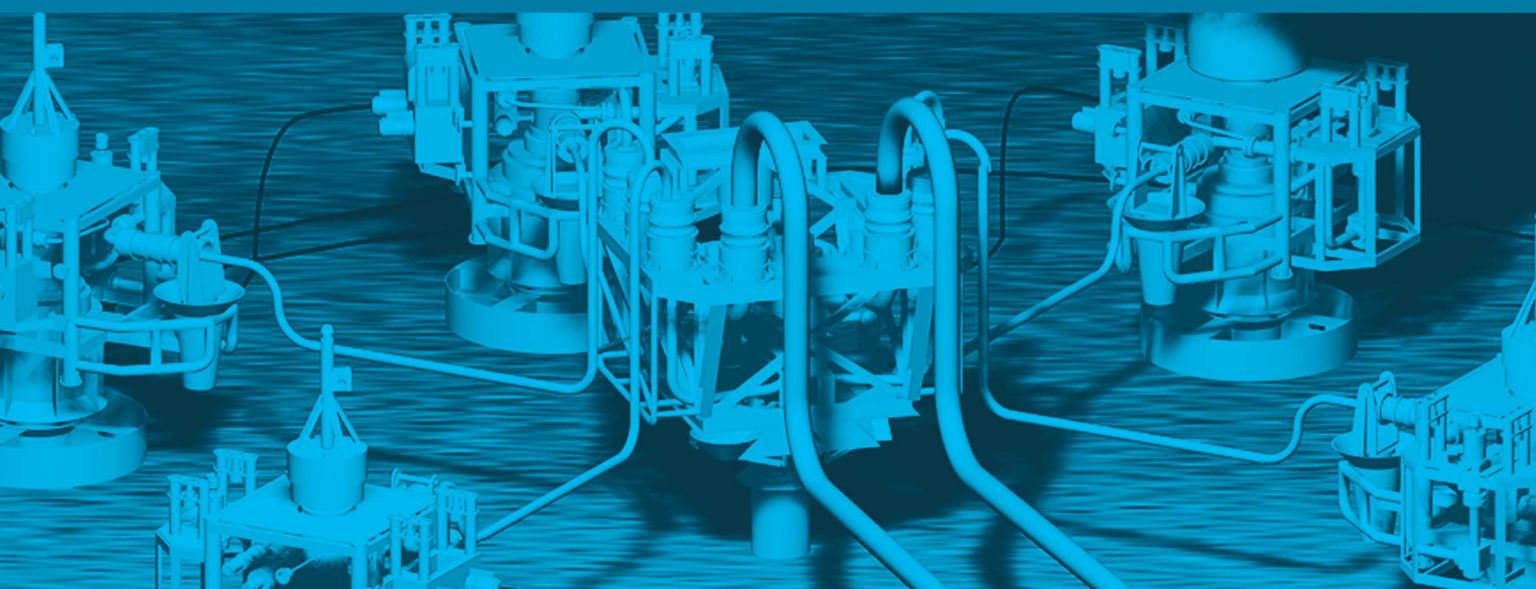

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Financial crisis hurts outlook for EU energy goals

The folly of governmental targets for energy use is coming into clear focus in Europe.

A global financial crisis is playing havoc with the European Union's decree that 20% of its members' energy must come from renewable sources by 2020.

When governments set targets like that, they take little account of the practicalities of achievement, including real-world con-

The Editor's Perspective

by Bob Tippee, Editor

straints such as engineering and economics. The EU could have set the target at 15% or 25%.

What's important in policy-making is that there be a target, without which policymakers can be criticized for lack of seriousness. In this case, it's easy to see how the EU came to its 20% target for renewables. Twenty percent in twenty-twenty. Isn't that clever?

Propaganda trumps practicality, not to mention the economic interests of European energy consumers.

The financial crisis has thrown doubt on large, risky offshore wind and tidal projects.

"Lack of liquidity means companies will find it nearly impossible to raise the €500 billion which we believe would be required to make such projects successful," says a report by Helmut Edelmann, a director in Ernst & Young's Power & Utilities Center.

While utilities remain focused on the big projects that have become financially doubtful, opportunities exist in small, decentralized power production from wind, solar, photovoltaics, and biomass, Edelmann told a conference in Brussels on Nov. 25. "Instead of just distributing power from the plant to the customer, grids will need to be adapted to receive power from customers and store or redistribute that power to others depending on demand," he said, stressing the need for cutting technology costs and "industrializing the whole supply chain."

Edelmann said, "Utilities should offer investment support to commercial customers or private consumers to help them build small renewable energy plants that feed in power back to the grid."

From here, that sounds like commercializing renewable energy on a scale sufficient to meet the EU's poetic target depends on patently noncommercial behavior by utilities. That's a flimsy foundation for a new industry—flimsy but essential.

"Without such structural changes," Edelmann says, "the ambitious EU targets will never be met."

(Online Nov. 28, 2008; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

OPEC: Oil demand deteriorates

Although there were no production adjustments at their Nov. 29 consultation in Cairo, members of the Organization of Petroleum Exporting Countries did note the rapid deterioration of demand prospects since their Oct. 24 agreement to reduce production effective Nov. 1.

In the Houston office of Raymond James & Associates Inc., analysts saw it as a "clear implication" that another production cut is coming, probably at OPEC's Dec. 17 meeting in Oran, Algeria. Others wonder why OPEC should consider another cut without knowing the extent of compliance with its previous reduction and its effect on oil markets. The last cut did not slow the temporary fall of oil prices to below $50/bbl on Nov. 20; that was the first time since May 2005 that a front-month crude contract dipped below $50/bbl in the New York market. In the past, OPEC hasn't had much luck maintaining prices during a financial crisis.

"World oil markets clearly reflect lack of credibility in OPEC, their ability to adhere to output cuts, and their ability to support their [unofficial] target price of $75/bbl," said analysts at Pritchard Capital Partners LLC in New Orleans.

Raymond James analysts said the oil market apparently has factored into prices a 3-4% decline in global oil demand. "From a historical perspective, that type of demand decline in a falling oil price world just seems too severe. That means we expect oil prices to gradually improve though 2009 as liquidity returns to the commodity markets and global capital infusions begin to drive global oil demand gradually higher," they said. At KBC Market Services, a division of KBC Process Technology Ltd. in Surrey, UK, analysts expect OPEC's production cuts to stabilize prices. "In 2009 the average price of Brent crude oil will be $80/bbl," they said.

"The best cure for low oil prices is…low oil prices," said Raymond James analysts. "As investment in new supply dwindles—both because of more limited available cash flow and also the credit crunch—non-OPEC supply will likely fall, and the prospects for growth from OPEC look anemic as well."

Consequences of $50 oil

Meanwhile, analysts noted various consequences if crude hovers at $50/bbl for a substantial period:

- Lower prices for transportation and heating energy bring relief to consumers. In Arlington, Va., however, analysts at Friedman, Billings, Ramsey & Co. Inc. (FBR) reported signs "that the US driver may be coming back to life." The latest data from MasterCard Advisors indicated US gasoline demand increased 172,000 b/d to 9.2 million b/d in a week. Demand is still down 1.2% from a year ago, but it's a possible start.
- Lower prices disrupt the budget plans of OPEC countries. "If prices move much below $50/bbl, the alarm bells will be deafening," said KBC analysts. "Spending commitments range from social programs to long-term investments in oil infrastructure that are needed to meet long-term energy demand. Political stability in some OPEC countries might depend on these social programs, and the world's future supply of crude oil and products will depend on these investments in oil infrastructure."
- It raises doubts about the viability of oil projects both upstream and downstream. At the end of November, the list of deferred and cancelled projects was growing.

"We are witnessing the end of structurally cheap oil and the beginning of structurally higher-priced oil," said KBC analysts. "There is an incentive to invest, but is there the will?" By 2010, KBC analysts expect a strong recovery in demand "that will be maintained for much of the following decade." Meanwhile they expect conventional crude production in non-OPEC countries to increase until 2020 before going into gradual decline. That will increase world dependence on OPEC suppliers who need to invest to provide more production capacity.

"After 2015, we will need more refining capacity to meet global demand growth," they said. As upstream and downstream spare capacity shrink, KBC analysts expect crude prices to inch up to $105/bbl in 2015 and $130/bbl in 2020.

"The driving force—literally—behind oil demand growth in China and the rest of the developing world is the dramatic expansion of vehicle fleets," said KBC analysts. By 2030 there will be 1.3 billion vehicles from 800 million today, they said. But new CAFE standards and an apparent "structural move" to more fuel-efficient vehicles have KBC analysts expecting a 2.5 million b/d decrease in US gasoline demand by 2030. Demand for diesel and jet fuel will grow to 2030, but the ratio of fuel growth to GDP growth will fall as more fuel-efficient vehicles and aircraft come into service.

(Online Dec. 1, 2008; author's e-mail: samf@ogjonline.com)




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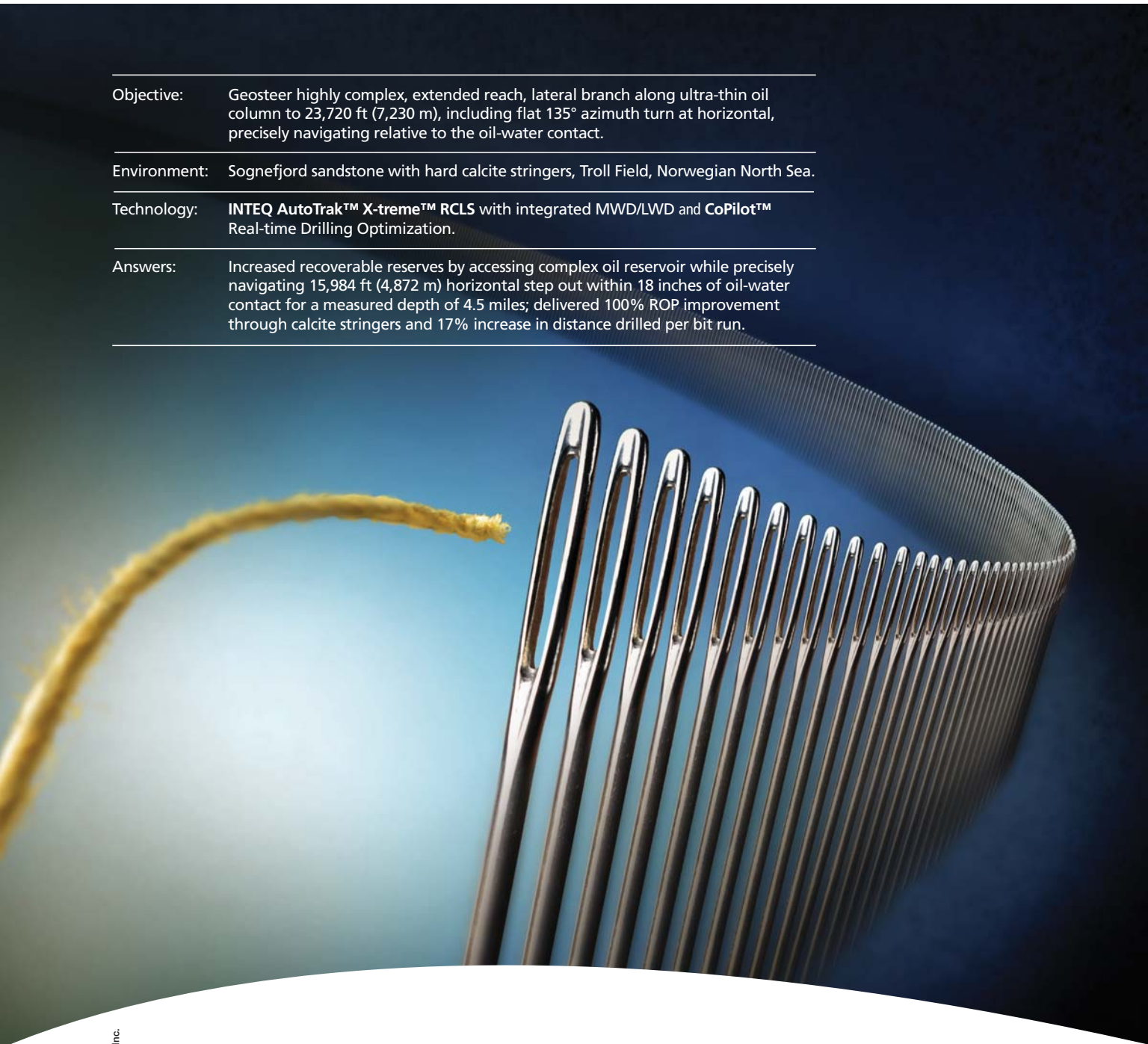

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