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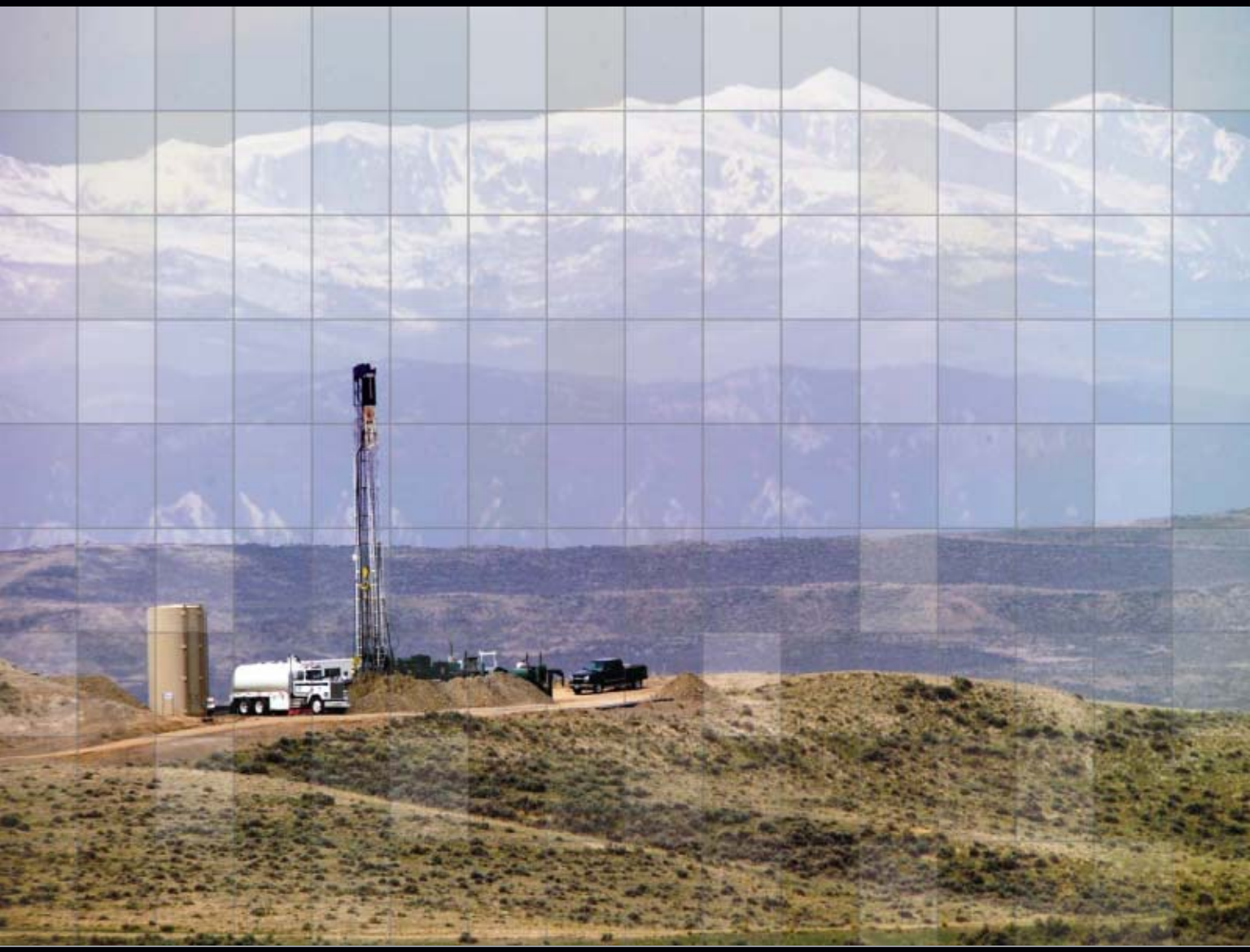

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Jan. 22, 2007
Volume 105.4

COALBED METHANE PROGRESS

REGULAR FEATURES

COVER

Bighorn Mountains in north-central Wyoming form a backdrop for a rig drilling a well for coalbed methane in the Powder River basin. The outlook is for the drilling of 3,000 wells/year in 2007-13 under current regulations. A status report on drilling and water issues in the basin highlights OGJ's Coalbed Methane Progress starting on p. 30.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

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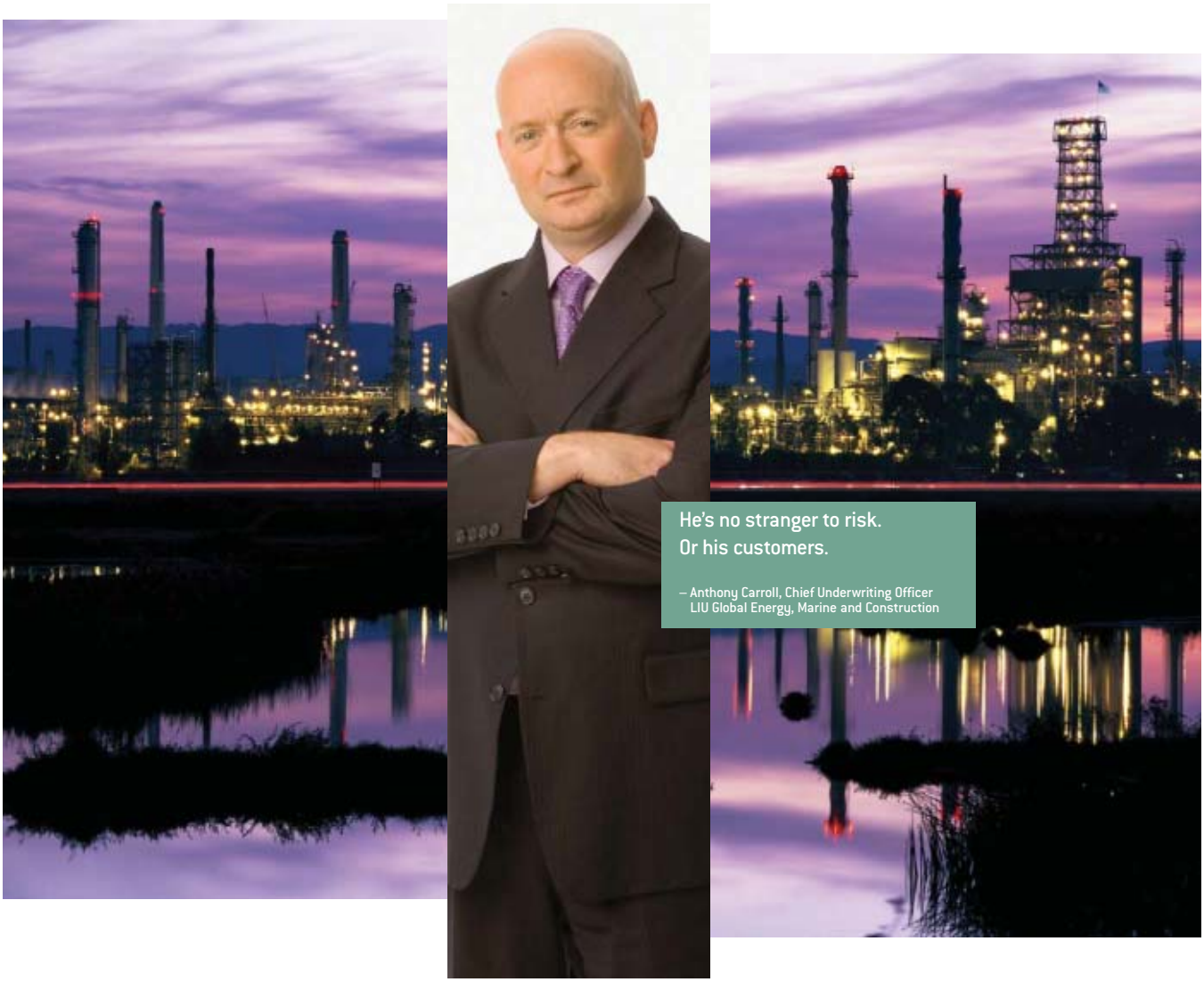

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OGJ Newsletter

Jan. 22, 2007

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General Interest — Quick Takes

BP's US safety culture draws fire in review

BP's US refinery and corporate safety culture has been severely criticized in a report by an independent review panel investigating the explosion last March that killed 15 people and left 170 people injured at BP's Texas City, Tex., refinery.

The 374-page report, led by James Baker, former US secretary of state, said BP management had failed to implement process safety as a core value across its five US refineries.

"BP has emphasized personal safety in recent years and has achieved significant improvement in personal safety performance, but BP did not emphasize process safety. BP mistakenly interpreted improving personal injury rates as an indication of acceptable process safety performance at its US refineries," the report concluded.

Employees working at BP refineries in Texas City; Toledo, Ohio; and Whiting, Ind., did not feel comfortable about communicating with management about safety issues, according to the panel, which said safety culture appears to be improving at Texas City and Whiting.

Neither did BP ensure that there were sufficient resources to underpin a strong process safety performance, the report added, stating, "BP does not have a designated, high-ranking leader for process safety dedicated to its refining business."

The panel was unable to conclude whether BP had problems with its safety culture because of cost-cutting. "BP tended to have a short-term focus, and its decentralized management system and entrepreneurial culture have delegated substantial discretion to US refinery plant managers without clearly defining process safety expectations, responsibilities, or accountabilities," the panel wrote.

The report also criticized the company's delay in adopting engineering practices that could otherwise improve safety culture. BP's accident was the worst in US industrial history for the past 2 decades, but the US refining industry has lower accident rates than US manufacturing, the American Petroleum Institute said. In 2004, the rate of job-related injuries and illnesses for US petroleum refinery workers, as compiled by the US Occupational Safety and Health Administration, was 1.5 for every 100 full-time employees, compared with a rate of 6.6 for all US manufacturing employees.

John Browne, the chief executive of BP who last week announced a surprise early retirement from the role in July, denied cost-cutting was responsible for the failings. Browne has insisted that his departure is not related to the report.

A Citigroup research analyst note said Tony Hayward, Browne's successor, will need to focus on making changes in the company following the Baker report, rebuild BP's US reputation, safeguard TNK-BP's assets, deliver on growth, and restore market confidence in BP.

BP has committed to implementing the report's recommendations and has initiated some measures, which include:

- Creating a senior executive team to support and oversee process safety, integrity management, and operational integrity initiatives.
- Forming a Safety and Operations division to establish group operations and process safety standards and auditing safety and operations performance.
- Empowering the chairman and president of BP America to monitor BP's US operations and compliance with regulatory requirements and company standards and to rectify problems when they are identified.
- Appointing retired federal Judge Stanley Sporkin to receive, investigate, and resolve concerns raised by BP staff and contract workers in the US.
- Investing $1.7 billion/year during 2007-10 to improve the integrity and reliability of refining assets in the US. The company spent $1.2 billion in 2005.

DPC chair warns against tax, royalty increases

Increasing oil and gas producers' tax and royalty costs to fund future conservation and alternative energy efforts would also have near-term supply impacts damaging to consumers, the chairman of the Domestic Petroleum Council warned on Jan. 16.

Charles Davidson, who also is chairman, president, and chief executive of Noble Energy Inc., Houston, made that point in response to provisions in HR 6, which House Ways and Means Committee Chairman Charles B. Rangel (D-NY) and Natural Resources Committee Chairman Nick J. Rahall (D-W.Va.) introduced 4 days earlier.

The largest US independent oil and gas producers, represented by DPC, "invest more than they earn each year—over the past 5 years, twice their earnings—to apply leading-edge technology to find and develop energy supplies that are essential for our economy and our consumers," Davidson said in a letter to House members. "The good news is that especially with respect to natural gas, we have abundant resources in North America. With access to them, and with stable tax and other policies, we can approach self-sufficiency."

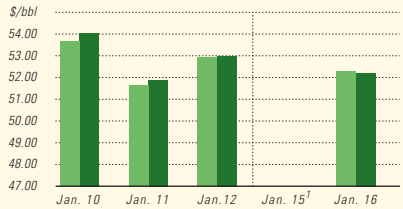
Drilling is at record levels, reserves are growing, and production is essentially steady, according to Davidson.

"There is movement toward accessing more-promising areas that will make substantial improvements in our energy outlook, including the offshore as a result of the Gulf of Mexico Energy Security Act passed by Congress and signed into law late last year. And our energy permitting and related processes are becoming more efficient," he said.

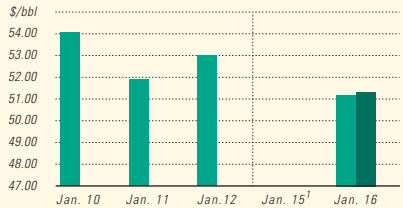
"We must do more in all these areas, not slow our progress or reverse it."

Industry Scoreboard

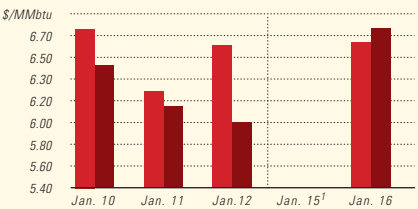
IPE BRENT / NYMEX LIGHT SWEET CRUDE



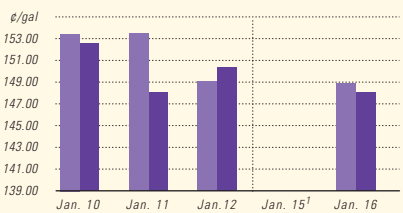
WTI CUSHING / BRENT SPOT



NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



IPE GAS OIL / NYMEX HEATING OIL



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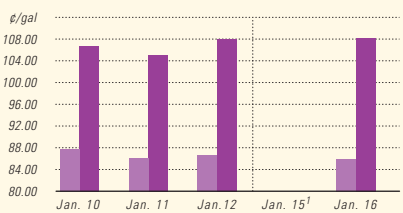
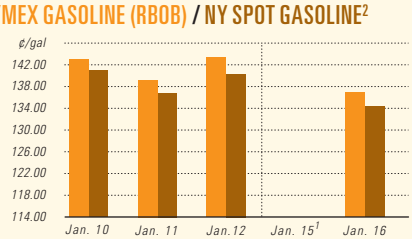


NYMEX GASOLINE (RBOB) / NY SPOT GASOLINE[2]



[1]Not available
[2]Nonoxygenated regular unleaded.

SCOREBOARD

Due to the holiday in the US, data for this week's industry Scoreboard are not available.

Recently mild weather has masked a delicate gas supply-demand balance while allowing producers to increase reserves, he continued. Denial of access to promising areas has forced producers to focus their efforts on smaller reservoirs and formations that are more difficult to produce.

"The result is that well decline rates are 32%/year and accelerating. That means we must drill more wells every year just to maintain production levels," Davidson said.

DPC members and other US independent producers face rising drilling and service costs as they pursue these projects, he added. Meanwhile, earnings, which had reached a level that produced adequate returns after years of underperformance relative to other businesses, are heading downward with falling oil and gas prices.

"Increasing taxes and royalties on these companies now will almost certainly force reductions in drilling budgets. That will quickly lead to falling production and higher prices for all gas consumers," Davidson warned.

In its latest short-term energy outlook, issued on Jan. 9, the US Energy Information Administration said warm weather in December reduced space-heating demand and kept gas prices from rising. "With about 16% fewer heating degree days than normal in December, the Henry Hub spot natural gas price averaged $6.97/Mcf for the month," it said.

In the longer term, the federal energy forecasting and analysis service expects Henry Hub spot prices to increase from an average $6.94/Mcf in 2006 to $7.06/Mcf in 2007 and $7.72/Mcf in 2008.

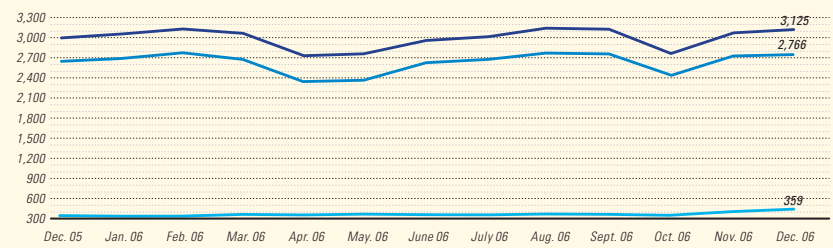
EIA currently expects domestic gas consumption to grow 2.4% in 2007 from 2006, when demand was 1.3% lower than in 2005. US gas production, which grew 2.4% in 2006 from 2005, is forecast to increase by a more moderate 1.9% during 2007, according to the January 2007 Short-Term Energy Outlook.

Gas exports to Georgia start

Azerbaijan's Azarigaz began exporting natural gas Jan. 11 along the Haciqabul-Qazax-Tbilisi trunk line to Georgia, which is seeking to reduce its dependence on increasingly expensive Russian supplies.

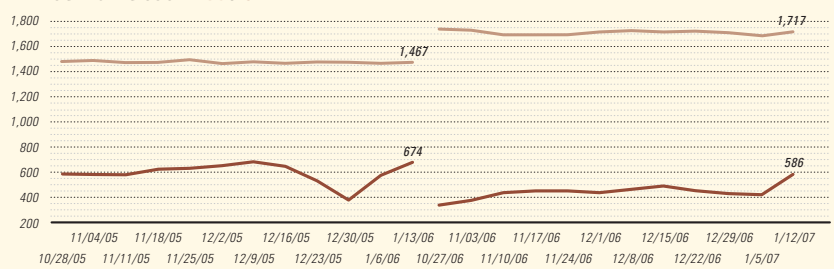
The State Oil Co. of the Azerbaijani Republic will initially supply 3 million cu m/day of gas from Jan. 11-21 at a cost of

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



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

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$120/1,000 cu m. By the end of January, gas from Azerbaijan's Shah Daniz field will be supplied to Georgia via the Baku-Tbilisi-Erzurum pipeline.

Georgia is expected to require 1.8 billion cu m of gas in 2007 and had an agreement with Russia's OAO Gazprom to supply 1.46 billion cu m this year. But on Nov. 2, 2006, Gazprom announced that prices for the Georgian market could more than double in 2007 to $230/1,000 cu m from $110/1,000 cu m. As Georgia balked at paying the new price, Gazprom threatened to cut off supplies.

Meanwhile, to bolster its energy security, Georgia is reportedly considering plans to repair its main gas lines and to build a gas storage facility in the southern Ninotsminda district initially capable of storing as much as 500 million cu m of gas.

US-financed Millennium Challenge Corp. will undertake a feasibility study of the project, which is expected to attract foreign investors. The potential site was recently viewed by Lasha Shanidze, president of the local Millennium Challenge Georgia Fund (MCGF).

Last November, MCGF formally launched its Energy Infrastructure Rehabilitation Project after signing contracts with Georgian and Azerbaijani firms for repairs on the six most hazardous sections of the country's North-South gas pipeline.

On Nov. 3, 2006, MCGF entered into two, 120-day contracts for the repair work with Georgia's Geoengineering and Azerbaijan's Khazardenizneftegaztikint.

The Azeri firm will work on the northern section of the gas main and accomplish urgent repair works on four sites, while the Georgian company will work on the remaining two sites in the south section of the pipeline.

John F. Tefft, US Ambassador to Georgia, said the repairs would increase gas supplies to Georgia and neighboring Armenia by reducing the threat of breaks, leaks, and emissions. He said the project is one of several supported by the US government with a view to enhancing Georgian energy security. ✦

Exploration & Development — *Quick Takes*

Statoil's Alve field to produce in late 2008

Statoil ASA plans to spud a well on Aug. 1 and start production in December 2008 from its Alve gas-condensate field in the Norwegian Sea.

At its peak, Alve is expected to produce 4 million cu m/day of gas. The field's reserves are pegged at 6.78 billion standard cu m and 8.3 million boe of condensate.

The field's development will be phased in via a tieback to Statoil-operated Norne field using a single subsea template with four drilling slots. Statoil has informed the Norwegian Ministry of Petroleum and Energy that it will spend about $310 million on Alve.

The development will exploit available capacity on the Norne production ship and in the Aasgard transport gas trunkline, said Jostein Gaasemyr, operations vice-president for Alve. Urd satellite field was tied back to Norne in 2005, and developing Alve requires some modifications to the Norne ship.

Alve lies in PL 159B and is 16 km southwest of Norne field in 390 m of water. Alve comprises the Garn, Not, Ile, and Tilje formations, with proved reserves lying in Garn and Not.

Statoil holds a 75% share in Alve. Other licensees are Danish Oil & Natural Gas 15% and Norsk Hydro AS 10%.

Heritage finds oil-bearing zones in Ugandan well

Heritage Oil has found oil-bearing zones totaling 40 m in its Kingfisher-1A sidetrack well on Uganda's Block 3A in Lake Albert. The block spans 1,991 sq km.

The company will test the zones when it finishes drilling the well, which has reached 2,962 m and has been cased to 2,502 m. A spokesman for partner Tullow Oil told OGJ that it is negotiating with companies to secure a rig to drill to 3000-4000 m TD over the next 45 days

Heritage Oil said: "The Kingfisher prospect is a very large structural high that is expressed at surface on the bed of Lake Albert." Seismic data indicate the Kingfisher prospect has an area extent of up to 70 sq km, although the Kingfisher-1A well will only explore a limited part of this structure, it said.

Heritage and Tullow Oil have a 50:50 interest in the block. Heritage plans to gather 270 sq m of 3D seismic over the Kingfisher structure during the first half of 2007. The partners are appraising other options to carry out more exploration on Kingfisher and other prospects in Lake Albert.

Last November, the upper zone of the Kingfisher-1 well tested at a stabilized flow rate of 4,120 b/d through a fixed 1-in. choke at a flowing well head pressure of 221 psi. The 30° gravity oil was sweet with a low gas-oil ratio and some associated wax (OGJ Online, Nov. 7, 2006).

Firms submit plan to redevelop Yme oil field

Talisman Energy Norge AS and license partners in PL 316, Revus Energy and Pertra, have informed the Norwegian energy ministry that they wish to redevelop Yme oil field in the Norwegian North Sea.

Under their proposed plan, the partners expect to be able to produce 50-60 million bbl of oil from the field, depending on future oil prices. Estimated investment costs are more than $629.1 million to produce a maximum of 40,000 b/d of oil.

Stein Fines, vice-president, technology and health, safety, and environment for Pertra, one of the smaller partners in the Yme proposal, told OGJ there are 66 million bbl of oil to be recovered. Yme field will be redeveloped using 12 production and injection wells and a production platform with a jack up unit and subsea storage tank.

Start of production is expected in January 2009 and this is the first time in Norway that an abandoned field would be redeveloped.

Single Buoy Moorings Inc. has received a letter of intent from the partners to provide and lease a newbuild production facility. Drilling production wells would begin next summer using the Maersk Giant jack up rig.

KPO lets contract for fourth Karachaganak train

Karachaganak Petroleum Operating BV (KPO) let an engineer-

ing, procurement, construction, and commissioning contract to oil services provider Petrofac of Aberdeen to add a fourth stabilization and sweetening train at the Karachaganak Processing Complex in northwest Kazakhstan. The train will process gas and condensate from Karachaganak oil and gas-condensate field. The contract's value was not disclosed.

Liquids capacity at the complex will increase to 10.3 million tonnes from 7.7 million tonnes after installation of the train, which is scheduled for completion in mid 2009.

The new facility will consist of pipeline, slug catcher, condensate stabilization, gasoline sweetening, export oil facilities, flash gas compression, gas dehydration and dew pointing, export gas compression, flare, and utilities, a Petrofac spokesman told OGJ.

This agreement follows Petrofac's successful completion of the development's front-end engineering design study carried out last year.

Karachaganak field has gross field reserves of more than 2.4 billion bbl of oil and condensate, and 48 tcf of gas. Liquids are exported south via the 28.2 million tonne/year Caspian Pipeline System to the Black Sea near Novorossiysk in Russia and are then exported to western markets.

BG International operates the field on a joint basis with Eni SPA, and each company holds a 32.5% share in KPO. Other partners are Chevron Corp., with a 20% stake, and OAO Lukoil with a 15% stake.

Coastal Tanzania gets gas discovery

Maurel & Prom, Paris, reported a stabilized gas flow rate of 19.2 MMcfd in 4 hr from the Upper Cretaceous Ruaruke formation at 2,030 m in the Mkuranga-1 exploration well in coastal Tanzania.

The flow came on a $^{48}/_{64}$-in. choke with a maximum pressure of 1,465 psi. Longer-term tests were being run. Maurel & Prom's interest is 60%.

The wellsite is 5 km from the gas pipeline to Dar-es-Salaam from Songo Songo gas field, Tanzania's only producing area.

Indonesia to offer 30 blocks in 2007

Indonesia plans to offer 30 new oil and gas blocks later this year, mostly in the deep waters of Papua and Nusa Tenggara, along with a package of incentives for investors.

R. Priyono, the energy ministry's director for the upstream oil and gas industry, said the blocks would be offered through a regular tender and direct offer mechanism, scheduled to start in May or June.

By way of incentives, Priyonoi said companies could return their exploration rights to the government if they consider their areas unpromising after 2-3 years of exploration.

Priyono also said the government would announce in February the results of 20 tenders held in August 2006.

Blocks put up for tender at the time are in Madang, South Mandar, Sageri, and South Sageri, all off the South Sulawesi coast; Enrekang, onshore in South Sulawesi; and Karama, Malunda, and Mandar, off West Sulawesi. ✦

Drilling & Production — *Quick Takes*

Shah Deniz gas, condensate production restarted

Gas production has resumed from the first well at the Shah Deniz gas field off Azerbaijan, a BP spokesman told OGJ. The project was shut in late in December because of problems with pressures in the wells (OGJ Online, Jan. 10, 2007).

According to press reports from Azerbaijan, State Oil Co. of Azerbaijan, a partner in Shah Deniz, said the field is producing 3.2 million cu m/day of gas and 1,300 tonnes/day of gas condensate.

The $4.5 billion project, in the Azerbaijan sector of the Caspian Sea, will export gas to Azerbaijan, Georgia, and Turkey via the $1.3 billion, 700 MMcfd South Caucasian Pipeline.

Georgia and Azerbaijan have been eager to receive the gas following the recent demands by Russia's OAO Gazprom for higher gas prices. Shah Deniz represents a degree of independence from Russia. But Georgia was forced to sign temporary gas supply deals with Gazprom at prices it considered exorbitant in December while Shah Deniz gas production was suspended.

The BP spokesman said Shah Deniz will continue to ramp up production to plateau levels next year, and the field is expected to produce 8.6 billion cu m of gas in the winter of 2007-08.

Shah Deniz holds 25-35 tcf of gas and in Stage 1 will produce 37,000 b/d of condensate, which will be shipped to Ceyhan, Turkey, for processing (OGJ, Aug. 21, 2000, p. 68).

Oil production from Java's Cepu block delayed

Indonesian officials say the Cepu block in the border area of Central and East Java will start producing oil in first quarter 2009, one quarter later than originally scheduled (OGJ, Sept. 11, 2006, Newsletter).

Trijana Kartoatmodjo, deputy head of the upstream oil and gas regulatory body BP Migas, said the block, operated by ExxonMobil Corp. and state-owned PT Pertamina, would produce 25,000 b/d of oil, eventually rising to 165,000 b/d.

Trijana said the delay in the block's operation had been caused by problems in clearing land, with opposition coming from locals who have concerns about environmental damage.

The government has been anxious to speed up development of the oil field to help curb declining oil output in the face of increased domestic demand. A net importer of oil since late 2004, Indonesia wants Pertamina to raise its oil production to 250,000-300,000 b/d from 140,000 b/d.

The Indonesian economy has been hard-hit by financing the gap between domestic sales and price rises on the international market over the past year. Indonesia pays market rates for imported oil, but it subsidizes domestic consumption.

Apache's Alexandrite 1X well to start production

Apache Corp. reported that its Alexandrite 1X well in the Matruh concession in Egypt's Western Desert has flowed 19.8 MMcfd of gas and 4,045 b/d of condensate, indicating that it is commercial.

The well will begin commercial production next week from a recompletion in the Alam El Bueib 6 (AEB 6) formation.

Within the new interval, Apache tested 37 ft of net pay in two AEB 6 segments between 12,112 ft and 12,198 ft. The test was conducted with 1,650 psi of flowing wellhead pressure through a 1-in. choke.

Alexandrite 1X was drilled to a depth of 15,300 ft in 2003 and it previously produced hydrocarbons from a Jurassic Upper Safa formation, which have totaled 3 bcf of gas and 514,000 bbl of condensate since November 2003.

Apache said the nearest AEB 6 production is in its Emerald field, about 30 km east of the Alexandrite 1X well.

An Apache spokesman told OGJ that the gas would be used domestically. Apache is planning additional drilling for Jurassic and AEB targets in the Alexandrite 1X area in 2007.

Petrobras puts FPSO online off Brazil

Petroleo Brasileiro SA (Petrobras) on Jan. 9 brought online the Cidade do Rio de Janeiro floating production, storage, and offloading vessel in Espadarte oil field in the Campos basin.

The new unit, under contract from MODEC International LCC, is 320 m long, 54 m wide, and 30 m tall. It is installed in 1,350 m of water and has a capacity of 100,000 b/d of oil and 2.5 million cu m/day of gas. It can store 1.6 million bbl of oil.

The unit is expected to reach its full production capacity this year. When operating at full capacity, it will be connected to nine subsea wells, five of which produce oil and gas while the other four are for water injection.

The FPSO is equipped with an oil-pumping system developed by Petrobras Research Center. The subsea centrifuge pumping system, or S-BCSS, assists in lifting the oil from the field to the vessel. Compared to traditional systems, it is installed externally to the well on the sea floor expediting pump maintenance and replacement. This technology will slash operating costs, facilitate remote intervention in the connected wells, and eliminate completion rug use. ✦

Processing — *Quick Takes*

Fire extinguished at Chevron California refinery

Chevron Corp. said a fire was extinguished in a crude separating unit at its 225,000 b/cd refinery in Richmond, Calif.

The fire started at 5:15 a.m. PST on Jan. 15 and was contained at 7:50 a.m. It was extinguished at 2:10 p.m.

Cause of the fire and extent of the damage was under investigation.

A refinery spokesman said the crude unit was at the beginning of a planned maintenance cycle, and the fire was not expected to affect current refinery production.

West Hawk, Lu'An to develop China coal projects

West Hawk Development Corp., Vancouver, BC, and Shanxi Lu'An Coal Mining (Group) Co. Ltd. of Changzhi City, China, have agreed to jointly develop an underground coal gasification system to produce clean liquids and electric power.

This agreement strengthens an earlier memorandum of understanding between the companies to develop a coal gasification project and to review certain coal resources owned by Shanxi Lu'An Mining Group. The partners want to determine the best resources available for a conventional integrated gasification combined cycle electrical power plant and a coal-to-liquids plant.

Lu'An Mining will dedicate 500 million tons of coal property toward the underground gasification development and both companies are working on a program to advance this technology. ✦

Transportation — *Quick Takes*

Transneft completes first ESPO pipeline section

Russia's state-owned OAO Transneft reported it has constructed about 530 km of the planned 4,188-km East Siberia Pacific Oil Pipeline (ESPO).

Construction on the pipeline, which is intended to serve the Asia-Pacific region, is currently under way between Taishet and Ust-Kut in the Irkutsk region and Tynda and Skovorodino in the Amur region along the Chinese border.

A spokesman for Transneft's project management center said the company also established storage facilities and operation bases during 2006 along the pipeline.

He said the firm is thus positioned to start extending ESPO quickly on the basis of feasibility studies made and approved in 2006. He said Transneft plans to lay about 1,250 km of the pipeline in 2007.

A feasibility study of the first extension between Ust-Kut and Talakan field already has been approved, while studies of the Tynda-Aldan and Talakan-Aldan segments and the Kozmino special seaport are to be assessed early this year.

On the supply side, Transneft last year authorized Urals Energy Public Co. Ltd.'s Dulisma oil field to be connected to the pipeline (OGJ Online, Nov. 14, 2006).

BG Group to add two LNG vessels to fleet

BG Group PLC has signed an agreement with South Korea's Samsung Heavy Industries Co. Ltd. for the delivery of two newbuild dual-fuel diesel-electric (DFDE) LNG vessels.

The design of the 170,000 cu m capacity carriers incorporates hull modifications and DFDE propulsion technology, which is expected to improve operating efficiency and reduce air emissions compared with conventional steam turbine technology.

Samsung will build, equip, launch, and deliver the ships using the GTT Mark III membrane cargo containment system. Both ships are scheduled for delivery in 2010.

BG says the new vessels will replace some of its chartered ships. BG has an additional four vessels, each with 145,000 cu m of capacity, under construction at Samsung's South Korea shipyard. These ships are scheduled for delivery this year and in early 2008. ✦

Correction

Rafael Ramirez retains his position as Venezuela's energy minister and has not resigned (OGJ, Jan. 1, 2007, Newsletter).

Calendar

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

OIL&GAS JOURNAL online research center

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2007

JANUARY

GTLtec Conference, Doha, (65) 6345 7322, (65) 6345 5928 (fax), e-mail: cynthia@cmtsp.com.sg, website: www.gtltec.com. 22-23.

Power-Gen Middle East Conference, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.pennwell.com. 22-24.

API Exploration and Production Winter Standards Meeting, Scottsdale, Ariz., (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 22-26.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 23-25.

SPE Hydraulic Fracturing Technology Conference, College Station, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 29-31.

Underwater Intervention Conference, New Orleans, (281) 893-8539, (281) 893-5118 (fax), website: www.underwaterintervention.com. Jan. 30-Feb. 1.

FEBRUARY

NAPE Expo, Houston, (817) 847-7700, (817) 847-7704 (fax), e-mail: nape@landman.org, website: www.napeonline.com. 1-2.

IPAA Small Cap Conference, Boca Raton, Fla., (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org/meetings. 5-8.

IADC Health, Safety, Environment & Training Conference & Exhibition, Houston, (713) 292-1945, (713) 292-1946 (fax); e-mail: info@iadc.org, website: www.iadc.org. 6-7.

Russia Offshore Oil & Gas Conference, Moscow, +44 (0) 1242 529 090, +44 (0) 1242 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 7-8.

Multiphase Pumping & Technologies Conference & Exhibition, Abu Dhabi, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.multiphasepumping.com. 11-13.

SPE Middle East Oil & Gas Show & Conference (MEOS), Bahrain, +44 20 7840 2139, +44 20 7840 2119 (fax), e-mail: meos@oesallworld.com, website: www.allworldexhibitions.com. 11-14.

International Petrochemicals & Gas Technology Conference & Exhibition, London, +44 (0) 20 7357 8394, e-mail: Conference@EuroPetro.com, website: www.europetro.com. 12-13.

IP Week, London, +44(0)20 7467 7100, +44(0)20 7580 2230 (fax); e-mail: events@energyinst.org.uk, website: www.ipweek.co.uk. 12-15.

Pipeline Pigging & Integrity Management Conference, Houston, (713) 521-5929, (713) 521-9255 (fax), e-mail: info@clarion.org, website: www.clarion.org. 12-15.

CERAWeek, Houston, (800) 597-4793, (617) 866-5901, (fax), e-mail: register@cera.com, website: www.cera.com/ceraweek. 12-16.

International Downstream Technology & Catalyst Conference & Exhibition, London, +44 (0) 20 7357 8394, e-mail: Conference@EuroPetro.com, website: www.europetro.com. 14-15.

Pakistan Oil & Gas Conference, Islamabad, (92-21) 6634795, (92-21) 6634795 (fax), website: www.pakoil-gas.com. 18-20.

SPE/IADC Drilling Conference and Exhibition, Amsterdam, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 20-22.

AustralAsian Oil Gas Conference and Exhibition, Perth, (704) 365-0041, (704) 365-8426 (fax), e-mail: sarahv@imexmgt.com, website: www.imexmgt.com. 21-23.

Pipe Line Contractors Association Annual Meeting, Aventura, Fla., (214) 969-2700, e-mail: plca@plca.org, website: www.plca.org. 21-25.

International Conference and Exhibition on Geo-Resources in the Middle East and North Africa, Cairo, 00202 3446411, 00202 3448573 (fax), e-mail: alisadek@mailer.eun.eg, website: www.grmena.com.eg. 24-28.

Laurance Reid Gas Conditioning Conference, Norman, Okla., (405) 325-3136, (405) 325-7329 (fax), e-mail: bettyk@ou.edu, website: www.lrgcc.org. 25-28.

CERA East Meets West Executive Conference, Istanbul, (800) 597-4793, (617) 866-5992 (fax), e-mail: register@cera.com, website: www.cera.com. 26-28.

SPE Reservoir Simulation Symposium, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-28.

Subsea Tieback Forum & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.subseatiebackforum.com. Feb. 27-Mar. 1.

International Symposium on Oilfield Chemistry, Houston, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Feb. 28-Mar. 2.

MARCH

Natural Gas Conference, Calgary, Alta., (403) 220-2380, (403) 284-4181 (fax), e-mail: jstaple@ceri.ca, website: www.ceri.ca. 5-6.

Gas Arabia International Conference, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.theenergyexchange.co.uk. 5-7.

SPE E&P Environmental and Safety Conference, Galveston, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 5-7.

International Pump Users Symposium, Houston, (979) 845-7417, (979) 847-9500 (fax), website: http://turbolab.tamu.edu. 5-8.

Purvin & Gertz International LPG Seminar, Houston, (713) 236-0318 x229, (713) 331 4000 (fax), website: www.purvingertz.com. 5-8.

African Refiners Week, Cape Town, +44 (0)20 7343 0014, +44 (0)20 7343 0015 (fax), website: www.afrra.org. 5-9.

Power-Gen Renewable Energy & Fuel Conference, Las Vegas, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.pennwell.com. 6-8.

Annual Fuels & Lubes Asia Conference, Bangkok, +632 772 4731, +632 772 4735 (fax), e-mail: conference@flasia.info, website: www.flasia.info. 7-9.

GPA Annual Convention, San Antonio, (918) 493-3872, (918) 493-3875 (fax), website: www.gasprocessors.com. 11-14.

SPE Middle East Oil & Gas Show & Conference (MEOS), Bahrain, +44 20 7840 2139, +44 20 7840 2119 (fax), e-mail: meos@oesallworld.com, website: www.allworldexhibitions.com. 11-14.

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Energy and litigation

Sam Fletcher
Senior Writer

Oil and gas companies have long worried about where they'll find the geologists and engineers they'll need in the future, but there's another group of professionals whom they apparently also need to recruit—lawyers.

In its third annual survey of corporate litigation trends, Fulbright & Jaworski LLP, Houston, found the average US energy company has 364 separate lawsuits currently pending in US courts. That's the second most lawsuits of any industry surveyed, with only the insurance industry attracting more litigation.

A check of companies of all sizes and industries suggests litigation is a fact of US corporate life. Of all the US corporate attorneys surveyed, 94% said their companies had some form of legal dispute pending in a US venue. For 89%, at least one new suit was filed against their company during the past year.

'Deep pockets'

Not surprisingly, companies with the deepest pockets—annual gross revenues of $1 billion or more—carry the biggest litigation burden, fielding 556 cases on average, with nearly half of those firms facing 50 new suits/year. Among those large companies, 40% expect the number of actions to increase in the coming year.

"With big litigation comes a big price tag. US companies report spending 71% of their overall estimated legal budgets on disputes," the study said.

Nearly 40% of all US firms reported at least one $20 million suit against them in the past year, the survey said. Among energy companies, 59% were hit by at least one lawsuit valued at $20 million or more in 2006.

"Large US companies commit an average of $19.8 million to litigation, approximately 58% of total average legal spending of $34.2 million. More than two thirds of large companies surveyed reported at least one new suit involving $20 million or more in claims; 17% faced a minimum of six suits in the $20 million-plus range," the survey said.

The typical energy company spent an average $13.5 million on litigation in the past year, fourth among the 12 other industries in the survey of 422 corporate attorneys worldwide about their top litigation concerns and attitudes.

While smaller companies are hardly litigation-free, the weight is considerably less. Companies with revenues under $100 million/year reported only nine cases pending on average. Attorneys for those small US companies said their average dispute spending totaled $178,000.

"The high cost of litigation in the US has not been lost on the rest of the world. For more than half of foreign counsel surveyed, 'high legal costs' were cited as a top concern about litigating a dispute in US," the legal firm said.

Among the energy companies polled, 58% said environmental issues, toxic materials, and contract disputes were among their top litigation concerns, followed by labor issues and regulatory matters, securities enforcement, and antitrust and other trade issues. Moreover, 36% of those energy companies expect their US caseloads to increase in 2007.

Fulbright & Jaworski said 46% of the energy companies surveyed have class action suits pending against them in US courts, 10 percentage points above the national average for other industries.

Internal investigations

One of the surprises this year is the large percentage of firms—81% of the energy companies, second only to the pharmaceutical industry and well above the 63% average for all US companies—involved in internal investigations requiring outside counsel. "Partly this is an outgrowth of our modern regulatory and enforcement climate in which companies are put on fast-track notice by government agencies that an action may be forthcoming, which prompts them to conduct a full-scale investigation," said Stephen C. Dillard, chair of Fulbright & Jaworski's global litigation practice.

"The surge in investigations is also an inevitable consequence of the big corporate meltdowns that have occurred in recent years," Dillard said. "Management and corporate boards have become much more proactive at taking the lead in policing themselves for possible wrong-doing and potential liability. Whether borne from the fear of enforcement, litigation, or negative publicity, internal investigations are actually a means of containing future financial or reputational damage."

The law firm found US companies in general face an average of 305 pending lawsuits internationally. Although most of those cases are in US courts, the study said, "The tide of international disputes is rising; more than one third of the companies said up to 20% of their dockets originate in foreign venues, proof that US-style litigation is going global." ✦

Editorial

Oil and instability

The next time anyone complains about oil from "unstable" countries, check the US Congress. With their Clean Energy Act of 2007, House Democrats test new limits for instability.

The bill, introduced Jan. 12, would:

- Deny oil and gas producers and refiners use of the manufacturing tax deduction enacted in the American Jobs Creation Act of 2004.
- Extend by 2 years the 5-year amortization period for geological and geophysical expenditures by major integrated oil companies. In 2005, Congress refused to allow expensing of G&G costs, formerly amortized over the lives of producing properties, but agreed to shorten the amortization period to 2 years for most producers and 5 years for large integrated companies.
- Coerce holders of deepwater Outer Continental Shelf leases issued during 1998 and 1999 into renegotiation to set oil and gas price limits on deepwater royalty relief. Leases issued in those years omitted price thresholds contained in agreements of different vintage. Under the House measure, companies not renegotiating threshold-free leases would have to pay stiff fees or be excluded from future OCS leasing in the Gulf of Mexico.
- Repeal incentives in the Energy Policy Act of 2005 (EPACT) for gas production from deep wells on the Gulf of Mexico shelf and for oil and gas production in deep water.
- Repeal an EPACT cap on fees for drilling-permit applications while a permit-streamlining pilot project is under way.
- Shorten the terms of leases issued in the National Petroleum Reserve-Alaska, and repeal authority for exploration and production incentives in the area.
- Use revenue generated by the new measure to pay for federal promotion of renewable and alternative energy sources and conservation.

This mischief isn't energy policy. It's punishment. Oil and gas companies provoked public outrage by reporting inevitably high profits after gasoline prices spurted in an extraordinarily strained market. Although prices have fallen by one-third since then, a newly Democratic Congress wants oil-company blood.

If the House bill passes, oil and gas companies will have to degrade investments in US energy supply for the hikes in taxation and political risk. They'll have to distrust the US government as a contract partner. They'll have to evaluate the large, long, and risky investments essential to energy supply while wondering what a capricious Congress might do next. This combination of horrors will constrain domestic supply of the energy forms that last year satisfied 63% of US demand.

Oil exporters habitually disparaged in the US as unstable at least see their interests clearly. They have to sell oil. Their economies depend on it. The US economy depends on a ready supply of affordable energy, largely oil and gas. Politics can only nibble at the edges of this dependency. Vindictive laws that discourage the development of oil and gas supply contradict the country's economic interests. Laws that try to replace oil and gas with costlier fuels waste resources and hurt consumers. Proposals for such laws would not emerge from a Congress led by politicians clear about their country's energy interests. They reflect instability.

Normally, it falls to the Senate to defend the republic from political lurches of the House. On Jan. 4, however, Democratic senators introduced a bill endorsing steps as sublime as "eliminating tax giveaways to large energy companies" and "preventing energy price-gouging." From such a group, little sophisticated guidance can be expected.

The last defense against an energy future contorted by senseless political manipulation thus may be the presidential veto. George W. Bush in fact inspired energy lunacy last year with state-of-the-union assertions about a national addition to oil. He can redeem himself on this subject by snuffing the mistakes Congress wants to make.

How Democrats would caterwaul about that! "He's doing it for the oil companies," they'd say. To which Bush, if he's on his game, could respond, "Oil companies can take care of themselves. I'm keeping Congress from hurting consumers and taxpayers."

With that statement he would begin to reorient energy policy-making to the public interests from which it has strayed and rescue discussion of the subject from political opportunism. ✦

EU energy investment drops as development obstacles rise

Carlo Stagnaro
Istituto Bruno Leoni
Torino, Italy

COMMENT

The European Commission, which aims to devise a "European strategy for sustainable, competitive, and secure energy," published a green paper in March 2006 to that effect, suggesting that "Europe has not yet developed fully competitive energy markets."

Energy is still regarded as a strategic sector in most European Union member states unwilling to relinquish their hold over the energy sector. Likewise, Europe's major energy utilities are either state-owned or state-controlled. Under such conditions, new entrants often face many regulatory obstacles or political opposition.

Yet there is a more basic problem. Even when a company manages to find its way through the maze of protectionist hurdles, a mix of local vetoes, environmental opposition, and bureaucratic confusion increases the cost of investment, either in monetary terms or in the disproportionate amount of time and effort needed to satisfy all administrative and legal mandates such as ever-stricter environmental requirements.

Hence the size and effectiveness of investments are tending to decrease, while the efficiency of the energy sector as a whole decreases. Meanwhile demand continues to grow.

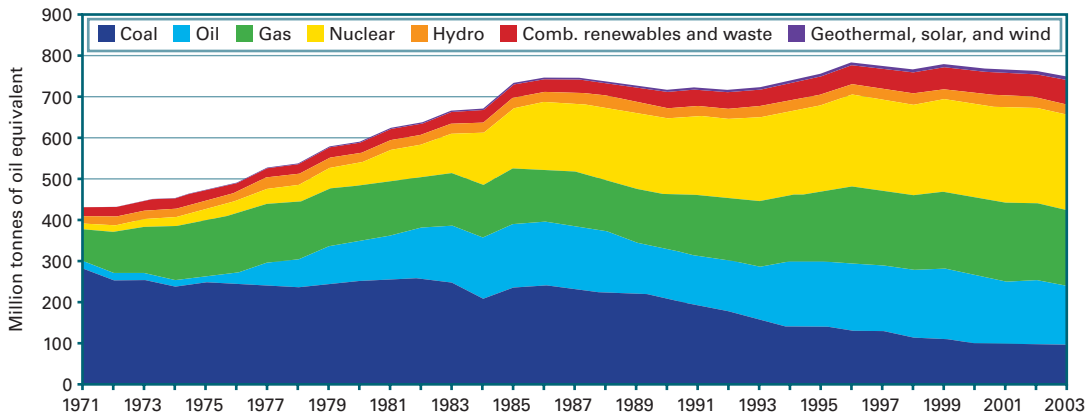
Greater investment is needed to meet the growing demand, heighten competitive pressures over incumbents, and to replace ageing facilities. It is also needed to strengthen cross-border ties and to phase out fuels currently used in Europe's power plants, such as the shifting from crude oil to gas or coal.

Figs. 1 and 2 illustrate the challenge Europe is facing. Total energy production in the 15 original member states rose by almost 80% during 1970-85 (Fig. 1). Then the rate of growth slowed to the current level, which is slightly above that of 20 years ago. Since the early 1970s, the share of coal has dramatically decreased, whereas nuclear power, oil, and gas use have all gained momentum. The reliance on imported energy sources has grown to 50% of total consumption and is expected to increase again—to 65% in 2030: That means natural gas imports will grow to 84% from 57%, and oil imports will increase to 93% from 82%.

If one looks at electric power generation, the figures speak for themselves. The amount of generated electricity has more than doubled since the 1970s, and the upward trend shows no sign of slowing down or reversing course (Fig. 2). The amount of electricity generated by coal has been about the same since the early 1980s, with a slight increase across the 1980s, a slight decrease in the 1990s, and another increasing stage as oil prices

TOTAL EU-15* ENERGY PRODUCTION

Fig. 1



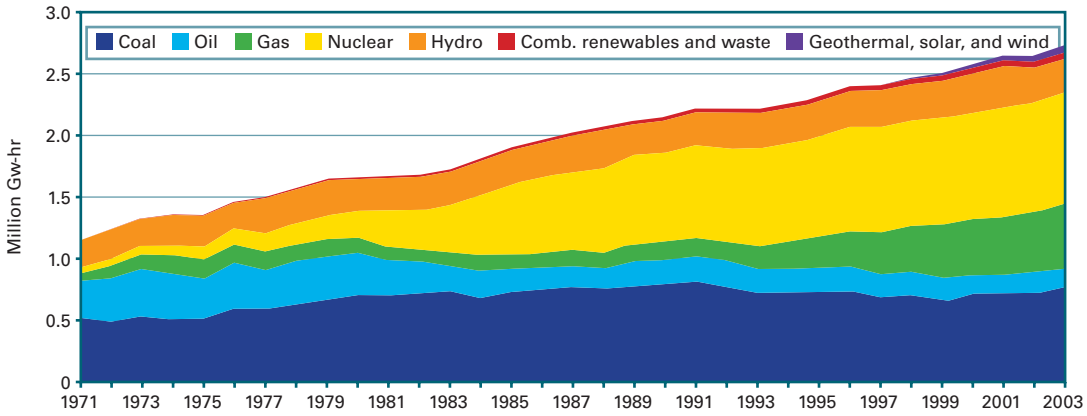
*Original 15 European Union members: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK.
Source: International Energy Agency statistics

started to surge in the 2000s. Nuclear power increased dramatically until some 20 years ago, and oil use shrank as gas gained momentum.

The increase in demand for electricity, as well as the threats to energy security due to the opportunistic behavior of some producing countries and the shift from coal and oil to gas-based generation, have made investments to improve energy security both a political priority and an economic necessity. Given the vital importance of energy to a modern economy, the search for security or the unreliability of energy supplies keeps companies from investing and prevents the economy as a whole from becoming more competitive.

EU15* ELECTRIC POWER GENERATION BY FUEL

Fig. 2



*Original 15 European Union members: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK.
Source: International Energy Agency statistics

Likewise, from a political point of view, the failure to create an environment of maximum energy security would cast a shadow on the EU's ability to address the very basic needs it is charged with handling. Yet Brussels hasn't been able to implement a consistent energy policy because, under the European Treaty, it hasn't the power to make binding decisions on the issue. In this respect, it is unlikely that any significant change will occur, as most member states consider energy to be a national security priority and would not be willing to give up their sovereignty over the energy sector.

Suggested solutions

Nevertheless, there is a way for the EU to improve energy security effectively without directly affecting it—that is through liberalization. By promoting liberalization—removing barriers to market entry and fighting nationalistic claims and attempts to prevent foreign takeovers of energy companies—the commission may help the European energy sector become more flexible and better equipped to react to shocks.

In a March-April 2006 article in "Foreign Affairs," Cambridge Energy Research Associates Director Daniel Yergin argued that markets themselves are a source of security. Yet a well-performing regulatory framework is not enough. As Yergin puts it, "The investment climate itself must become a key concern in energy security. There must be a continual flow of investment and technology in order for new resources to be developed." In other words, the most basic need Europe is facing is a host of companies willing to invest and be able to draft projects that meet all of the environmental and regulatory requirements. That is not always possible.

For example, environmental organizations—while officially standing for energy security—often pursue policies that would result in the opposite outcome. The organization Friends of the Earth, for one, claims it seeks to cut Europe's energy consumption by 20% by 2020 and to have renewables meet 25% of primary energy demand by then. Neither is consistent with the target of energy security. Indeed the former is inconsistent with reality, as energy consumption worldwide is always growing, while the latter implies a greater reliance on more-expensive sources of energy. While Friends of the Earth may look like an extremist pressure group, its goals are more or less openly shared by many inside the EU.

However, as Leonardo Maugeri said in his book, The Age of Oil, "In the real world, the replacement of a resource with another is driven by economics, not by politics." It looks as if the EC and its environmental stakeholders have not fully realized this latter point. A communication from the Commission to the European Parliament, released as recently as Jan. 10, sets the goal of increasing the level of renewable energy in the overall EU mix to 20% in 2020. What is more relevant is not that such a goal is utterly unrealistic. By following such a course, emphasis is shifted away from what really matters, allowing—or better yet promoting—investments in reliable, economically efficient resources and technology that are already available.

The commission well knows that the real problem is not really renewables development but how to achieve a higher degree of energy security. In its communication, it also calls for more effective regulation, ownership unbundling in the electricity and gas sector, and more investments in energy infrastructure. The paper estimates that the EU will have to invest €900 billion on new electricity

generation alone in the next 25 years. However, by mixing climate alarmism, unrealistic targets, and sound policies, the commission can hardly be said to be making a fair assessment of the situation—and an unfair assessment is unlikely to lead to a meaningful solution.

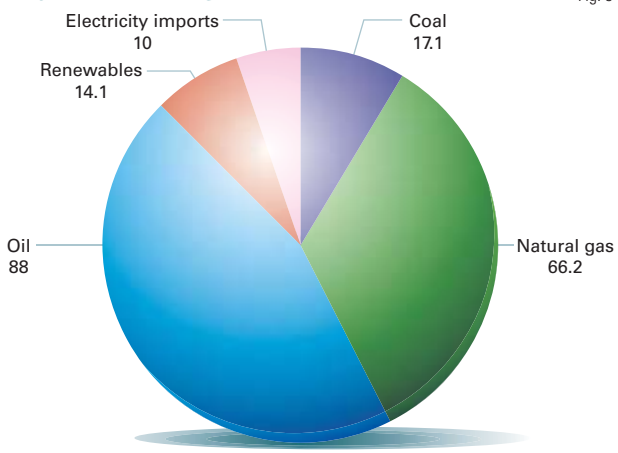
The Italian case

In this respect, the Italian case is particularly interesting. For both political and economic reasons, the country has shifted from oil to gas as its major source for electric power generation. Gas also is the most important fuel for heating. Domestic oil consumption is driven almost exclusively by the transportation sector, while coal plays a smaller, although slowly growing, role. Finally, nuclear power was banned after a referendum in 1987.

Fig. 3 shows Italy's primary energy needs by source. In 2004 annual oil demand fell to 88 million tonnes of oil equivalent from 91.2 in 2001—down 3.5%—whereas gas demand rose 13.2% to 66.2 million tonnes of oil equivalent from 58.5 during that time. Total energy demand rose by 4.1% in the same years.

Because Italy has small and declining domestic gas production of only 13 billion cu m/year, it relies on imported gas for an additional 66.2 billion cu m (in 2004). Of the imports, 30.6% comes from Russia and 29.7% from Algeria. Since the early 2000s the country has gone through electricity and gas crises due to weaknesses in the power grid, lack of generation capacity, and

ITALY'S PRIMARY ENERGY DEMAND* Fig. 3



*Million tonnes of oil equivalent, 2004.
Source: Ministry of Productive Activities [now Ministry of Economic Development], 2004

insufficient import capacity. Today regulators and industry personnel are crossing their fingers in hopes the winter will remain mild, keeping gas demand relatively low. Virtually everyone agrees that import capacity should be boosted by building LNG terminals and laying additional pipelines or increasing the size of existing lines.

Just one LNG regasification terminal exists in Italy. Operated by Eni SPA, it has a capacity of 4 billion cu m/year compared with demand of 86 billion cu m in 2005. Eleven projects for LNG terminals have been submitted for authorization, two of which—in Rovigo and Brindisi—have been authorized and four that are expected to receive final authorization soon.

The authorization process for Rovigo began in 1997 when the terminal was planned to be onshore. However opposition of local groups was so vocal that it convinced Edison Gas SPA, the company in charge of building the terminal, to move the projected facility offshore. In the meantime, Edison formed a partnership—Edison 10%, ExxonMobil Corp. 40%, and Qatar Petroleum Co. 40%—to build and run the terminal.

Local governments still held that the terminal was harmful to the environment and to the local economy, particularly to tourism. The legal battle is continuing, even though the companies involved have consistently won, and construction of the terminal has begun. Because of high legal costs and increased expenditures associated with building it offshore, the terminal costs more than doubled—from €450 million to €800 million and then to the latest estimate of over €1 billion. As far as the timing is concerned, it took almost a decade to get authorizations for a terminal whose construction will require 2 years. The terminal was to become fully operational in 2008 if no further obstacles were encountered. Unfortunately, on Sept. 18, 2006, when the regasification plant—which was being built in Spain—was 50% complete, construction was stopped for an apparent lack of authorization for a secondary, temporary structure, and a new legal battle began.

The Brindisi project is in a much worse predicament. The €400 million regasification plant, on which €150 million has already been spent, received its "definitive" authorization in 2002, but it is still unclear whether prospective operator British Gas will ever be able to actually build it. In an interview with Il Corriere della Sera, Italy's most influential daily magazine, on Sept. 11, 2006, Nichi Vendola, head of the regional government of Puglia, where Brindisi is located, said the plant ob-

tained approval of both the Brindisi City Council and the Puglia regional government, along with 21 other governments or agencies, but "thereafter the administrations were kicked out of office." Vendola said, "That means that their decisions didn't satisfy local populations. Hence they have to be changed. It is not by chance that current administrations have been voted precisely because of their opposition to the LNG terminal."

As to the other submitted projects, most of them are unlikely to be built. That leads to the paradox of a virtual oversupply of gas vis-à-vis a gas scarcity, as former Industry Minister and Editor-in-Chief of the specialized magazine Energia Alberto Clò, wrote. The same may be said of electric power generation. For example, Enel has been struggling for months to convert an old oil-fueled plant into a more-efficient coal-fueled facility. The delays again result from legal actions and political opposition from local and regional governments.

Even when the authorization process was faithfully followed, local, provincial, and regional governments, as well as environmental or consumer organizations and other pressure groups have filed lawsuits, known to be lost in advance, that can be used to stop work in progress and increase monetary and time costs. Hence, they become a disincentive to investors, as the real cost of investments in such a crucial sector as energy is significantly increased.

A way out?

Italy's problem—which is partly shared by other EU member states, but which in Italy reaches an unsustainable level—is twofold: On one hand, local populations scarcely involved in the decision-making process and who gain almost no benefit from it have an incentive to oppose any project.

On the other hand, the decision-making process is too confused, and too many subjects hold a de facto right to veto any decision. For example, in the case of Brindisi, 23 different subjects have been involved in the decision-making process.

A recent piece of incentive legislation promoted by Minister of Economic Development Pierluigi Bersani moves in the right direction: It would reduce the level of energy taxation for those communities that allow a power plant to be built in their territory. While the attempt to create an economic incentive to oppose the NIMBY (not in my back yard) effect is a good move, it is not enough. Other amendments in the current legislation can help to make more socially acceptable those plants that are required to strengthen Italy's energy security.

- Companies should be allowed to sell electricity or gas to local consumers at a discounted rate to increase the economic incentive. Such discounts should be tax-deductible for the companies.
- A principle of "administrative continuity" should be enforced: Once an administration has given its approval to a project, it shouldn't be allowed to reverse the decision, even when the governing coalition changes after elections.
- When an authorization is released, a mandatory period of 180 days should be left for those who still have complaints to seek an adjustment with the operating company. If a negotiation round is made possible and compulsory, the parties might find it more convenient to take advantage of it, rather than assuming the costs of litigation.
- After authorization becomes effective, it should still be possible to file appeals, but they should not be allowed to stop work in progress except for the most serious reasons. It should be up to the company to choose between going on and stopping temporarily—if the company knows that the appeal is just a pretext to delay the work, then it could resume construction.

What Italy and the rest of Europe need is not revolutionary change, but common sense amendments to current legislation. A recent survey by the World Bank shows that, as far as ease of doing business is concerned, Italy ranks 82nd, down from 69th in 2005. In terms of licensing procedures, it ranks 104th. To secure the necessary licenses to start a business, an Italian company needs, on average, to clear 17 procedural hurdles—as opposed to an Organization for Economic Cooperation and Development (OECD) average of 14—to wait for 284 days (149.5 in OECD) and to spend 142.3% of per capita income (72% in OECD).

The consequence is that Italy's energy system is weak, and an energy crisis is always looming. This is not about a lack of capital or companies willing to invest in the country. This is because of perverse incentives that are set up by an overwhelming, confused, antimarket regulatory environment. ✦

The author

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EC proposes legislation to enforce utility unbundling

Uchenna Izundu
International Editor

The European Commission has proposed enforcing full ownership unbundling of gas and electricity infrastructure via new legislation as one of its measures to help facilitate an internal energy market in Europe.

Unveiling a comprehensive energy policy package in Brussels Jan. 10, the EC said it was necessary to have a fully

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functional internal energy market to ensure competitive and secure energy supplies.

However, the European Union is likely to miss its deadline in July to have a fully opened internal market, as many member states are now involved in infringement procedures launched by the EC for failing to implement the directives to meet this objective.

According to the EC's sectoral enquiry launched to investigate the progress of energy liberalization across the EU, European Commission Competition Commissioner Neelie Kroes said there was danger of discrimination and abuse when companies control energy networks as well as production or sales because they protect national markets and prevent competition.

Ownership unbundling

The EC said it has a "clear preference" for ownership unbundling meaning that network companies would be wholly separate from the supply and generation companies. It will carry out an impact assessment of this proposal before exploring a legislative route. The other option would be to implement an Independent System Operators (ISO) system, where vertically integrated companies remain owners of the network assets and receive a regulated return on them, but they would not be responsible for their operation, maintenance, or development.

An industry source told OGJ that having full ownership unbundling would be problematic for large international companies that invest in major infrastructure projects and need wide portfolios to negotiate with other partners. The proposal is "radical," the source said, adding that the tone of the sectoral report was very negative and had not recognized the levels of progress made in improving competition by industry participants.

But the European Federation of Energy Traders welcomed the focus on unbundling, saying it was crucial "to achieving nondiscriminatory access to transmission infrastructure and services and to facilitating cross-border trade."

According to an analysis by PricewaterhouseCoopers, the recommendations offer energy and utility companies various possibilities to restructure and expand their EU-wide position, bringing nearer the potential for customer-focused transnational energy and utility businesses.

Mark Hughes, European leader, utilities corporate finance and advisory services, at PricewaterhouseCoopers said, "The commission's conclusions encourage infrastructure investment, particularly in a cross-border context, which provides opportunities for new entrants, large and small market participants alike, and which should benefit consumers and security of supply across Europe."

Assessing infrastructure

The EC also will identify the most significant missing infrastructure up to 2013 and will try to rally political support to fill these holes under its Priority Interconnection Plan, also announced Jan. 10. About €150 billion of investments will be required for gas-fired electric power plants and €220 billion for gas infrastructure. The proposed Nabucco gas pipeline, which will bring Caspian gas to central Europe, will be treated as a priority by four new European coordinators, and new European energy projects planning and approval procedures will be fast-tracked under a 5-year program.

The EC said it would examine the need to increase funding for the Energy Trans-European networks and establish a new community mechanism and structure for Transmission System Operators, responsible for coordinated network planning.

Security of supplies

Imported oil and gas are expected to constitute a respective 90% and 80% of Europe's energy mix in 2030. "Electricity generation will be heavily dependent on gas. Without a significant technology breakthrough, oil will continue to dominate transport. Therefore, security of supply of these fuels will continue to be paramount to the EU economy," the EC said.

The package will promote diversity of energy suppliers, particularly among member states that are wholly reliant upon one supplier. Measures to achieve this include developing projects to bring gas from new regions, establishing gas hubs in central Europe and the Baltic states, improving the use of strategic storage possibilities, and encouraging the building of LNG terminals.

The package is yet to be approved by the EU's 25 members, but this is the first time that Europe has formulated an energy policy, which has previously been left to individual member states to define and implement. ✦

EBRD withdraws financial support for Sakhalin-2

Uchenna Izundu
International Editor

The European Bank for Reconstruction & Development (EBRD) will not offer financial support for the controversial Sakhalin-2 oil and gas project in Russia following the change in majority control of Sakhalin Energy Investment Co. (SEIC), the company behind the $20 billion proposal. Over the past 5 years, EBRD had reviewed the project and was considering offering a $300 million syndicated loan to SEIC.

EBRD said, "If the new group of shareholders were to request it and make a case that the project could be eligible for EBRD investment, the bank

could consider financing in the future. The closer the project comes to completion, however, the less value EBRD financing could add."

Gazprom paid $7.45 billion for a 50% stake plus one share in SEIC last December from the partners Royal Dutch Shell PLC, Mitsui, and Mitsubishi, changing the ownership structure in SEIC to Shell holding 27.5%, Mitsui 12.5%, and Mitsubishi 10%.

A Shell spokesman said, "EBRD's decision is no great surprise, since it reflects the fact that the approach to financing of the project has yet to be decided by the new shareholders, so that EBRD does not see the current financing package as feasible to pursue."

Environmentalists welcomed the announcement, having lobbied the EBRD for the past 5 years to ditch financial support claiming that the project has breached environmental standards.

Dimitry Lisitysn, head of Sakhalin Environment Watch, said, "Environmental groups agree with EBRD that its value added was decreasing as the project comes closer to completion. We witnessed EBRD's environmental leverage diminishing last year when the project's negative impacts on the ground overtook Sakhalin Energy's rhetoric to the contrary."

Nevertheless, a number of other lenders—export credit agencies from Japan, the UK, and US, and ABN Amro, Royal Bank of Scotland, and Mizuhoare—are yet to decide on whether they will invest in Sakhalin-2 or not. Environmentalists have urged them to follow EBRD's lead and abandon the project.

Chris Weafer, chief strategist at Russia's Alfa-Bank, told OGJ that EBRD's pullout would not have any major effect on Sakhalin-2's future. The project was no longer within the EBRD's remit because Gazprom's majority control meant that its status had changed from development to one of state-control, he added. "Gazprom's role will accelerate the process of Sakhalin, and the partners can earn money quickly from the oil and gas. They can go out and borrow money from other banks on terms as good as EBRD's and at very favorable rates." ✦

EIA forecasts another wave of growth in US LNG imports

Nick Snow
Washington Correspondent

Despite declining volumes in the last 2 years, US LNG imports should experience another wave of growth in the next 2 years, the US Energy Information Administration predicts.

"Predominantly driven by a significant expansion in world supply, EIA forecasts year-over-year increases in US LNG imports of 34.5% and 38.5% in 2007 and 2008, respectively," analysts Damien Gaul and Kobi Platt said in a supplement to the federal energy forecasting and analysis service's January 2007 Short-Term Energy Outlook.

They said US LNG imports are expected to reach 770 bcf in 2007, about 210 bcf more than in 2006, as exports from Nigeria and Trinidad and Tobago grow with the availability of more feedstock gas.

EIA also expects a bigger proportion of the two countries' LNG exports to come to the US as world prices adjust to less demand growth in Asia and Western Europe, Gaul and Platt said.

Supplies also are expected from Equatorial Guinea, which will become the world's 14th LNG exporting nation later this year, they added. "As of late 2006, the Marathon Oil Corp.-led project on Bioko Island was 85% complete. BG Group has contracted to market supplies from the one-train facility and has focused on the US as a destination market," they said.

EIA expects US LNG imports to reach 1,080 bcf in 2008 with the likely arrival of supplies from Snohvit project in Norway through a contract with Statoil ASA, which has already contracted for capacity at Dominion Inc.'s Cove Point, Md., import terminal, Gaul and Platt indicated. Additional LNG imports from projects in Qatar and Yemen also could contribute to growth next year, they said.

While LNG from the Sakhalin-2 project in Russia, which is scheduled to start up in 2008, does not appear likely to reach the US directly, it could arrive in a regasified form from the Costa Azul terminal in Baja California which might receive some of the Russian supplies, Gaul and Platt said.

They cautioned that political activities in some LNG exporting nations, potential construction and start up problems, and competition from other consuming countries could influence actual US LNG import levels in the next 2 years.

Competition's impact

Competition for supplies clearly affected US LNG imports in 2006, according to Gaul and Platt. Volumes were 580 bcf this past year, about 8% less than 2005's 631 bcf and 11% less than 2004's 652 bcf, they said.

US LNG import volumes accounted for an estimated 22% of total Atlantic Basin consumption in 2006, with the remainder going to Europe, the EIA analysts said. Through October 2006, the most recent period for which complete data are available, they said European LNG imports grew an estimated 12.6% year-to-year.

For all of 2006, Europe's LNG imports are expected to be more than 2 tcf, with France, Belgium, and Spain accounting for most of the volume consumed, Gaul and Platt said. Spain leads Europe in imports because it relies heavily on LNG deliveries for its gas supplies and has outbid US buyers in

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

China courts Myanmar

Myanmar has recently been hitting the news, both for its oil and natural gas as well as for alleged human rights abuses. The two sides of the news meet, of course, since the abuses often involve forced labor or abuse of minorities at oil and gas developments.

Last November, some of these issues came to the fore when the International Labor Organization signaled its intention to take the issue of forced labor in Myanmar to the International Court of Justice and the International Criminal Court, as well as to the United Nations Security Council.

Back then, too, Myanmar had a visit from UN Undersecretary Ibrahim Gambari, who said the country's generals must take clear steps to demonstrate their interest in cooperating with the international community.

Gambari was granted a meeting with Aung San Suu Kyi, the detained Nobel Prize-winning democracy advocate. She expressed support for deeper UN engagement in Burma, he said, if it could deliver results. He also held what were described as "frank and extensive" talks with Senior General Than Shwe, the country's ruler.

Gambari gave a mixed review, saying "The outcome of my visit—and the concrete results—are still being awaited" and, "The ball is back in the court of the authorities."

Authoritarian rules

Well, the authorities in Myanmar have responded, and it is not in any liberal direction, whether for political prisoners or forced labor. It seems they have appealed to countries where their authoritarianism is not an issue.

Last week, the issues discussed by Gambari came to a vote in the UN, and the vote did not go the way he wanted. In fact, China vetoed a US-drafted UN resolution calling on Burma to free political prisoners, move towards democracy, and end attacks against ethnic minorities.

Wang Guangya, the Chinese ambassador, said, "The Myanmar issue is mainly the internal affair of a sovereign state." He saw "no need for the Security Council to get involved."

Before casting what was only Beijing's fifth veto in UN history, he decried the "arbitrary" highlighting of one country, as "similar problems exist in many other countries as well."

New contracts

Doubtlessly they do. But it is also noteworthy that just a few days after casting that vote, China was a clear beneficiary as Myanmar signed production-sharing contracts with China National Petroleum Corp. for three offshore blocks: AD-1, AD-6, and AD-8 off the Rakhine coast.

Attending the signing ceremony were a number of Myanmar officials, including Minister for Cooperatives Major Gen. Tin Htut, Minister for Finance and Revenue Major Gen. Hla Tun, Minister for Livestock and Fisheries Brig. Gen. Maung Maung Thein, Minister for Forestry Brig. Gen. Thein Aung, Minister for Electric Power No. 1 Col. Zaw Min, Atty. Gen. U Aye Maung, and Deputy Minister for Energy Brig. Gen. Than Htay.

Kindly note: The Myanmar officials were all military men and mostly generals. ✦

order to meet core demand, including growing electricity generation needs, they said.

But the biggest change in Atlantic Basin LNG imports during 2006 came in the UK, where the Isle of Grain terminal, in its first full year of operations since reopening, received volumes of more than 115 bcf, Gaul and Platt said.

US capacity utilizations also were lower than expected in 2006 as supply problems in Nigeria and in Trinidad and Tobago affected liquefaction operations, the analysts said. US imports also felt the impact of fewer long-term supply contracts relative to other consuming countries, they pointed out.

"For the most part, the current LNG market functions through long-term contractual agreements for delivery of cargoes from producer nations to Western Europe and Asia. With the exception of deliveries from Nigeria and [from] Trinidad and Tobago, US importers have not yet begun to bring the large volumes of LNG under similar long-term agreements," they explained.

Long-term prospects

In the reference case for its 2007 Annual Energy Outlook (AEO2007), EIA said it expects LNG imports to meet much of the increased US gas demand through 2030. In the AEO2007 reference case, which was released on Dec. 5, EIA expects US LNG imports to rise to 4.5 tcf in 2030 from 600 bcf in 2005, 200 bcf more than in its 2006 reference case.

"In addition to new terminals, including four that are currently under construction, expansions of three of the four existing onshore US LNG terminals (Cove Point; Elba Island, Ga., and Lake Charles, La.) are included in the AEO2007 reference case. Because of liquefaction project delays, supply constraints at a number of liquefaction facilities, and rapid growth in global LNG demand, the US LNG market is expected to be tight until 2012," it said. ✦

House Democrats' bill to repeal oil, gas tax incentive

Nick Snow
Washington Correspondent

US House Democrats introduced legislation on Jan. 12 to repeal a pair of oil and gas tax incentives and put pressure on holders of Gulf of Mexico deepwater leases issued in 1998 and 1999 without price thresholds to renegotiate terms.

The legislation, HR 6, would end oil and gas companies' qualification for a manufacturers' tax credit, which was enacted in 2004, according to cosponsors Charles B. Rangel (D-NY), chairman of the Ways and Means Committee, and Nick J. Rahall (D-W.Va.), chairman of the Natural Resources Committee.

It also would slightly reduce tax benefits enacted as part of the 2005 Energy Policy Act (EPACT) for geological and geophysical costs for "very large, integrated oil companies," they said in a joint statement. The money would be reinvested in renewable energy, Rangel and Rahall said.

The bill would change the geological and geophysical cost amortization period back to 7 years from 5 years. Within the EPACT, it would repeal Section 344, relating to incentives for gas from deep wells in the shallow Gulf of Mexico; Section 345, relating to royalty relief from deepwater production in the gulf; and Subsection (i) of Section 365, relating to the prohibition on drilling permit application cost-recovery fees.

"These tax breaks came at a time of record profit for the big oil corporations and were so large that even the Bush administration called them excessive. In order to reduce our dependency on foreign oil, we need to stop lining the pockets of oil corporations and rewarding our enemies in the Middle East," Rangel said.

The bill also contains language aimed at pressuring holders of deepwater Gulf of Mexico leases issued in 1998 and 1999 without price thresholds. The leaseholders would either be barred from bidding for future federal offshore leases or pay a "conservation of resources fee" if they did not renegotiate new terms, including price thresholds with the US Minerals Management Service.

Fee specifics

The US secretary of the interior would be required to establish within 60 days of enactment conservation fees of $9/bbl for oil and $1.25/MMbtu for gas. These would apply to production after Oct. 1, 2006, on any federal lease in years when the average of daily closing prices on the New York Mercantile Exchange was more than $34.73/bbl for oil and $4.34/MMbtu for gas in 2005 dollars.

For nonproducing leases, the fee would be $2.75/acre/year in 2005 dollars.

HR 6 would place money collected under the renegotiated terms, from the new fees and from the repealed tax incentives into a "Strategic Energy and Renewables Reserve" from which funding would be available "1. To accelerate the use of clean domestic renewable resources and alternative fuels, 2. To promote the utilization of energy-efficient products and practices and conservation, and 3. To increase research and development of clean renewable energy and efficiency technologies."

"This carefully crafted legislation we are introducing today will address the broken royalties system that has plagued the [DOI] and put these payments right back where they belong—in the federal treasury," Rahall said.

Oil and gas trade association leaders immediately criticized the bill.

"If the goal is to lessen our dependence on foreign oil, then this bill falls far short. The American oil and natural gas industry is our most precious and primary defense against increased oil imports. This is a time to encourage American investment in energy projects here at home, not discourage it. This bill takes capital from US oil and natural gas companies that otherwise would be spent on domestic energy exploration," Independent Petroleum Association of America Pres. Barry Russell said.

In a letter to House Speaker Nancy Pelosi (D-Calif.), National Petrochemical & Refiners Association Vice-Pres. Charles T. Drevna said the bill's proposed revocation of oil and gas companies' manufacturers' tax credit would deny refiners money to invest in infrastructure, particularly to increase capacity.

He said NPRA and its members also are concerned about the possible impact on supplies from changing the G&G amortization period back to 7 from 5 years. "The government's provision of financial incentives, like the ones discussed above, has produced real benefits for the nation, including the creation of US jobs and enhanced energy security," Drevna said in his letter to Pelosi. ✦

Water issues overshadow Powder River coal gas play

Alan Petzet
Chief Editor-Exploration

Wyoming's Powder River basin coalbed methane development began its third decade in 2006 with vast gas potential and environmental challenges.

Cumulative production from the coal beds is about 2.2 tcf through 2006 from at least 25 tcf thought to be recoverable. The play has at least several decades still to run.

The basin's Paleocene Fort Union coals are producing at a combined rate about the same as the Barnett shale play in North Texas.

Water-handling issues have bruised operating costs, the number of operators has shrunk, and the majority of gas production of 1.1 bcfd is concentrated in a relatively small number of companies (Fig. 1).

The environmental and legal entanglements have all but stalled development in Montana, where only a few hundred wells have been drilled.

With about 35% of the basin and 15% of the recoverable gas in Montana, the big question for the future is whether and how the state and federal governments will deal with water issues there.

Almost 27,000 wells had been drilled in the basin in northeastern Wyoming by the end of 2006. Horizontal drilling hasn't been needed because the coals are generally high in permeability.

Operating conditions and economics have deteriorated as the play moved westward across Wyoming from eastern counties with shallow coal and good water quality to central and western areas with deeper coals and less desirable water.

This article updates the status of the play, discusses the gas potential, and outlines hurdles.

Drilling and recovery

The 27,000 wells drilled so far plus another 24,391 wells likely to be drilled by 2016 as provided in the original federal environmental impact statement are estimated to yield 16 tcf of the 25 tcf of gas believed recoverable.

That 2003 EIS covered the drilling of 51,391 wells, more than half of which have been drilled. Not all have produced gas, however.

Recovering the remaining 9 tcf would require another EIS covering 28,900 more wells. That would extend drilling 10 more years and prolong field life.

Initial producing rates generally range from 100-300 Mcfd of gas from Wyodak coals on the east side of the basin to 250 Mcfd-2 MMcfd from the deeper and thicker Big George coals in the central and western portions.

Wyoming foresees the drilling of 3,000 wells/year for the next 7 years, tapering off in 2014-16, said Don Likwartz, oil and gas supervisor, Wyoming

Oil & Gas Conservation Commission (WOGCC) (Fig. 2).

The current drilling rate is 8 wells/day as the state's active CBM rig count averaged 44 units in 2006 (Fig. 3). The available fleet is thought to be 116 rigs, down from 230 in the play's heyday.

Of total drilling, 8,712 wells have been drilled on federal lands. That has led to substantial drainage of gas into wells on the surrounding state and fee lands.

Truck-mounted rigs drills a coalbed methane well in the Powder River basin in Wyoming. Photo courtesy of Williams Cos.

Pace of drilling

WOGCC, which issues permits to drill on state, fee, and federal land, has issued 54,200 permits.

Permits are valid for 1 year, and 23,350 of them have expired without drilling.

As of September 2006, 72 operators were producing 17,100 wells and had another 6,250 shut-in, many to replace failed water pumps. Of the 6,250, 3,300 wells are under evaluation.

The other 2,950 have never produced and are awaiting installation of infrastructure, Wyoming Department of Environmental Quality water management permits, or US Bureau of Land Management drilling permits. DEQ and BLM permitting can take 5 months or more.

Drilling peaked at 4,500 wells in year 2000 and fell to 2,900 in 2005 and around 2,780 in 2006. Spacing is 80 acres/well.

The first coal wells were drilled in 1986. Operators drilled 10 to 253 wells/year through 1996, for a total of 680 wells. Drilling then grew rapidly from 460 wells in 1997 to the peak in 2000.

By the end of 2006, 1,692 wells were plugged and abandoned, and another 273 wells are set for plugging.

Operators are no longer required to build roads to drill sites. Surface installations of completed wells are small, and some are camouflaged. It is possible to drive long distances on main roads without seeing evidence of CBM development.

Operators drilled 88 CBM wells in Wyoming outside the Powder River basin in 2006.

Operators consolidate

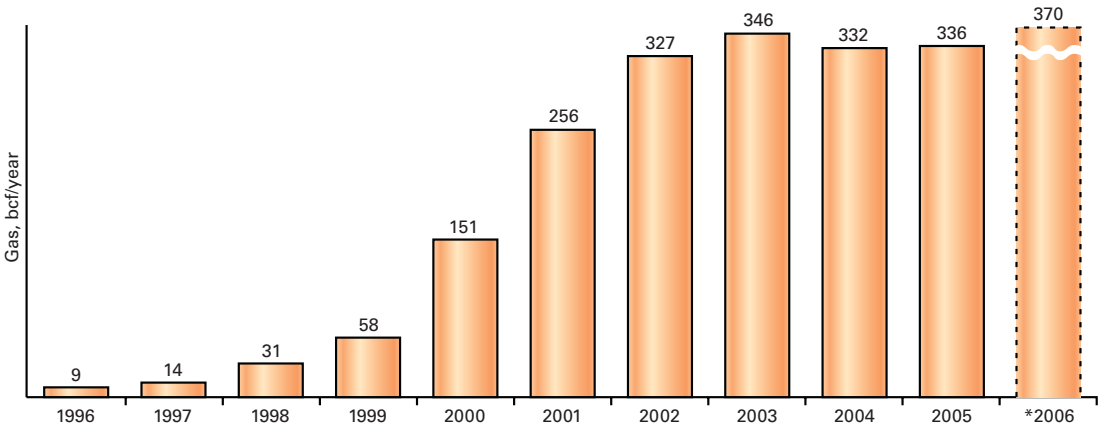
As of mid-2006, 72 entities operated Powder River CBM wells compared with a peak of 158 operators in year 2000.

The state has approved drilling permits under 216 discreet operator names since 1985.

The top 5 operators now account for more than 70% of the gas production, and the top 10 account for about 87%. The top 6 are Williams Production RMT

WYOMING POWDER RIVER CBM PRODUCTION

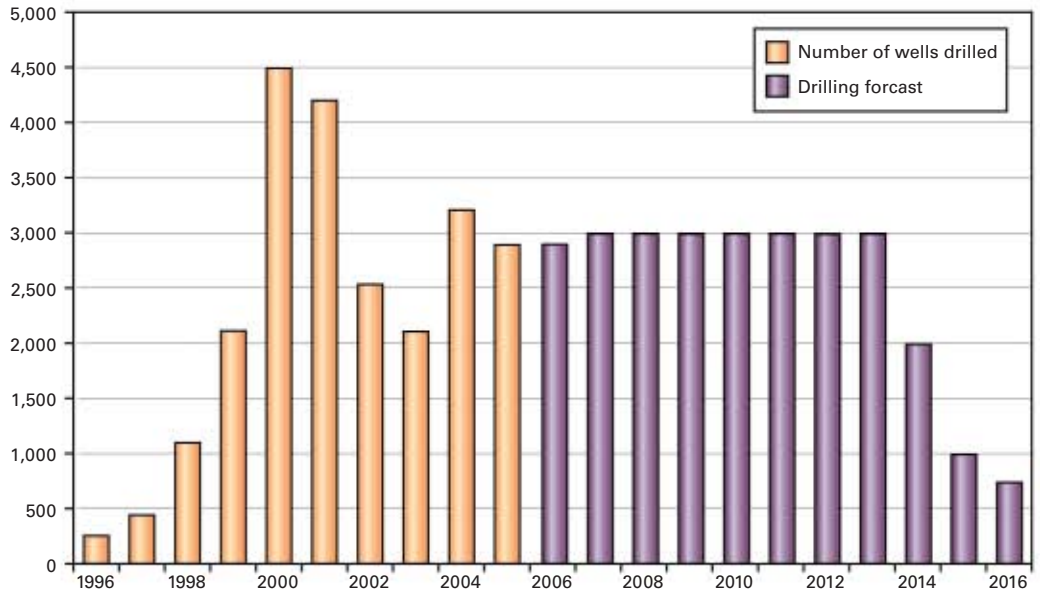
Fig. 1



*Estimate.
Source: Wyoming Oil & Gas Conservation Commission

WYOMING POWDER RIVER CBM WELL DRILLING

Fig. 2



Source: Wyoming Oil & Gas Conservation Commission

Co., Anadarko Petroleum Corp., J.M. Huber Corp., Pennaco Energy Inc., Yates Petroleum Corp., and Devon Energy Production Co. LP.

For January through October 2006, Williams averaged a gross 266 MMcfd of production and Anadarko, including its mid-2006 acquisitions of Western Gas Resources Corp. and 50% of private Lance Oil & Gas Co. Inc., averaged a gross 212 MMcfd.

Williams and Anadarko together accounted for 43% of gross 2006 Wyoming Powder River basin CBM production.

Gas transportation capacity is not expected to become a constraint. Pipeline construction at the turn of the decade led to the availability of 1.6 bcfd of capacity in six systems since 2001. This is about the same capacity as the basin's seven large CBM gathering systems.

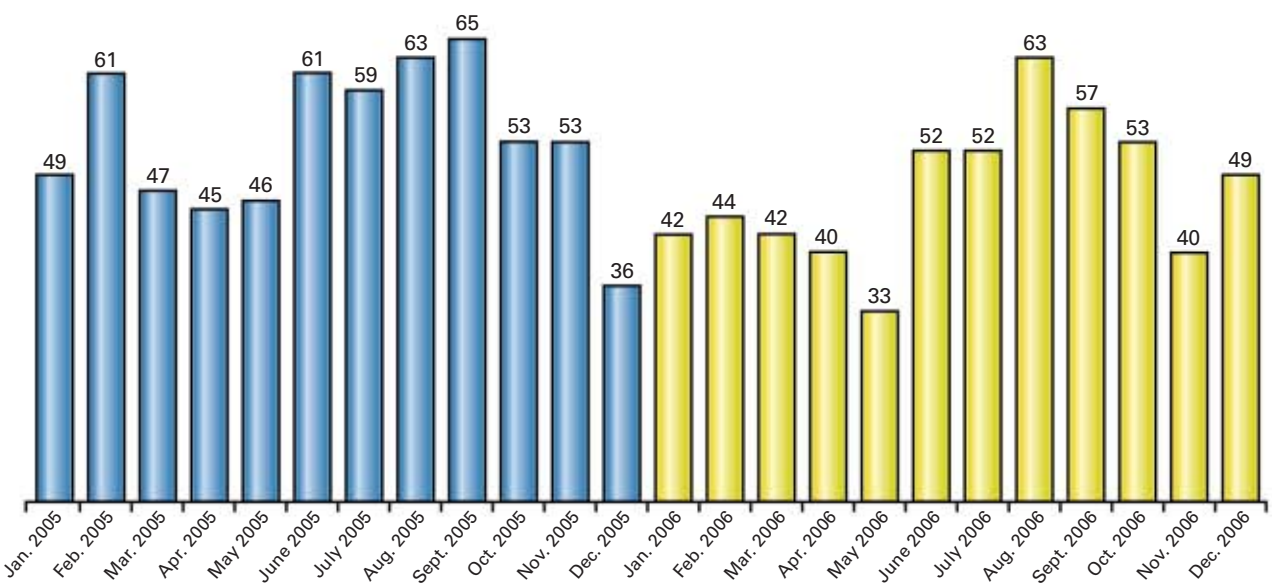
The other resource

Besides gas, the Powder River CBM wells have produced nearly 4 billion bbl of water through 2006, or almost 2 bbl/Mcf of gas (Fig. 4).

Operators discharged 61% of the water down ephemeral and perennial surface drainages. This is the practice in nearly all of the eastern part of the

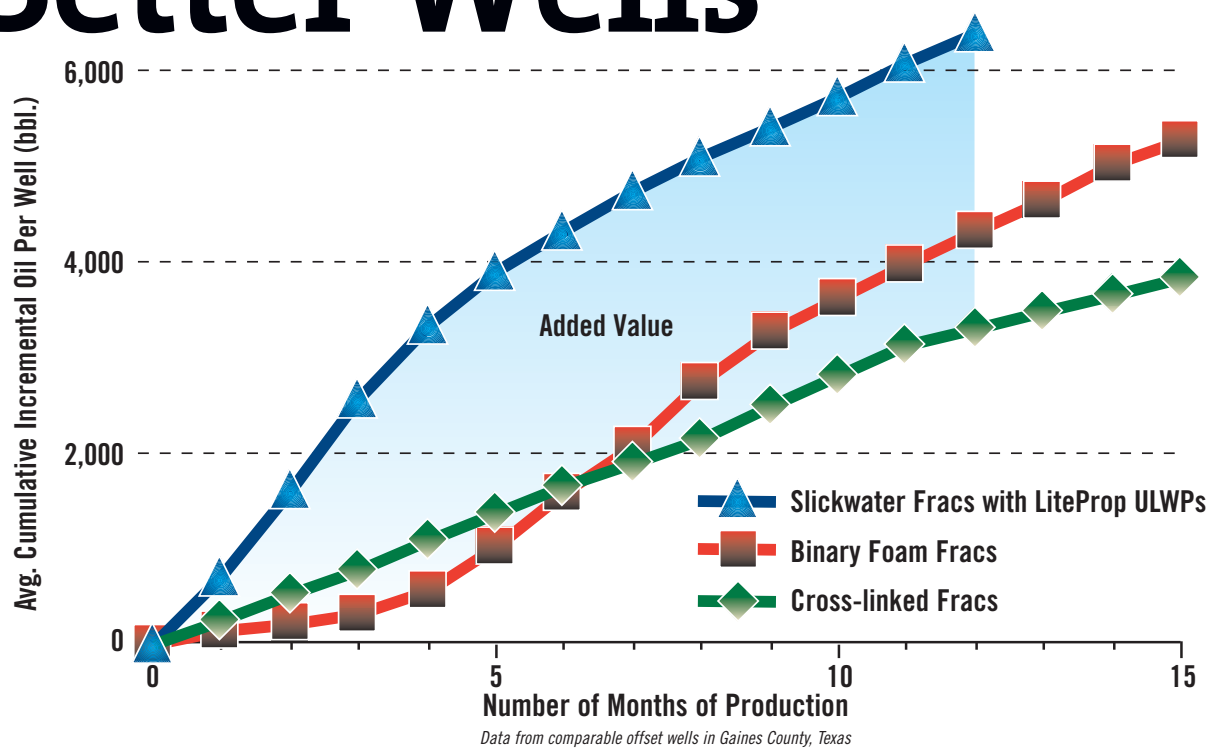
WYOMING STATEWIDE CBM RIGS*

Fig. 3



*As many as 4-5 rigs have worked in 5 other Wyoming CBM basins.
Source: Wyoming Oil & Gas Conservation Commission

Better Fracs Making Better Wells



Data from comparable offset wells in Gaines County, Texas

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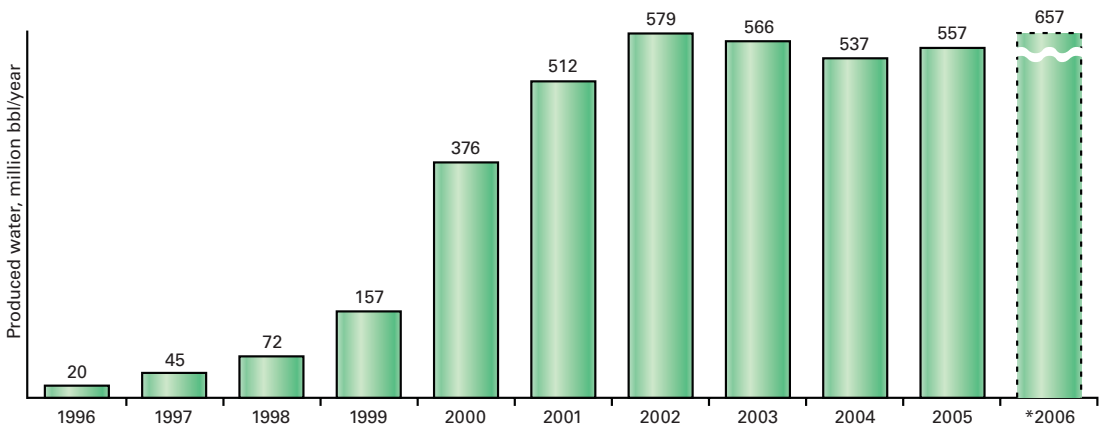
WYOMING POWDER RIVER CBM WATER PRODUCTION

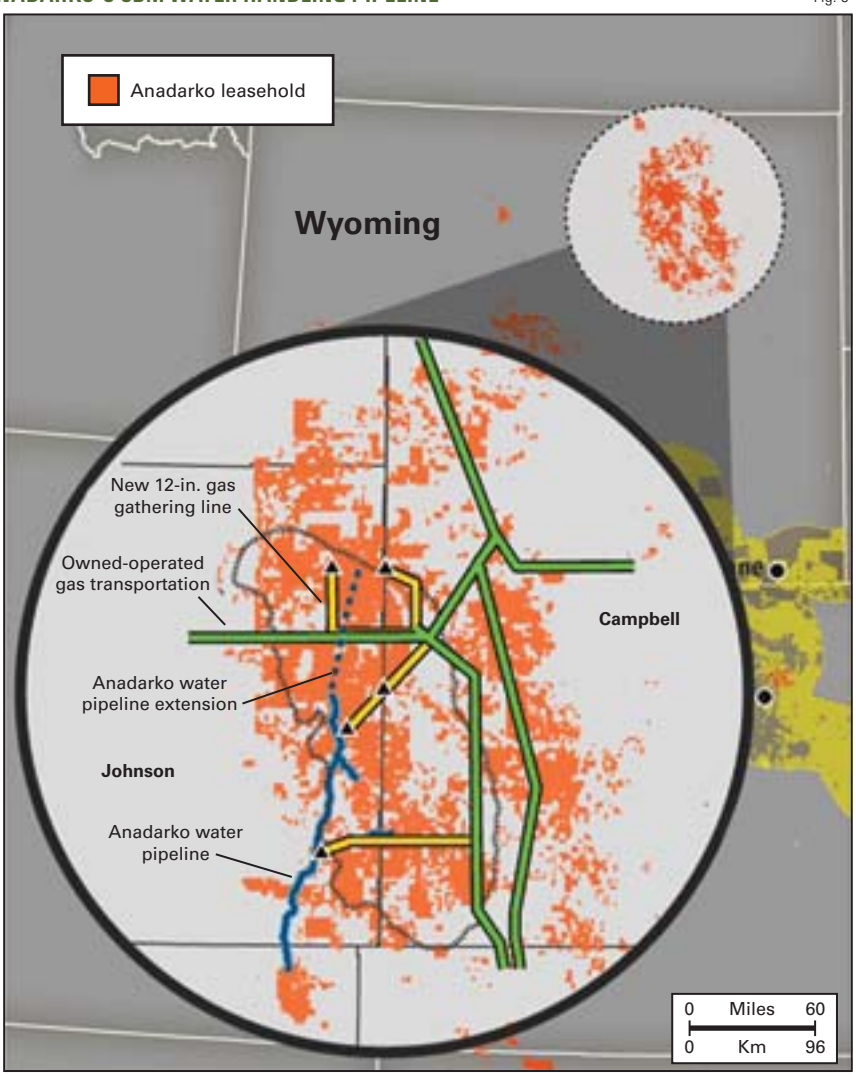
Fig. 4



*Estimate.
Source: Wyoming Oil & Gas Conservation Commission

ANADARKO'S CBM WATER HANDLING PIPELINE

Fig. 5



Source: Anadarko Petroleum Corp.

basin and a large part of the central basin.

Another 31% of the water is contained in 251 off-channel pits under state permits. WOGCC permits the pits, which are bonded by the commission on state and fee lands and by State Lands and Investments on school lands.

Another 5.7% of water is used for irrigation, often requiring soil amendment.

About 52 million b/d or 1.4% of the water is reinjected into wells permitted by the state DEQ, and 45 million b/d or 1.2% is treated by an ion exchange process by a single contractor.

Water production

Cumulative water production is 4 billion bbl, or 510,000 acre-ft, and water production averaged 1.8 million b/d for the first 10 months of 2006.

Water is fresh on the basin's east side, and its quality declines farther west and northwest, as measured by total dissolved solids content (Table 1).

East side well water meets most federal drinking water standards including a secondary threshold of 500 ppm TDS. East side water is largely discharged down drainages and has helped ranchers irrigate land and water livestock during the multiyear drought that is still going on.

The northwest part of the basin, in Sheridan County, Wyo., has the poorest quality water, but Likwartz said he has seen only 2-3 samples from that area with more than 2,500 ppm TDS. The federal wildlife and livestock standard is 5,000 ppm TDS.

The northwestern water does have a high sodium absorption ratio (SAR) that will turn dry soil into hardpan that

USGS WATER QUALITY CATEGORIES

Table 1

	TDS,* mg/l.
Fresh water	<1,000
Slightly saline water	1,000-3,000
Moderatley saline water	3,000-10,000
Highly saline water	10,000-35,000
Seawater	Avg. about 35,000
Brine	>35,000

*Total dissolved solids.

prevents water from infiltrating crop roots.

Wyoming water plans

The WOGCC began permitting off-channel water pits at the end of 1999.

The pits had to be fenced and lined with plastic, and the operator posted a bond for each pit.

A joint 2000 WOGCC/Wyoming DEQ rulemaking provided that if coalbed water quality is as good or better than water quality in a given area's shallow aquifers, no liner is required. Of 251 pits permitted, 53 are lined.

As pits spread in Johnson and northern Campbell counties along the north-flowing Powder River, which more or less bisects the basin, Wyoming DEQ stopped issuing permits in Wyoming in the Tongue River watershed in Sheridan County. The Tongue River flows into Montana and drains four main counties.

The pits often require more land than ranchers are comfortable removing from other uses, even though operators pay damages.

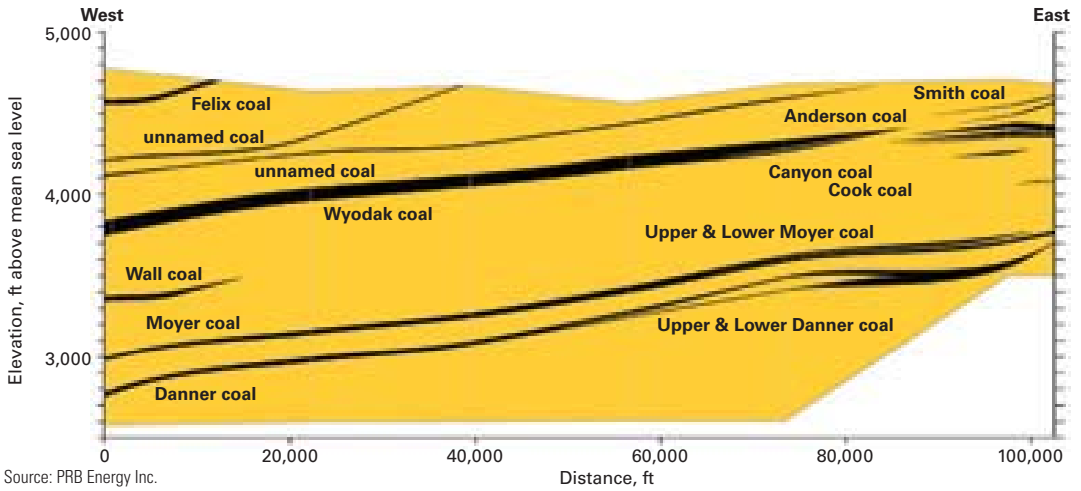
One private company treats water under contract, but at 20-50¢/bbl this more than doubles the operator's cost of handling water, Likwartz estimated.

Where high SAR water is used for irrigation, hired professional soil engineers manage the process. This may result in the introduction of gypsum to provide calcium and magnesium, and sulfur to prevent calcium carbonate deposits and benefit soil in which hay or alfalfa are to be planted. The engineers drill soil borings before and after each growing season to check for the accumulation of chemicals near the surface.

A state panel is addressing another potential problem. The constant flow of

COALS IN CENTRAL CAMPBELL COUNTY, WYO.

Fig. 6



Source: PRB Energy Inc.

Wyoming operators produce CBM and water from about 50 named coal seams, and water quality, volume, and adsorption can vary widely even from the same coals in different areas (Fig. 6).

The future

Gas production could fill some spare pipeline capacity if coals dewater as expected.

Gas flow from some early wells has declined, and operators are considering whether economics justify installing vacuum compressors on single wells or pods of 8 wells or recompleting in shallower, usually thinner coals. Vacuum pumps might add 1-2 years to the 7 to 12-year well life.

Operators plugged some 300 wells in 2006, and this number should increase yearly, Likwartz said.

Williams had 346 bcfe of proved reserves plus 1.5 tcf of probable and possible reserves at the end of 2005 and 8,500 drilling locations, half of them company operated.

The overall outlook for gas production the next few years is murky. For Anadarko, Big George coals have been the focus of drilling for the past several years.

"Dewatering of the coals has advanced in parts of the Big George to the point of substantial gas increase," Anadarko said.

The Powder River basin CBM properties Anadarko acquired with Western Gas Resources are estimated to hold 9 tcf of original gas in place (OGJ Online, July 3, 2006).

Anadarko has 6,270 producing wells, plans to drill 750 wells in 2007, and has more than 12,000 drillsites in inventory.

CBM water down ephemeral drainages, or those that used to flow only during rain or snow melt, turns them into perennial drainages and causes flooding where landowners constructed dikes in the channels to irrigate crops.

Deep injection

The WOGCC has permitted 5 wells to inject CBM water into the Mississippian Madison aquifer at 14,000-16,000 ft.

Yates Petroleum Corp., after drilling the first well hoping to inject 25,000 b/d, was only able to inject 16,000-18,000 b/d and has declined to drill the other 4 wells.

The US Environmental Protection Agency considers any water with less than 5,000 ppm TDS as potential drinking water, so Wyoming DEQ authorizes injection of CBM water into these aquifers.

Anadarko has laid 48 miles of 24-in. pipeline in southeastern Johnson County with a capacity of 450,000 b/d of water (Fig. 5). It plans to inject water produced from the coals into the Madison formation in Salt Creek oil field. A possible 20-mile northern extension is contemplated in 2009.

The company was commissioning pump stations and drilling injection wells, hoping to inject 90,000 bbl/well into the Madison. It intended to accept water from other operators for a fee, but uncertainty over controlling water quality under its DEQ permit might limit it to injecting only its own water. Only 25% of the shallow injection wells have been successful.

Montana's outlook

Only two companies have drilled a total of 500-600 wells in Montana, and the state no longer issues drilling permits because of the lawsuits.

Practically no gas infrastructure exists in the Montana part of the basin.

Suits were filed in both states after publication of the EIS on Apr. 30, 2000. Wyoming separated from the Montana actions, and a Wyoming judge took depositions 2 years ago but has not yet heard the cases.

Montana in 2003 adopted SARs and electrical conductivity volumes for each river that flows into the state.

Montana also considered requiring that all produced water be injected but gave up the idea in the face of poor reinjection results in Wyoming and Montana.

Montana is debating stiffer regulations, some of which could affect water discharge to the south in Wyoming.

A Wyoming water management task force is considering the option of laying water lines to other parts of Wyoming for various uses if Montana adopts stringent standards.

DRILLING MARKET FOCUS

Spending increasing on new yards, new rigs, company acquisitions

Nina M. Rach
Drilling Editor

Drilling rig contracts are lengthening, in response to increasing demand, reduced rig availability, and long lead times for new construction.

Additional newbuild contracts, and announcements of new rig construction yards may increase supply in a few years, but manufacturing bottlenecks remain. Capital expenditure announcements indicate that worldwide drilling activity will be steady in 2007.

Rig contracts

Drilling contractors are attracted by both high day rates and long contract duration. The worldwide increase in day rates for most drilling units is reported regularly in the media. But a study by Rigzone noted the increasing length of contract periods for different rig types, across 13 different regions.[1] The study is based on worldwide count of 598 offshore rigs.

From May 2005 to November 2006, the average length of offshore drilling rig contracts increased 6% worldwide, to 679 days from 639 days. The top six regions posting double-digit increases (from 71% to 11%) include the US Gulf of Mexico, Australia, Caspian Sea, Brazil, Mediterranean, and Southeast Asia (Table 1). These six regions account for 265 rigs, representing 44% of the worldwide offshore fleet.

Three regions registered decreasing contract lengths:

- Far East, down 34% to 272 days from 410.
- Mexico, down 23% to 888 days from 1,150.
- South Asia, down 8% to 1,716 days from 1,870.

As of last November, the longest duration contracts (average more than 2.5 years) were being written in South Asia (1,716 days), Brazil (1,066 days), the Persian Gulf (1,049 days), and the Red Sea (988 days).

These longer contracts, as well as higher rates, are an incentive to move in rigs from other regions. Petrobras, in particular, is apparently willing to lock in rigs for long-term drilling commitments, giving it the ability to negotiate lower day rates.

The shortest duration contracts (average less than 1 year) were being written in the US Gulf of Mexico (245 days), the Far East (272 days), and Australia (317 days). Rig rates are particularly low in the gulf, compared with worldwide pricing, and in combination with short contracts have led to a continuing exodus of rigs.

The length of drilling contracts is dictated by rig type. Rigzone's data indicated that drillships (38 in the world fleet, + 12 under construction) have the longest contracts, averaging 910 days. Surprisingly, contracts for jack ups (400 in world fleet, + 62 under construction) are the next longest, at 713 days, followed by semisubs (167 in world fleet, + 34 under construction) at 561 days. Jack up contracts are now 27% longer than semisub contracts, on average. The gap is slipping, however: 18 months earlier, jack up contracts were 35% longer than semisub contracts.

Looking at regional desires for rig

OFFSHORE DRILLING RIG CONTRACTS, REGIONS

Table 1

Region	Total rigs, no.	Average contract length (Nov. 2006), days	Average contract length (May 2005), days	Change in contract length, %
US Gulf of Mexico	134	245	185	71
Australia	11	317	195	63
Caspian Sea	15	748	527	42
Brazil	35	1,066	845	26
Mediterranean	16	666	564	18
Southeast Asia	54	410	371	11
Total	**265**	—	—	—

Source: Rigzone

Canadian spending outlook for 2007 slightly depressed

Spending may be slightly depressed in Canada for 2007, relative to 2006, but $22 billion (Can.) will still drill many wells.

Shell

Shell Canada announced aggressive capital expenditure plans of $4 billion in 2007, up nearly 50% from 2006. Nearly $1.1 billion will be spent on exploration and production, including $430 million in the foothills, $470 million on unconventional gas projects, $130 million in frontier areas, and $40 million for predevelopment studies for growth assets.

One of the drilling projects associated with a "growth asset" is a 100-well, cold production program in the Peace River area.

The increased funding can be partly attributed to the announcement by parent company Royal Dutch Shell PLC that it would buy the remaining 22% of its Canadian subsidiary that was publicly owned.

Petro-Canada

On Dec. 15, Petro-Canada announced it would spend $4.1 billion on 2007 capital expenditures, an increase of 15% over 2006 levels.

The company will spend $210 million of its budget for drilling programs at Hibernia, Terra Nova, and White Rose fields off Newfoundland. Petro-Canada has contracted the Henry Goodrich drill rig through April 2007 to drill two development wells and a delineation well at Terra Nova.

The company is waiting for regulatory approval from the Canada-Newfoundland and Labrador Offshore Petroleum Board before formalizing a drilling plan for Hibernia and is studying the potential for expanding White Rose field.

Terra Nova, Hibernia, and White Rose are all in the Jeanne d'Arc basin on the Grand Banks offshore NL. Petro-Canada is lead operator on Terra Nova (33.99%), has a 20% share in Hibernia, and a 27.5% share in White Rose.

EnCana

Calgary-based EnCana Corp. announced on Dec. 15 that it plans

types, the longest contracts in the world are being written in:

- India, for drillships (1,850 days).
- India, for jack ups (1,711 days).
- Persian Gulf, for jack ups (1,049 days)
- Mexico, for semisubs (1,380 days).
- Brazil, for semisubs (1,198 days).

It appears that national oil companies (NOCs) are more comfortable with committing to long contracts in their own waters.

Conversely, the shortest contracts are being written in:

- US gulf, for jack ups (173 days).
- US gulf, for semisubs (370 days).
- Southeast Asia, for drillships (395 days).
- Southeast Asia, for semisubs (265 days).
- Australia, for semisubs (301 days).

These data suggest that international operators appear to write shorter contracts, overall, than national oil companies.

New yards

A new modular fabrication facility is planned for Sohar in north Oman to fabricate integrated decks from 10,000 to 20,000 tonnes, jack up drilling rigs, and FPSOs. The 400,000 sq m yard will have waterfront captive jetties able to accommodate oceangoing vessels of 10-12 m draft. The L&T Modular Fabrication Yard LLC is a joint venture of Larsen & Toubro Ltd. and the Zubair Corp. Larsen & Toubro operates the Hazira facility, a rig repair and inspection yard on the west coast of India.

In November 2006, the JV signed an SUA (sub-usufruct agreement) for the Sohar yard construction project with Sohar Industrial Port Co.

On Dec. 20, J Ray McDermott announced beginning construction on a $220 million construction yard at the Altamira port in Mexico's Tamaulipas state. McDermott's Mexico country manager Juan Manuel Pineda said the company should be able to begin deepwater platform construction by July 2007.

The first phase of yard construction will cost $20 million, to be followed by another $60 million in 2007-08. McDermott has a 30-year lease on the site from the Mexican government.

Newbuilds

In early January, there were at least 117 drilling rigs under construction worldwide, including 62 jack ups, 34 semisubmersibles, 12 drillships, 4 inland barges (all for the Gulf of Mexico), 3 tenders (all for SeaDrill Ltd.), and 2 platform rigs (both for Nabors Offshore).

A variety of yards in Mexico, Singapore, and China has recently announced new contracts.

On Dec. 18, China Oilfield Services Ltd. announced an agreement with Mexico's Goimar SA de CV to build and service four new "module" drilling rigs for the Mexican offshore market. The rigs are expected to be completed in second-quarter 2007 and will work under 3-year contracts. COSL will provide staff for two of the four rigs.

Goimar is an oil field services company that provides services and equipment to Mexican state oil company, Pemex.

Singapore's Keppel FELS announced that it would build the first KFELS N-class jack up rig for Norway's ProdJack AS, part of the Skeie Group. The new design will be the largest jack up ever

to spend $5.9 billion in 2007, a 6% decrease from 2006. The company will focus on expanding natural gas and oil sands production.

In October, EnCana had announced it was scaling back drilling plans for the remainder of 2006 to cope with softer natural gas prices and spiraling costs.

Husky

On Dec. 12, Husky Energy Inc. announced it would spend $3.18 billion in 2007.

John C.S. Lau, president and chief executive officer of Husky, said the "2007 capital expenditure program will focus on Husky's growth in the oil sands and further exploration and development in the offshore East Coast of Canada, offshore China and Indonesia."

About 82% ($2.62 billion of the $3.18 billion) will be spent on upstream, including $1.63 billion in western Canada, $210 million on western Canadian exploration, $330 million on oil sands, and $290 million in eastern Canada.

Drilling in western Canada will focus on natural gas in the deep basin and foothills of Alberta and British Columbia.

Oil sands drilling includes $31 million at Caribou Lake for delineation wells and advance engineering and $31 million for resource evaluation wells to further assess the Saleski oil sands lease.

Husky's east coast drilling budget includes a seventh production well in White Rose oil field and delineation drilling of the O-28 discovery in West Avalon pool, north of White Rose development.

constructed in Singapore, with the ability to both drill and produce. ProdJack plans to market the innovative rig in marginal fields in the North Sea. The KFELS N Class rig is designed to operate in harsh weather and in water up to 400 ft deep. It is capable of drilling to 35,000 ft.

The new rig will cost $371 million and Keppel will retain a 10% equity stake. Delivery is scheduled for the end of first-quarter 2010.

China's Yantai Raffles Shipyard Ltd. will begin building jack ups. YRS already has contracts for five submersible drilling rigs, one semisubmersible decommissioning rig, and one drilling production semisubmersible. In December, YRS announced a new contract to build a Friede and Goldman Super M2 jack up at its yard in Yantai, Shandong, China.

The new jack up rig will cost Uni-Arab Group Holdings only $135 million due to owner-furnished equipment. Construction will begin in first-quarter 2008 and is to be complete in early 2009.

Ability Drilling ASA has a plan to build 42 state-of-the-art fourth-generation land drilling rigs and 42 workover rigs with Sense EDM. Two of the drilling rigs were already under construction when Ability announced the third in early December, along with start of the first workover rig, a trailer-mounted, rack and pinion design.

Ability will own and market the rigs in the Middle East and North Africa through its new subsidiary on Malta.

Rebuilds

UAE-based Lamprell PLC announced in December that it received rig refurbishment contracts totaling $84.5 million. The Lamprell yard will rehabilitate the Nabors 660 jack up (formerly the Ocean Warwick), refurbish four Global SanteFe jack ups, and fabricate FPSO topside modules for Akers FP.

The Ocean Warwick jack up was damaged during Hurricane Katrina, when it floated 66 miles from Main Pass Block 299 to beach on Dauphin Island, off Alabama. The rig, renamed Nabors 660, was transported aboard the Hamriyah Pride semisubmersible barge, left the gulf on Aug. 13, and arrived at the Lamprell yard on Nov. 11.

The rig will be outfitted with a replacement drill floor, legs, spud cans, sponsons, drilling package, and five new engines, and the living quarters will be refitted, by November 2007. The first phase of work for Nabors Drilling International Ltd. will run about $43 million, with possible additional work worth $25 million.

GlobalSantaFe will spend $36.4 million to refurbish four jack ups: Main Pass 1 and 4 and the High Island 2 and 4. The rigs will arrive in UAE this month aboard two heavy-lift vessels. Work is to be complete in April, after which the rigs will move to Saudi Arabia to begin long-term contract work for Saudi Aramco.

Shopping

Cyprus-based Essar Shipping and Logistics Ltd. will invest $400 million to acquire onshore and offshore drilling rigs through its newly formed subsidiary, Essar Oilfields Services Ltd. (EOSL), based in Dubai.

In its Dec. 18 announcement, Essar Shipping explained that "contract drilling rates have nearly doubled in the last 3 years and we forecast they will remain robust."

Norway's Seadrill Ltd. acquired a large position in Grimstad, Norway-based Eastern Drilling ASA when it purchased privately held offshore drilling contractor Smedvig ASA in second-quarter 2006.[2] Smedvig was the largest single investor in Eastern Drilling, with 39.75% (OGJ, June 19, 2006, p. 35).

Seadrill may make another offer for outstanding shares of Eastern Drilling, based on a review by the Appeal Board of the Oslo stock exchange in December.

The West E-drill, a sixth-generation semisubmersible, has been under construction for Eastern Drilling since March 2006, under a turnkey contract with Samsung Heavy Industry in Korea.

Scotland's Qserv, based in Aberdeenshire, announced in late December that it had purchased the wireline division of international drilling contractor KCA Deutag, including the transfer of 25 employees. This follows Qserv's June

DRILLING RIG CONTRACTS, REGIONAL

Table 2

Rig type	Total rigs, no.	Average contract length (Nov. 2006), days	Average contract length (May 2005), days	Change in contract length, %
Drillship	38	910	840	8
Jack up	394	713	678	5
Semisubmersible	166	561	502	12
Total, worldwide	**598**	—	—	—

Source: Rigzone

30, 2006, purchase of the Weatherford Group's coiled-tubing division.

Petrolia Drilling ASA, which manages two offshore rigs, the Petrolia semisub and the D/S Deep Venture drillship, will move into the equipment-rental market. In December, Petrolia announced that its subsidiary, Petrolia Shashin AS, will acquire Independent Oil Tools AS, a subsidiary of IOT Holding ASA, for $59.3 million.

E&P spending

Lehman Bros.' Original E&P Spending Survey shows that the 299 operators surveyed plan to increase upstream spending by 9% in 2007, to $292 billion from $268 billion in 2006.

Larger increases are expected outside North America (13%), led by NOCs.

Upstream capital expenditures in the US will grow only 5.1%, to $73 billion in 2007 from $69 billion in 2006.

Exploration and production spending will decrease 7% in Canada, to $22 billion in 2007 from $24 billion in 2006.

Companies are basing forecasts on an average price of $42.40/bbl oil and $4.80/Mcf natural gas.

International spending

In mid-December, Pemex's exploration and production unit, Pemex Exploracion y Produccion, awarded $412 million in drilling contracts to three companies: Swecomex, Servicios Integrales GSM, and BJ Services. The joint drilling contract is in two parts ($132 million and $280 million) for southern region fields.

Hess Corp. plans to spend $550 million on drilling in 2007. The overall 2007 capital expenditure plans, announced on Dec. 19, 2006, include $3.5 billion for exploration and production; $1.4 billion for field development, $1.2 billion for production, and $0.9 billion for exploration.

Drilling plans include:

- 10-12 wells and construct onshore and offshore facilities at Ujung Pangkah, East Java.
- 18 development wells and completion of offshore production facilities at Okume, Equatorial Guinea.
- Development drilling and facilities expansion at the JDA Phase 2 gas development in the Gulf of Thailand.

Canada's Husky Energy Inc. will spend about $160 million internationally in 2007, including $100 million in China and $60 million in Indonesia. The company will drill an exploration well in Block 04/35 in the East China Sea and study potential development of the Liwan gas discovery. In Indonesia, Husky will work toward developing Madura BD offshore natural gas field and evaluating recently acquired East Bawean II block.

According to a report from Britain's Hannon Westwood, as many as 50 of 107 wells scheduled to be drilled on the UK continental shelf in the next 2 years will require farm-in funding.[3] The report details 23 farm-in opportunities in the Central North Sea, 14 in the Southern Gas basin, 2 West of Britain, and 9 targeting heavy oil or HPHT plays.

A founding partner of Hannon Westwood, Charles Westwood, said "Since the late 1990s, the number of acreage holders in the North Sea has doubled, changing the dynamics of the North Sea. There are now 143 companies holding North Sea assets, offering an abundance of investment opportunities as well as intense competition for rig slots." ✦

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3. Hannon Westwood, "Potential Farm-in Opportunities," December 2005, www.hannonwestwood.com.

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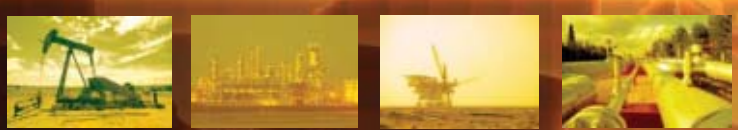

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The webcast will be based on the annual Forecast and Review special report appearing this year in the January 15 issue of Oil & Gas Journal. The Forecast and Review projects oil and gas demand worldwide and in the US for the new year. The US forecast analyzes demand by petroleum product (such as gasoline, diesel, jet fuel, and so forth). As the name implies, the report compares the forecast with estimates for actual numbers for the prior year. In addition to oil and gas markets, the Forecast and Review includes a forecast for US and Canadian drilling activity.

The format for the webcast will include predictions made at this time last year for 2006. Bob Tippee, Editor, will make the presentation. If schedules permit, Marilyn Radler, Senior Editor-Economics, and G. Alan Petzet, Chief Editor-Exploration, will be on hand for questions. Marilyn assembles the numbers and writes copy for the supply-demand portions of the Forecast and Review. Alan does the drilling forecast.

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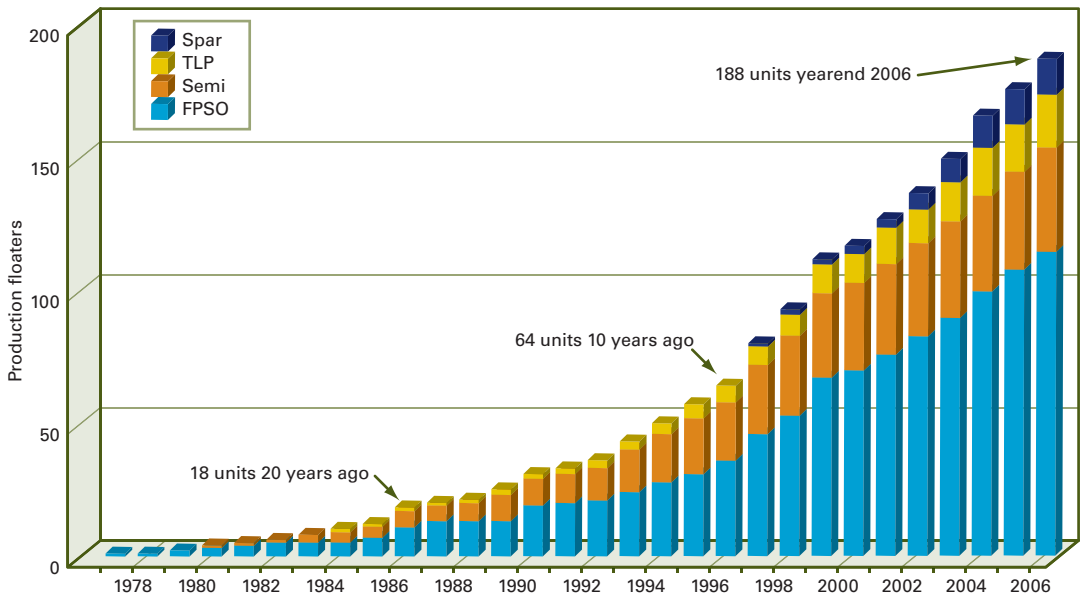
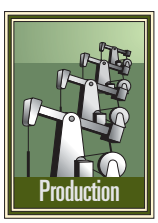


Source: IMA

Floating production system orders spike in late 2006

Orders for production floaters spiked in second-half 2006, according to International Maritime Associates Inc.'s 4-month update of worldwide floating production systems. IMA found that since July the industry has placed orders for 20 production floaters, which will add almost 9% to the future inventory.



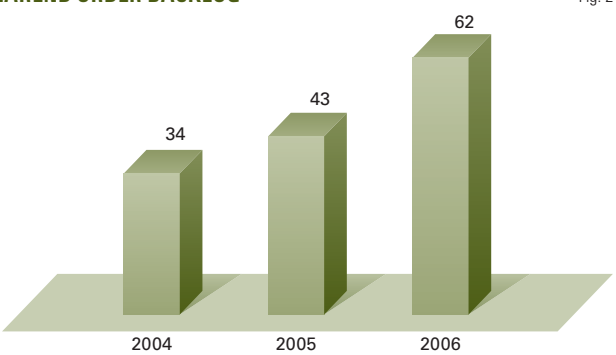
IMA's project inventory includes floating production, storage, offloading (FPSO) vessels, production semisubmersibles, spars, and tension-leg platforms (TLPs).

Its report provides details for production and storage floaters in service, profiles known floater projects in the planning pipeline, analyzes market share of key players in the floater sector, and examines developments taking place that impact the future floater market.

Its series of reports began in the mid 1990s.

YEAREND ORDER BACKLOG

Fig. 2



Source: IMA

Inventory

IMA's latest report says that industry had 188 production floaters in service or available at yearend 2006. This amount is almost triple the number of units operating 10 years ago and more than 10 times the number 20 years ago (Fig. 1).

The current inventory consists of 115 FPSOs, 39 production semis, 20 TLPs, and 14 spars.

These units are on fields primarily off West Africa, Northern Europe, US Gulf Coast, Brazil, Southeast Asia, China, Australia, and New Zealand.

Besides the production units, the industry has installed 70 floating storage vessels, without production capability, primarily in Southeast Asia, West Africa, and the North Sea.

Order backlog

The report says the industry had 62 units on order at yearend 2006 for

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delivery during the next 2 years. This is much higher than the backlog at the same time in previous years (Fig. 2).

The current backlog consists of 47 FPSOs, 9 production semis, 2 TLPs, and 4 spars.

According to Jim McCaul, head of IMA, "this is by far the highest order backlog of floaters in the 30-year history of floating production systems." He added that "the number of floaters now on order is about the same as the total number in operation 10 years ago."

McCaul sees the market for floating production units in the foreseeable future to continue to be strong. He has identified 108 projects currently in the bidding, design, or planning stage that potentially require floating production or storage systems.

McCaul said, "if all these projects materialized, they would generate a requirement for 88 production floaters, 15 floating storage units, and 7 floating regasification facilities."

In terms of water depth, 25 of the 108 projects in the planning pipeline are in ultradeep water, deeper than 1,500 m. Another 28 are in water depth of 1,000-1,500 m, while the remaining projects are in water less than 1,000 m deep.

The report says seven operators account for 56 of the 108 projects in the planning pipeline. Petroleo Brasileiro SA (Petrobras) has the most with 16 projects, followed by Chevron Corp. with 11, Total SA and Royal Dutch Shell PLC with 7 each, BP PLC with 6, ConocoPhillips with 5, and BHP Billiton Ltd. and Eni SPA with 4 each.

Fabrication facilities

The IMA report says that the number of facilities for fabricating or converting floating production and storage systems also has increased. Currently 34 facilities worldwide, up from 31 in July and 20 from 2 years ago, fabricate or convert floaters.

These facilities do work covered by major fabrication or integration contracts but not work done by subsuppliers and engineering, which is done at many other locations.

The report says Asia continues to have the most construction activity for production and storage floaters, with 16 units currently being built.

FPSO construction is strong in China, with a focus on midsize production units, both ship-shape and cylindrical. Korea continues to fabricate mostly top end, purpose-built production units. Singapore remains the major center for conversion of tankers to FPSOs, according to the report. ✦

Study evaluates link between environmental performance, profits of Canadian refiners

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A study conducted on the Canadian refining industry for 1993-2003 showed a positive correlation between environmental performance and profitability. For every 1 tonne decrease in emissions, the income from refinery operations increased by about $2,000 (Can.).

Public concern for the environment has triggered new regulations and increased stakeholder expectations. Both have triggered costs that profoundly affect the petroleum-refining sector.

There are two competing views on the overall impact of environmental spending on profitability. One says that pollution-abatement efforts divert resources from the production of marketable output and lead to a decline in profits. The other says that environmentalism has led to modernization of operations and better management, which together result in higher profits.

This article examines the correlation of Canadian petroleum refinery profits with the volume of reported pollutant emissions. These emissions are reported to the Canadian government and are available to the public in Environment Canada's "National Pollutant Release Inventory," (NPRI).

We examined the correlation of emissions with profit for a 10-year period beginning in 1993.

Petroleum refineries play a significant role in the Canadian economy. They have a high public profile among environmental groups and are frequently targeted for regulation. The costs that result from these regulations can be difficult to assess. They are known, however, to be substantial.

In 1993, for example, the National Petroleum Council estimated the cost for refineries to satisfy environmental regulations in the US were $152 billion.[1] Purvin & Gertz estimated the cost of Canadian sulfur-reduction regulations for gasoline and diesel products alone to be $5.3 billion (Can.).[2]

Previous studies

Other studies have examined the environmental vs. financial performance question in a variety of industries, with mixed results.

For example, pollution abatement reduced productivity in both the brewing industry and the electrical utilities industry.[3,4]

Freedman and Jaggi found no evidence to support claims that it hurt profitability in the pulp and paper industry.[5] On the other hand, Spicer found that better pollution control was associated with higher profitability for pulp and paper companies.[6] Russo and Fouts argued that some of these earlier studies can be challenged on methodological grounds because they failed to control for factors that contribute to profitability.[7]

Some have argued that cross-sectional studies such as these are rooted in time and are therefore unable to capture the effects of technological advances.

Our study, funded by Ryerson University, Toronto, is designed to address both concerns by exploring the long-term relationship of profit and environ-

Equations

$$\text{Profit} = B_0 + B_1\text{EnvirPerformance} + B_2\text{Control\#1} + B_3\text{Control\#2} + \ldots \quad (1)$$

$$\text{NetInc}_{i,t} = B_0 + B_1\text{NPRI}_{i,t} + B_2\text{Crude}_{i,t} + B_3\text{CapEmp}_{i,t} + B_4\text{Yr}_t \quad (2)$$

Nomenclature

B	=	Constant
$\text{CapEmp}_{i,t}$	=	Total capital employed in refinery operations for company i in year t, million $ (Can.)
$\text{Crude}_{i,t}$	=	Volume of crude processed by company i in year t, million bbl
Control	=	Control variable
EnvirPerformance	=	Environmental performance
$\text{NetInc}_{i,t}$	=	Net income from refinering operations of company i in year t, million $ (Can.)
$\text{NPRI}_{i,t}$	=	Total NPRI emissions from company i refineries in year t, tonnes
Profit	=	Refinery profit, $ (Can.)
Yr_t	=	Year, 1993-2002

mental performance in refineries, while controlling for the main cost of those operations.

Although there are many factors that affect the profitability of refineries, and many studies about them, much of the information is proprietary. Empirical evidence, therefore, about the relationship between economic and environmental performance remains largely unknown.

Model definition, data

A rough configuration of the statistical model for this study is shown in Equation 1 (see equation box).

Earlier studies from other industries use a variety of measures for the Envir-Performance variable. These measures include the number of environmental charges a company has faced, the number convictions a company has faced, the size of monetary penalties, and the direct cost of complying with regulations.

Each measure has its limitations. The number of charges, for example, is due as much to regulatory enforcement efforts as to company actions and therefore may not truly measure how managers are addressing environmental concerns. Fines and convictions are due to enforcement efforts too, as well as to companies' efforts to defend themselves in court. For this reason, neither infractions nor fines and convictions fully reflect the pervasive impact on operations of the environmental movement.

Compliance costs of regulations might be a better proxy, but the data are not easily obtained. Compliance costs are not easily identified, even with access to proprietary information. For example, managers at an Amoco refinery in Virginia initially believed the cost of complying with environmental regulation was about 3% of non-crude operating costs. A 2-year study reassessed the figure at 22%.[8]

Furthermore, shareholders have reacted when companies respond to environmental concerns, even when regulatory action is not involved. Spicer's study showed that pulp and paper companies with better pollution control records have higher price-earnings ratios, and lower share price volatility than companies with poor records.[6] Klassen and McLaughlin found that share prices rise when companies win awards for exemplary environmental management.[9]

It is a matter of speculation as to whether these capital market responses mean investors are expressing concern that current (legal) behavior may in the future be challenged by expanding regulation, or whether they are expressing their personal values. Nevertheless, these results argue in favor of a measure of environmental performance that goes beyond regulation or the cost of compliance, to include voluntary efforts as well.

King and Lenox examined the correlation of financial performance with toxic release inventory emissions in their study of US manufacturing companies. They found a positive correlation of financial performance with waste prevention.[10]

We therefore decided to use NPRI emissions as the measure of environmental performance.

Equation 2 shows the final model that we used in our analysis.

Total refining capacity in Canada was about 1,855,850 b/d in 2003. There were 19 petroleum refineries in Canada at that time, owned by 10 companies. This excludes refineries classified as upgraders, as well as petrochemical plants.

Of the 19 petroleum refineries, those operated by private companies were eliminated from the study because of the difficulty in obtaining financial performance data. Refineries fully owned by US companies were also eliminated to avoid complications that could arise from the differences between US and Canadian financial reporting guidelines.

Data were collected from these six companies that operate 15 refineries:

- Husky Energy Inc., 2 sites.
- Imperial Oil Ltd., 4 sites.
- Parkland Industries Ltd., 1 site.
- Petro-Canada, 4 sites.
- Shell Canada Ltd., 3 sites.
- Suncor Energy Inc., 1 site.

Using data from these 15 refineries, our study estimated the long-term correlation between profit and pollution based on data representing over 60% of total refinery capacity in Canada.

All of the data used in this study came from publicly available documents. Emissions volumes came from the Environment Canada NPRI database. Financial data and feedstock volume data came from the companies' annual reports.

There were limitations in the data available from some of the companies, and some of the data required estimation. Husky, for example, did not become a publicly traded company until 2000. Husky's annual reports contained sufficient historic information to provide data for 2000-02 only.

Parkland Industries, the smallest company in the sample, required special treatment. Because Parkland sold its refinery in 2000, only 8 years of data were available for this company. Furthermore, Parkland's main business was marketing gasoline, which distinguished it from the larger, integrated oil companies. Parkland did not disclose petroleum refinery operations as a separate segment. An estimate of $NetInc_{i,t}$ for Parkland Industries was based on the proportion of sales volume for which cost of sales was produced internally.

The other control variable was $CapEmp_{i,t}$. This was measured as the cost of refinery assets less accumulated amortization. Integrated companies provided this information in their segmented disclosures. For Parkland, the information came directly from the balance sheet.

The time factor Yr_t is included in this study as a trend variable, serving to capture the effect on $NetInc_{i,t}$ of factors that may correlate with downstream profit yet remain unidentified, or for which the information is unavailable.

Energy efficiency, for example, is a key factor in determining refinery profitability. The energy efficiency of each refinery is assessed with Solomon's Energy Intensity Index. These numbers, however, are considered confidential

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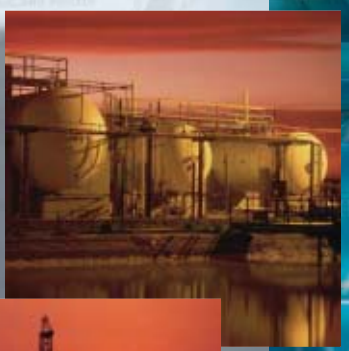

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business information by each refiner and are only released to the public as an annual aggregate. Because these energy intensity numbers, however, were highly correlated with Yr_t, we decided simply to use the latter as a sort of "catch all" trend variable.

The final data set included 51 company-years. A statistically significant and negative emissions factor would support King and Lenox's evidence of a positive correlation between financial and environmental performance. On the other hand, a significant and positive coefficient would support the "dead loss expenditure" view that environmental legislation creates new costs for refiners while adding nothing to the bottom line.

Study findings

Table 1 shows the regression results. All control variables are statistically significant at $\alpha = 0.05$ or less. About 66% of the variation in $NetInc_{i,t}$ is explained by variation in the independent factors identified in this model. The key independent variable $NPRI_{i,t}$ is statistically significant at $\alpha = 0.05$ and is negative.

These results argue that when aggregate NPRI emissions drop by 1 tonne (while controlling for size of operation and volume of crude), the income from refinery operations rises by about $2,000 (Can.).

This model is designed to test for correlation, not causation. We cannot, therefore, conclude that a reduction in emissions means that profits will increase. Nevertheless, these results provide evidence that the "dead-loss expenditure" argument does not fully capture the impact of the environmental movement on the refining industry.

An explanation for these findings is not immediately obvious. After all, environmental regulations have increased the cost of doing business. One possible explanation is that when operations are modernized to meet environmental control requirements, plant operating efficiencies are also enhanced with technology and innovation.

Furthermore, the correlation between these two performance measurements—profit and emissions—is caused, at least partially, by external factors such as societal expectations. This makes sense in the face of public demand for cleaner technologies, especially in an oil and gas industry that seeks to be publicly accountable for its activities.

There is, however, no clear cut evidence that "lean" (lower costs, higher profitability) and "green" (environmental performance) are complementary objectives. It is possible that both trends—falling emissions and rising profits—could be occurring anyway, caused by unrelated factors excluded from the analysis.

Data used in a cross-sectional study are anchored at a fixed point in time. This was mentioned earlier as one of the criticisms of previous research. The current study pooled cross-sectional with time series data to avoid this constraint.

REGRESSION RESULTS Table 1

		Coefficient	t-value
B_{0i}	Intercept	–28,878	[1]–3.922
B_{1i}	$NPRI_{i,t}$	–0.002	[2]–2.451
B_{2i}	$Crude_{i,t}$	0.001	[1]8.854
B_{3i}	$CapEmp_{i,t}$	0.087	[2]2.545
B_{4i}	Yr_t	9.878	[1]2.779
$R^2 = 0.66$			

[1]Significant at $\alpha = 0.01$. [2]Significant at $\alpha = 0.05$.

Time plays a major role in the relationship between financial and environmental performance in several ways. First, concern for the environment has grown as our economies have matured, along with our understanding of the long-term effects of business activity on the ecosystem and of the effects of environmental change on human health. Second, technological change is itself a function of time.

Finally, Russo and Fouts found the relationship of environmental performance with profit to be strongest in those industries that are in a growth phase.[7] This makes sense, given that these are the industries in which investment in new technology will be the greatest.

Our dependence on certain industries, which distinguishes those that are growing from those that are mature, or dying, depends itself upon time. Despite the maturity of this sector, refineries have a long history of continued technological innovation in both core refining processes and products. This trend is evident in increases in annual capital investments by existing refineries over the long term (25+ years) to ensure these plants remain economically viable in a very competitive sector.

This study was subject to numerous limitations and many questions remain unanswered. We did not try, for example, to test whether the best environmental performance (lowest emissions) is associated with the best financial performance. An examination of this nature would be a logical extension to this research, and a positive finding would support the conclusion that a competitive advantage is available through effective and improved environmental control.

The industry in Canada is small, which made it difficult to obtain sufficient data for a thorough analysis. Furthermore, we had to estimate some of the data when they were not provided directly in the annual reports. This contributed to potential measurement error in the variables.

Finally, the choice of NPRI emissions as the proxy for environmental performance introduced a host of problems. The refineries are not homogeneous in their range of emitted substances. The list of NPRI reportable substances was not constant. This was particularly notable in 2002, when the aggregate emissions for each refinery spiked up sharply, due to additions to the list of reportable substances.

All of this suggests that a better analysis would be possible if more finely specified data were available. For example, a study that focused on a smaller number of substances that all refineries (or at least all companies) report each year would strip out the

variability introduced by the additions to and deletions from the NPRI reportable substances list. The use of site-specific energy intensity numbers, along with site-specific profit figures, would enhance the internal validity of the model and increase the usefulness of the findings.

Acknowledgment

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ENVIRONMENTAL MITIGATION—Conclusion

Habitat replacement increases flora-fauna diversity, abundance

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Habitat replacement areas used by Gulfstream Natural Gas System LLC on the Gulf of Mexico seafloor have provided habitat for both the recruitment of sessile epifauna-epifora and use by a substantial demersal and commercially important fish community. Biotic cover has moved to these areas in a greater diversity and abundance than found in neighboring undisturbed areas. A greater diversity of fish also exists in the habitat replacement areas.

Part 3 of this series (OGJ, Jan. 15, 2007, p. 60) evaluated the success of the habitat replacement sites in terms of both colonization by sessile epifauna, and habitat use by reef fishes. The article's conclusion, presented here, offers a detailed examination of the project's postconstruction fish community and a discussion of the habitat replacement program's effects on this community.

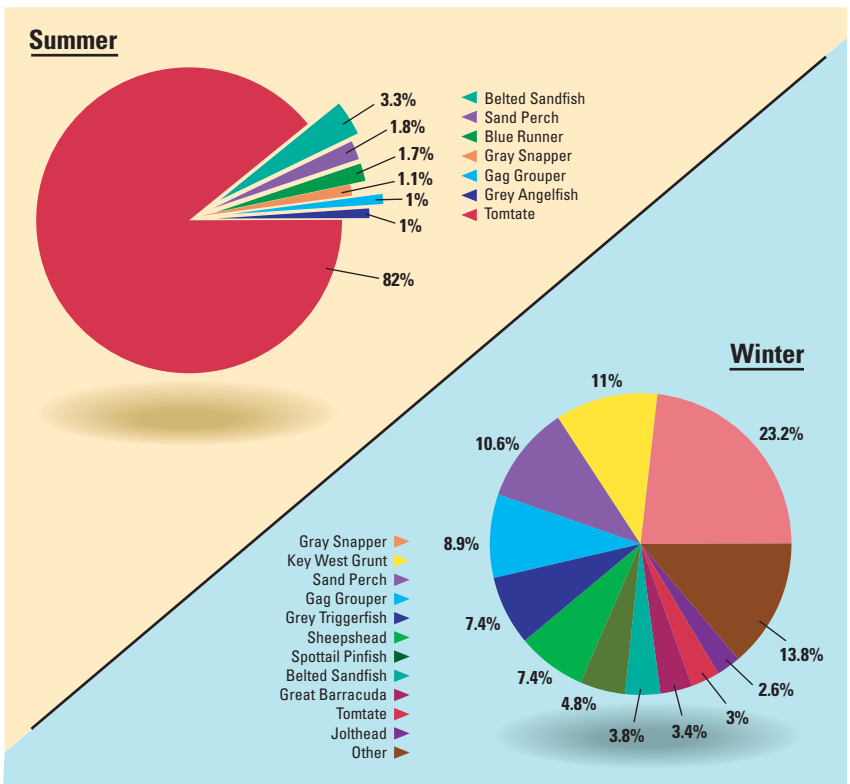
Fish community

Abiotic conditions observed during fish census activities show that the stations were similar and sampled under comparable conditions. Mean water temperature during the winter census was cooler on the bottom (21.9° C.) than that found during the summer census (26.9° C.). Regardless of the time of year, however, bottom temperature was similar across all stations.

The fish census methodology required divers to survey a 5-m radius visually from a position above each point count station. Secchi measurements at all stations ranged from 6.9 to 15.9 m during the summer survey and 6.4 to 13.3 m during the winter survey, showing that water clarity was sufficient for

FREQUENTLY OBSERVED FISH SPECIES

Fig. 1



conducting fish census activities at all sampling stations.

Surveyors recorded 56 different fish species during the summer census, compared to only 25 during the winter census. Of the species recorded, 12 have commercial importance:

- Black Grouper.
- Gag Grouper.
- Goliath Grouper.
- Gray Snapper.
- Greater Amberjack.
- Gray Triggerfish.
- Hogfish.
- Lane Snapper.
- Red Grouper.
- Scamp.
- Spanish Mackerel.
- Yellowtail Snapper.

The majority of the species recorded during both seasons were demersal species, having direct ties to the bottom substrate. Fig. 1 shows the dominant species for each season.

Tomtates represented more than 82% of recordings in the summer census. Juvenile schools, however, were most often encountered and census takers therefore could not make exact counts of this species. Using the Bohnsack method instead provided estimated counts for these schools. Separate parallel analyses excluded tomtates in order to avoid skewed results stemming from their dominance.

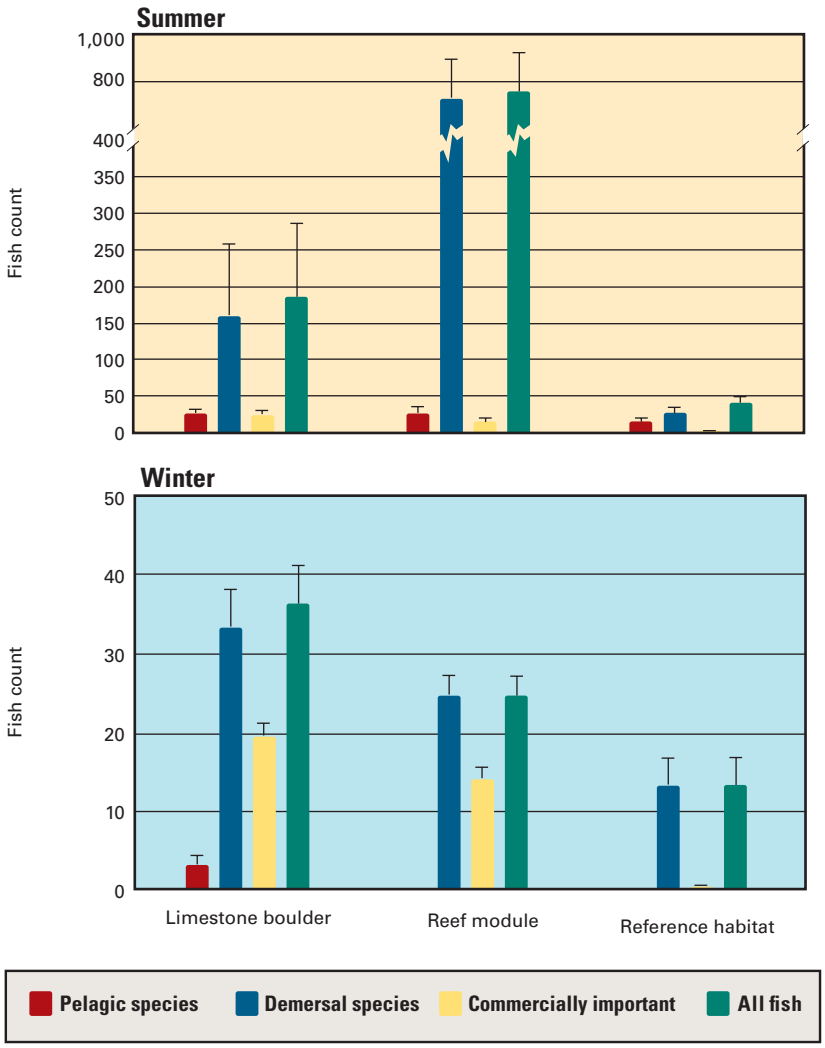
Gray snapper dominated during the winter census, representing almost 25% of observed individuals. The Key West grunt and sand perch both represented more than 10% of the population as the second and third most commonly observed species, respectively.

Mean abundance of all fish species, commercially important species, and demersal species was higher at habitat replacement stations than at reference habitat stations, regardless of season (Fig. 2).

Replacement stations' higher vertical relief may partially explain this. Relief in the reference habitat generally did not

MEAN FISH ABUNDANCE

Fig. 2



ANOVA TEST RESULTS, FISH ABUNDANCE

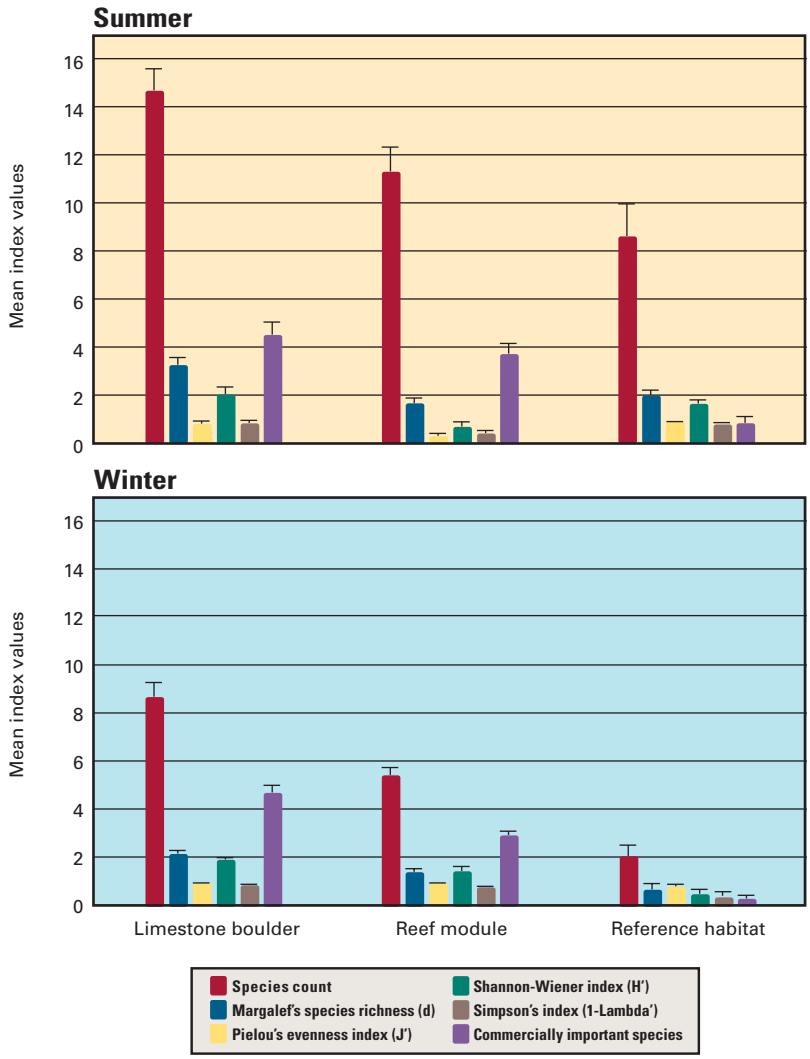
Table 1

Metric	Season	Transformation	F value	P value[1]	Multiple comparison results[2]
All fish	Summer	Log X	21.8	*0.001	Modules Boulders Reference habitat
	Summer (tomtates excluded)	(None)	(2.75)	(0.08)	(Modules Boulders Reference habitat[3])
	Winter	None	8.9	*0.001	Boulders Modules Reference habitat
Commercially important species	Summer	Log X+1	31.0	*0.001	Modules Boulders Reference habitat
	Winter	Log X+1	211	*0.001	Boulders Modules Reference habitat
Pelagic species	Summer	Log X+1	4.46	*0.021	Boulders Modules Reference habitat
	Winter	N/A	N/A	N/A	—
Demersal species	Summer	Log X	23.6	*0.001	Modules Boulders Reference habitat
	(Tomtates excluded)	(Log X)	(2.0)	(0.155)	(Modules Boulders Reference habitat)
	Winter	None	7.3	*0.003	Boulders Modules Reference habitat

[1]Significant P values are denoted with an asterisk. [2]Treatments sharing an underline are not significantly different. [3]Although the ANOVA result was significant, multiple comparison results did not indicate any significant pairwise differences at the P = 0.05 level.

FISH SPECIES COUNT, DIVERSITY VALUES

Fig. 3



exceed 0.5 m, while the reef modules were all 1 m high and relief ranged from 0.75–1.5 m in the limestone boulder sites.

Surface roughness is also an important habitat feature and the rugosity measurements taken during fish sampling showed greater habitat complexity in the habitat replacement areas. The limestone boulder stations had the highest mean rugosity value (1.55) followed by the reef module stations (1.16). The reference habitat stations had the lowest value (1.05).

Fish abundance was significantly greater at reef module stations than at limestone boulder stations during summer when tomtates were included. This pattern, however, switched in the winter, when fish abundance was significantly higher at the limestone boulder stations (Table 1).

The recorded number of fish species, number of commercially important species, number of demersal species, and number of pelagic species were all greater at the habitat replacement stations than at the reference habitat stations. Diversity indices calculated for both seasons likewise show the habitat replacement stations as more diverse than the reference habitat stations. Between the two habitat replacement types, diversity was greater at the limestone boulder sites (Fig. 3).

PRIMER analysis shows that fish community structure differs between the habitat replacement and reference habitat stations (Table 2). This is not surprising given the greater diversity of species observed at the habitat replacement stations.

SIMPER results for the summer show that the tomtate and belted sandfish, both with a greater presence on the reef modules, contributed substantially to community structure differences (Table 3). The presence of gray angelfish, gray snapper, and scamps at the limestone boulder stations also contributed to a community different from the reference habitat stations (Table 3).

SIMPER results for the winter show that the increased presence of gag groupers, gray triggerfish, mangrove snapper, sand perch, and sheepshead at the habitat replacement stations contributed substantially to community structure differences from the reference habitat (Table 4). Belted sandfish, great barracuda, and Key West grunt contributed to differences between the habitat-replacement types (Table 4) with the gray triggerfish, great barracuda, Key West grunt, and mangrove snapper all more abundant at the limestone boulder sites.

The community structure of commercially important species was also different between the habitat replacement and reference stations (Table 2). The relatively low number of commercially important species found in the reference habitat mitigated against performing SIMPER results on this segment of the population. Community differences between the reef module and limestone boulder stations for commercially important species existed only in the winter (Table 2).

Results

The specific gravity and size of limestone used to create the replacement habitat proved to be sufficient, as neither feature-type is displaying signs of movement or dissolution since initial

placement. Habitat replacement areas provide hard-bottom structure in areas that would otherwise be bare sand. They also have a greater amount of relief and habitat complexity than neighboring natural live hard-bottom. The surfaces of the habitat replacement sites support epifaunal-epifloral colonization and have substantially higher levels of biotic cover than the hard-bottom reference areas.

A difference exists in the epifaunal-epifloral community structure of the habitat replacement as compared to natural-hard-bottom areas; the diversity and abundance of organisms within the habitat replacement areas are greater. Increased algal cover, including coralline, macro, and turf algal species caused a large proportion of this difference. A broader array of species, rather than an entirely different group of organisms, colonized the habitat replacement sites.

The increased vertical relief and surface area of the replacement habitat may have contributed to recruitment success through increased exposure to spores and larvae within the water column, with successful establishment of lasting communities helped by reduced sediment abrasion.

Fish abundance was more than twice as great in the summer census, with more than twice as many species also recorded. Demersal species were dominant during both census periods, with many commercially important species also present in both periods. Regardless of season, a relatively diverse fish community uses the habitat replacement areas and both methods of habitat replacement, limestone boulders and reef modules, have a greater abundance and number of species on them than natural hard-live bottom areas in the same area.

Commercially important species are also more abundant and diverse on both types of habitat replacement structures than in natural hard-bottom areas. Numerous grouper species (particularly red grouper) use the habitat-replacement areas, significant because the Gulf of Mexico Fisheries Management Council (GOMFMC) is trying to close commercial grouper fishing within federal waters Feb. 15-Mar. 15.

The time frame corresponds to a peak in the grouper spawning period. Both the GOMFMC and state of Florida (Florida Fish and Wildlife Conservation Commission) also have voted to reduce red grouper bag limits in response to information from the National Marine Fisheries Service that the current grouper population is being severely overfished.

Similar to the epifaunal-epifloral community, habitat replacement areas are being used by a wider range of fish species than natural hard-live bottom, not simply a different group of fish. A seasonal shift in rank abundance between the two habitat-replacement sites makes it difficult to determine which of the two, limestone boulder or reef module, is a more successful mitigation technique.

Demersal fish species used both habitats in relatively high abundance, showing the potential importance of using both types of mitigation habitat.

The reduction in both species abundance and diversity between the summer and winter census may not reflect a regular seasonal cycle but the influence of a red tide event.

Red tide is a natural marine algal disturbance that can damage benthos and fish populations. The dinoflagellate responsible for the red tide blooms, Karenia brevis, has resided on the west

ANOSIM RESULTS

Table 2

Comparison	Season	Global test sample statistic, R	Global test significance level, P[1]	Pairwise test results[2]
All species	Summer	0.63	0.01*	Modules Boulders Reference
	Winter	0.66	0.01*	Boulders Modules Reference
Commercially important species	Summer	0.44	0.01*	Modules Boulders Reference
	Winter	0.41	0.01*	Boulders Modules Reference

[1]Significant P values are denoted with an asterisk. [2]Underlined comparisons are not significant.

SUMMER CENSUS COMMUNITY COMPOSITION, SIMPER RESULTS

Table 3

Species	Community	SIMPER results: Treatment differences, % contribution*
Tomtate	Reef modules vs. limestone boulders	40.4
	Reef modules vs. reference habitat	43.6
	Limestone boulder vs. reference habitat	10.8
Belted sandfish	Reef modules vs. limestone boulders	6.0
	Reef modules vs. reference habitat	5.7
Grey angelfish	Limestone boulders vs. reference habitat	6.3
Gray snapper	Limestone boulders vs. reference habitat	5.5
Scamp	Limestone boulders vs. reference habitat	5.1

*Percent contribution only provided if species contributed >5% of differences.

WINTER CENSUS COMMUNITY COMPOSITION, SIMPER RESULTS

Table 4

Species	Community	SIMPER results: Treatment differences, % contribution*
Belted sandfish	Reef modules vs. limestone boulders	9.0
	Reef modules vs. reference habitat	7.3
Gag grouper	Limestone boulders vs. reference habitat	8.8
	Reef modules vs. reference habitat	9.6
Great barracuda	Reef modules vs. limestone boulders	6.3
Gray snapper	Reef modules vs. limestone boulders	7.6
	Limestone boulders vs. reference habitat	12.9
	Reef modules vs. reference habitat	19.2
Grey triggerfish	Reef modules vs. limestone boulders	7.0
	Limestone boulders vs. reference habitat	8.1
	Reef modules vs. reference habitat	7.8
Key West grunt	Reef modules vs. limestone boulders	12.2
	Limestone boulders vs. reference habitat	11.3
Sand perch	Limestone boulders vs. reference habitat	14.4
	Reef modules vs. reference habitat	19.3
Sheepshead	Limestone boulders vs. reference habitat	7.4
	Reef modules vs. reference habitat	9.0

*Percent contribution only provided if a species contributed >6% of differences.

Florida continental shelf since 1844. The microalgal cells produce a toxin that kills fish, mobile invertebrates, and sessile epifauna. Red tide also depletes dissolved oxygen (DO) levels, creating hypoxic conditions (DO <2-3 mg/l.) in the water column.

The summer 2005 red tide affected Tampa Bay and the northeast-central Gulf of Mexico. Collection of summer fish census and photostation information happened before the red tide while the winter fish census and transect information was collected after the red tide and during the initial recovery phases.

The red tide radically changed the benthic community structure. The toxins and hypoxia it created resulted in mass mortalities to virtually all benthic invertebrates: anemones, zooanthids, octocorals, firecorals, stony corals, polychaetes, mollusks, crustaceans, and echinoderms. All hard bottom areas, including the habitat replacement sites, became barren.

The ability of fish to temporarily move into deeper water and recolonize shallower depths when favorable conditions return limited the red tides' damage to them relative to the invertebrate population.

The timing of the red tide provides an opportunity to compare recovery of the benthic and fish communities, in terms of both recovery rate and species composition, in the mitigation areas as compared to natural hard-live bottom. Gulfstream expects that the mitigation areas may recover more quickly, their greater surface complexity and vertical relief possibly improving recruitment rates. ✦

New weld alignment clamp

Here's a new compact, high-strength weld alignment clamp that is easy to use for rigidly holding in place two sections of tube, pipe, flanges, or plate.

The HOG-TIE weld alignment clamp delivers up to 15,000 lb of force for rapidly positioning two pipes, boiler tubes, flanges, or plates. Fast and easy to use, it consists of two clamping jaws and a steel strap that inserts between the two sections being aligned, engages the two clamping jaws positioned on either side, and pulls them together using a wrench.

Machined from heat treated steel, the clamp sets up quickly and releases instantly, while allowing users to set the weld gap in the same step. Applications include boiler tube water wall panels and pendant tubes, pipe from 2 in., steel plate, panel sections for erecting tanks, and flange alignment for valve replacement.

Source: **ESCO Tool**, Box 530, Medfield, MA 02052.

Marine magnetometer for survey uses

The G-882, an ultrasensitive-high sample rate marine magnetometer, is designed for shallow and deep oil and gas survey operations.

It features ultrahigh sensitivity, low noise, and a high sample rate for detecting small objects, a compact and stable design that allows deployment and operation by one person, automatic hemisphere switching, worldwide operation, and it comes with processing software providing data profiling or contouring for in-field or laboratory analysis. Its cesium sensor is designed for reliability and ruggedness and never needs recalibration or factory realignment. The G-882 comes with a 2 year parts and labor warranty and unlimited technical support.

The tool is designed to operate anywhere in the world, in any direction from

small ships in shallow or deep water and weighs only 50 lb with its 200 ft cable and sensor. Lead weights can easily be added for deep tow applications.

Source: **Geometrics Inc.**, 2190 Fortune Drive, San Jose, CA 95131.

Weatherford International Ltd.

Houston, has announced the appointment of E. Lee Colley III as chief operating officer, a newly created post. In conjunction with this appointment, the company will merge its two existing divisions into a single operating group.

Colley has been with Weatherford for more than ten years, and most recently served as president of the Completion & Production Systems Div.

Weatherford International Ltd. is a global provider of mechanical solutions, technology, and services for the drilling and production sectors of the oil and gas industry. The company operates in over 100 countries and employs more than 33,000 people worldwide.

WS Atkins PLC

Epsom, Surrey, UK, has announced its acquisition of Boreas Consultants Ltd., a company specializing in engineering of subsea oil and gas facilities. Boreas has offices in Aberdeen, Cranfield, Newcastle, and Weybridge.

Atkins will integrate Boreas into its existing oil and gas business. It has been active in the industry since 1975 and is a leading independent supplier of engineering and specialist services.

Cameron

Houston, has announced the election of Lorne E. Phillips as a vice-president of the company. He will retain his position as treasurer.

Phillips holds a BA degree from Rice University and an MBA from the Harvard Graduate School of Business Administration. He has been with Cameron since 1999.

Cameron is a leading provider of flow equipment products, systems, and services to worldwide oil, gas, and process industries.

PSL Energy Services Ltd.

Aberdeen, has announced the appointment of Charlie Topp as regional manager for the Middle East.

Topp, who has 25 years of experience in the oil and gas industry, has held senior positions with major operators in the North Sea, Saudi Arabia, Malaysia, and the UAE.

PSL Energy Services Ltd. provides well services, process, pipeline, excavation, and inspection services, and hydraulic workovers from bases around the world.

Conam Inspection & Engineering Services

Houston, has announced the appointment of Randy Sweet as Gulf Coast regional business development and sales director. Sweet previously was a member of the Conam executive team from 1994 to 2000. He has 32 years of experience in non-destructive testing (NDT) and the inspection services industry.

Conam Inspection & Engineering Services is a division of MHG Services, a part of the Mistras Holdings Group (MHG), headquartered in Princeton Junction, NJ. MHG provides NDT solutions needed to enhance environmental safety of refineries, gas and oil pipelines, petrochemical pressure vessels and storage tanks, strategic components of nuclear and fossil fuel plants, and applications for a variety of industries.

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March 28, 2007.

Cost is $20,000 per page.

To participate in this project, contact:
Shawn Sejera at 918.831.9731 or ShawnS@PennWell.com, or call your local PennWell representative.

Statistics

Editor's note: Due to a holiday in the US, API data were not available at presstime.

OGJ GASOLINE PRICES

	Price ex tax 1-10-07	Pump price* 1-10-07	Pump price 1-11-06
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	183.2	222.9	227.7
Baltimore	183.7	225.6	230.1
Boston	186.5	228.4	226.4
Buffalo	186.9	247.0	241.7
Miami	193.8	244.1	234.7
Newark	188.3	221.2	245.2
New York	182.1	242.2	251.2
Norfolk	179.0	216.6	226.4
Philadelphia	197.7	248.4	236.8
Pittsburgh	181.8	232.5	240.9
Wash., DC	197.0	235.4	240.1
PAD I avg.	187.3	233.1	236.5
Chicago	205.2	256.1	244.0
Cleveland	167.0	213.4	224.1
Des Moines	170.3	210.7	219.5
Detroit	161.2	210.4	223.5
Indianapolis	165.9	210.9	221.4
Kansas City	168.5	204.5	215.9
Louisville	176.2	213.1	218.9
Memphis	175.1	214.9	225.3
Milwaukee	172.2	223.5	230.4
Minn.-St. Paul	168.9	209.3	222.7
Oklahoma City	164.8	200.2	214.3
Omaha	167.1	213.5	219.2
St. Louis	172.2	208.2	224.8
Tulsa	169.4	204.8	215.1
Wichita	160.9	204.3	216.6
PAD II avg.	171.0	213.2	222.4
Albuquerque	177.8	214.2	223.8
Birmingham	178.7	217.4	222.1
Dallas-Fort Worth	181.2	219.6	222.7
Houston	178.2	216.6	218.4
Little Rock	175.5	215.7	223.2
New Orleans	179.6	217.9	243.5
San Antonio	176.7	215.1	222.1
PAD III avg.	178.2	216.6	225.1
Cheyenne	174.8	207.2	213.6
Denver	169.8	210.2	220.0
Salt Lake City	181.7	224.6	218.6
PAD IV avg.	175.4	214.0	217.4
Los Angeles	202.7	261.2	242.8
Phoenix	198.7	236.1	228.7
Portland	223.5	266.8	215.8
San Diego	209.3	267.8	238.5
San Francisco	225.1	283.6	239.5
Seattle	227.9	280.3	230.9
PAD V avg.	214.5	266.0	232.7
Week's avg.	**183.0**	**226.6**	**227.6**
Dec. avg.	**184.9**	**228.5**	**216.5**
Nov. avg.	**180.1**	**223.7**	**229.9**
2007 to date	**186.0**	**229.6**	—
2006 to date	**178.8**	**221.2**	—

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

REFINED PRODUCT PRICES

	1-5-07 ¢/gal		1-5-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	146.93	New York Harbor	152.28
Gulf Coast	143.05	Gulf Coast	149.78
Los Angeles	164.55	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	136.82	ARA	157.37
Singapore	145.71	Singapore	154.88
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	146.55	New York Harbor	87.50
Gulf Coast	143.05	Gulf Coast	91.07
Los Angeles	173.55	Los Angeles	114.96
		ARA	87.63
		Singapore	95.83

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

BAKER HUGHES RIG COUNT

	1-12-07	1-13-06
Alabama	6	5
Alaska	9	11
Arkansas	36	16
California	35	33
Land	33	29
Offshore	2	4
Colorado	91	84
Florida	0	2
Illinois	0	0
Indiana	0	0
Kansas	14	7
Kentucky	7	6
Louisiana	190	167
N. Land	54	56
S. Inland waters	21	17
S. Land	48	33
Offshore	67	61
Maryland	0	0
Michigan	1	2
Mississippi	20	7
Montana	18	24
Nebraska	0	0
New Mexico	86	93
New York	9	4
North Dakota	33	28
Ohio	11	9
Oklahoma	183	151
Pennsylvania	16	16
South Dakota	0	1
Texas	789	659
Offshore	12	11
Inland waters	2	1
Dist. 1	17	20
Dist. 2	25	27
Dist. 3	59	52
Dist. 4	95	74
Dist. 5	143	117
Dist. 6	124	101
Dist. 7B	35	24
Dist. 7C	47	38
Dist. 8	102	82
Dist. 8A	25	23
Dist. 9	45	27
Dist. 10	58	62
Utah	44	29
West Virginia	27	25
Wyoming	85	85
Others—HI-1; ID-1; TN-4; VA-1	7	3
Total US	**1,717**	**1,467**
Total Canada	**586**	**674**
Grand total	**2,303**	**2,141**
Oil rigs	269	241
Gas rigs	1,444	1,224
Total offshore	83	78
Total cum. avg. YTD	**1,706**	**1,466**

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	1-12-07 Percent footage*	Rig count	1-13-06 Percent footage*
0-2,500	50	2.0	29	3.4
2,501-5,000	102	53.9	89	44.9
5,001-7,500	236	19.4	197	19.7
7,501-10,000	414	3.3	334	4.1
10,001-12,500	420	2.3	355	1.1
12,501-15,000	251	—	294	0.6
15,001-17,500	124	0.8	108	—
17,501-20,000	78	—	61	—
20,001-over	41	—	24	—
Total	**1,716**	**7.4**	**1,491**	**6.7**
INLAND	34		33	
LAND	1,619		1,402	
OFFSHORE	63		56	

*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]1-12-07	[2]1-13-06
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	20	21
Alaska	810	834
California	703	695
Colorado	59	60
Florida	8	7
Illinois	32	29
Kansas	95	94
Louisiana	1,410	1,139
Michigan	14	14
Mississippi	53	49
Montana	95	97
New Mexico	167	162
North Dakota	103	101
Oklahoma	174	168
Texas	1,392	1,291
Utah	45	47
Wyoming	143	140
All others	64	72
Total	**5,387**	**5,020**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

$/bbl*	1-12-07
Alaska-North Slope 27°	48.88
South Louisiana Sweet	54.25
California-Kern River 13°	41.30
Lost Hills 30°	49.15
Wyoming Sweet	49.49
East Texas Sweet	51.07
West Texas Sour 34°	40.75
West Texas Intermediate	49.50
Oklahoma Sweet	49.50
Texas Upper Gulf Coast	46.25
Michigan Sour	42.50
Kansas Common	48.50
North Dakota Sweet	43.25

*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]	1-5-07
United Kingdom-Brent 38°	56.66
Russia-Urals 32°	52.36
Saudi Light 34°	53.48
Dubai Fateh 32°	56.43
Algeria Saharan 44°	59.77
Nigeria-Bonny Light 37°	60.64
Indonesia-Minas 34°	62.31
Venezuela-Tia Juana Light 31°	52.60
Mexico-Isthmus 33°	52.49
OPEC basket	56.82
Total OPEC[2]	55.06
Total non-OPEC[2]	54.32
Total world[2]	54.63
US imports[3]	51.57

[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]

	1-5-07	12-29-06	Change
	Bcf		
Producing region	933	942	–9
Consuming region east	1,712	1,740	–28
Consuming region west	380	392	–12
Total US	**3,025**	**3,074**	**–49**
	Oct. 06	**Oct. 05**	**Change, %**
Total US[2]	**3,452**	**3,194**	**8.1**

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

World oil balance

	2006 3rd qtr.	2006 2nd qtr.	2006 1st qtr.	2005 4th qtr.	2005 3rd qtr.	2005 2nd qtr.
	Million b/d					
DEMAND						
OECD						
US & Territories	21.15	20.88	20.76	21.16	21.24	21.02
Canada	2.34	2.14	2.18	2.23	2.24	2.24
Mexico	1.99	2.02	2.08	2.10	2.06	2.11
Japan	4.81	4.78	5.96	5.46	5.03	4.94
South Korea	2.02	2.03	2.28	2.23	2.01	2.07
France	1.95	1.89	2.10	1.96	2.00	1.93
Italy	1.66	1.63	1.86	1.78	1.68	1.69
United Kingdom	1.76	1.81	1.90	1.84	1.82	1.79
Germany	2.71	2.55	2.56	2.63	2.75	2.55
Other OECD Europe	7.33	7.16	7.35	7.49	7.30	7.22
Australia & New Zealand	1.07	1.06	1.06	1.10	1.04	1.06
Total OECD	**48.79**	**47.95**	**50.09**	**49.98**	**49.17**	**48.62**
NON-OECD						
China	7.39	7.34	7.15	7.14	6.93	6.89
FSU	4.13	3.90	4.40	4.60	4.04	3.81
Non-OECD Europe	0.64	0.69	0.74	0.69	0.64	0.69
Other Asia	8.58	8.81	8.43	9.06	8.43	8.71
Other non-OECD	14.70	14.46	14.40	14.14	14.14	13.91
Total non-OECD	**35.44**	**35.20**	**35.12**	**35.63**	**34.18**	**34.01**
TOTAL DEMAND	**84.23**	**83.15**	**85.21**	**85.61**	**83.35**	**82.63**
SUPPLY						
OECD						
US	8.48	8.35	8.18	7.74	7.95	8.84
Canada	3.31	3.16	3.29	3.28	3.02	3.06
Mexico	3.71	3.79	3.80	3.75	3.72	3.89
North Sea	4.51	4.71	5.11	5.05	4.95	5.22
Other OECD	1.53	1.41	1.41	1.51	1.55	1.57
Total OECD	**21.54**	**21.42**	**21.79**	**21.33**	**21.19**	**22.58**
NON-OECD						
FSU	12.18	11.96	11.75	11.97	11.72	11.62
China	3.83	3.85	3.83	3.75	3.80	3.76
Other non-OECD	13.44	13.11	12.99	13.20	13.19	12.83
Total non-OECD, non-OPEC	**29.45**	**28.92**	**28.57**	**28.92**	**28.71**	**28.21**
OPEC	**34.19**	**33.38**	**33.90**	**34.30**	**34.55**	**34.25**
TOTAL SUPPLY	**85.18**	**84.17**	**84.26**	**84.55**	**84.45**	**85.04**
Stock change	**0.95**	**1.02**	**–0.95**	**–1.06**	**1.10**	**2.41**

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

US petroleum imports from source country

	Sept. 2006	Aug. 2006	Average YTD 2006	Average YTD 2005	Chg. vs. previous year Volume	Chg. vs. previous year %
	1,000 b/d					
Algeria	796	803	650	483	167	34.6
Kuwait	227	155	171	223	–52	–23.3
Nigeria	1,078	1,026	1,144	1,143	1	0.1
Saudi Arabia	1,564	1,514	1,464	1,583	–119	–7.5
Venezuela	1,384	1,438	1,445	1,590	–145	–9.1
Other OPEC	789	782	690	625	65	10.4
Total OPEC	**5,838**	**5,718**	**5,564**	**5,647**	**–83**	**–1.5**
Angola	678	544	525	444	81	18.2
Canada	2,262	2,468	2,276	2,136	140	6.6
Mexico	1,569	1,758	1,757	1,643	114	6.9
Norway	159	255	201	232	–31	–13.4
United Kingdom	239	262	284	394	–110	–27.9
Virgin Islands	396	377	323	320	3	0.9
Other non-OPEC	3,234	3,231	2,888	2,818	70	2.5
Total non-OPEC	**8,537**	**8,895**	**8,254**	**7,987**	**267**	**3.3**
TOTAL IMPORTS	**14,375**	**14,613**	**13,881**	**13,634**	**184**	**1.3**

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

OECD total net oil imports

	Sept. 2006	Aug. 2006	July 2006	Sept. 2005	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	–1,163	–1,034	–1,002	–878	–285	32.5
US	12,791	13,334	12,441	12,385	406	3.3
Mexico	–1,713	–1,665	–1,614	–1,522	–191	12.5
France	1,588	2,012	2,055	1,797	–209	–11.6
Germany	2,656	2,467	2,367	2,653	3	0.1
Italy	1,646	1,543	1,555	1,766	–120	–6.8
Netherlands	1,171	966	1,114	874	297	34.0
Spain	1,598	1,514	1,723	1,569	29	1.8
Other importers	4,148	3,860	3,929	3,992	166	4.2
Norway	–2,582	–2,609	–2,636	–2,327	–255	11.0
United Kingdom	132	324	97	267	–135	–50.6
Total OECD Europe	**10,367**	**10,077**	**10,204**	**10,591**	**–224**	**–2.1**
Japan	4,803	5,102	5,122	4,834	–31	–0.6
South Korea	2,071	2,165	1,974	1,836	235	12.8
Other OECD	654	712	726	616	38	6.2
Total OECD	**27,810**	**28,691**	**27,851**	**27,862**	**–52**	**–0.2**

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

OECD* total gross imports from OPEC

	Sept. 2006	Aug. 2006	July 2006	Sept. 2005	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million b/d					
Canada	395	375	447	353	42	11.9
US	5,838	5,718	5,505	5,085	753	14.8
Mexico	10	—	—	—	10	—
France	767	857	939	801	–34	–4.2
Germany	474	508	523	644	–170	–26.4
Italy	1,285	1,227	1,372	1,350	–65	–4.8
Netherlands	601	719	604	561	40	7.1
Spain	762	790	844	781	–19	–2.4
Other importers	1,462	1,256	1,466	1,389	73	5.3
United Kingdom	277	329	212	255	22	8.6
Total OECD Europe	**5,628**	**5,686**	**5,960**	**5,781**	**–153**	**–2.6**
Japan	4,457	4,540	4,484	4,519	–62	–1.4
South Korea	2,409	2,454	2,309	2,022	387	19.1
Other OECD	788	612	674	481	307	63.8
Total OECD	**19,525**	**19,385**	**19,379**	**18,241**	**1,284**	**7.0**

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

Oil stocks in OECD countries*

	Sept. 2006	Aug. 2006	July 2006	Sept. 2005	Chg. vs. previous year Volume	Chg. vs. previous year %
	Million bbl					
France	188	198	192	191	–3	–1.6
Germany	279	279	281	276	3	1.1
Italy	134	133	131	137	–3	–2.2
United Kingdom	98	98	99	105	–7	–6.7
Other OECD Europe	673	668	672	648	25	3.9
Total OECD Europe	**1,372**	**1,376**	**1,375**	**1,357**	**15**	**1.1**
Canada	174	173	173	171	3	1.8
US	1,786	1,764	1,745	1,740	82	4.8
Japan	649	641	631	638	11	1.7
South Korea	160	159	158	145	15	10.3
Other OECD	109	106	112	112	–3	–2.7
Total OECD	**4,250**	**4,219**	**4,194**	**4,127**	**123**	**3.0**

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

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Europe pressing failed approach to global warming

In the battle over what to do about global warming, alarmists are trouncing deniers.

Those unflattering labels emerged in the uncivil controversy that has raged over how humanity should respond to observed warming.

One side accuses the other of fomenting undue alarm. The other side responds by diagnosing the opposition as smitten by denial.

Right or wrong, the alarmists have prevailed. The Kyoto Treaty has entered into force. And Democrats promise to make something like Kyoto part of their energy initiatives in the US Congress.

It does no good to ask whether humans can meaningfully influence global average temperature. The effort will be made, very likely with the hitherto reluctant US participating in some fashion.

It might as well be done properly, then. It won't be if governments address climate phenomena by manipulating markets and dictating behavior.

Europe continues along that discredited course. The European Commission on Jan. 10 proposed that European Union members cut emissions of greenhouse gases by 20% from 1990 levels by 2020 and by 30% if an international agreement takes effect to pursue the more aggressive target.

As part of the European effort, the EC wants to improve energy efficiency by 20% and raise the market share of renewable energy sources to 20% by 2020.

It won't work. Fuel use mandates by governments never do. They raise costs, distort markets, and breed unintended consequences.

For that matter, official targets for greenhouse-gas emission cuts have been no twinkling triumph. Kyoto followed that approach, calling for comparatively modest 8-10% emissions cuts from 1990 levels by 2012. Emissions from Kyoto signatories are now slightly below the target only because of plunges in the 1990s from so-called economies in transition—formerly Soviet countries whose economies collapsed and are now modernizing. Emissions are rising for the other group of Kyoto participants.

If 8-10% cuts by 2012 look unachievable, why stretch the target? If emissions mandates are failing, why press the approach?

European leaders say they want to lead the world on this issue. Costly government intrusions, destined to fail, are no way to go about it.

(Online Jan. 12, 2007; author's e-mail: bobt@ogjonline.com)

The Editor's Perspective

by Bob Tippee, Editor

Market Journal

by Sam Fletcher, Senior Writer

NYMEX crude breaks $55/bbl price support

The February contract for benchmark US light, sweet crudes broke through former market support at $55/bbl to close at $54.02/bbl, down $1.62 for the day, after trading at $53.44-55.81/bbl Jan. 10 on the New York Mercantile Exchange. It fell further, closing at $51.88, Jan. 11.

The next key support level for the February crude contract was $50/bbl, "which in the current volatility can be reached in 2 days," said Olivier Jakob, managing director of Petromatrix GMBH, Zug, Switzerland. That price, however, "has now become the consensus and should be a strong support," he said.

Meanwhile, Jakob noted "some supportive flags that will need watching," including "for the first time this year" a reduction of all crude open interest for both North Sea Brent and benchmark US crudes in both the New York and London markets. "This would suggest that some liquidation has started, and, while it can bring some further violent correction, a further confirmation of falling open interest would point to the start of an exhaustion move," said Jakob. In addition, he said, "The rest of the commodity complex has found a floor for now. The oil correction is now purely an oil affair rather than a general commodity sell-off."

The Energy Information Administration report on US inventories of crude and refined products showed demand was dropping as mild winter weather continued. Commercial inventories of benchmark US crudes fell by 5 million bbl to 314.7 million bbl in the week ended Jan. 5. Gasoline stocks rose by 3.8 million bbl to 213.3 million bbl in that period, while distillate fuel inventories jumped by 5.4 million bbl to 141 million bbl, with gains in both heating oil and diesel (OGJ Online, Jan. 10, 2007). It marked the fourth consecutive week that distillate and gasoline supplies increased, but crude inventories have fallen for 7 weeks.

"The tumbling crude oil price has had its effect on the Organization of Petroleum Exporting Countries, with its spokesman urging its members to 'comply with the agreed cuts,'" said analysts in the Houston office of Raymond James & Associates Inc. "OPEC had announced a cut of 1.2 million b/d in October, and another 500,000 b/d production cut is scheduled to take place in February. Our analysis suggests that only about 65% of the agreed October cuts have been implemented. The latest slide may just tip the scales in favor of better compliance with the next agreed production cut."

Jakob said, "Despite its claims otherwise, it is evident that OPEC is trying to defend a price rather than a supply and demand picture. It starts to talk about cuts as soon as the price approaches $55/bbl but fails to act as soon as it approaches $60/bbl."

Natural gas

While crude prices slipped lower that week, natural gas broke its 5-week downward spiral in the New York market Jan. 8, both because of weather outlooks. The February natural gas contract escalated by 12.4¢ to $6.76/MMbtu Jan. 10 on NYMEX. On the US spot market, gas at Henry Hub, La., jumped by 36¢ to $6.42/MMbtu. "Short-term weather forecasts from the National Oceanic & Atmospheric Administration (both 6-10 day and 8-14 day) continue to show that colder weather is likely in the latter part of January. This may provide some support to natural gas prices," said Raymond James analysts.

The February gas contract fell back to $6.29/MMbtu Jan. 11 when EIA reported withdrawal of 49 bcf of natural gas from US underground storage in the week ended Jan. 5. That was above the consensus of Wall Street analysts and compared with withdrawals of 47 bcf the previous week and 20 bcf a year ago. US storage was then slightly above 3 tcf of gas, up by 401 bcf from year-ago levels and 461 bcf above the 5-year average.

"We believe that many E&P companies are prepared to face natural gas price volatility this year, as the average company has hedged approximately one third of its gas at $7-8/Mcf, with room for upside should the energy markets improve throughout the year," said Raymond James analysts. "Short-term, energy investors could take a more conservative stance by looking at well-hedged producers, which will provide the most insulation from price volatility."

Hedging by producers "will help generate ample cash flow to fund bullish capital spending programs and even free cash flow (which could be used for share repurchases or dividends, for instance)," the analysts said. "While acknowledging the possibility of further price fluctuations and milder weather throughout this winter, we feel that E&P stocks should still fare well in 2007."

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

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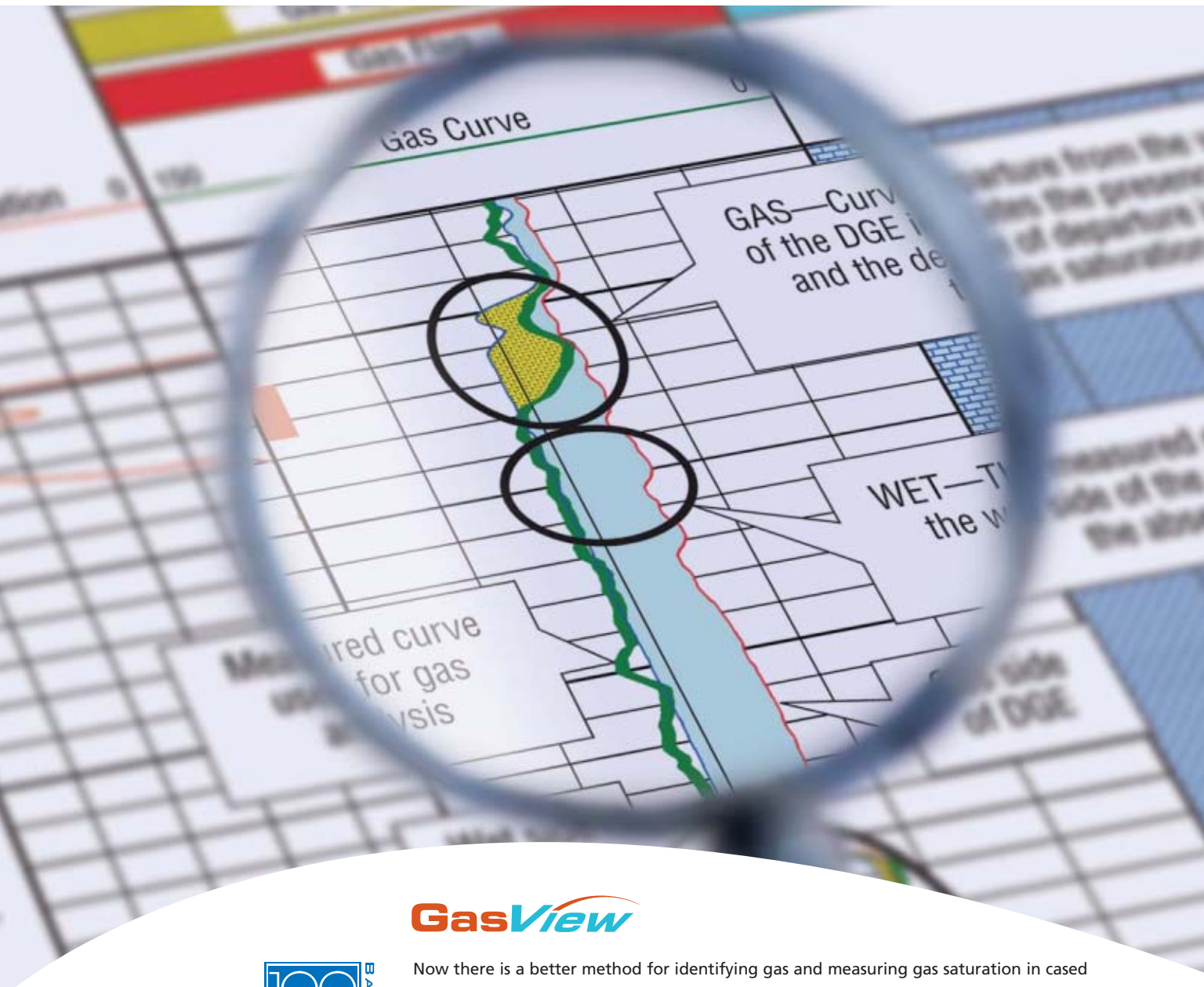

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