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Independent Operations

BP describes maturity model for IT in its E&P organization
Rising drilling, stimulation costs pressure economics
Policy issues will affect future US fuels markets
China's growing LNG demand will shape markets, strategies

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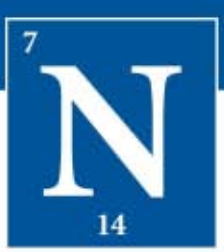

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Oct. 15, 2007
Volume 105.39

INDEPENDENT OPERATIONS

REGULAR FEATURES

COVER

Independent oil and gas producers continue to adapt their business strategies in an ever-changing global environment, as evidenced in a special report that begins on p. 20. The first article spotlights independents based in the UK. A second article, starting on p. 22, examines US independents' adaptation to a new political climate in Washington, DC. On the cover, the setting western Oklahoma sun highlights a drilling rig in the Anadarko basin operated by Chesapeake Energy Corp., one of the most active drillers in the US. This particular area is characterized by a wide variety of play types and depth ranges, including some of the most complex and prolific gas reservoirs in the US. Photo from Chesapeake.

General Interest

Exploration & Development

Drilling & Production

Processing

Transportation

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OGJ Newsletter

Oct. 15, 2007

International news for oil and gas professionals
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General Interest — Quick Takes

Ecuador claims 90% of oil 'windfall profits'

Ecuador's President Rafael Correa has signed a decree requiring foreign oil firms with operations in his country to pay the treasury 90% of their profits resulting from the rise in global crude prices and not 99%, as earlier stated by official sources.

There was no explanation regarding the change from earlier reports that quoted Correa as saying that by a new decree "it is established that 99% of the windfall oil profits will go to the state and the remaining 1% to companies."

Under a law passed last year, oil companies and the Ecuadorean government each received 50% of profits whenever prices on international oil markets exceeded prices established in existing contracts.

Correa said last year's law had to be changed, however, because "it's not enough for Ecuador to get 50%," as in the past. He said the new law puts an end to "the distribution system by which for every 100 bbl of oil, the country (Ecuador) would only keep between 46 and 48 bbl."

According to Correa's decree, "It's the state's fundamental right to defend the country's natural patrimony and preserve the economy's sustainable growth."

The new regulation comes as Ecuador is renegotiating contracts with foreign oil companies, including Petroleo Brasileiro SA, Repsol-YPF SA, and Perenco SA.

Ecuador produces 530,000 b/d of oil. Of that total, 363,000 b/d comes from private oil companies, while the remainder is produced by state oil company Petroecuador.

Changes proposed to OCS pipeline rules

The US Minerals Management Service is proposing revisions to its Outer Continental Shelf pipeline and pipeline right-of-way (ROW) regulations. The new rules would bring the regulations, last revised in 1988, in line with current MMS policies and selected industry practices, it said.

Many industry standards covering pipelines have been revised since 1988, and MMS has issued several notices to lessees and operators containing guidance on applying for, installing, maintaining, and decommissioning pipelines, MMS said.

The proposals include two new safety initiatives. One is a requirement for companies to follow MMS pipeline operations and maintenance manuals as well as pipeline integrity management and personnel training manuals. Another would require a pipeline riser attached to a floating platform to use an independent, third-party review of its design, fabrication, and installation which would be similar to, but separate from, the platform verification program.

MMS said its proposed rule also would increase the ROW bonding amount to more accurately reflect actual pipeline decommissioning liabilities. The proposed revisions would let an ROW holder choose either a $300,000 individual bond or a $1 million area bond covering all pipeline ROW grants held by a company in an MMS OCS region.

The proposals also include an increase in annual rental fees for pipeline ROW grants, currently $15/mile. Guidelines for new rights of use and easement (RUE) and pipeline accessory structures and pipeline accessory structures based on acreage would equal about $125/mile. MMS said the proposed $70/mile rate attempts to strike a balance between the ROW and RUE amounts.

MMS is accepting comments on the proposals, which can be viewed online at www.mms.gov/federalregister, through Jan. 31, 2008.

Ukraine, Gazprom reach deal on gas debt

Ukraine is expected to pay $1.3 billion it owes OAO Gazprom for natural gas by Nov. 1 under an agreement reached Oct. 3 to avoid cuts in gas supplies.

Gazprom has assured Europe that it will not suffer a shortfall in gas deliveries after a meeting between Alexey Miller, chairman of the Gazprom management committee, with Ukraine Energy Minister Yury Boiko. Gazprom had threatened to cut supplies to Ukraine if the arrears were not paid by the end of the month.

According to Russian news reports after the talks, Boiko said, "I hope the situation will stabilize in the near future."

Europe's Commissioner for Energy Andris Piebalgs welcomed the resolution, stressing that Europe expects the problem to be solved by Nov. 1.

"Transparency is capital in our relations with gas supply and transit countries," he said.

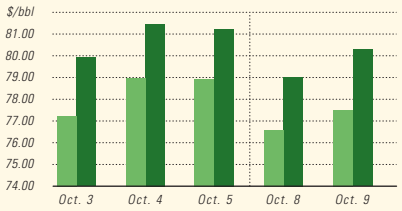
Earlier, the European Commission urged Ukraine and Gazprom to speedily resolve the fallout over gas debt payments. It noted that Gazprom had promised to fulfill all existing gas supply commitments to European companies. The commission has invited Russia and Ukraine to discuss energy security in Brussels later this month.

Ukraine has disputed the debt. First Deputy Prime Minister, Finance Minister Nikolai Azarov said Ukraine does not "owe a single cent. The size of debt which it (Gazprom) is talking about is out of the question."

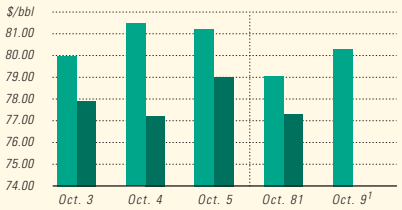
The dispute escalated as Ukraine prepared for elections and the formation of a new government in which Yuliya Tymoshenko looks set to become prime minister. Russia has been accused of using energy as a foreign policy tool by punishing Ukraine for supporting Tymoshenko, who had a pro-Western stance during the Orange revolution leading to the country's independence from the fomer Soviet Union. ✦

Industry Scoreboard

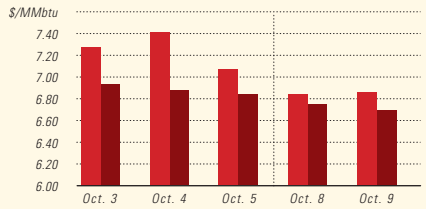
IPE BRENT / NYMEX LIGHT SWEET CRUDE



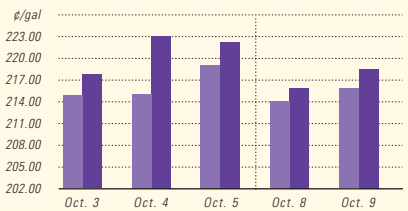
WTI CUSHING / BRENT SPOT



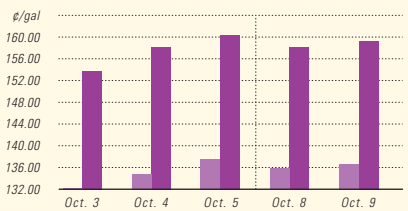
NYMEX NATURAL GAS / SPOT GAS - HENRY HUB



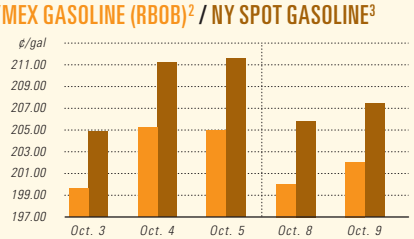
IPE GAS OIL / NYMEX HEATING OIL



PROPANE - MT. BELVIEU / BUTANE - MT. BELVIEU



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



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

US INDUSTRY SCOREBOARD — 10/15

Latest week 9/28	4 wk. average	4 wk. avg. year ago[1]	Change, %	YTD average[1]	YTD avg. year ago[1]	Change, %
Demand, 1,000 b/d						
Motor gasoline	9,249	9,239	0.1	9,313	9,242	0.8
Distillate	4,110	4,127	0.4	4,220	4,140	1.9
Jet fuel	1,565	1,658	–5.6	1,620	1,639	–1.2
Residual	737	552	33.5	764	713	7.2
Other products	4,797	4,948	–3.1	4,838	4,864	–0.5
TOTAL DEMAND	20,458	20,524	–0.3	20,755	20,669	0.4
Supply, 1,000 b/d						
Crude production	5,065	5,149	–1.6	5,168	5,095	1.4
NGL production[2]	2,321	2,461	–5.7	2,362	2,180	8.3
Crude imports	10,016	10,699	–6.4	10,058	10,192	–1.3
Product imports	3,230	3,714	–13.0	3,501	3,732	–6.2
Other supply[3]	1,068	957	11.6	993	1,092	–9.1
TOTAL SUPPLY	21,700	22,980	–5.6	22,082	22,291	–0.9
Refining, 1,000 b/d						
Crude runs to stills	15,273	15,737	–2.9	15,268	15,278	–0.1
Input to crude stills	15,464	16,174	–4.4	15,514	15,643	–0.8
% utilization	88.6	93.0	—	89.0	90.0	—

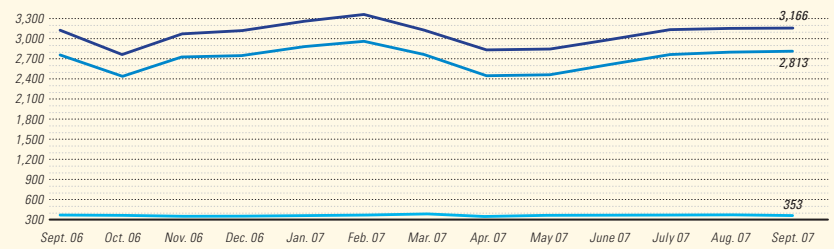
Latest week 9/28	Latest week	Previous week[1]	Change	Same week year ago[1]	Change	Change, %
Stocks, 1,000 bbl						
Crude oil	321,755	320,617	1,138	328,122	–6,367	–1.9
Motor gasoline	191,325	191,366	–4.1	215,052	–23,727	–11.0
Distillate	135,887	137,060	–1,173	151,466	–15,579	–10.3
Jet fuel-kerosine	40,846	41,751	–905	42,699	–1,853	–4.3
Residual	37,408	37,960	–552	42,754	–5,346	–12.5
Stock cover (days)[4]			Change, %		Change, %	
Crude	21.1	20.7	1.9	20.8	1.4	
Motor gasoline	20.7	20.4	1.5	23.3	–11.2	
Distillate	33.1	33.5	–1.2	36.6	–9.6	
Propane	54.0	55.8	–3.2	72.6	–25.6	

Futures prices[5] 10/5			Change		Change	%
Light sweet crude, $/bbl	80.66	81.09	–0.43	59.47	21.19	35.6
Natural gas, $/MMbtu	7.25	6.59	0.66	6.02	1.22	20.3

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

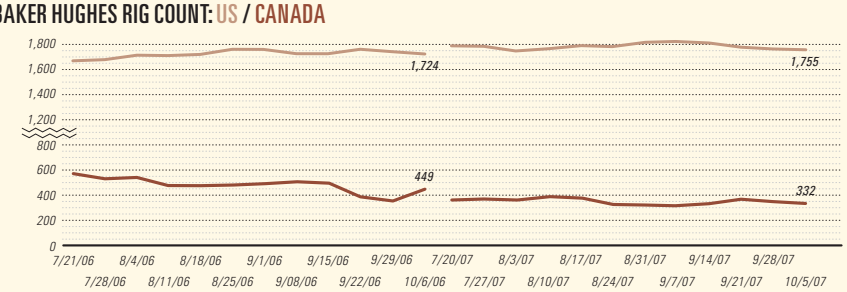
Sources: Energy Information Administration, Wall Street Journal

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



Note: Monthly average count

BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

Exploration & Development — *Quick Takes*

Lease Sale 205 attracts $2.9 billion in high bids

More than $2.9 billion in apparent high bids—the second-highest total in US leasing history—were offered for 723 tracts in the central Gulf of Mexico Lease Sale 205, the US Department of the Interior's Minerals Management Service reported.

The agency's previous sale in August, Lease Sale 204 covering the western Gulf of Mexico, attracted high bids of $290 million (OGJ Online, Aug. 27, 2007).

In the latest sale, the first under the newly demarcated central gulf area, MMS received 1,428 bids totaling $5.246 billion from the 84 companies participating.

This sale offered 5,359 tracts comprising about 28.7 million acres in federal areas off Louisiana, Mississippi, and Alabama. Developing these oil and gas rights could result in the production of 776 million-1.3 billion bbl of oil and 3.2-5.2 tcf of natural gas, according to Interior officials.

About 40% of the tracts that received bids are in ultradeep water of more than 1,600 m. MMS said it expected the ultradeep and deepwater areas to receive a high level of interest. It said, "The progress being made both in terms of discoveries and advanced technology provide incentive for operators to explore these frontier areas."

The deepest tract to receive a bid is Amery Terrace Block 206 in 3,398 m of water.

MMS said BP Exploration & Production Inc. submitted the most high bids, 83 for a total of $107.1 million. Shell Offshore Inc. took second place with 69 high bids totaling $554.6 million. It also submitted the highest single bid of $90.5 million for Walker Ridge Block 7.

Rounding out the top five for high bids were Cobalt International Energy LP with 53 bids totaling $211.3 million, Chevron USA Inc. with 44 at $283.4 million, and Nexen Petroleum Offshore USA Inc. with 30 at $113.6 million.

The top five companies submitting the highest dollar amount of high bids are Shell with high bids totaling $554.6 million, Chevron with $283.4 million, Marathon Oil Co. with $221.7 million, Cobalt International with $211.3 million, and Murphy E&P Co. with $161.1 million.

Based on all the bids submitted, Shell offered the highest dollar amount of $650 million for its tracts. Chevron followed with a submission of $380 million.

Total finds gas on Mahakam block off Indonesia

Total SA has made two natural gas discoveries in the southern part of Mahakam block, 45 km off Balikpapan, Indonesia.

Total said both well—East Mandu-1 and West Stupa-1—were drilled in 60 m of water. EM-1 found 164 m of good quality, gas-bearing reservoirs, while WS-1 found 72 m of reservoirs.

Total said the discoveries lie a few kilometers from, and will be developed in connection with Stupa field. A development plan for Stupa field was submitted to Indonesian authorities in July.

Work on Mahakam block was carried out with Indonesian firm PT Apexindo Pratama Duta Tbk., which has five drilling rigs operating for Total in Indonesia.

Total, operator of Mahakam block, holds equal interest with Inpex.

Statoil stops oil development work at Snohvit

Statoil AS and partners have decided to cease oil zone development work at Snohvit field in the Barents Sea as analyses show its development would not be economical.

"This decision is final," said Geir Pettersen, senior vice-president for the Tromso Patch business cluster. Pettersen said the upcoming startup of gas production from Snohvit will prevent the oil zone being developed at a later stage.

Earlier this summer the partnership drilled an appraisal well in the Snohvit structure to confirm the presence of oil and the thickness of the oil zone in its western part. The well confirmed the presence of oil. ✦

Drilling & Production — *Quick Takes*

BHP starts oil production from Genghis Khan

BHP Billiton, on behalf of partners Hess Oil Corp. and Repsol-YPF SA, has begun oil production from the Genghis Khan development in the deepwater Gulf of Mexico 120 miles off Louisiana.

The BHP-led group acquired an interest in Genghis Khan earlier this year for $1.33 billion. The development, which has pegged gross reserves of 65-170 million boe, may include as many as seven production wells (OGJ Online, Nov. 12, 2006).

Currently, production is flowing from a single well connected to a subsea manifold on Green Canyon Block 652. A second well is being drilled, and two more wells are to follow shortly. One of these additional wells is slated to test Green Canyon Block 608.

The produced oil is transported to a third-party owned and operated facility where it is processed and sent via existing pipelines to markets in Texas or Louisiana. The oil is sold as a blend, commingled with crude oils from other pipeline shippers.

The Genghis Khan development comprises the western flank of the Shenzi structure, which lies on adjacent blocks in 4,300 ft of water. The Shenzi project is also being developed by the same BHP-led group. Interests in the Genghis Khan and Shenzi developments are operator BHP 44%, and Hess and Repsol-YPF, 28% each.

"This project allows us to optimize the development of the reserves at Shenzi-Genghis Khan, providing flexibility in selecting well locations, production facilities, and the pace of development to capture the most value possible over the expected 25 to 30-year life of the field," said J. Michael Yeager, chief executive for BHP Billiton Petroleum.

Genghis Khan is one of three fields BHP has in development in the deepwater gulf that is scheduled to come on stream this year.

The Atlantis and Neptune fields, which are also in the Western Atwater Foldbelt region of the gulf, are expected to begin production by yearend. These three projects, combined, boost BHP's net

production in the region to more than 100,000 b/d of oil. In the 12-month period ending June 30, the company's production from the gulf averaged 12,000 boe/d.

Austral Pacific producing from Cheal oil field

Austral Pacific Energy has completed commissioning of the small Cheal oil field in the Taranaki basin, onshore New Zealand, and the field was scheduled to be opened officially on Oct. 8.

Commissioning began in early August, and the production facilities have already produced 14,000 bbl of oil and 5.9 MMcf of gas.

The field comprises four active wells plus two more in an advanced planning stage. Proved and probable reserves are put at 2.6 million bbl and about 1.8 bcf of gas.

Operator Austral Pacific holds 69.5%, and Calgary-based independent Tag Oil Ltd., 30.5%.

Soco plans well on Block 16-1 off Vietnam

Soco Vietnam Ltd. is preparing to drill the Voi Nau 1X (VN-1X) exploration well on the AA prospect on Block 16-1 off southern Vietnam. Drilling is expected to take 20 days.

The AA prospect is on trend with Voi Trang oil field, which was discovered in 2002 by the Voi Trang 1X well.

The planned VN-1X well will be drilled with the same rig used to drill the recent Te Giac Lam 1X (TGL-1X) exploration well, which is also on Block 16-1 and the first well on Prospect O.

The TGL-1X well, drilled to 3,697 m TD, was designed to test a Miocene four-way closure on one of the basement ridges that appear on seismic to be analogous to Te Giac Trang field, discovered to the east.

TGL-1X was deepened to intersect the Oligocene sands. Although the well was drilled overpressured, mud log data indicated 70 m of sand with good oil shows in the Oligocene section. However, a test of this interval found that the sands at this location were tight, and further testing was discontinued. The test data will be further analyzed to determine future drilling on this new play type, Soco said. Meanwhile, the TGL-1X well will be plugged and abandoned.

After drilling the VN-1X well, the rig will be fitted with high-pressure equipment, including a 15,000 psi blowout preventer, to enable testing of the Te Giac Den 1X (TGD-1X) well on Prospect E.

The TGD-1X well encountered hydrocarbons in two Oligocene clastic sequences, which were separated by a volcanic layer. Well logs over the upper sequence, the object of the impending test, indicated about 30 m of net pay.

After drilling through the volcanics, the well also encountered a deeper high-pressure clastic sequence with oil and gas shows. A further 300 m of sediment is interpreted above the basement. This interval will not be reentered on this test, but will be redrilled later in the drilling program, Soco said.

Murphy advances development of Azurite oil field

Murphy West Africa Ltd. has let an engineering, procurement, fabrication, testing, installation, and precommissioning contract to Technip for the development of Azurite oil field on Mer Profonde Sud (MPS) block, which covers more than 800,000 acres in 1,400 m of water 80 miles off Congo (formerly Zaire).

The $110 million contract covers two production and one water injection flexible risers, two production jumpers, and one umbilical. Technip also will supply 10 well jumpers and provide transportation, installation, and precommissioning for subsea equipment supplied by Murphy West Africa.

Technip's operations and engineering center in Paris will carry out the contract. Flexi France, one of the Group's flexible pipe plants in Le Trait, France, will manufacture the flexible pipe. The umbilical will be manufactured by Duco, Technip's subsidiary based in Newcastle, UK.

Offshore operations will be carried out using one of the Group's construction vessels during fourth quarter 2008.

Murphy, MPS block operator and 85% interest holder, made the Azurite discovery in early 2005 with the Azurite Marine-1 well. It encountered 160 ft of net oil pay with no associated water in multiple Lower Miocene reservoirs (OGJ Online, Mar. 29, 2005).

The discovery was appraised with a well that tested at 8,000 b/d of oil from one zone. A third well in early 2006 further appraised the Azurite area, and the field development plan was approved in late 2006. ✦

Processing — *Quick Takes*

Chad, CNPC to build refinery near N'Djamena

China National Petroleum Corp. subsidiary CNPC Service & Engineering Ltd. has signed an agreement with the government of Chad for joint investment in a refinery north of N'Djamena.

The CNPC unit will oversee all engineering construction and will adopt Chinese design specifications, manufacturing standards, and mechanical equipment. No details of timetables, costs, or construction were announced.

In January, CNCP International (Chad) Ltd., also a CNPC subsidiary, bought EnCana Corp.'s exploration assets in Chad for $202.5 million (OGJ Online, Jan. 15, 2007).

Lurgi to supply units for Gdansk refinery upgrade

Grupa Lotus SA has let a €182 million contract to Lurgi SA for the construction of an oil distillation unit, a vacuum distillation unit, and a hydrogen plant for its 120,000 b/cd refinery in Gdansk, Poland.

The oil and vacuum distillation complex will have total capacity of 4.5 million tonnes/year. The hydrogen plant, which is designed to process various feedstocks such as natural gas, naphtha, and liquid petroleum gas, will have a capacity of 7 tonnes/hr. It is slated to be commissioned in second half 2009.

The contract follows the €472 million lump-sum, turnkey contract awarded in July 2006 to Technip for design of the 45,000 b/d mild hydrocracking unit for the Gdansk refinery. This unit is expected to go on stream in fourth quarter 2010 (OGJ Online, July 18, 2007).

The projects form part of Lotos's comprehensive technical up-

grade program to increase throughput capacity at the Gdansk refinery by 75%, to 10.5 million tonnes/year.

Hunt Refining settles air pollution charges

Hunt Refining Co. and Hunt Southland Refining Co. agreed to pay a $400,000 fine and spend more than $48.5 million for new and upgraded pollution controls at three refineries, the US Department of Justice and Environmental Protection Agency jointly announced on Sept. 28.

They said the settlement resolves alleged violations of the federal Clean Air Act and is expected to reduce by more than 1,250 tons/year the harmful emissions from the company's refineries in Tuscaloosa, Ala., and Sandersville and Lumberton, Miss. The plants have a combined throughput capacity of nearly 70,000 b/d.

New pollution controls to be installed under the agreement will reduce annual nitrogen oxide emissions at the refineries by 150 tons and sulfur dioxide by almost 1,100 tons when fully implemented, according to DOJ and EPA. The controls also will reduce the plants' volatile organic compound and particulate matter emissions, the federal agencies said.

Hunt also agreed to spend $475,000 on projects to benefit the environment. The company has agreed to upgrade controls to reduce VOC emissions from the Tuscaloosa refinery's wastewater emissions and to buy emergency preparedness equipment and train mutual aid responders in Vicksburg, Miss., and Choctaw County, Ala.

DOJ and EPA said Alabama and Mississippi joined in the settlement and will share equal portions of the fine with EPA. The consent decree, which was lodged in US District Court for the Northern District of Alabama, is subject to a 30-day public comment period and final approval by the federal court. ✦

Transportation — *Quick Takes*

Five countries agree to extend Odessa-Brody oil line

Ministers from five East European countries Oct. 10 signed an agreement for construction of a crude pipeline extension that will link Caspian producers with consumers in Northern Europe.

The agreement, signed by Azerbaijan, Georgia, Ukraine, Poland, and Lithuania, calls for the building of a 490-km extension to the existing Odessa-Brody pipeline and securing supplies of Azerbaijan's crude oil to fill the extended line.

The Odessa-Brody leg of the pipeline from Odessa to Brody was completed in 2004, and the extension will stretch from Brody to Plock, in central Poland, and from there to the port of Gdansk.

The pipeline will transport 14 million tonnes/year of crude.

Spectra gauges interest in Texas Eastern expansion

Spectra Energy Transmission plans another capacity expansion of its 9,040-mile Texas Eastern pipeline system that connects Texas and the Gulf Coast to the US Northeast.

The company has started to gauge shipper interest in the project, designated the Time 3 Project, via a binding open season through Nov. 16.

The Time 3 Project involves expanding the pipeline system from a point in Oakford, Pa., through the addition of compression and pipeline looping. Existing rights of way will be used, where possible, to minimize environmental impacts, Spectrum said.

The project will provide many potential receipt points, including existing gas storage fields in Oakford and the proposed Steckman Ridge gas storage project in Bedford, Pa.; points to be created by its proposed Northern Bridge project, which is designed to move western supplies from Clarington, Ohio, to the Oakford area; and interconnections to numerous other gas pipelines.

At an estimated $300 million, the Time 3 Project is expected to be placed into service in late 2010.

PTT lets contract for Rayong gas plants

PTT PLC, Thailand's largest integrated energy group, has awarded contracts worth $1.1 billion to Samsung Engineering Co. of South Korea to build two natural gas separation plants, each capable of processing 800 MMcfd of gas.

The plants will be built on a turn-key basis in Rayong, about 180 km southeast of Bangkok for completion in March 2010, reported PTT executives.

The plants form part of a new gas system PTT is constructing to ramp up gas throughput from the Gulf of Thailand to meet the country's increasing appetite for energy.

PTT is completing a third trunk line that will provide a throughput capacity of 750 MMcfd, enhancing deliveries through decades-old transmission lines that are operating at capacity limits of 1,800 MMcfd (OGJ Online, June 22, 2007).

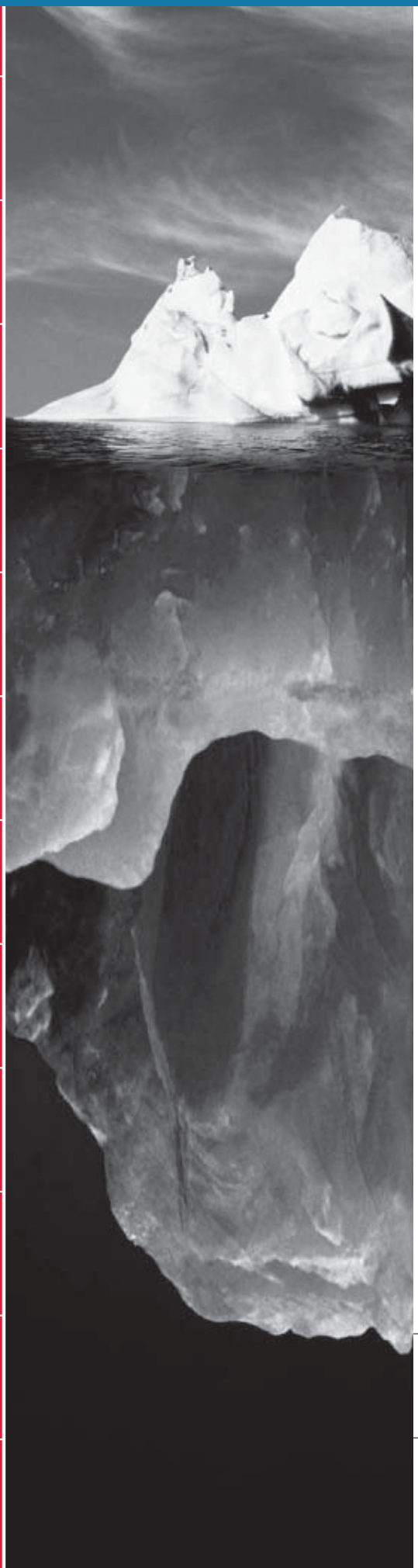
EPP places MAP pipeline expansion in service

Enterprise Products Partners LP (EPP) has placed into service the final phase of its 50,000 b/d expansion of the Rocky Mountain portion of its 2,500-mile long Mid-America Pipeline (MAP) system, increasing the system's capacity to 275,000 b/d from 225,000 b/d.

This portion of the project involved the installation of new pumps and modification of existing equipment at 20 pump stations. The initial 30,000 b/d of additional capacity was created by looping more than 160 miles of pipe, which were placed into service in April.

The expansion will enable EPP to handle natural gas liquids from two new plants: the Meeker gas processing plant in northwestern Colorado's Piceance basin, which is expected to be in service in the coming weeks, and the Pioneer cryogenic facility near Opal, Wyo., which is on schedule to begin operations by yearend.

In addition to the Rockies project, EPP in the second quarter completed a 190-mile, 12-in. expansion of its MAP system between Conway, Kan., and Skellytown, Tex., along with installation of additional compression. As a result, capacity for mixed NGLs between Conway and Skellytown increased by 67,000 b/d, while 48,000 b/d of incremental capacity is now available between Skellytown and the Hobbs station adjacent to EPP's new fractionation complex in Gaines County, Tex. ✦



Letters

Government and energy

I should like respectfully to comment on the article in which you attack Rep. John Dingell's suggestion that the government should take action to reduce consumption as part of a climate change policy (OGJ, Sept. 17, 2007, p. 100). You say that it ought to be left to "market principles."

Consider the following two propositions:

1. That the US government might decide that the Saddam Hussein government of Iraq so much threatened peace in the region that it is legitimate for the government to assign resources to overthrow him.

2. That the US government might decide that the development of nuclear weapons by Iran so much threatens peace that it is legitimate for the government to assign resources to overthrow the present regime.

I am not concerned here with the rights and wrongs of either policy, but I would argue that these are reasonable positions for a government to take. As we know, the US government adopted proposition 1 at a huge cost to the economy in money (and a huge cost in blood and suffering). Nobody would argue that "market principles" ought to decide the issues.

I suggest a third proposition:

3. That the US government might decide that climate change is so severe a threat to the US economy, and to other aspects of the life of the community, that it is legitimate for the government to take action to control it, and to assign resources.

I further suggest that this is an equally reasonable position for the US government to take. One might argue with the policy but not with the principle that the government is entitled to take action.

Climate change will come with huge and potentially catastrophic costs. Why should it be right for politicians to turn their backs and say that everything can be left to the market? Or for the energy industry to take the same line?

In saying all this, I am not arguing for an extreme position. You were kind enough to publish an article I wrote in

2001 about how we should respond to global warming (OGJ, July 30, 2001, p. 24). I still feel that if global warming is the most severe problem humanity has to deal with in the new century, we shall be very lucky.

Andrew Palmer
National University of Singapore

Calendar

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

OIL&GAS JOURNAL online

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

2007

OCTOBER

The Athens Summit on Global Climate and Energy Security, Athens, +30 210 688 9130, +30 210 684 4777 (fax), e-mail: jangelus@acnc.gr, website: www.athens-summit.com. 14-16.

ERTC Petrochemical Conference, Brussels, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 15-17.

GPA Houston Annual Meeting, Kingwood, Tex., (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 16.

Global E&P Technology Summit, Barcelona, +44 (0) 20 7202 7511, e-mail: anne.shildrake@wtgevents.com, website: www.eptsummit.com. 16-17.

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

PIRA New York Annual Conference, New York, 212-686-6808, 212-686-6628 (fax), e-mail: sales@pira.com, website: www.pira.com. 18-19.

SPE/IADC Middle East Drilling and Technology Conference, Cairo, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 22-24.

World Energy & Chemical Exhibition and Conference, Kuwait City, +32 2 474 8264, +32 2 474 8397 (fax), e-mail: d.boon@bruexpo.be, website: www.wecec-kuwait.com. 22-25.

Annual Natural Gas STAR Implementation Workshop, Houston, (781) 674-7374, e-mail: meetings@erg.com, website: www.epa.gov/gasstar. 23-24.

Louisiana Gulf Coast Oil Exposition (LAGCOE), Lafayette, (337) 235-4055, (337) 237-1030 (fax), website: www.lagcoe.com. 23-25.

Pipeline Simulation Interest Group Annual Meeting, Calgary, Alta, (713) 420-5938, (713) 420-5957 (fax), e-mail: info@psig.org, website: www.psig.org. 24-26.

GSA Annual Meeting, Denver, (303) 357-1000, (303) 357-1070 (fax), e-mail: gsaservice@geosociety.org, website: www.geosociety.org. 28-31.

Expandable Technology Forum, Reims, +44 (0) 1483 598000, e-mail: info@expandableforum.com, website: www.expandableforum.com. 30-31.

Asia Pacific Oil and Gas Conference and Exhibition, Jakarta, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. Oct. 30-Nov. 1.

Chem Show, New York City, (203) 221-9232, ext. 14, (203) 221-9260 (fax), e-mail: mstevens@iecshows.com, website: www.chemshow.com. Oct. 30-Nov. 1.

Methane to Markets Partnership Expo, Beijing, (202) 343-9683, e-mail: asg@methanetomarkets.org, website: www.methanetomarkets.org/expo. Oct. 30-Nov. 1.

NOVEMBER

IADC Annual Meeting, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 1-2.

Annual U.S. – Canada Energy Trade & Technology Conference, Boston, (781) 801-4310, e-mail: ellenrota@aol.com, website: www.necbc.org. 2.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.deepwateroperations.com. 6-8.

IPAA Annual Meeting, San Antonio, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org/meetings. 7-9.

Regional Mangystau Oil & Gas Exhibition & Conference, Aktau, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 7-9.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gasprocessors.com, website: www.gasprocessors.com. 8.

SPE Annual Technical Conference and Exhibition, Anaheim, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 11-14.

World Energy Congress, Rome, +39 06 8091051, +39 06 80910533 (fax), e-mail: info@micromegas.it, website: www.micromegas.it. 11-15.

API/NPRA Fall Operating Practices Symposium, San Antonio, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org. 13.

Houston Energy Financial Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.accessanalyst.net. 13-15.

Turkemenistan International Oil & Gas Conference, Ashgabat, +44 207 596 5016, e-mail: oilgas@ite-exhibitions.com, website: www.ite-exhibitions.com/og. 14-15.

Annual Unconventional Gas Conference, Calgary, Alta., (866) 851-3517, e-mail: conference@emc2events.com, website: www.csugconference.ca. 14-16.

Australian Society of Exploration Geophysicists International Geophysical Conference & Exhibition, Perth, (08) 9427 0838, (08) 9427 0839 (fax), e-mail: secretary@aseg.org.au, website: www.aseg.org.au. 18-22.

ERTC Annual Meeting, Barcelona, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. 19-21.

Asia Pacific Natural Gas Vehicle Conference & Exhibition, Bangkok, +66 0 2617 1475, +66 0 2271 3223 (fax), e-mail: angva@besallworld.com, website: www.angvaevents.com. 27-29.

DryTree & Riser Forum, Houston, (918) 831-9160, (918) 831-9161 (fax), e-

Calendar

mail: registration@pennwell.com, website: www.drytreeforum.com. 28.

IADC International Well Control Conference & Exhibition, Singapore, (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 28-29.

DECEMBER

International Oil and Gas Industry Exhibition & Conference, Suntec, +44 (0)20 7840 2100, +44 (0)20 7840 2111 (fax), e-mail: osea@oesallworld.com, website: www.allworldexhibitions.com. 2-5.

Middle East Nondestructive Testing Conference & Exhibition, Bahrain, +973 17 729819, +973 17 729819 (fax), e-mail: bseng@batelco.com.bh, website: www.mohandis.org. 2-5.

International Petroleum Technology Conference, Dubai, +971 4 390 3540, +971 4 366 4648 (fax), e-mail: iptc@iptcnet.org, website: www.iptcnet.org. 4-6.

IADC Drilling Gulf of Mexico Conference & Exhibition, Galveston, Tex., (713) 292-1945, (713) 292-1946 (fax), e-mail: info@iadc.org, website: www.iadc.org. 5-6.

Oil & Gas Maintenance & Technology Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 9-13.

Pipeline Rehabilitation & Maintenance Conference & Exhibition, Manama, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.oilandgasmaintenance.com. 9-13.

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

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JANUARY

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

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

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

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

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

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

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

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

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

FEBRUARY

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

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

SPE Heavy Oil Challenge: Completion Design and Production Management Forum, Sharm El Sheikh, (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 9-13.

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

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

Deep Offshore Technology International Conference & Exhibition, Houston, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.dotinternational.net. 12-14.

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

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

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

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

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

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

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

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

Middle East Refining Conference & Annual Meeting, Abu Dhabi, +44 (0) 1242 529 090, +44 (0) 1242 529 060 (fax), e-mail: wra@theenergyexchange.co.uk, website: www.wraconferences.com. 25-26.

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

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

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

MARCH

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

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

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

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

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

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

IADC/SPE Drilling Conference & Exhibition, Orlando, (713) 292-1945, (713) 292-1946 (fax); e-mail: conferences@iadc.org, website: www.iadc.org. 4-6.

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

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

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

Gastech International Conference & Exhibition, Bangkok, +44 (0) 1737 855005, +44 (0) 1737 855482 (fax), e-mail: tonystephenson@dmgworldmedia.com,

website: www.gastech.co.uk. 10-13.

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

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

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

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

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

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

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

Offshore Asia Conference & Exhibition, Kuala Lumpur, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoreasiaevent.com. 18-20.

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

Middle East Geosciences Conference and Exhibition, Bahrain, +60 3 4041 0311, +60 3 4043 7241 (fax), e-mail: geo@oesallworld.com, website: www.allworldexhibitions.com/oil. 24-26.

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

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

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

APRIL

SPE/ICoTA Coiled Tubing & Well Intervention Conference & Exhibition, The Woodlands, Tex., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@spe.org, website: www.spe.org. 1-2.

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

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

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

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

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

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

2007-08: LNG pace quickens

Warren R. True
Chief Technology Editor-LNG/ Gas Processing

By reading Oil & Gas Journal, gas industry professionals can readily keep up with major events in the rapidly expanding LNG industry. For additional news as well as details and developments of those major events, OGJ readers since late 2004 have also had available OGJ's quarterly LNG Observer.

No issue of importance and no project that has advanced beyond conception have gone unnoticed in that supplement, which now reaches more than 87,000 OGJ subscribers. And its frequency allows LNGO the luxury between issues to sort fact from rumor, fantasy from reality.

As we enter fourth-quarter 2007, it might be useful to employ that perspective to see where the LNG industry has reached this year and what new thresholds it likely will cross in 2008.

Two years' growth

When 2007 began, the LNG industry was coming off an impressive 2006: More than 20 million tonnes/year of production capacity came online between December 2005 and January 2007; the population of LNG carriers surpassed 200; and new regasification capacity started up in Spain, China, and Mexico. The latter two terminals were the first in their respective countries.

This year has witnessed a continuing charge of events.

More than 22 million tpy of liquefaction capacity was to have started up this year. In June, Marathon Oil commissioned its 3.4-million-tpy Bioko Island plant in Equatorial Guinea. Qatar Petroleum's RasGas completed the 4.7-million-tpy Train 5 in March. And the first LNG export project north of the Arctic Circle, Statoil's Snohvit, began production in September and was to have loaded out its first cargo this month.

Only Nigeria's Bonny Island Train 6, due to start up in 2007, has been delayed until early next year.

In shipping, EA Gibson Shipbrokers, London, lists 22 vessels that have been or will be commissioned in 2007 (www.lngobserver.com). Of special note is that five of them will exceed 200,000 cu m each in capacity. A glut of vessels along with escalating material and labor costs have slowed vessel construction this year; originally, EA Gibson had forecast 35 vessels to be commissioned.

New regas capacity in 2007 was to have reached more than 30 million tpy. So far, a new 2.7-million-tpy Spanish terminal at Reganosa has started up, and Excelerate Energy in January commissioned the world's second offshore terminal at Teesside, UK.

Yet to come online in 2007 are two terminals at Milford Haven, UK, which will add 12.2 million tpy, and a new terminal in France at Fos Cavaou to add 6 million tpy. All three may well run into 2008.

Indeed, next year's developments will exceed this year's. Making a few assumptions about some liquefaction projects whose start-up dates have slipped suggests 38.8-54.1 million tpy coming online in 2008.

It is possible, though improbable, that Indonesia's much-anticipated 7.6-million-tpy Tangguh plant will start up in 2008. Yemen LNG is to bring on 6.7 million tpy; Qatargas II and RasGas Train 6 will combine for more than 23 million tpy (more than for all of 2007); and Sakhalin 2 is supposed to finish bringing on more than 9 million tpy—a long shot.

For 2008, EA Gibson has projected 61 LNG carriers will be commissioned. Capacity will average more than 161,000 cu m. Of these, at least 21 are of more than 200,000 cu m in capacity, and eight of them are for more than 215,000 cu m each.

And for 2008, more than 57 million tpy of regas capacity is set to come online at such locations as St. John, NB; near Lake Charles, La., and Sabine Pass and Freeport, Tex.; and in Baja California.

However late to the terminal scramble, Brazil may open both planned offshore terminals; another opening is likely in Chile late in the year; and another terminal will open in China.

Scale, significance

For scale, global crude oil and product transportation facilities dwarf those for LNG and likely always will.

But this overview illustrates the pace of development in an industry many had given up on scarcely a decade ago. Most important about the development is that, for the first time in the international trade in hydrocarbons, natural gas has finally become a globally traded commodity, breaking out of the regional restrictions caused by reliance on pipelines for transportation.

And given the environmental benefits of burning natural gas for power generation—by far the largest demand driving LNG growth—such growth is welcome indeed. ✦

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Editorial

Price and energy politics

In US energy politics, the prime mover is price. Yet politicians fortify their energy initiatives with other, seemingly steadier motives, probably because they've learned that prices fluctuate. Favorite motives of the day are global warming and energy independence.

In fact, however, neither of those issues influenced energy politics generally until prices of energy, especially gasoline, reached levels the public found outrageous. Energy then became a public concern with gravity enough to pull global warming and independence into orbit. This happened perhaps just before and certainly after Hurricanes Katrina and Rita jolted oil supply. Before then, global warming and independence were discrete causes. Energy in general aroused little public excitement.

New pressure

Because prices rose, politicians feel new pressure to do something about energy. Worse, an acrimonious presidential election campaign buries discussion of the issue beneath the fevered exaggerations and outright lies that political discourse has become. With both major political parties jousting under the banner of energy against the twin demons of foreign oil and global warming—on battles against which it is possible to spend limitlessly to no avail—an appeal based on price might be the only hope. A study released last month by the US Energy Information Administration therefore deserves more attention than it has received.

Conducted at the request of Sen. James Inhofe (R-Okla.), the study examines the 25-by-25 proposition frequently discussed in Washington, DC, under which 25% of the electricity and 25% of the liquid transportation fuel sold in the US in 2025 would come from renewable energy sources. Inhofe asked EIA how much this might cost. Inhofe deserves credit for asking the question.

No government can manipulate energy use without require sacrifice by energy users. US energy users should know how implementation of the 25-by-25 proposal would affect them. In its study, EIA gauges the effect as the difference between price and other projections it makes for the proposal and corresponding reference-case forecasts in its Annual Energy Outlook, with some adjustments.

In the case of retail electricity prices, that difference in 2030 would be 0.5¢/Kw-hr, a 6.2% increase, in 2005 money. To meet the legislative goals, electricity generation from biomass and wind would have to be more than 10 times current levels. Use of coal and natural gas in power generation would fall. Annual consumer spending on electricity would track the reference-case projections as prices of fossil fuels fell through 2022. After that, the annual expenditure under the legislative proposals would outstrip the reference-case projections, becoming $16 billion (3.9%) higher in 2030.

The price effect of the 25-by-25 proposal on transportation fuels—politically more reactive than electricity—is much greater. Against reference-case projections, the retail price of gasoline would be higher by 10¢/gal (5%) in 2020, 28¢/gal (1.3%) in 2025, and 24¢/gal (1.1%) in 2030. The diesel fuel disparity would be even greater, EIA says. Overall, the proposal would raise consumer expenditures on all liquid transportation fuels by 5.4% in 2020 and 8% in 2030.

Hitting the renewable-fuel targets would require ethanol and biodiesel supply to increase during 2005-25 by a factor of 12. EIA points out that such an increase would raise food prices, with corn, for example, costing $6.25/bushel in 2025 instead of $3/bushel in the reference case. And the higher energy prices would reduce economic activity.

Consumption declines

Meeting the 25-by-25 goals would lower the use of fossil energy from reference-case projections: of coal by 23% in 2030, of natural gas by 26%, and of petroleum by 12.1%. Asked if they would support those consumption declines, most Americans would answer affirmatively. Asked if they would favor those consumption declines at the cost of the price increases EIA projects for electricity, gasoline, diesel, and food, and the consequent damage to economic growth, most Americans might answer differently.

Not long ago, Americans didn't know how much coal, gas, and oil they used. They didn't care. What they cared about then is what they care about now: price. Told of EIA's new study, they might begin to care supremely about what some lawmakers want to do to them. ✦

Independents working UKCS areas abandoned by majors

Uchenna Izundu
International Editor

Independent oil and gas producers are moving into traditional producing areas of the UK Continental Shelf (UKCS) as major companies move toward technologically the region's challenging frontiers or out altogether.

Royal Dutch Shell PLC, Chevron Corp., and ExxonMobil Corp. recently have begun selling UK North Sea fields, following BP PLC and ConocoPhillips last year. Increasingly taking their place are companies like Fairfield Energy Ltd., Oilexco Inc., and Venture Production PLC.

Attracting the smaller companies are fields too small for the exiting majors but still plentiful enough to represent much of what remains a large target for exploration and production. The trade group Oil and Gas UK estimates potentially recoverable oil and gas reserves for all the UK at 25 billion boe.

Access by independent operators to existing production platforms and other equipment set in place by the majors and to seismic data acquired in the past improves the allure. And the UK government has stimulated activity by encouraging the transfer of licenses to companies eager to work.

But problems remain. They include tax and cost increases, equipment and worker shortages, and the indirect effects of a global credit squeeze.

UK attraction

The ability to develop small North Sea oil and gas fields via tie-in to the large production facilities installed years ago by major producers has long been recognized as an attraction to independent operators.

In addition, active asset trading has enabled relatively small companies to establish positions on the UKCS quickly. The government has helped.

"The Department for Business, Enterprise, and Regulatory Reform [formerly the Department of Trade and Industry] has simplified the paperwork for asset trading and improved the process for third-party access to infrastructure," said Geoff Gillies, lead analyst for Europe at Wood Mackenzie. "The fallow-fields initiative, where unworked acreage and discoveries are recycled so that companies can't just sit on them, has created opportunities and helped attract independents to the UK North Sea."

Jim Stockley, treasurer of the Oil & Gas Independents Association (OGIA), which represents small to medium-size companies with approximately 5% of UKCS production and 27% of the exploration well count, said the availability of seismic data has also lured explorers to the UK North Sea. But not all companies have the geophysical talent they need to interpret the information.

"Lots of people are retiring, and some are opening up their own consultancies and are a lot more expensive," Stockley told OGJ.

Although the government launched a data-access initiative to help independents secure seismic data and well information from major operators at cost, there have been problems.

"Some majors put in overhead costs, but they have to pay for those people who are diverted from what they were doing to run off the data," Stockley said. "The data that is public is 10 years

old, and some of this is not useable because it's on tape."

Government policies

Encouraging activity by independent producers has been an aim of UK licensing policy.

In 2002, the former Department of Trade and Industry introduced promote licenses, offering them at reduced cost to small producers willing to generate prospects and commit to prompt work programs by themselves or others. It also introduced the fallow initiative mentioned by Gillies, a system for transferring licenses with no activity to companies agreeing to aggressive work programs.

According to North Sea consultancy Hannon Westwood, the initiatives have stimulated exploration and appraisal in general and work by operators new to the UKCS in particular.

Hannon Westwood Technical Director Andrew Vinall noted recently that 37% of more than 3,600 individual working interests on UKCS acreage fall under pressure for early activity from the promote program or frontier licenses, which encourage operators, not specifically small producers, to generate and promptly drill prospects in unusually challenging areas such as deep water. He also cited the fallow initiative.

"Fallow wells are important as they tend to examine riskier but larger structures compared to traditional joint ventures targeting near-field accumulations," he said. "We have seen farm-in exploration wells on fallow acreage outperform regular joint-venture-funded wells by a significant margin."

Jim Hannon, founding partner of the consultancy, said drilling in the past 2 years "exceeds the 50 or so wells per year that are necessary to adequately explore and appraise the remaining potential of the UKCS at a reasonable pace."

According to a Hannon Westwood report, 116 UKCS exploratory and appraisal wells drilled in 2005-06 found an estimated 1.2 billion boe of oil and gas and confirmed through appraisal a further 1.415 billion boe.

"The fallow-fields initiative has created opportunities and helped attract independents to the UK North Sea."
Geoff Gillies, Wood Mackenzie

The report, Hannon said, showed that exploratory and appraisal drilling in the 2 years under study had "returned to levels not seen since before 1998." Companies new to the UKCS, he added, "are a real driving force" in the activity.

"At the end of 2006 there were 124 'new entrant' companies holding between them more than 1,200 working interests in UKCS blocks and participating in just over 50% of all E&A wells in 2006," he said.

Tax issues

While encouraging activity by independent operators, the UK government has increased the supplementary corporate tax to 20% in the past 5 years, leaving producers grumbling about poor fiscal stability and the diminished economic viability of developing risky and expensive fields.

The current corporation tax rate is 50%, and the total tax rate on production from old fields is 75%. The producing industry commented on the fiscal regime in a consultation with the government that closed in September.

Stockley told OGJ that independent operators are seeking lower taxes to accommodate for diminishing discovery size.

"Everyone would like to see corporation tax coming down," he said. But he conceded that, in comparison with Norway, where costs are 30% higher, the UK is not a high-taxation environment.

Wood Mackenzie's Gillies said: "The future of Petroleum Revenue Tax (PRT), which applies to fields that had development approval before 1993, is an issue for the industry. By 2020 it is likely that PRT will become a negative tax to the government due to the anticipated high levels of decommissioning around this time.

"It's currently a 50% revenue tax, and any PRT losses generated through decommissioning can be carried back against previous years' PRT profits to generate a PRT repayment. A change to PRT could mean that some companies will gain and others will lose out due to the nature and age of the fields in their portfolios."

Stockley stressed: "Some individuals are making cases for a different tax regime for gas projects because of the volatility in gas prices, which are not comparable with oil." Low gas prices, increased production costs, and uncertainties threaten to curb development in the UK North Sea's Southern Gas basin. Gas prices have slumped because of a surplus of gas since the winter of 2005-06.

Wood Mackenzie has estimated that 15 exploration wells targeting gas will be drilled in 2007, compared with 23 last year. The reasons: low gas prices and lower perceived prospectivity in the Southern Gas basin.

Soaring costs

Rising costs and equipment shortages, meanwhile, have hit independent producers on the UKCS.

David Smith, of Celerant Consulting, noted that independent producers typically operate more efficiently than

major international oil companies (IOCs) do.

"Many IOCs have responded to cost by out-sourcing," he said. "Sometimes this saves them money, and at other times they lose control and cost increases. But with smaller companies this is not always an option."

Mike Wagstaff, chief executive of Venture Production, Aberdeen, has criticized contractors for what he sees as inefficiency manifest in low margins at a time of high prices. He has called for producers and contractors to "rip up the way they do things," saying, "The net unit cost in the Gulf of Mexico is lower, and contractors there make bigger margins."

Celerant's Smith pointed to low productivity of offshore workers resulting from poor project planning. On a typical 12-hr work shift, only 3-4 hr is usually productive, Smith told OGJ. The rest of the time is spent waiting for equipment or permits.

Skills shortage

Also raising costs are the salaries companies must pay to lure workers into oil and gas jobs to fill a skills shortage not confined to the UKCS. Operators say the problem is jeopardizing projects.

According to Sam Olsen, energy sector strategist at Celerant, small companies understand the importance of recruitment and retention of talent.

"Independents can't afford the high bills associated with high turnovers, so there needs to be good management," he said. "With IOCs, staff can be there for 1½ years and leave because they become annoyed, and it is fragmented as they move from one major to another."

Olsen said independent operators need to adjust their assumptions about the potential of technology to the availability of talented and experienced workers.

"The IOCs can use proprietary technology to develop technologically advanced fields in the world and decrease the manpower needed on them," he said. "Smaller companies don't have access to that technology because of cost, and so they need to pull on other levers if they are to have their unique selling point."

Credit squeeze

The credit squeeze on general financial markets potentially threatens activity by independent producers in the North Sea.

Hannon told OGJ that he believes there will be a shortage of funds with

"At the end of 2006 there were 124 'new entrant' companies holding between them more than 1,200 working interests in UKCS blocks."
Jim Hannon, Hannon Westwood

$1-1.2 billion required to drill 40-60 wells/year over the next 10 years.

"Around 40% of that money is already missing from the outset. We're talking about $400-500 million that companies need to raise," he said. Farm-ins from larger operators can help ease this, but moving from exploration into appraisal and production drilling requires $17 billion/year, Hannon added. "In the '70s and '80s, the majors financed these projects themselves, but now they're leaving. Small companies will need to consolidate to help with finances."

Steve Mills, senior director of oil and gas projects and export finance at the Royal Bank of Scotland, is confident that the UK oil and gas industry can survive credit difficulty because it has established a good record in delivering oil and gas (OGJ Online, Oct. 1, 2007). He cautioned that it is still early to judge the full impact of the credit squeeze, adding: "I feel the banks will ride this comfortably because it is long term and it's about regular cash flows." ✦

AEPC sees reversals of '05 gains in new energy bills

Steven Poruban
Senior Editor

US independent oil and gas producers and their industry associations are fighting a political storm as energy bills that would hamper their work head toward a House-Senate conference.

HR 3221, passed by the House this summer, for example, would slow US gas production, points out Bill Whitsitt, president of the American Exploration & Production Council (AEPC).

The effects on supply and, therefore, consumer prices were highlighted in an Aug. 1 memorandum that AEPC sent to House members.

The AEPC memo said provisions in

"We are seeing an extremely wide gap between 'reality' and 'hopes or expectations' with regard to energy policy. In fact, the gap is the worst I've seen in a not-so-short career here in Washington."

American Exploration & Production Council Pres. Bill Whitsitt

the bill by the House Natural Resources Committee to extend project permitting times and increase producers' taxes, fees, and other costs would "reverse a range of energy-permitting reforms put in place less than 2 years ago by the bipartisan Energy Policy Act of 2005 (EPACT)."

The EPACT reforms, AEPC said, "are already starting to produce results" in the form of increased gas supply.

The memo said producers are "frankly baffled as to why policy-makers would consider such a reckless course of action."

Earlier this month, AEPC Pres. Bill Whitsitt told OGJ that there is even more evidence now than in 2006—EPACT's first full year of operation—that EPACT has begun to enhance gas supply, particularly onshore production.

According to AEPC, EPACT was part of the reason US gas production increased by about 1.5% in 2006 after adjustments for the effects of Hurricanes Rita and Katrina.

Reality check

Whitsitt told OGJ that with US energy he has sensed a "disconnect" between policy-making driven by politics and that backed by logic and data.

"We are seeing an extremely wide gap between 'reality' and 'hopes or expectations' with regard to energy policy," he said. "In fact, the gap is the worst I've seen in a not-so-short career here in Washington."

Whitsitt said the movement in Congress to unwind many features of EPACT when they're beginning to boost energy supply makes no sense.

Whitsitt cited a meeting he witnessed between an executive of one of AEPC's member companies and a Democratic member of Congress. After a short, polite discussion about future gas demand and supply, Whitsitt said, the congressional member ended the meeting with a comment to the effect that: "I've heard what you said, and you might be right, but as a country we still need to change direction regarding energy policy."

Whitsitt said that line of thought typifies many current policy discussions.

"How else could you explain a House energy bill that clearly leads to a reduction in natural gas production?" he asked. "How else can you explain something that's that reckless? You can't explain it as rational policy."

'Back to basics'

Whitsitt said members of AEPC and other industry associations have gone "back to basics" with educational outreach, particularly for politicians.

"It's astounding that we had producing-state Democrats, particularly, who voted to decrease energy supplies," Whitsitt noted about the most recent energy bills. "What are we not doing right that would convince these members from producing states—and some congressional districts that produce oil and gas—that to vote for this bill is to vote against a fundamental sector that should be important to them?" he asked.

Whitsitt said the outcry has been strong for industry to supply information for decisions about energy policy.

"We've heard specifically from some members of Congress who have told us that they don't see enough of us in their town-hall meetings," he said.

Whitsitt said outreach occurs in the framework of an association such as AEPC as well as individual companies.

"Over the past 2-3 years, we have actually been on a targeted basis trying to reach out to Democrats and Republicans who might be nontraditional supporters of the industry in the future," he said. Those efforts were overwhelmed by the politics of the change from Republican to Democratic control of Congress.

AEPC also continues outreach efforts to natural gas consumers.

"We really hit a nice stride with our consumer groups when we were able to pass in 2006 the relatively modest—but still important—eastern Gulf of Mexico access legislation," Whitsitt said. He added that this legislation would not have passed had it not been for the involvement by industrial gas users, from farm groups concerned about fertilizer prices, to the American Chemistry Council, to the gas distributors of the American Gas Association.

Climate change

The latest wrinkle in the fabric of effective energy policy-making that would affect independent producers has been climate change legislation, Whitsitt noted.

Policy-makers are beginning to understand that any effort to lower emis-

sions of carbon dioxide will increase demand for natural gas, he said.

"You can't do climate change policy in a vacuum when it comes to natural gas supply policy," Whitsitt said. That message has been difficult for some lawmakers, especially those from districts opposing LNG terminals or offshore drilling.

Earlier this month the Natural Gas Council released a study highlighting the need for conventional gas from basins subject to restrictions on exploration and development if the US mandates reductions in greenhouse gas emissions (see story, this page). The NGC-commissioned study was of S. 280, the Climate Stewardship and Innovation Act, which US Sens. Joseph I. Lieberman (I-Conn.) and John McCain (R-Ariz.) introduced on Sept. 12. ✦

Onshore pipeline spend to be $180 billion by 2012

An estimated $180 billion will be spent on onshore pipeline projects worldwide through 2012, says Douglas-Westwood analysts in a new study, "The World Onshore Pipelines Report 2008-12."

Based on strong market drivers and the volume of announced projects, the analysts expect the onshore pipelines industry to experience "substantial and sustained growth over the forecast period."

Analyst John Westwood, speaking at Brazil's Rio Pipeline 2007, said: "With oil and gas demand set to continue growing, production increases are forecast, leading to greater need for the transportation of products to market. Increasing demand for gas to be transported vast distances from source to market in places such as the USA and Australia, coupled with previous underinvestment in Russia, for example, and aging infrastructure set the stage for an increase in onshore pipeline project investment over the forecast period."

According to Westwood, "Currently, there are almost 2 million km of oil, gas, and product pipelines installed globally, with 65% located in North America and Eastern Europe and the FSU (Former Soviet Union), with gas pipelines making up the majority."

The Douglas-Westwood report forecasts a 16% increase in kilometers of pipelines installed during 2008-12, compared with the historic 5-year period of 2003-07. Nearly 75% of this expenditure is expected to be spent in Asia, Eastern Europe and the FSU, and North America. Almost 70% of this expenditure is expected to be allocated for gas pipelines.

Asia stands out as the largest forecast market based on the length of pipeline construction. The region accounts for $42 billion of forecast capital expenditure.

The status of forecast pipeline projects shows that about 47% are in the planning stage, 40% are under construction or have been ordered, and 13% have been approved. Analysis on a project-by-project basis has resulted in more than 90,000 km of announced pipeline projects being 'slipped out' of the forecast period. However, new projects that will be commissioned over the forecast period will compensate somewhat for project slippage.

Pertaining to the future of the LNG market, the report predicts that "although the LNG market is continuing to experience strong growth and is expected to increase its share of gas transportation from around 7% in 2003 to 26% by 2025, piped gas will remain the main method of gas transportation, carrying over 30% more gas (by volume) in 2025 than in 2007. With an onshore activity boom under way, both upstream and downstream projects are exerting an upward pressure on levels of pipeline construction. ✦

NGC: Gas to play critical part in reducing GHG emissions

Nick Snow
Washington Correspondent

Conventional natural gas supplies from basins currently restricted for exploration and development will be needed if the US adopts greenhouse gas (GHG) emissions reduction mandates, the Natural Gas Council said Oct. 3.

The findings were contained in an NGC-commissioned study of S. 280, the Climate Stewardship and Innovation Act, which US Sens. Joseph I. Lieberman (I-Conn.) and John McCain (R-Ariz.) introduced on Sept. 12. The bill aims to reduce domestic GHG emissions by 30% below the "business as usual" scenario by 2020 and by 60-80% from current levels by 2050.

NGC said its study built on the US Energy Information Administration's recent analysis of S. 280's potential domestic economic impacts, but added that the study's findings can be applied to other climate-change proposals. NGC said it used conservative assumptions under the National Energy Modeling System, or NEMS, including the unlikelihood that 145 new US nuclear power plants would be built by 2030 as EIA assumed in a July analysis of the legislation.

More constrained nuclear power development means rising overall natural gas demand will put pressure on wellhead prices due to the increased

Who follows Domenici?

The changing of the Republican leadership on the US Senate Energy and Natural Resources Committee is a relatively small consequence of Pete V. Domenici's deciding not to seek reelection in 2008 for health reasons. But it could have a big impact on the oil and gas industry in Congress.

It's easy to identify the two bills that Domenici promoted during his 35 years in the Senate that most affected the industry: the Energy Policy Act of 2005 and the Gulf of Mexico Energy Security Act of 2006.

Both became law because of compromises he developed to assure passage. This especially mattered in the second bill. The compromise cut provisions to increase offshore leasing that the House had passed but that the Senate would not.

The final bill retained language initially establishing shares of federal revenues for affected coastal states—crucial to gaining support of senators from Alabama, Mississippi, Texas, and especially Louisiana. It also added 25 miles to a proposed coastal buffer zone that helped end opposition by Florida's senators.

Consequently, the US Minerals Management Service has begun preparations for federal oil and gas leasing in the eastern Gulf of Mexico.

Bipartisan spirit

Domenici and New Mexico's other US senator, Democrat Jeff Bingaman, made the Energy and Natural Resources Committee more bipartisan than others in the Senate as its chairman and chief minority member. They carried on a tradition I first observed in the early 1990s when Democrat J. Bennett Johnston of Louisiana and Republican James McClure of Idaho held those posts.

Bingaman and Domenici traded jobs earlier this year after Democrats gained a majority in the Senate during the 2006 elections, but they have continued to cooperate.

"Today, and during his entire Senate career, Pete has achieved what all of us try to achieve—that is, to be effective in getting results in Washington while also staying close to the people who have sent us here to represent them," Bingaman said on the Senate floor after learning of Domenici's decision.

Next top Republican

An obvious question is who will follow Domenici as the committee's top Republican. Larry E. Craig of Idaho was No. 2, but he lost his seniority after legal problems in August made his reelection next year questionable. So it's likelier that Alaska's Lisa Murkowski, who was No. 3, will get the job.

That could be interesting, since she supports not only opening the Arctic National Wildlife Refuge Coastal Plain to oil and gas leasing and constructing a gas pipeline from Alaska to the Lower 48 states but also investment incentives for renewable energy and reform of automotive fuel efficiency standards.

Domenici has 15 more months in office, however, and he'll likely play a major role in the upcoming House-Senate energy conference. His potential successors on the Senate energy committee and in New Mexico probably will pay close attention. ✦

need to comply with carbon dioxide limits, NGC's study said. The higher wellhead prices would affect all consuming sectors but have their biggest impact on electric utilities and industrial users paying more for CO_2 allowances required to consume gas, it said.

Leaders from four oil and gas industry associations that are also NGC members said NGC believes gas will be a critical component in achieving GHG reductions under any climate-change legislation. They said the US gas industry would welcome the exploration of policies with Congress to facilitate optimizing the potential contribution of gas as a bridge fuel to generate electricity until GHG emission reduction technologies and market mechanisms can be implemented.

Significant component

"No climate-change approach should be adopted unless it includes mechanisms to assure access to American natural gas," said Mike Linn, chairman of the Independent Petroleum Association of America and NGC. "Even with the potential changes in the energy supply mix to expand renewable fuels, improve efficiency and enhance conservation, natural gas will continue to be a significant supply component and leading solution to reduce greenhouse gas emissions," he said.

Skip Horvath, president of the Natural Gas Supply Association, said NGC was puzzled by EIA's conclusion that less gas would be used under carbon-reducing legislation. "When we examined the reasons, we noticed that EIA's assumptions were constrained by that agency's restrictions on modeling US societal and political limitations. After adjusting these assumptions to better reflect US realities, we found that an additional 4 tcf of gas would be used above the base case by 2020," he said.

Results from NGC's modeling project show that gas will continue to play a key part in meeting US energy needs and reducing GHG emissions under the most likely scenarios, said Donald F.

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Santa, president of the Interstate Natural Gas Association of America.

"Yet some policymakers remain determined to frustrate the nation's ability to gain access to additional gas supplies that are available from both domestic sources and from the global market. We need an honest discussion about the importance of gas supply and infrastructure development as part of a comprehensive policy," Santa said.

David N. Parker, president of the American Gas Association, said, "Unless policymakers adopt policies that encourage ample, environmentally responsible production of the gas we need to meet climate change goals and keep us globally competitive, future generations of American businesses and families will pay a hefty price."

Parker said the average American gas-consuming household uses 33% less gas than in 1980. "However, we can't rely on efficiency alone. We need supply to help us meet our environmental goals," he said. ✦

Rowan Cos. pleads guilty to environmental charges

Rowan Cos. Inc. has pleaded guilty to three felonies involving the discharge of pollutants and garbage into the Gulf of Mexico from the Rowan-Midland drilling rig, the US Department of Justice reported.

Nine employees also filed guilty pleas to related charges. Although the company sold the Rowan-Midland rig in January, the discharges were made in 2002-04. Rowan and its employees pleaded guilty Oct. 9, 2006, in federal court in Beaumont, Tex.

A government investigation revealed that Rowan employees discharged waste hydraulic oil mixed with water, used paint, paint cans, and other pollutants and garbage into the gulf and failed to notify the government of violations of the Clean Water Act (CWA) and the Act to Prevent Pollution from Ships (APPS).

The company will pay a $7 million criminal fine, along with community service payments totaling $1 million to five state government enforcement organizations for environmental training, education, and enforcement coordination.

Rowan of Houston also provided a community service payment of $1 million to the National Marine Sanctuaries Foundation to be used for preservation and protection projects at the Flower Garden and Stetson Banks National Marine Sanctuary off Texas and Louisiana.

As part of a plea agreement, Rowan will be subject to 2 years probation during which time it will reorganize its corporate structure to add an environmental division and implement a comprehensive environmental compliance plan for its rigs.

In cooperation with the US Environmental Protection Agency and the Coast Guard, Rowan will develop new sandblasting techniques and help establish new industry standards for the minimization and containment of sandblasting debris over water.

Employees plead guilty

Charges associated with these violations were filed in the US Eastern District of Texas. In the US Eastern District of Louisiana, Rowan pleaded guilty to one CWA felony count for discharging pollutants into the Sabine River as a result of sand blasting operations used to clean the rig in Port Fourchon in 2004.

Nine supervisory employees of Rowan pleaded guilty to charges related to Rowan's violations. Carl Smith, James Rawson, Warren James, and Randy Hoover each pleaded guilty to negligently discharging pollutants and agreed to pay a $2,500 fine.

David Burcham and Murphy Comardelle each pleaded guilty to a failure to report knowledge of a felony regarding illegal discharges of waste oil and agreed to pay $5,000 in criminal fines.

Terry Glen Fox and Michael Friend pleaded guilty to misdemeanor charges for negligently discharging waste oil and agreed to pay $2,500 in fines. Michael Freeman pleaded guilty to a felony violation for knowingly discharging waste oil and faces a maximum fine of $250,000, the exact amount to be determined by the court. ✦

Total CEO says work will continue in Iran, Myanmar

Eric Watkins
Senior Correspondent

Total SA Chief Executive Christophe de Margerie, in an interview with Le Monde newspaper, has affirmed that his company will continue to work in Iran and Myanmar despite pressure coming from government and nongovernmental organizations (NGOs).

In response to a request by French President Nicolas Sarkozy, who asked Total to freeze all of its investments in Myanmar, De Margerie said it would be "provocative" to invest in that country today. But, he noted that Total's investments "date back to the 1990s and there have not been any new ones. We have been asked not to talk about our activities. I find that is very good."

De Margerie also commented on requests by NGOs to withdraw from Myanmar, "We listen to [NGOs], but

they do not decide what the group does. Total will not get out."

Noting that his firm was awarded the Helen Keller humanitarian prize 2 years ago, De Margerie said NGOs vary in their perception of his firm's contributions to rights issues. Even the opposition in Myanmar has not sought Total's departure from the country, he added.

Referring to recent demonstrations in Rangoon, De Margerie said, "We did not wait for this crisis to become involved locally and [to] support activities that are in keeping with our code of conduct, which bans forced labor." Total has "intervened massively with the junta in the past to avoid these blunders," he said.

Responding to questions about legal cases against Total in connection with forced labor in Myanmar, De Margerie said both suits filed against the company were dismissed. "There is no forced labor at our facilities."

De Margerie also dismissed suggestions that the company is indirectly supporting the military regime through Yadana, which allegedly brings the state $500 million/year, saying all companies that pay taxes could face that type of charge.

"These taxes (30%) are paid by Total as well as by its three partners: Chevron, PTTEP (Thailand) and the Burmese national company."

However, he insisted that, "Total, no more so than any other company, cannot ask the government what it does with that money. Yadana earned the state a total of 350 million euros in 2006. The [Myanmar] government would have earned this revenue regardless of whether the shareholder was Total or a Chinese, Indian, Thai, or South Korean company.

Turning to Iran, De Margerie acknowledged that "there are differences between the current government and the international community." As for Pars LNG, however, he said it is a very important LNG project and one the company has been working on for 10 years.

"It has to be reviewed; its costs have skyrocketed. It is clear that before we begin, we shall take the political context and the nuclear crisis into account. The question does not arise today [because] the contract does not exist."

De Margerie said pressure from the US over Iran is "very strong" but that Total, like any other oil company, has its own interests to consider. "No country, regardless of how powerful it might be, can unilaterally decide where an oil company can invest," he said. "It is up to the company to assess the risks."

He noted the demands of politicians, but said they are conflicting. "Demands cannot be made to have oil prices under control and at the same time push producer countries to shut off the taps. This oil—we are required to go get it where it is." ✦

Norwood to press exploration program in Nicaragua

Numerous opportunities may have gone unevaluated in Norwood Resources Ltd.'s initial two-well program in the remote Sandino basin in nonproducing Nicaragua, a consulting engineer's report indicated.

In addition to possibly productive formations at the San Bartolo and Las Mesas exploratory wells, the Vancouver, BC, company's integration of well and seismic data confirmed the existence of 8-10 nearby structures with 2 to 5 sq miles of closure each, using only the productive intervals discovered at San Bartolo as horizons of interest.

Meanwhile, the consulting engineers' evaluation of logs and drillstem tests from the two wells suggests that several potential reservoirs were damaged during drilling and testing and that large potential may exist in zones thought to be water-bearing or tight (OGJ Online, July 12, 2007).

Zones at 6,764-6,835 ft and 6,210-6,277 ft at San Bartolo are capable of commercial production rates that could approach the initial DST flow rates of 570 and 365 b/d, respectively, with proper cleanup, the evaluation concluded.

Several of the tested intervals, including 8,610-38 ft and 6,380-6,584 ft, were damaged by drilling or completing overbalanced and would require some stimulation to determine their productivity. Acid frac stimulated intervals at 7,014-7,244 ft, 6,135-85 ft, 6,066-6,110 ft, 5,975-6,010 ft, and 5,790-5,885 ft need to be flowed for longer periods to determine their true production rates. DSTs run on damaged intervals caused several zones to be abandoned without testing and considered unproductive, which may not be the case, the evaluation said.

Artificial lift is probably needed, but low-pressure gas in the oil in the successfully tested intervals could facilitate gas-lift production as opposed to installing surface or submersible pumps. This gas probably caused the appearance of gas flows while drilling and the unneeded builds in mud weights that contributed to formation damage.

The interval 3,350-3,460 ft was found to be the most promising at Las Mesas. The interval might produce better than the initial 107 b/d flow rate, but artificial lift is implied.

Intervals at 8,818-38 ft, 8,708-28 ft, 7,846-8,034 ft, and 7,054-90 ft warrant further investigation.

Recoveries at 4,742-4,810 ft and 3,908-4,186 ft are considered invalid because it is suspected that the fluids were from failed squeeze perforations.

The report recommends modifying drilling practices, including single trip tubing-conveyed perforating/DST to maintain underbalanced perforating, sample-chambered DST tools, and possibly air drilling. Avoiding formation damage is of high importance because of the sands' clay content.

The company is retooling to continue its exploration program at reduced cost and has evaluated rigs in four US states. ✦

Tengizchevroil fined for Tengiz field sulfur storage

Eric Watkins
Senior Correspondent

Kazakhstan authorities have imposed a $609 million fine on Tengizchevroil (TCO), the Chevron Corp.-led consortium developing giant Tengiz oil field, for alleged violations of national environmental legislation.

Kazakh Environmental Protection Minister Nurlan Iskakov said the company "is causing colossal damage to the environment and all people in Kazakhstan's western region by its actions." He said complaints had been filed against the consortium for storing uncondensed sulfur during 2003-06.

A TCO spokesperson said the consortium had received notification of the fine but said the firm would appeal. TCO said formal notification of the fine was delivered by a local court in July. The firm said it operated and managed its sulfur storage in an environmentally safe manner.

TCO also said it was reducing the sulfur stockpiles by increasing sales, which have increased by 28% as of June 30. Sulfur has been sold to China, Russia, Uzbekistan, and Kazakhstan, and some Mediterranean countries.

After the July notification, however, TCO came under further pressure in September when Kazakh parliamentarians threatened to revoke the company's license if it did not produce a plan to deal with the storage of millions of tonnes of sulfur at the site. Gani Kasymov, a member of the upper house of parliament, called for TCO's project to be suspended unless the joint venture dealt with the "huge stocks" of sulfur that have built up at the field as a byproduct of the production of sour Tengiz oil and gas. "The nation is closely watching the government's actions to protect our country's economic interests," Kasymov told parliament.

Chevron thought its problems with the Kazakh government had been resolved later in September when Chief Executive Officer Dave O'Reilly met with Kazakh Prime Minister Karim Masimov and other officials, who praised TCO as a model of cooperation.

"The regional authorities have always found the common ground with Ten-

gizchevroil on every issue that arises," said Bergei Ryskaliyev, the governor of Atyrau, the region of Kazakhstan where TCO operates.

"Taking advantage of this opportunity, I once again want to express my appreciation for the work done by Tengizchevroil in the region," Ryskaliyev said at a meeting with O'Reilly.

In August, TCO said it produced 6.72 million tonnes of oil in the first half of 2007, an increase of some 12% over the 6 million tonnes it reported for the same period in 2006.

TCO is comprised of ChevronTexaco Overseas 50%, ExxonMobil Kazakhstan Ventures Inc. 25%, KazMunayGas 20%, and LukArco 5%. ✦

Kazakhstan rejects new Kashagan oil contracts

Eric Watkins
Senior Correspondent

Kazakhstan will not revise the terms of its contract with the Eni SPA-led consortium developing Kashagan oil field, according to Kazakh President Nursultan Nazarbayev.

"There is no revising the contract signed 10 years ago," said Nazarbayev after concluding talks with visiting Italian Prime Minister Romano Prodi in the Kazakh capital, Astana.

But Nazarbayev also warned that if investors break their contracts, Kazakhstan "reserves the right" to take measures envisaged by its laws, i.e., to review contracts with foreign companies on the development of subsurface resources if such contracts are deemed damaging to the country's strategic economic interests.

The president based the threatened action on a bill the Kazakh parliament passed last month that will become law when Nazarbayev signs it.

Nazarbayev said the disagreement between his government and the consortium arose from increased estimated development costs and a delay in the onset of production. The two changes mean delays in the country's economic development, which could violate the new law.

"This year Eni, which became the operator with the backing of Kazakhstan's government, presented a new budget under which the outlays grow by $100 billion and the beginning of oil extraction is put off until 2010," Nazarbayev said.

"The government has estimated that

large funds envisaged in our strategic plans for economic development will thus be lost to Kazakhstan's budget," the Kazakh president said, adding that, "For this reason both sides entered the negotiations."

Nazarbayev said the current negotiations are purely commercial and "have nothing to do either with Kazakhstan's president or with the Italian prime minister." Instead, he said, "We will offer the opportunity to carry them through."

For his part, Prodi expressed hope that the disagreement will be settled in the spirit of friendship and cooperation. The Italian leader said that "specialists are holding negotiations; they are working, and when they sum up the results, we will familiarize ourselves with them and express our views on them."

Late last month, Prodi and Nazarbayev—meeting informally at the United Nations—agreed that the situation regarding the Kashagan oil project should not be politicized (OGJ Online, Sept. 27, 2007).

The consortium includes ExxonMobil Corp., ConocoPhillips, Royal Dutch Shell PLC, Total SA, and Inpex Corp. ✦

COMPANY NEWS

KMG EP to acquire interest in Citic Energy

JSC KazMunaiGas Exploration Production (KMG EP) will buy a 50% stake in Citic Canada Energy Ltd. for $930 million, which will provide access to the Karazhanbas field in western Kazakhstan.

In other recent company news:

- Norway's Pertra ASA announced plans to merge with DNO ASA's Det Norske Oljeselskap ASA (NOIL) in a move that will create the second-largest operator in Norway after the newly formed StatoilHydro ASA.
- OMV AG plans to grow production to 500,000 boe/d by 2010 from a current 324,000 boe/d through acquisitions and organic growth, a senior company executive told reporters Oct. 9 in Vienna.

KMG EP acquisition

Citic Canada owns Citic Canada Petroleum Ltd., which has total control of JSC Karazhanbasmunai (KBM), a large oil and gas company developing that field. Total proved reserves of KBM as of Jan. 1 were 363.8 million bbl of oil according to a Miller & Lents Ltd. reserve report. In 2006, Karazhanbas produced 2.3 million tonnes of oil.

Askar Balzhanov, KMG EP chief executive, said the deal—approved by board members Oct. 3—would boost its production level by another 10%. "We are working closely with Citic with the goal to improve performance of Karazhanbas field," he said.

KMG EP will pay $875.5 million for its interest in CCEL and spend $54.5 million on financing costs. "Management structure of CCEL and CCPL as well as underlying assets will include representatives of both shareholders. Important matters, including related party transactions, annual work plan, budget, significant financial commitments and significant supply contracts will require unanimous approval," KMG EP said.

The transaction follows an option agreement KMG EP signed with JSC National Co., Kazakhstan's state-owned oil company, to acquire interest in CCPL by yearend (OGJ Online, May 30, 2007).

KMG EP will spend $150 million from its own funds to finance the deal and will be entitled to a preferred return of $26.2 million/year from the project. CITIC will provide limited recourse financing to KMG EP to meet the shortfall and other financing charges at a cost comparable to KMG EP's own cost of financing.

Closure of the 50% beneficial interest is expected to be completed before the end of the year once the parties have secured necessary regulatory approvals.

Pertra-NOIL merger

The transaction is expected to close in November pending approval by the companies' shareholders and Norwegian authorities.

The new company will be called Det norske oljeselskap ASA. It will operate 17 licenses off Norway and expects as operator to drill 20 exploration wells over the next 3 years.

Pertra Chief Executive Erik Haugane and Chairman Kaare M. Gisvold will both continue in their respective roles with the new company.

The deal, structured as an exchange offer, requires Pertra to swap each one of its shares for three shares in NOIL. DNO will be the largest shareholder of the new company with a stake of 39.97%. Terms of the agreement requires DNO to reduce its stake to no more than 25% by yearend 2008.

OMV looks at acquisitions

Helmut Langange, OMV head of exploration and production, said, "Developing new fields will contribute more than 70,000 b/d in places like Pakistan and New Zealand. We are one of the few companies that can show organic production growth of 5-6%/year." OMV expects 100,000 b/d from its 2010 target will come from acquisitions. Langange acknowledged that would be difficult with high prices now

being paid for assets.

Romania is a key license area for the company with 65,000 sq km of acreage. It is applying modern seismic technology to help increase its exploration success.

OMV is focusing on drilling deep wells onshore and deepwater wells offshore in light of high oil prices. Its deep onshore wells are hitting 5,500 m in Austria. "The target has been gas, and we've been very successful with that," Langange told OGJ.

OMV is drilling deepwater wells in the Atlantic margin, New Zealand, and Egypt, but the major problem is securing drilling equipment for which prices have soared. "This is driven by a scarcity of ships and the huge demand in Gulf of Mexico, Norway, and West Africa," Langange added.

OMV is a partner with operator Chevron Corp. in Rosebank, which recently tested 6,600 b/d of oil in July (OGJ Online, July 18, 2007). However, it took the partners 2 years to acquire a drillship that could reach depths of 1,500 m. Hiring these vessels 2 years ago cost $150,000/day and now costs are $600,000/day, Langange said.

Presently OMV is able to recover about a third of its reserves but wants to improve recovery rates to 50% and expand into frontier areas. "Research should focus on how to recover more oil. Enhanced oil recovery is helping and we are using more sophisticated methods such as surfactant flooding, reducing tension pressure, and carbon dioxide flooding to get out more oil and gas."

Langange is not optimistic that prices would ease in the short term. "I don't think the extra capacity will come on stream in time. Projects are being affected by time delays and cost overruns. We see projects that were delayed to 2009-10 instead of starting in 2007-08, which is due to an overheated market and scarcity of skilled workers." ✦

WATCHING THE WORLD

Eric Watkins, Senior Correspondent

Oil at center of Iraqi flaps

In US congressional hearings last week, Iraq's central government was accused of reverting to its old ways, with control of the country's oil reserves a mainstay of that effort. That's what the people in Kurdistan think, too.

Nechirvan Barzani, prime minister of the Kurdistan Regional Government in Iraq, is clearly not the least bit happy about the efforts of Iraq's central government to control the country's oil—especially that of Kurdistan.

"This August, the Kurdistan Regional Government (KRG) of Iraq passed an oil and gas law to regulate the oil sector in our region," Barzani recently wrote. "So far," he said, "we have signed eight production-sharing contracts with international oil and gas companies. We expect to sign another two in the near future."

Negative reaction

But the Iraqi government has hardly welcomed the agreements. Indeed, as Barzani says, "We were deeply disappointed by the negative reaction of several officials in Baghdad to these contracts."

Pay careful attention to his real concern: "In the last several months it has become clear to us that many in the Iraqi Oil Ministry are locked in a time warp dating back to the regime of Saddam Hussein, in which Baghdad holds tight control of all the resources of Iraq and uses these resources to create obeisance and loyalty to the center."

If you think that sounds like bombast, consider the sworn testimony of another Iraqi. In congressional hearings held just last week, Radhi Hamza al-Radhi, an Iraqi judge who led the US-established Commission on Public Integrity, said—among other things—that oil revenues were helping to finance militias in the country.

Rocket attacks

Also consider al-Radhi's observations that Iraqi Prime Minister Nouri al-Maliki had protected relatives involved in corruption and allowed ministers to protect their employees from investigation.

According to al-Radhi, 31 of his employees and 12 of their family members were assassinated, including one investigator and his pregnant wife, and his home was attacked with rockets. "We have learned the hard way that the corrupt will stop at nothing," al-Radhi said. "They are so corrupt that they will attack their accusers and their families with guns and meat hooks, as well as countercharges of corruption."

Does that sound like the regime of Saddam Hussein, or does it not?

Listen to Barzani again: "In the past, oil in the Kurdistan region has been more of a curse than a blessing. The people have never benefited from our natural resources. Successive governments in Iraq have deliberately left our oil in the ground in an effort to keep our people poor and to deny our aspirations for a better way of life."

One can easily understand then when he asks: "Does it surprise anyone that we harbor deep suspicions about becoming reliant on the capital that has brought us such misery for so many years?"

No, it does not surprise us at all. ✦

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5. Maximum length of paper should be 15 typewritten pages, including references. Bibliography tables should not exceed 6 pages.
6. Full instructions on preparation of manuscripts and presentations will be sent to authors of selected papers. Complete manuscripts must be provided by April 4, 2008.
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WEB SERVICES TO SOA—2

BP describes maturity model for IT in its E&P organization

Russell D. Foreman
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In the first part of this article, we provided an overview of the value BP will derive from a broad service-oriented architecture (SOA) program as well as the issues that exist today in realizing this desire (OGJ, Oct. 8, 2007, p. 38).

Part 1 outlined an SOA maturity model that BP has developed to support a clear roadmap for adopting and deploying an SOA-based approach at scale across the organization. This model was presented as an actionable, vendor-independent approach to delivering immediate value from SOA while recognizing that this is a long-term journey.

BP defines SOA as a transformational approach to the design, implementation, and management of business solutions and their supporting technical infrastructures. SOA is a method of delivering business solutions through services (capabilities) that are linked together by business logic. This approach reflects how a business actually operates compared to conventional application development methods.

This second and final part discusses the details of that maturity model and the explicit deliverables—including standards, tools, and infrastructure—that are needed to deliver the value BP believes can be realized at each incremental level of the model.

Defining SOA maturity

The following section describes each of BP's SOA maturity levels in sequence, along with associated standards, management processes, and business benefits.

While this article provides an overview of the five maturity levels, more explicit details, best practices, and recommendations for internal use are embedded in a proprietary set of documents, which we will identify for each level. Each IT group and company must create these to fit its particular needs and circumstances.

Additionally, we provide a checklist of documents that must not be overlooked if an organization expects to realize the full value of SOA.

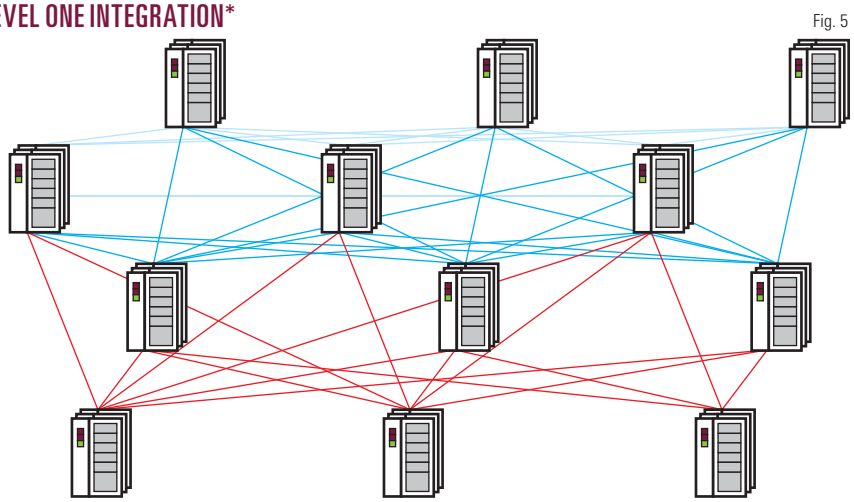
Level 1: Initial

At this level—where all IT organizations begin—no SOA or web service standards or products exist either for individual projects, a business unit, or the enterprise.

There is, in fact, no common environment for developing, deploying, or maintaining business solutions. Common services are not yet defined. Data at this level are not often shared, even within a single business unit. Few, if any, data or architectural standards exist, making cross-organizational sharing virtually impossible. Business processes are constrained by the design and logic of monolithic applications. Software applications are still created in functional silos and interact with each other via custom, point-to-point interfaces, propagating what we call "spaghetti integration" (Fig. 5). Considerable time and money are spent as projects do their own

LEVEL ONE INTEGRATION*

Fig. 5



*Requires custom, hard-wired connections between every single data source and software application—"spaghetti integration."

SOA LEVEL ONE

Fig. 6

Maturity level	Prime business benefits	Critical success factors for people, process, and organization	Critical success factors for technology	Standardized toolset	Standards and guidelines
1 Initial	Localized business benefits	Minimal cross-project benefit as each team delivers local benefits	Experienced technical architect and software development team	None	None

thing and the wheel is reinvented several times through the enterprise.

This is not to say that Level One IT projects fail to deliver any real value. They do. However, benefits tend to be localized, and little cross-project value or reuse of technology occurs (Fig. 6)

Success depends largely on having a seasoned technical architect and a capable software development team, rather than any structured organizational competence. While an overall portfolio management process may be available to optimize sanctioned applications, there is scant guidance around implementation.

It is, of course, at Level One that an IT organization realizes the need for SOA and web services and begins to move in that direction. However, no formal SOA work occurs at this point. Most of the heavy lifting will take place in Levels Two and Three.

Level 2: Managed services

At Level Two, where many IT organizations are today, basic web service standards are being established for the first time.

By the end of this phase, web services will be the preferred method for all projects in the organization to connect all applications and-or services. In effect, projects will have to request a formal exception if they wish to do it any other way.

During Level Two, therefore, considerable time is spent building or otherwise acquiring common business functions intended for reuse. These include not only specific business and technical functions but generic services required by all applications, such as security.

It would be highly inefficient for every project to continue writing code for user authorization and access, as they do today. It's best to do it once and do it rigorously for the whole organization.

Security services may be among the most challenging technical hurdles at this level, but the value in getting them right is enormous. With potentially thousands of employees, contractors, and partners to keep track of day-by-day, no company can treat SOA security as an afterthought.

Legacy applications can also be elevated from Level One to Level Two by wrapping their core functions with standard web service interfaces. Ultimately, as the library of discrete services grows, projects will favor reuse of existing components before building new ones, off-the-shelf services will take precedence over custom-built services, and application vendors who provide native services will be preferred over those who do not. To find reusable components, project teams will refer to a central catalog where all services must be registered. Initially, this may be little more than a web page on the corporate intranet identifying what the service is, what it does, and who maintains it.

Divergent data models still exist at this level, but services that show the greatest potential of being reused across the organization should be aligned with key data models by the IT team.

It is recognized that not all services created at Level Two will necessarily be adopted by other projects or business units. However, the service development process is disciplined enough and sufficient web service standards are available to enable adequate interoperability, both internally and with external partners.

For some period of time—perhaps several years—an organization could remain at Level Two as past IT initiatives continue untouched, new services are under construction, and new projects slowly begin adopting them (Fig. 7)

To efficiently manage Level Two activities and encourage a culture of reuse, basic IT metrics on the cost of building services and amount of reuse among projects must be tracked and reported centrally. In addition, a comprehensive set of documents that capture SOA policies, standards, and governance processes must be created. General documents intended for internal SOA marketing and training should include:

1. SOA overview presentation—provides a reasonably technical introduction to web services and the SOA vision for IT professionals.
2. Maturity Level Two training pack—includes overview presentations and related "deep-dive" documentation on Level Two.

In terms of process-related documents, the SOA Maturity Model itself (whether the one presented in this article or another version) is required to facilitate the transition to Level Two. It

SOA LEVEL TWO

Fig. 7

Maturity level	Prime business benefits	Critical success factors for people, process, and organization	Critical success factors for technology	Standardized toolset	Standards and guidelines
2 Managed web services	• Improved speed of implementation through reuse and standards • Consistency and reliability due to common interfaces • Cost effectiveness from reduced integration costs • Essential foundation for future benefits achieved in levels 3-5	• Understand and follow standards • Governance adoption • Reuse mindset/ culture • Basic measures of service reuse and cost	• Established technical standards • Capacity planning • Version control • Services catalog	Common service catalog	• Service life-cycle management • Maturity levels and assessment criteria • SOA governance framework • Architecture principles • Interim security model • SOA standards & guidelines

should include a definition of SOA maturity levels, as well as the criteria used to assess the maturity of any given IT initiative. Other SOA process documents we've identified include the following:

1. Service life-cycle management—describes the entire process of creating services, from conception to delivery, including requirements planning, design, development, testing, deployment, and documentation.

2. Operational support plan—describes the handover-to-support process as well as the standard process of supporting individual services.

3. SOA governance framework and policies—defines the management structures required to ensure that SOA architectural decisions will actually get implemented.

Important technical SOA documents, which contain more details than the above, should include:

1. SOA architectural principles—outlines a high-level set of principles and "beliefs" within which the entire SOA concept and architecture operates.

2. SOA architectural decisions—lists the key architectural decisions that have been made and the reasoning behind each one, for future reference.

3. SOA standards and guidelines—identifies detailed technical standards for the development and deployment of services and web services in the organization.

4. SOA development tools—contains guidance and recommendations on best-practice usage of commercial service development technology; in general, the development environment should be chosen based on the most appropriate solution for a company's specific issues; the only mandated "tool" required at Level Two is a common service catalogue that complies with standards.

5. Interim security model—describes the interim security model to be used until an enterprise security framework is established.

6. Interim scalability and SLA model—describes the interim scalability model and how service level agreements (SLAs) will be managed and met.

As the foundations of the SOA are put in place at Level Two, a number of benefits can be expected. The use of basic integration standards and a cohesive architectural framework will accelerate the evaluation, design, and execution of internal and external solutions. Availability of a small number of common services will begin to reduce both the costs and time involved in deploying applications, significantly in at least a few cases. Establishing an organizational approach to SOA will help educate key IT and business stakeholders, as well as primary IT vendors, on the company's plans and processes for pursuing the SOA vision. The organization is now starting to think strategically rather than around the tactical, disjointed projects of Level One.

Shared services developed at maturity Level Two will form the essential basis for Level Three process orchestration and all subsequent SOA-related benefits.

Level 3: Process orchestration

At Level Three, the primary activity is the formal "orchestration" of broad business processes based on a pool of fine-grained services rather than the writing of code as in Levels One and Two.

This means the organization must have begun modeling current processes that span multiple areas of the business, decomposing those processes into discrete activities, mapping those to available services, and managing services with a common drag-and-drop orchestration tool.

At this level, a broad range of standards and definitions exists for implementing SOA and consuming reusable services across projects. A more formal services registry has been implemented, providing a single source of information on all available services.

Although new services continue to be introduced and some are not intended for broader use, the focus is on increasing the amount of sharing and reuse among as many different programs as possible.

To ensure integration in critical business areas, a small number of common data models exist—either industry standard models, or at least major data models used by other projects. However, no standard for all possible data types is available at this point.

Additional SOA metrics captured

March 3 – 5, 2008 / Moody Gardens Hotel & Convention Center, Galveston, Texas

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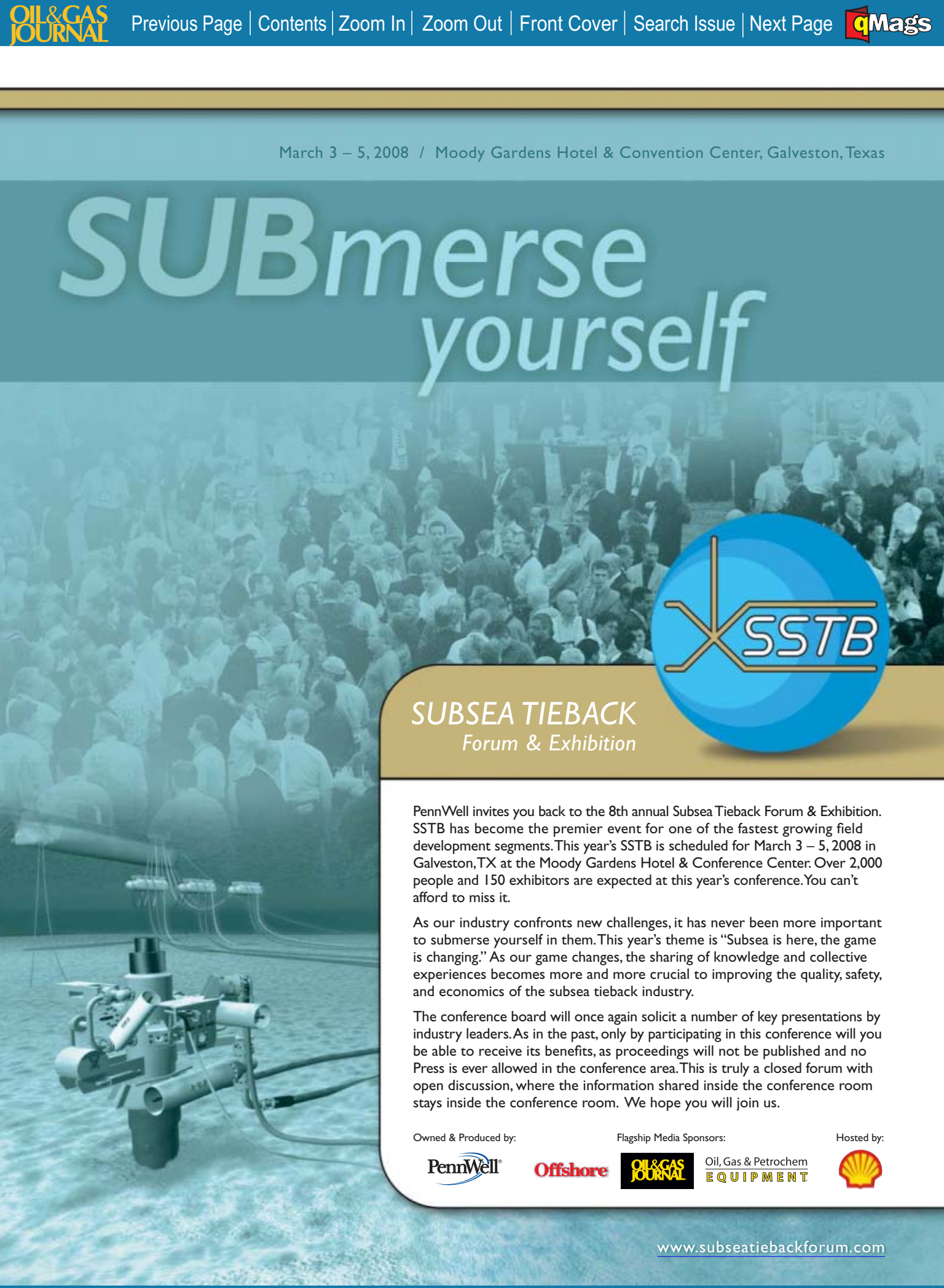

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SOA LEVEL THREE

Fig. 8

Maturity level	Prime business benefits	Critical success factors for people, process, and organization	Critical success factors for technology	Standardized toolset	Standards and guidelines
3 Process orchestration	• Improved agility by reducing the IT barriers to change • Improved allignment between common business processes and supporting IT • Greater integration opportunities enabled • Automization of business processes	• Projects understand the business processes they are implementing and are skilled in decomposing these processes • Project teams have access to a growing pool of reusable components from which to build these services	• Process and data modeling tools extensively used in design process • Process automation tools used to implement application flow • Automation test tools used by teams	• Process modeling tool • Process orchestration engine • Data modeling tool • Intranet portal • Web services gateway • Services registry • Publish/subscribe environment • Sand-box	• Process modeling tool standard • Orchestration engine standard • Intranet portal standard • Web services gateway standard • Services registry standard • Enhanced security model

at this level include the spread of web services as the preferred integration technology, the number of key business processes being modeled and executed in the orchestration environment, and estimated cost savings generated by service reuse.

SOA solutions at this level enable much greater business agility. In different regions or business units, even when a relatively similar overall process is called for, unique operating conditions may require flexibility in IT implementation. Even if the same component services are involved, they may need to be orchestrated differently.

Once it has reached Level Three, an organization can rapidly "rewire" existing services used in a particular business process, without necessarily buying or building any new technology. Services can be upgraded or replaced entirely without any noticeable impact on the process, because the user's interface remains unaltered (Fig. 8).

As we noted earlier, Level Three is still a good state for most large companies, including BP. We have a few advanced IT projects dabbling with Level Three capabilities, but at present there are still too few services available to orchestrate a complete business process. By the end of this year, we expected to have sufficient services completed to begin orchestration of a few critical processes in E&P.

The SOA Maturity Model currently includes all documents we have completed for Level Two. However, documents for Levels Three through Five are still in development. We have identified seven standards that appear critical to successful implementation of Level Three:

1. Process modeling tool standard—defines the standard for exchanging models and identifying compliant tools that enable process modeling and creation of executable business process definitions.
2. Orchestration tool standard—identifies a commercial product and defines usage guidelines for executing business process models at runtime.
3. Data model standard—defines the standard for exchanging models and identifying compliant tools for capturing and extending existing data models, or proposing new models.
4. Intranet portal standards—identifies a specific product and defines usage guidelines for the implementation of an intranet portal.
5. Web services gateway standard—identifies a product and defines usage guidelines for a service gateway that mediates services between providers and consumers.
6. Services registry standard—identifies a product and defines usage guidelines for a central repository of service information.
7. Publish/subscribe standard—identifies a product and defines usage guidelines for an environment that allows publish/subscribe connectivity.

In addition to the above standards, Level Three requires two, more detailed technical documents, to update Level Two documentation with new information:

1. Extended SOA standards and guidelines—incrementally extends the allowable definition of a service where new SOA industry standards become available for implementation.
2. Enhanced security model—updates the maturity model to incorporate the enterprise SOA security model, framework, and patterns.

Finally, an SOA test bed or "sand box" must be provided—a preconfigured environment (target platforms) equipped with the standard tools listed above, enabling projects to test new composite business applications and services.

Maturity Level Three further boosts business agility through more extensive reuse and better integration of services across the organizational project portfolio. Greater reuse of common components and interoperability standards enables the company to deploy or rewire business solutions more quickly, at lower costs.

Business processes are no longer "hidden" inside big, monolithic applications, thereby supporting greater awareness and ownership of processes by the operating units. With greater knowledge, they can begin to analyze, automate, and optimize processes more intelligently and responsively than the long, costly IT initiatives of the past.

SOA LEVEL FOUR

Fig. 9

Maturity level	Prime business benefits	Critical success factors for people, process, and organization	Critical success factors for technology	Standardized toolset	Standards and guidelines
4 Quantitatively managed	• Process efficiency can be measured and benchmarked • Opportunities for efficiency improvement can be identified • IT sstems availability and performance can be monitored and assured • Data and services are routinely shared across segments	Process measurement and monitoring	Process and service monitoring tools implemented by projects	• Business activity monitoring tool • Industry data standards • Service management monitoring tool	• Business activity monitoring tool and usage guide • Broad range of industry data standards • Service management standards and guidelines

Level 4: Quantitatively managed

In moving to Levels Four and Five, it's important to reiterate that significant areas of maturity remain unidentified.

Nevertheless, we have sought to avoid the kind of arm-waving statements that are common at higher levels of transformational change programs, such as "everything just gets better, faster, and cheaper."

While many details may be uncertain at present and subject to revision, the purpose and value of each higher level is not fuzzy at all.

For the most part, by the time an organization reaches Level Four few basic enterprise-level services will be missing and orchestration will be well understood (Fig. 9).

Also, the message semantics (based on XML industry standards) for service/data interchange will be fully defined and governed. Services intended only for local use will be rare, and the introduction of new services will be seen as "adding to the pool" or "extending the portfolio" rather than creating independent work.

Industry-wide—or at least consistent vertical segment-wide—data models will be available for most sectors of the business. Because external partners and suppliers have access to the same models, data can be shared more transparently than at any previous level of maturity.

At Level Three, metrics were focused largely on IT processes associated with the spread of reusable services across projects and business processes. The organization was still putting critical pieces in place, and learning how to use them.

The primary shift at Level Four is starting rigorous quantitative measurement of the effectiveness of business processes now being orchestrated within the SOA environment. Quantitative targets, therefore, are set for cost, quality, and performance both of the business processes themselves and of the services supporting them. These goals are determined by the needs of the business users, those who implement the processes, and the organization.

Quality and performance are understood in statistical terms, monitored, and managed throughout their life span—a practice currently known as business activity monitoring (BAM). The idea is to benchmark now well processes are functioning, identify significant causes of process variation, and seek to rectify them, where appropriate, to ensure repeatability and prevent future issues.

At Level Five, all this quantitative feedback on current processes will act as a baseline for greater automation and process optimization.

The only new technology considered essential to success at Level Four is some type of BAM tool. Organizations will only need to create a small number of SOA documents at this stage:

1. Business activity monitoring tool—identifies a selected commercial product and defines usage guidelines for monitoring and measurement of processes.
2. Industry data standards—identifies multiple vertical industry standards that will be adopted, along with gaps in existing data models that need to be filled (known examples for the upstream energy industry include WITSML, PRODML, and PIDEX—all XML-based standards for data exchange in specific areas).

Monitoring the benchmarking of business process efficiency at Level Four will enable rapid identification of opportunities for improvement. Then processes can be quickly reconfigured using new or reusable services, and resulting enhancements can be compared with a known baseline. With pervasive common services and supporting data standards, information from diverse locations throughout the organization can be located, aggregated, reported, shared (internally and externally), and analyzed with ease and efficiency.

Level 5: Optimized

Here we reach the summit of the SOA vision.

By this point, it may seem there is almost nothing left to accomplish. Nevertheless, at this maturity level, considerable added value will be created through continuous process improvements—both incremental and innovative. Primary activities revolve around

SOA LEVEL FIVE

Fig. 10

Maturity level	Prime business benefits	Critical success factors for people, process, and organization	Critical success factors for technology	Standardized toolset	Standards and guidelines
5 Optimized	• Automated optimization of business processes • Extensive reuse of resources resulting in faster and cheaper project cycle • outsourcing of commodity processes to vendors • Tighter integration with partners	Continuous process improvement	• New projects seen as adding to the pool rather than inventing whole new systems • Automated tools monitor and optimize critical business processess	Process optimization tool	• Business process efficiency • External process security standards

automated process monitoring and optimization.

This completes the shift from companies being suboptimized through traditional IT approaches to a truly virtualized company where the optimized business processes seamlessly span internal organizations and external partners. Quantitative improvement objectives for the organization will be established and continually revised to reflect evolving business needs.

All resulting changes will be measured and compared with objectives. Broad transformation of existing business models will take place through this ability to monitor, evaluate, and reconfigure processes "on the fly" (Fig. 10).

At Level Five, detailed external security standards and services will enable complex, seamless integration of the global organization's entire value network. Internal staff (even those using mobile devices) and authorized external partners, vendors, and customers can access shared services over the internet. Commodity business functions can be outsourced based on cost, performance, and delivery without being constrained by past technological barriers. Based on carefully formulated trust models, diverse external resources can be leveraged to accomplish a variety of strategic endeavors.

We have identified only two more SOA documents that will be needed here:

1. Business process efficiency standard—describes a standard (and possibly commercial tools) for automating the optimization of business processes; possibly including "what-if" analysis.

2. External security standards—details the standards required to interact with third parties by way of complex, potentially lost-lasting transactions; and outlines the process of building trust models with external organizations.

Automated optimization of business processes will increase the global organization's ability to respond quickly and intelligently to change, boosting competitive advantage. Tighter integration with, and outsourcing of commodity processes to, external parties will further lower costs, and free internal time and talent to pursue more important core activities.

Conclusion

Any large corporation or IT group within an organization that commits to the vision and value of SOA could run into three major roadblocks along the way.

The first roadblock, which we've called the "chasm"—the general lack of a common, compelling SOA vision and a practical, proactive SOA maturity model—is the subject of this article. For the most part, it's an "internal" organizational roadblock.

IT managers and staff don't know exactly how to get where they want to go. Once they have a common vocabulary to talk about SOA and a clear, comprehensive roadmap showing the way forward, they can be off and running.

The second roadblock, by contrast, is one common to all major technology initiatives, namely, "How do we engage the business teams to adopt this vision and what governance do we need to ensure consistent application of the approach and standards?"

Clearly, a lack of understanding and involvement from the project team working in the business will be a significant impediment to the success of an SOA program. Further, an absence of corporate governance will mean a disjointed and inconsistent application of the architecture.

SOA changes the fundamental relationship between the business and IT and, if that relationship is not addressed, much of the true value of SOA will not be realized. Therefore, a comprehensive engagement and education effort, along with a governance process that fits with the organization's culture, is a key to the success of an enterprise-level SOA program.

The third and final roadblock is largely "external." For companies beginning to take well-defined, incremental steps toward SOA, the general immaturity of SOA industry standards and dearth of commercial, reusable services could cause SOA early adopters to stall out.

Even if an organization has the will and resources to forge ahead aggressively, it may be forced to wait for SOA tools to mature or evolving standards to crystallize before it can move to the next higher maturity level. On the

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other hand, it could go ahead and build proprietary services in-house, but some or all of them will have to be torn out when standards become available.

What's more, if a corporation's major IT vendors, vertical application developers, and business partners are not embracing SOA as well, everyone could be held back. No one can do this alone.

It behooves every IT organization, therefore, to launch a coordinated SOA program, accelerate its move from Level One to Level Two, and to inform all of its partners and suppliers of its commitment to the vision. In addition, it will benefit all of us to work together, across traditional organization and industry lines, to develop, test, and establish solid SOA standards.

As we noted above, SOA is not a natural evolution of current practices or environments. It is a totally new and revolutionary way of creating business solutions and optimizing business processes. Only with widespread cooperation among forward-thinking global businesses will we begin to realize the full promise and potential of SOA.

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Danny J. Ducharme is the lead enterprise architect for E&P Digital and Communications Technology, BP's upstream information technology organization. He has over 25 years' experience in information technology, strategic planning, computer integrated manufacturing, operations and engineering management in semiconductor and related high-tech industries. At BP, he established an enterprise architecture team and core capability for E&P to create and maintain blueprints of the processes, systems, solutions, and standards across the segment. He holds an MBA in technology management and bachelor's degrees in electrical engineering, physics, and mathematics.

Dean Forrester is senior technical architect for SAIC Consulting. He has 13 years of experience with companies including EDS, Halliburton, and SAIC in the design and implementation of IT systems, including major "next-generation oil field" programs. He earned degrees in physics and instrumentation, systems analysis, and design, and an MBA from Napier University.

Israel

Israel's petroleum commissioner issued Avenue Energy Inc., New York City, a license to Heletz-Kokhav field near Ashkelon.

The 60,000-acre license includes Heletz, Brur, and Kochav oil fields. Lapidoth Ltd. recently operated Heletz field under contract to the state, producing 70 b/d of oil from 6 wells.

Avenue Energy agreed to a 3-year work program of field studies, well workovers, 3D seismic, and drilling a new well. The license may be converted to a 30-year production lease if a substantial production increase occurs.

Heletz, developed on 80-acre spacing, has 53 idle wells, large infill drilling potential, and secondary and tertiary recovery potential.

Kansas

Canary Resources Inc., Spring, Tex., started gas production from 10 coalbed methane wells in the eastern Forest City basin.

Canary operates all 10 wells and has 100% working interest in two and 50% interest in the other eight with K C Clean Energy LLC. Flow rates were not disclosed.

The wells are connected to Canary's wholly owned interconnect into the 20-in. Southern Star Central Gas Pipeline.

The company's focus area is Johnson and Miami counties, Kan., and Cass and Bates counties, Mo., in coals at 600-1,000 ft.

EnerJex Resources Inc., Overland Park, Kan., has identified more than 150 drilling locations on seven oil leases it has acquired in eastern Kansas for $2.7 million from an undisclosed seller.

The leases, in Johnson, Anderson, and Linn counties, are producing 50 b/d of oil equivalent. The purchase includes a 100% working interest and 1,500 gross acres of leaseholds.

The acquisition brings EnerJex operations to more than 200 b/d with 400 drillable locations in nine counties in eastern Kansas. Aggressive drilling is planned in 2008 once funding is secured.

Texas

West

Matador Resources Co., Dallas, and Meridian Resource Corp., Houston, plan to spud their first two wells in the fourth quarter of 2007 seeking gas in Barnett and Woodford shales in the Delaware basin.

The companies, which hold 85,000 acres in Hudspeth and Culberson counties, expect to encounter the formations at 5,500-8,500 ft. They identified the locations from 2D seismic.

UNCONVENTIONAL GAS—5

Rising drilling, stimulation costs pressure economics

Michael Godec
Tyler Van Leeuwen
Vello A. Kuuskraa
Advanced Resources International
Arlington, Va.

The sharp recent rise in well drilling and particularly well stimulation costs has led to the concern that much of the US unconventional gas resource may be becoming uneconomic.

Similar concerns about economic viability have existed since the initial pursuit of this resource, sometimes rightly so. However, by pursuing improvement in the unconventional gas knowledge base and its recovery technology (using industry-government partnerships), in our view, the industry will be able to maintain the economic viability of this large, often marginally productive resource.

Past reservoir characterization methods and traditional means of linking a wellbore to the low-permeability unconventional gas reservoir are no longer sufficient. As such, the discussion of the economic viability of unconventional gas is as much a story of technological advance and the pursuit of efficiency, as introduced in the third (OGJ, Sept. 24, 2007, p. 48) and fourth articles (OGJ, Oct. 1, 2007, p. 46) in this series, as it is a story of costs, financial risks, and wellhead prices.

Even though the overall economic trends for unconventional gas are currently unfavorable, with finding and development costs rising faster than wellhead prices, examples of economic success nonetheless exist.

This fifth article in the series presents a number of examples of how selected companies, with diligent pursuit of knowledge and technology, have converted previously judged uneconomic unconventional gas plays into economically viable prospects. In addition, potential actions can help maintain the future economic viability of US unconventional gas, although several challenges on the horizon could influence the future economics of this resource.

Cost increases

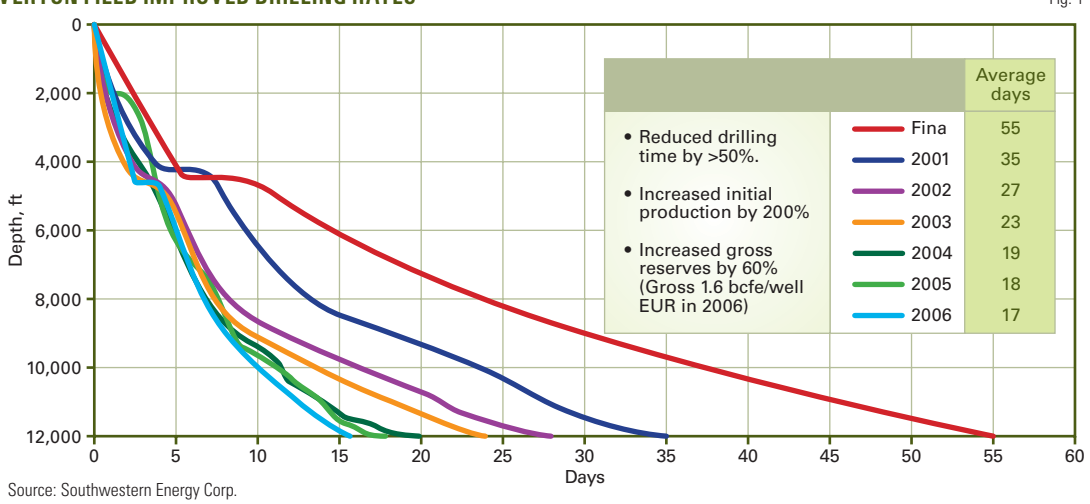
If sharp increases in well drilling and completion costs continue, they will harm the economic viability of unconventional gas.

So far, oil field service companies have been able to increase prices charged for services and products because of increases in natural gas prices and the subsequent boom in unconventional gas development.

For example, rig rates quoted at $12,000/day several years ago are now routinely at $18,000-20,000/day or more. Hydraulic fracturing services and

OVERTON FIELD IMPROVED DRILLING RATES

Fig. 1



Source: Southwestern Energy Corp.

ESTABLISHED GAS PLAY ECONOMICS

Table 1

	Tight gas sands, Williams Fork (Mesaverde), Southern Piceance basin	Coalbed methane, Big George, Powder River basin	Tight gas sands Wasatch (Mesaverde), Uinta basin
Realized gas price,[1] $/Mscf	7.58	6.34	6.80
Less: production taxes	(0.45)	(0.93)	(0.39)
LOE and other	(0.86)	(1.95)	(0.52)
F&D costs	[2](2.34)	[3](0.71)	[4](1.43)
Net margin, $/Mscf	3.93	2.75	4.46
Rate of return, %	36	53	52
Minimum required CIG base price, $/Mscf	4.50	3.00	3.90

[1]Mid-2007 Rockies strip with btu sales adjustment. [2]Assumes net EUR of 0.81 bcf/well and D&C costs of $1.9 million. [3]Assumes net EUR of 0.28 bcf/well and D&C costs of $0.2 million. [4]Assumes net EUR of 2.1 bcf/well and D&C costs of $3 million

Note: LOE—lease operating expense; F&D—finding and development; CIG—Colorado Interstate Gas Co.; EUR—estimated ultimate recovery; D&C—drilling and completion.

EMERGING GAS PLAY ECONOMICS

Table 2

	Tight gas sands, Deep Bossier, East Texas	Gas shales, Woodford, Southeast Oklahoma
Realized gas price,* $/Mscf	6.30	6.30
EUR/well		
Gross, bcfe	5.0	2.2
Net, bcfe	3.75	1.76
Cost/well, $ million	10	4.3
F&D cost, $/Mscf	2.67	2.44
Rate of return, %		
at current well costs	~70	~18
with reduced well costs (–15%)	>100	~25

*Assumes a NYMEX price of $7/Mcf and $0.70/Mcf for gathering plus differentials.

tubulars have had similar, if not higher, increases.

But in our view, the rise in well drilling and completion costs is near its peak because of the expansion in service industry capacity and the reluctance of producers to accept these high, increasing prices. For example:

- The supply of domestic drilling rigs, which accounts for 20-25% of a typical unconventional gas well's cost, has expanded greatly, with more than 200 land rigs added in 2006 and another nearly 200 land rigs expected in 2007. Several active unconventional gas producers, such as Chesapeake Corp., Southwestern Energy Corp., and Williams Cos., facing a tight, costly rig market, have taken the extraordinary step of contracting for purpose-built rigs and establishing their own drilling companies.
- The supply of high-pressure pumping services for well stimulation and hydraulic fracturing, which account for 30-40% of the well cost, increased by about 25% (about 700,000 hhp) in 2006. With expanded service capacity and several new companies entering this business, pumping service costs may stabilize and possibly decline.
- Following sharp increases in steel prices, the cost of oil field tubulars has stabilized and even shows a slight decline in 2007. Tubulars account for 10-15% of the cost of a typical unconventional gas well.

Nonetheless, these higher drilling rig, pumping service, and tubular costs exert pressure for a relentless pursuit of efficiencies in developing unconventional gas.

Rocky Mountain plays

ARI's Model for Unconventional Gas Supply (MUGS) provides an up-to-date perspective on the economic viability of 94 distinct US unconventional gas plays. This resource and economic model shows that, using a long-term $6/Mcf NYMEX gas price, 27 of these plays with 260 tcf of recoverable resources are economic, another 21 plays with 140 tcf of recoverable resources are marginally economic, while 46 plays are uneconomic.

Table 1 provides economics on three traditional Rocky Mountain unconventional gas plays developed from public data provided by Bill Barrett Corp. and other producers.

The Williams Fork (Measaverde) tight gas sands of the Southern Piceance basin now produce almost 1 bcfd. This play provides a 36% rate of return (ROR) to Bill Barrett and requires a $4.50/Mcf gas price at the Colorado Interstate Gas Co. (CIG) hub to be economic.

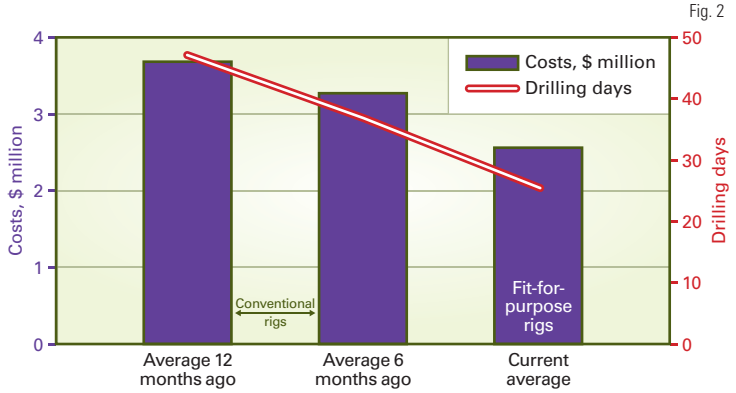
The heart of the Big George coalbed methane play in the Powder River basin provides a 53% ROR and requires a $3/Mcf gas price at the CIG hub to be economic. Geologically less favorable portions of this coalbed methane play,

FIT-FOR-PURPOSE RIG BENEFITS

Conventional	Fit-for purpose
Mechanical drive	Electric drive
Manual pipe handling	Automated pipe handling
Rig jacking company	Hydraulic self-elevating substructure
Rotary table and kelly bar	Automated slips
Manual slips	Top drive
Pipe tongs	Automated pipe connection
700 hhp mud pumps	1,000+ hhp mud pumps
Range 2 drill pipe	Range 3 drill pipe

Source: EnCana Corp.

Fig. 2



however, will have less robust economics.

The new Wasatch (Mesaverde) tight gas play in the Uinta basin, outside the Natural Buttes field area, has a 52% ROR and requires a $3.90/Mcf gas price at the CIG hub to be economic. EOG Resources Inc.'s optimization of well completions has helped improve the economic returns from this gas play.

Emerging plays

Some emerging unconventional gas plays in the US also exhibit attractive economics (Table 2).

According to Chesapeake Energy Corp., the Deep Bossier tight gas play in East Texas has an average $10 million well cost and a 5 bcf/well (gross) average estimated ultimate recovery (EUR).

At a $6.30/Mcf realized wellhead gas price, the play provides very attractive returns that should improve as drilling costs decline.

The Woodford gas shale in Southeast Oklahoma can provide RORs of 18-25%, assuming a $4.3 million well cost, 2.2 bcf/well gross EUR, and a $6.30/Mcf realized gas price, also according to Chesapeake Energy.

More speculative are the economics for the emerging deep Dakota-Entrada-Navajo tight gas play in the Uinta basin. The initial well costs range from $9 to 10 million for a 15,000-ft well. With expectations of obtaining 5-6 bcf/well EURs, however, the economics appear viable, especially if well costs decline.

The initial discovery well in this play tested at more than 11 MMcfd (gross) in the Dakota, Entrada, and Navajo formations, followed by wells tested at 6-10 MMcfd (gross) in the Navajo formation, supporting a favorable outlook for this new gas play.

Pursuing efficiencies

Faced with rising costs, the industry is rigorously pursuing efficiencies and cost reductions in drilling, well completions, and operations. A notable example is the reduction to 17 days in 2006 from 35 days in 2001 for drilling a well in the tight Cotton Valley gas sands at Overton field by Southwestern Energy (Fig. 1). Other unconventional gas producers such as EOG Resources and EnCana Corp. have had similar gains in well drilling efficiencies.

While companies have achieved efficiencies in the past, the rate of efficiency gain has slowed in recent years due to reaching practical limits in what is possible with traditional well drilling methods and rigs.

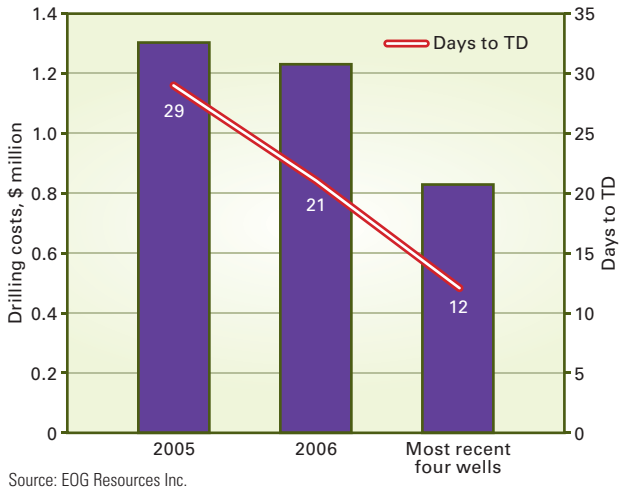
Drilling, completions

EnCana's experience illustrates the next phase in the pursuit of efficiency and costs savings in well drilling and completion. As the gains in drilling efficiencies with conventional rigs began to diminish, EnCana contracted for fit-for-purpose rigs and equipment that enabled it to reduce further drilling days for its Rocky Mountain gas prosepcts to about 30 days/well from more than 40 days/well. With experience, EnCana expects additional gains in future years (Fig. 2).

EOG Resources has had similar efficiency improvements in its horizontal wells in the Wolfcamp tight gas sand play in the New Mexico portion of the Permian basin. In this play, average well costs have declined to about $830,000/well for its most recent wells, compared to

PERMIAN BASIN HORIZONTAL WELL DRILLING

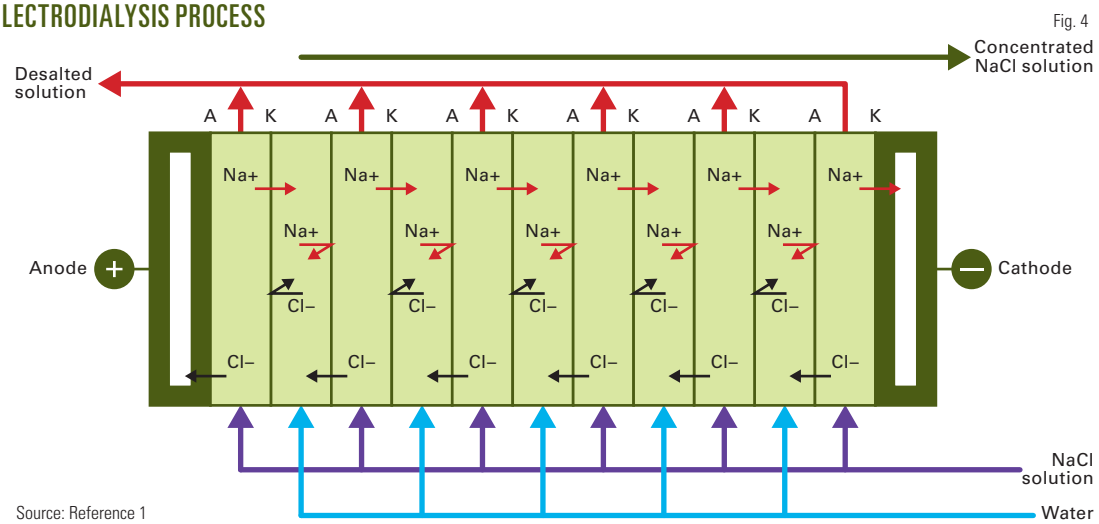
Fig. 3



Source: EOG Resources Inc.

ELECTRODIALYSIS PROCESS

Fig. 4



Source: Reference 1

$1.3 million/well in 2005 (Fig. 3). These wells now take about 20 days to drill, compared with more than 30 days in 2005.

Continuing improvements in horizontal drilling and completion technologies are also key to lowering costs and improving the economic attractiveness of emerging shale plays such as the Fayetteville and Woodford shales.

In the Fayetteville shale, for example, Southwestern Energy Co. uses a combination of horizontal wells plus large-volume slick-water fracs to place pressure and proppant deep into the formation. With average $2.3 million well costs, 1.3-1.5 bcf/well EURs, and $6.50/Mcf gas prices, the economics of this play are attractive.

Similarly, in the Woodford shale, Newfield Exploration Co., after drilling mostly vertical wells, is now drilling mostly horizontal wells and completing them with five-stage fracs.

Newfield found that higher frac density translates into higher initial production rates and higher expected EURs. While such wells cost $5-6 million to drill and complete, compared with earlier vertical wells that cost about $2 million, these increased costs appear to be more than offset by higher production rates and ultimate recoveries per well.

Production operations

Companies also are achieving efficiency gains in what are generally considered to be mature unconventional gas plays. In the San Juan basin of New Mexico, which has been producing from both coal seams and tight gas sands for many years, several companies are pursuing strategies to maximize the potential of this mature, gas-rich basin.

For example, to offset its declining production in this basin, Williams established a cross-functional team to develop strategies to maximize production from its more than 800 wells operating in the basin. By investing $15 million into an effort to reduce line pressures, install new pumping units and compressors, change tubing size, and perform well workovers, the company increased production by about 20% and lowered lease operating costs.

Water treatment, disposal

Water treatment and disposal can constitute a major cost for producing coalbed methane, particularly in environmentally sensitive basins. In addition to using evaporation ponds and reverse osmosis, companies have examined such promising water treatment options as electrodialysis, an electrically driven membrane filtration process in which desalted water is separated from a concentrated saline solution (Fig. 4).

With the process, a company then can dispose of the desalted water at the surface and reinject the saline water.

GTI has operated an electrodialysis pilot in the Wind River basin in Wyoming for several years, showing that the process is technically feasible. It also has conducted a test in the Powder River basin showing CBM produced water could be treated for about $0.15/bbl.[1]

Finding, development costs

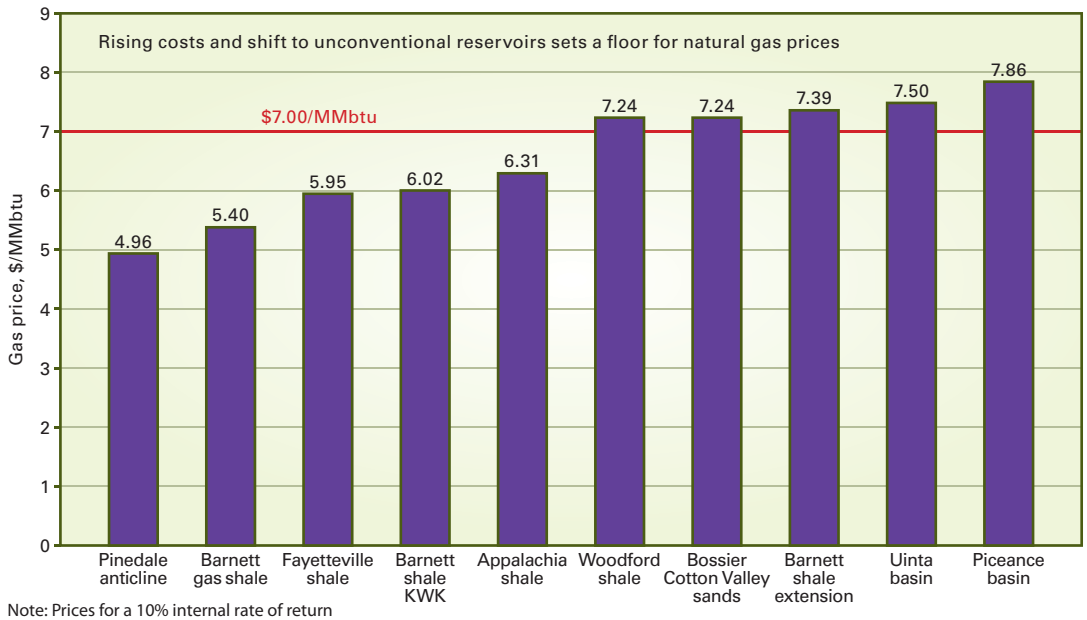
In the US, the cost to find and develop all gas resources, including unconventional gas, has risen considerably during the last 5 years. These rising costs, along with the continuing shift of US gas production to unconventional gas, has lead some, like the Credit Suisse Group, to believe that unconventional gas will set the floor for future natural gas prices (Fig. 5). In our view, however, the domestic natural gas price will be set by many factors, including world oil prices and LNG imports. As such, if domestic unconventional gas is to compete for investment capital and remain economically attractive, efforts to reduce finding and development costs must continue.

Barriers, opportunities

Unconventional gas development

BREAKEVEN NYMEX GAS PRICES

Fig. 5



Note: Prices for a 10% internal rate of return
Source: Questar Corp. and Credit Suisse Group

faces potential barriers, such as land use and environmental concerns, access to federal lands, and prudent management of produced water. At the same time, these barriers provide opportunities for innovative, forward-thinking firms.

Access and land-use policies on federal lands continue to pose formidable constraints on unconventional gas development. For example, for the remaining unconventional gas resource not yet developed in the Lower 48 states, about 15% is inaccessible, while another 64% is accessible but only under conditions more restrictive than standard lease terms.[2]

Some firms, however, are working collaboratively with government agencies to develop innovative "win-win" strategies to address seasonal restrictions in exchange for enacting more environmentally friendly drilling practices. For example, Questar Corp., a Rocky Mountain-based natural gas production and pipeline company, faced heavy restrictions on its lease in the Pinedale anticline of Wyoming. In response, the firm used information gathered through an extensive outreach program with local organizations and government officials to develop a plan whereby it could perform year-round drilling on previously seasonally restricted portions of its lease.

In exchange for the exception, the firm proposed to make investments that would reduce its environmental footprint, such as directionally drilling multiple wells from a single well pad and piping gas to central compression facilities instead of using tanker trucks.

In 2005, the Wyoming Bureau of Land Management approved the plan, giving Questar rights to drill year-round, including through the previously restricted winter months. Questar reports that these modifications will eliminate the need for an extra 89 well pads and 25,000 annual tanker truck trips.[3]

An increasingly visible and contentious issue is coalbed methane (CBM) produced water management. An in-depth US Department of Energy study demonstrated that the cost to treat produced water from coalbed methane operations could impact severely the economics of recovering natural gas.[4]

Depending on the regulatory requirements and management options used, capital costs for CBM-produced water management could range from as little as $1,500 to as much as $72,300/well.

In response to the barriers posed by managing produced water, Anadarko Petroleum Corp. implemented an innovative solution that creates synergies between its CBM and oil production investments.

The firm has recently completed a 48 mile, 24-in. Powder River basin pipeline to transport 400,000-450,000 bw/d produced from its CBM wells to the Madison aquifer at Salt Creek.

This pipeline will reduce greatly the water handling expenses for Anadarko, and establish a predictable cost structure for future water handling costs, reducing the risk in existing and future CBM development projects in the region.

Additionally, the water injected into this reservoir will provide an affordable source of water for enhanced oil recovery at the firm's nearby oil fields. Companies had depleted this low-cost Salt Creek reservoir water source through past waterflood and EOR activity.

Another example of turning a barrier into an opportunity is to use coal seams for value-added CO_2 storage. Coals are often near large point sources of CO_2 emissions, especially power plants. In addition, the injection of CO_2 into coal seams can enhance the recovery of methane (enhanced coal bed methane, or ECBM) from coal seams, although the technology is still relatively new.

Nonetheless, ARI analyses have shown that CO_2-ECBM can be economic with today's gas prices across a broad range of geologic environments, although substantial research and demonstration projects are still needed to push its application.

Economic viability

The economic viability of US unconventional gas resources remains in a precarious balance. Though drilling and completion costs are likely to level off and be partially offset by advances in technology, the economic viability of unconventional gas is at the mercy of service, raw material, and environmental management costs, all of which are increasing.

To remain a viable source of energy into the future, the unconventional gas industry as a whole will need to continue to build on the successes mentioned in this article by promoting greater cooperation between industry and government, by accelerating the pace of technological progress, and by tirelessly promoting efficiency and innovation in its field applications.

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Shell revitalizes 'Drilling the Limit' program

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Shell has revitalized its "Technical Limit" program in well delivery and well servicing activities. Early positive results have prompted the company to extend the program to additional assets in 2007 (Fig. 1).

The concept of technical limit (TL) arose in the late 1990s and quickly spread across the industry.[1] Led by Shell's technical-limit drilling approach, TL got well engineers to work toward a "perfect world" execution of their operations by removing lost time and adopting innovative practices.[2,3]

Shell achieved global success with the program, which eventually became known as "Drilling the Limit" (DtL).[1] Driven by a team of performance consultants supporting a global project base, many projects achieved step changes vs. historical performance levels. In retrospect, however, uptake was patchy and the performance was not sustained in some areas.

Top quartile challenge

By 2004, achieving industry top-quartile performance became a priority for Shell. The goal was to translate this strategy into a practical program to apply globally. Workers within the company's Wells discipline (Wells) felt that the response should be to revitalize DtL rather than to create a completely new performance initiative. Shell selected this revitalization approach, "rDTL," for two reasons:

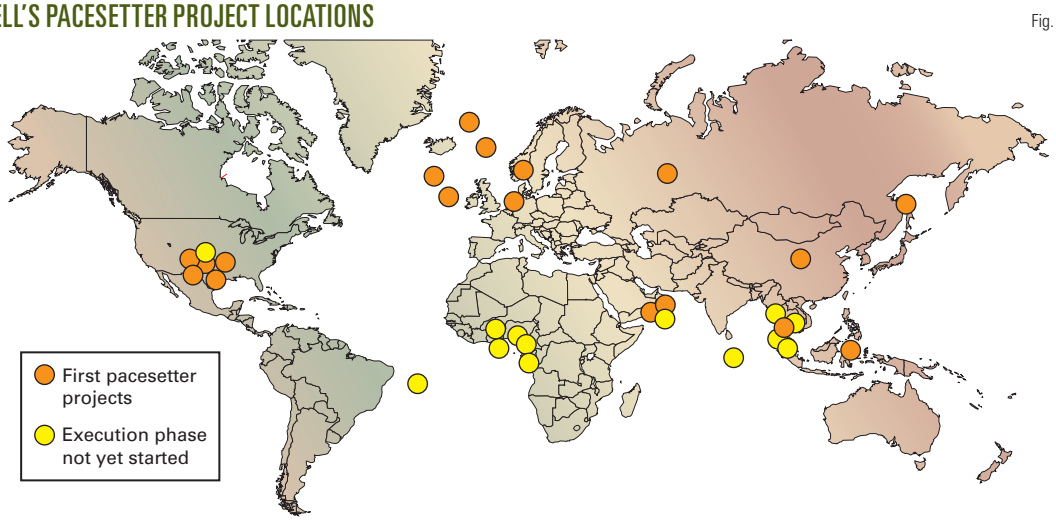
- DtL had been successful in many areas and clearly contained many of the necessary elements for success.
- The DtL name and brand were already familiar, reducing "initiative fatigue" in the organization.

The approach needed to be broadened and adapted, however, to cover aspects of performance that had not been addressed before and also to imitate operating units where DtL had been successful. To some, an environment for performance comes naturally; rDTL aimed to offer a framework for all projects on how to create such an environment.

In particular,

SHELL'S PACESETTER PROJECT LOCATIONS

Fig. 1



the revitalization effort focused on:

- Addressing Wells performance throughout concept, design, and execution, rather than purely focusing on execution.
- Defining "performance" via three cross-disciplinary measures ($/ft, wells unit development cost, and production attainment vs. plan) rather than focusing on execution-time performance.
- Approaching performance as a "change journey," in which direction setting, leadership engagement, and continuous communication all underpin the performance agenda.
- Embedding ownership for performance in the group, rather than it being the preserve of "fly-in-fly-out" consultants.
- Starting small and scaling fast, obtaining early successes, and learning before expanding the program.

West Alliance lies E6 Sarawak Waters. Sarawak's gas program will deliver 20% of Shell's Asian production (Fig. 2; photo from Shell Malaysia Corporate Affairs).

Six elements of rDTL

Combining DtL with change management and human performance revitalized "Drilling the Limit," the most comprehensive performance program ever applied in Wells. The program consists of six elements:

1. Set targets that beat the competition based on action plans.
2. Relate individual appraisal and rewards to business performance.
3. Measure and communicate business performance.
4. Improve decision quality within project management processes.
5. Train subordinates for performance.
6. Mobilize all players in the well-delivery discipline to improve performance.

While the program may at first sight appear complex, at its core are three simple issues: setting performance targets, setting plans to reach those targets, and creating accountability for their delivery.

Around this core, approach and emphasis of the program have been different across the 18 global "pacesetter" projects in which rDTL has been focused in its first year. As demonstrated in the following case studies of three high-performing teams, each took the essential elements of rDTL and delivered outstanding performance in very different environments.[4]

Europe—Arctic III

In Europe, Shell's Arctic III team deployed rDTL in phases which helped the team create a heightened focus on performance and reset expectations.

The team focused resources to support the project's performance expectations. Unlike the first iteration of DtL, however, in which performance consultants were often on the rig site, the new program was focused onshore. Consultants supported the project team throughout the project planning and execution in keeping performance at the top of the agenda.

In 2006, the team delivered five wells in top quartile vs. industry peers, saving 87 rig days—or $25 million—vs. plan. This performance enabled two additional wells to be drilled and resulted in 30% more production than had been planned.

The Arctic III team's approach, based on the rDTL program, created a high-performance environment. Artic III implemented all six elements of rDTL and reached its successes through precise target setting, strict planning and raising the team's awareness of performance, for instance by creating clear accountabilities and a reward culture.

Americas—Pinedale

Shell's Rocky Mountains well delivery unit in Denver has a similar story of high performance.

After acquiring this tight-gas asset from McMurry Energy Co. in 2001, Shell's operation has continued to face local competitive pressure. In early 2006, however, rDTL helped add focus and structure to the team.

For Pinedale, 2006 was about delivering on-performance targets that were already ahead of the leading local competitor. All three cross-disciplinary performance measures in rDTL were adopted: $/ft, wells unit development cost (UDC), and production attainment vs. plan.

The results were:

- 60 wells drilled and 55 completed, all on plan.
- UDC coming in just ahead of a tough target (against competition).
- Team exceeded its target of added production and reached a total of 500 MMcfd.

A crucial element of rDTL is the

performance staircase, which links expected performance effects to a detailed, improvement plan. The contents of the staircase—technical, commercial, or process improvements—form the core of the team's preparation for the year, creating focus and structure, and allowing the team to work only on activities that will have a major impact. In its drilling and completion activities, the Pinedale team used the staircases to focus the team's activities and to ensure that performance targets were based on facts, not aspirations.

The Pinedale team also developed a program of clear, simple, performance-based incentives with staff and key contractors. These incentives—all related to bottom-line delivery of the three key performance indicators—were replicated by several other rig teams.

In the spirit of continuous improvement, the Pinedale team further tested themselves in early 2007. Looking for new improvement opportunities, the team brokered a performance-benchmarking project with all of its local competitors.

In the study, the teams shared performance data, which further strengthened the Pinedale team's belief that its current performance and future targets were systematically outperforming the competition. Shell wells at Pinedale are top quartile, drilling costs are significantly lower than competitors, and days/1,000 ft drilled are significantly better than competitors.

Asia—Sarawak gas

In Asia, the big-bore gas wells of the Sarawak gas program (Fig. 2) will deliver 25% of LNG imports in Japan and Korea, and 20% of Shell's Asian production. It was therefore critical that the team achieve promised production levels at competitive cost.

In contrast to some other projects, the Sarawak Gas team did not apply dedicated performance staff to support its campaign, opting for performance to be a team responsibility.

Clarity of targets was considered vital to the team's success and, consequently, the team's performance objectives were rolled up into a drive for the "21-day well." The results were impressive, with $/ft and UDC both coming in at less than 70% of the project baseline. The team had the company's highest performance vs. project baseline for the year.

Lessons for industry

These case studies demonstrate the variety of approaches that can be taken to achieve high performance. Shell's experience has taught its rDTL team three unbreakable rules:

1. Set unambiguous targets tested against external performance markers, and hold people accountable for delivery.
2. Relentlessly communicate learning and success.
3. Ensure that facts and results are easily available to ensure high-quality discussions and avoid debate around the numbers.

rDTL's future

Based on its success in 2006, the rDTL program for well delivery is being expanded to a new wave of projects.

The program has been extended to support Shell's well-servicing activities. In this new avenue, the best learning from the well-delivery program has been adopted, and in partnership with asset production teams, well-services teams are well on track to achieve top quartile in Wells. ✦

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Policy issues will affect future US fuels markets

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This article examines the economic and policy factors that have played a large role in the US motor fuels market, and quantifies future outcomes based on a range of possible economic and policy conditions. These include aggressive pursuit of biofuels programs, increases in Corporate Average Fuel Economy (CAFE) standards, dieselization of US motor fuels, and the pricing of carbon emissions.

Part 1 of this two-part series, last week (OGJ, Oct. 8, 2007, p. 66), developed a forecast for diesel and gasoline demand in the US based on economic factors. This week, the concluding article will examine the factors that influence US motor fuel demand to draw a picture of what is likely to happen over the next decade.

Our findings suggest there will be substantial effects on the gasoline market, but fairly small effects on the diesel market. The US administration's program to decrease gasoline demand 20% in 10 years is unlikely to reach that goal, but pursuit of biofuels and higher CAFE standards still could substantially reduce historic gasoline demand growth. Continued economic growth should stimulate diesel demand, though constraints on carbon may temper its rate of growth.

Ordinarily, rising fuel demand would elicit additions to US refining capacity. Proposals, however, to control refined product prices and other measures to intervene in open fuel markets, or the imposition of special taxes on refiners, are likely to discourage such investment. Furthermore, efforts to mandate biofuels as a substitute for petroleum-based motor fuels create a new level of uncertainty in the downstream petroleum market.

Government policy is inherently unpredictable and current mandates may not be in place in the future. Some mandates are likely to have unintended consequences not yet fully understood. As a result, refiners face more rather than less risk in making decisions on how much capacity to add during the next 10 years.

We see a contradiction between the current market and recent policy proposals: market forces imply a need for more domestic refining capacity, while legislative and policy initiatives discourage it.

We chose a 10-year time span because beyond that the picture is less clear. Fuel prices, the state of technology, and policy all might be very different from today—projections beyond 10 years are highly uncertain. Still, a 10-year perspective can tell us a good deal about what the state of the world might look like by 2017.

Biofuels

President Bush's plan to reduce US gasoline demand 20% by 2017 is based on two approaches:

- An aggressive effort to substitute biofuels for gasoline (15% reduction).
- A 4%/year increase in the fuel economy of new light vehicles sold in the US (5% reduction).

If the market otherwise would have grown 13% as projected by the US Energy Information Administration, to 158 billion gal/year (10.4 million b/d) in 2017 from 140 billion gal/year (9.1 million b/d) in 2006, biofuels would replace 24 billion gal and rising fuel economy standards would conserve another 8 billion.

How realistic is this? Most of the biofuel contribution would have to come from ethanol. Biodiesel will reduce diesel demand somewhat, but US biodiesel production is projected to increase to only 650 million gallons by 2015.[1] If diesel demand grows 15-20% between now and then, this would be only a little over 1% of the total market.

Ethanol is currently made almost exclusively from corn and that is not likely to change dramatically in the next 10 years.

In the long term, ethanol from cellulose may make an important contri-

bution to supply. The US Department of Energy has offered $385 million in grants to build plants capable of supplying ethanol from cellulosic sources. At least three technical hurdles must be overcome at production scale, however. The cellulosic portion of the feedstock must be isolated, the cellulose must be enzymatically degraded into sugars, and those sugars need to be fermented to turn them into ethanol.

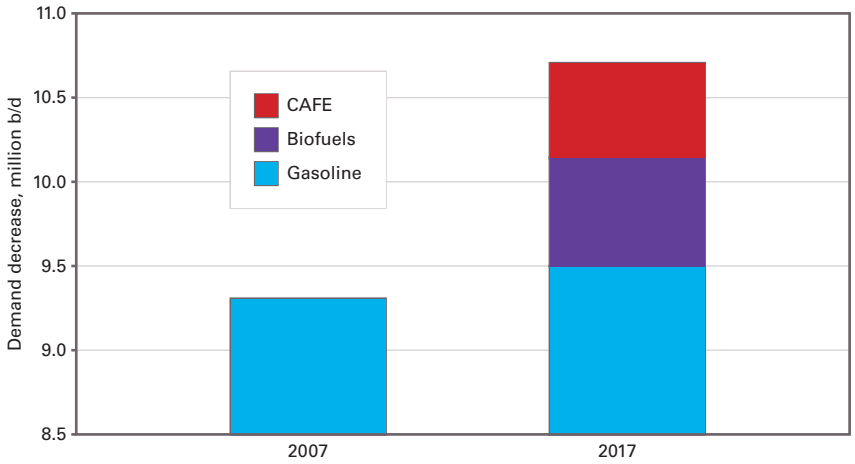
Different cellulosic sources require somewhat different processes, further complicating the situation. DOE's National Renewable Energy Laboratory has set a goal of cutting the cost of cellulosic ethanol by 50% over 5 years, which would make it competitive economically. The steps to do so, however, are likely to take longer than that and it appears unlikely that this technology will produce large quantities of fuel within 10 years.

In 2006, 23% of US corn production of somewhat less than 10 billion bushels was devoted to the fuels market, yielding about 5.3 billion gal. More acreage will be devoted to corn in 2007 and higher yields per acre may be possible.

The processing capacity exists or is under construction to produce as much as 12 billion gal/year of ethanol by 2009. This could consume ⅓ of the US corn crop, however, with consequent effects on food markets. Furthermore, because ethanol has only 67% of the energy content per gallon as gasoline, this is only 8 billion gal in gasoline equivalent. That is but ⅓ the 2017 goal.

Presumably, land that is now used for other crops could be replanted with corn to provide feedstock for the fuels market. That would reduce pressure on the corn market but would raise prices of other agricultural commodities. Also, some land now held in reserve might be released to increase aggregate corn production. But some of that land is unsuitable for corn and yield on other such acreage is likely to be low. Production devoted to the fuels market could yield 15 billion gal by 2017, but even this would replace only 10 billion gal of gasoline.

2017 GASOLINE DEMAND DECREASE Fig. 1



Sources: Energy Information Administration, EPRINC calculations

DOE's Office of the Biomass Program projects 2017 ranges for corn-based and cellulosic ethanol of 12.5-15.0 billion gal/year and 2-5 billion gal/year, respectively. Combined, this is 14.5-20.0 billion gal/year. The lower end of this range, mainly from corn ethanol, seems more likely.

It is clear that US corn-based ethanol cannot replace 24 billion gal of gasoline by 2017.

Another option is to relax import barriers to ethanol in order to induce greater supplies from around the world. To date, however, domestic producers have successfully opposed such relaxation and, in any case, such a program would merely replace one form of imported fuel with another.

In all likelihood, US-produced ethanol will slow growth in demand for gasoline but not prevent it. Even if that growth is no greater than DOE projects and 15 billion gal of ethanol are supplied by 2017 (equal to about 650,000 b/d of gasoline), ethanol will replace only a little more than half the projected growth amount (10 billion out of 18 billion gallons).

Tightened CAFE standards

Many studies have examined prospects for raising the average fuel economy of US vehicles. For example, the National Academy of Sciences in 2002 and Energy and Environmental Analysis Inc. in 2006 identified technologies already in commercial use that could increase fuel economy throughout the fleet. These include rolling resistance reduction, improved lube oils, weight reduction, engine friction reduction, and alternator improvements.

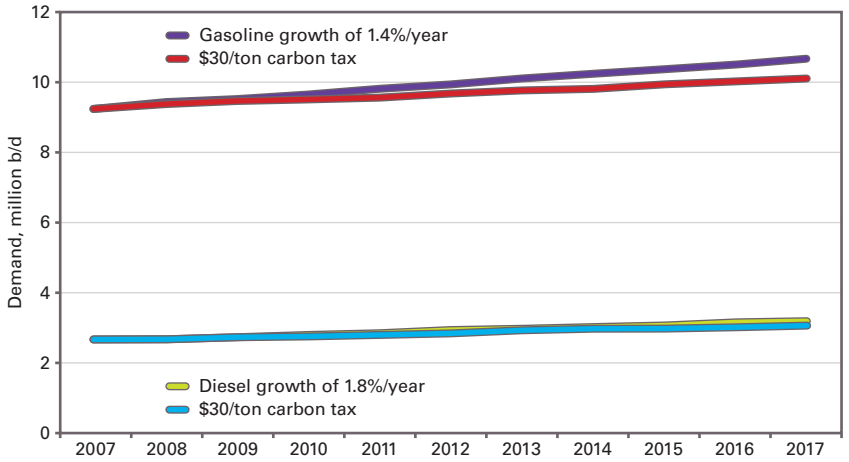
An analysis conducted at Oak Ridge National Laboratory found that at gasoline prices between $2/gal and $3/gal, increased light vehicle fuel economy of 30-50% will more than pay for itself.[2]

Other vehicle technologies also may contribute to increased fuel economy during the next 5-10 years. These include homogeneous charge compression ignition and hybrid electric vehicles, including plug-in hybrids with advanced batteries; but the contributions of these technologies will likely be limited during this time period.

Proposals have been made to raise US CAFE standards as a means to increase light vehicle fuel efficiency. For example, Senators Richard Lugar (R-Ind.) and Barack Obama (D-Ill.) have introduced the "National Fuel Initiative," which would mesh light trucks with autos and increase the overall CAFE standard by 4%/year. For our analysis, we initially assume that during 2008-17, average annual mileage among the US light vehicle fleet will increase by

EFFECT OF CO_2 ALLOWANCE

Fig. 2



Source: EPRINC calculations

that number.

Each year, new vehicles comprise about 7% of the vehicle fleet. The retirement rate is only about 4.5%; therefore, the vehicle fleet is expanding. Our first assumption is that 7% of the fleet turns over every year, with no net gain.

Currently, light vehicles average 21 mpg.[3] In 2008, therefore, the 7% of new vehicles would average 1.04 x 21 or 21.8 mpg. The 2009 new vehicles would average 22.7 mpg, and so on. Because new light vehicles make up only 7% of the fleet, the average increase in mpg from the first year increment is only 0.07 x 0.04 = 0.0028 or 0.28%. In the second year, the percentage gain would be from a slightly higher mpg base. By the 10th year, new vehicles would average 21 x 1.0410 raised to the 10th power or about 31.1 mpg.

Given these assumptions, the 2017 fleet would consist of 10 years of vehicles averaging 26.2 mpg (assumed to be 70% of the fleet) and another 3 years averaging 21 (30%). Fleet average fuel economy would be 24.6 mpg, a gain of 17%. A vehicle traveling 13,000 miles/year, the average in the US, would consume 528 gal of gasoline rather than 619 gal, a savings of 15%. This arithmetic suggests that growth in gasoline demand would be significantly affected.

The actual gain in fuel economy, however, between 2008 and 2017 from increasing CAFE standards by 4%/year is likely to be considerably less. First, the 2008 and 2009 models already are past the design stage; a new program probably would not be implemented until the 2010 model year.

This would reduce the average mileage of new vehicles sold between 2008 and 2017 to 24.3 mpg, and the overall fleet average to 23.3 mpg. Of course, if CAFE standards continue to increase past 2017, the effects would continue to grow.

Automakers receive credit towards CAFE goals by marketing flexible fuel vehicles—vehicles that can use alternative fuels such as ethanol or methanol as well as gasoline. The credit allows each manufacturer to increase the calculated CAFE value of its fleet by up to 0.9 mpg. Almost all of today's flexible fuel vehicles, however, use gasoline. Their production has little effect on demand.

If 0.9 is deducted from 24.3, new vehicles would average 23.4 mpg and the fleet average would be 22.7 mpg. A vehicle traveling 13,000 miles would consume 573 gal rather than 619 gal, a fuel economy gain of about 7.4%. Demand for gasoline would be reduced by about 775,000 b/d.

Other factors would reduce the effect of increased CAFE standards further. Better gas mileage means a lower cost of travel, which will induce people to drive more. This "rebound effect" is estimated to be about 20%. The average gain in fuel economy in new vehicles is effectively reduced by 0.5 mpg, to 22.9 mpg.

In reality, the light vehicle fleet will likely continue to expand by a few million vehicles every year. If this occurs mainly through old vehicles lasting longer—in contrast to extra new vehicles being sold—then new vehicles will comprise less than 70% of the total in 2017, and closer to 60%. In that case, raising CAFE standards by 4%/year for new light vehicles between 2010 and 2017 would result in fleet average fuel economy of about 22.1 mpg and a reduction in gasoline demand of about 550,000 b/d.

Fig. 1 shows the effects on gasoline demand if a biofuels program yielding 15 billion gal in 2017 is combined with a program to increase CAFE 4%/year for the light vehicle fleet. Assuming a base case growth rate of 15% between 2007 and 2017, to 10.7 million b/d from 9.3 million b/d, biofuels would reduce demand by 650,000 b/d and CAFE standards by another 550,000 b/d. The two together would reduce demand by around 1.2 million b/d, to about 9.5 million b/d.

President Bush's goal of a 20% reduction in gasoline demand would be only partly met, but the combined programs nevertheless would have a significant effect on gasoline demand.

Dieselization

Another way to reduce US motor fuel consumption would be a massive transformation of the light duty vehicle fleet from gasoline to diesel. Fewer gallons would be needed to propel vehicles because diesel has about 14% more energy per volume and because it combusts more efficiently than gasoline.

The two effects combined result in a vehicle of given size and weight going about 30% farther on a gallon of diesel than on a gallon of gasoline. For given aggregate vehicle miles traveled, therefore, about 23% less fuel is needed.

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8:15 – 9:45 am	Session 1 & Live Webcast
9:45 – 10:00 am	Coffee Break
10:00 – 11:30 am	Session 2 & Live Webcast
11:30 – 12:30 pm	Lunch
12:30 – 2:00 pm	Session 3 (closed session)
2:00 – 2:15 pm	Coffee Break
2:15 – 3:45 pm	Session 4 (closed session)
3:45 – 4:00 pm	Closing Remarks
4:00 – 5:00 pm	Networking Reception

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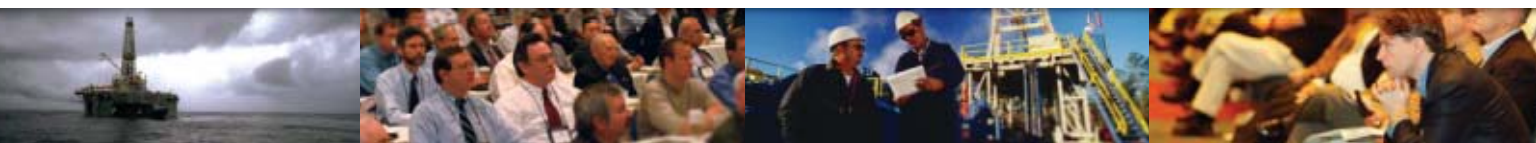

The net reduction in petroleum use would be less, however, because more oil is required to make diesel fuel than gasoline. Adjustment for this factor would reduce the net fuel efficiency advantage of diesel over gasoline by about 20%.

To help achieve greenhouse gas reduction goals, European nations have encouraged such a vehicle transformation through differential taxation of diesel and gasoline. The policy appears to be working. Despite diesel vehicles being more expensive (approximately $3,000 more for a comparable light vehicle), 50% of new cars sold in Europe in 2005 were fueled by diesel.

The current situation favors the US in one important respect. European refineries are producing more gasoline than Europe is consuming, and are exporting about 800,000 b/d to the world market.

Concurrently, the US is importing more than 1 million b/d of gasoline and gasoline components from world refining centers. Gasoline prices in the US would be higher if European refineries were not overproducing relative to European demand. To some extent in Europe, gasoline has now become an unwanted by-product of rising throughput to meet diesel demand.

A new policy to encourage diesel use in the US would require US refineries to substantially change their processing configuration. Currently, the product mix is heavily oriented towards gasoline, which makes up more than 50% of production. Only a little more than 20% is diesel.

A large-scale switch from gasoline to diesel would render past capital investments in catalytic cracking less valuable and would require large new investments in hydrotreating and hydrocracking. In the short run, such a policy would put pressure on the diesel market. In the longer run, increased US diesel production capacity would relieve that pressure, but several years would be required and cost recovery would be necessary.

US policy makers are indicating a preference for biofuels and fuel economy measures as the core strategy to reduce motor fuel consumption. Although diesel offers considerable potential for fuel savings, it appears unlikely that this alternative will be given serious consideration currently.

Carbon Tax

Increased motor fuels taxes are sometimes discussed by policy analysts, but rarely by policy makers, who would have to deal with voters' wrath over a widely unpopular measure. Such taxes would likely slow economic growth as well as reduce the efficiency of distribution of goods. Furthermore, these imposts would be unpopular with motorists, whose real incomes would be cut and their mobility curbed.

Other unresolved questions include what would be done with potentially large revenues, and how these monies would be recycled within the economy.

Although higher motor fuels taxes are unlikely in the near future, constraints on aggregate US carbon emissions are being aggressively advocated. A quantitative limitation on carbon emissions coupled with an allowance trading system is most often discussed. Such a limitation would have many of the properties of a carbon tax, although it would not be entirely equivalent.

Without knowing the specifics of what might be done, it is difficult to precisely predict the future price of prospective carbon allowances, but there is experience within the EU of carbon allowance trading and the price ranges that emerge.

For analytic purposes, we assume an allowance price of $30/ton of CO_2, which roughly equates to 30¢/gal of motor fuels. We also assumed the price is set in 2008 and remains constant in real terms through 2017. A base price of $2.60/gal for both fuels is also assumed.

We assume too that gasoline demand would rise 1.4%/year or 15% over 10 years if there were no carbon constraint; diesel demand would rise 1.8%/year or 20% over 10 years. The final assumption is that elasticity of demand increases in even increments towards intermediate term values of –0.5 for gasoline and –0.2 for diesel (for example, elasticity of demand for gasoline is assumed –0.05 in 2008, –0.1 in 2009, etc.).

Fig. 2 shows the effect of the carbon constraint on motor fuel demand.

We calculated that, by 2017, gasoline demand is 600,000 b/d less than what it otherwise would have been. But it still is more than 725,000 b/d more than 2007 demand. Diesel demand in 2017 grows by more than 400,000 b/d; it is only about 70,000 b/d below what it otherwise would have been. Together, the $30/ton implicit tax on carbon reduces demand for motor fuels by about 670,000 b/d in 2017. ✦

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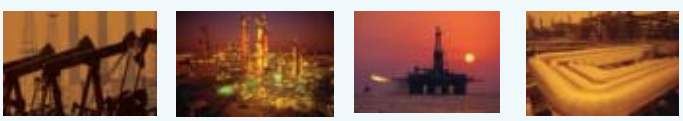

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China's growing LNG demand will shape markets, strategies

Gabriel Collins
China Maritime Studies Institute
US Naval War College
Newport, RI

China's rapidly growing demand for clean energy sources stands to make it a major LNG importer in coming years. Sixteen of the world's most heavily polluted cities are in China, and environmental damage causes more than 750,000 Chinese to die prematurely each year and costs China up to $200 billion/year.[1]

China has huge LNG demand potential. Natural gas currently provides only about 4% of China's national energy supply (as opposed to 23% in the US).[2] Yet gas demand will grow rapidly if China's leadership becomes serious about controlling pollution and summons the will to launch price reforms in the coal, gas, and electricity markets.

These are intertwined because gas can supplement dirty coal as a power-generation fuel but will only be broadly competitive in China if coal is taxed and electricity prices are liberalized and rise to market levels.

This analysis examines the market and strategic effects of increasing Chinese LNG demand as well as the possibilities for Chinese exploration and production, shipping, and energy service companies to gain footholds throughout the LNG value chain (Table 1).

China began importing LNG in 2006 and is likely to expand its LNG imports greatly in coming years, particularly if Russia cannot make good on longstanding promises to build gas pipelines to China. To date, the two sides have been unable to agree on a price, with China wanting prices of $100/1,000 cu m and Russia seeking prices nearer the $250/1,000 cu m it realizes for gas sales to Western Europe.

China's investment-led growth model leads to massive demand for inexpensive baseload electricity. Here coal will almost always prevail over gas, unless the government imposes draconian coal taxes, carbon-emission restrictions, or other such measures to lessen the raw fuel price disparity. Gas will gain from demands for generation flexibility, because unlike coal-fired plants, gas-fired combined cycle turbine plants can rapidly adjust their output.

Gas-fired generation also stands to benefit from growing electricity demand in southeast Chinese cities that are prosperous, far from coal supplies, lie near the coast, and are battling severe pollution.

Southern China

Sinopec and PetroChina are delaying LNG projects in northern China until more LNG supplies become available and the price situation improves. China is rich in coal, making LNG uncompetitive for baseload power generation at prices greater than $3.50/MMbtu. International LNG prices in August 2007 stood nearer $9-11/MMbtu. Japanese and Korean consumers can afford LNG at these prices, but relatively few Chinese consumers can. These customers are primarily in the more prosperous Shanghai, Fujian, and Pearl River Delta areas.

China's relatively prosperous and economically dynamic Southeast will therefore be the primary demand center. Even regional Chinese LNG demand growth can have global market effects. By 2015, LNG demand in southeast China and Shanghai could exceed that of South Korea, which is currently the world's No. 2 LNG consumer. Fig. 1 shows income levels in China's southeast, where LNG terminals are being built, vs. the rest of the country.

High world LNG prices amid growing competition for supplies and

CHINA GAS BALANCE: 2005-20

Table 1

	Domestic gas production	Domestic gas demand	Difference	Import dependency, %
	Billion cu m			
2005	50	50	—	—
2010	80	100	–20	20
2020	120	200	–80	40

Source: 2005 China Oil and Gas Industry Analytical Report; in Chinese

increased domestic gas supplies are currently dampening Chinese LNG demand growth. Average international LNG prices exceed Chinese coal prices by a factor of four and could remain high for several years to come because new projects can take 5 or more years to come online.

A recent spate of domestic gas discoveries equal to more than 5 years of imports at China's projected 2010 demand level will reduce China's prospective LNG demand.[3] China may also see domestic supply gains from its coalbed-methane reserves. Chinese residential gas prices are also controlled, making LNG largely uncompetitive at current price levels.

Although China's internal gas market policies and the broad inability of consumers to pay current international LNG prices are curtailing demand, there may be changes afoot. In April 2007, Mitsui UK and CNOOC signed a framework accord on LNG spot trading. Then, on May 10, 2007, CNOOC's Dapeng terminal accepted China's first spot LNG cargo, which came from Oman and was purchased ex-ship from Mitsubishi.

The deal's significance lies in the fact that for the first time, a Chinese local gas company was willing to pay full international price for gas imports. China's Fujian and North West Shelf LNG import contracts featured low prices and were signed during an LNG buyers' market.

Part of those deals' low prices may also stem from energy companies working to establish a foothold in the potentially huge Chinese market. Yet the spot deal combined with the fact that China's Ministry of Commerce recently eliminated gas import restrictions may signal that the Chinese government and Chinese companies are slowly moving toward greater integration with the international LNG market.

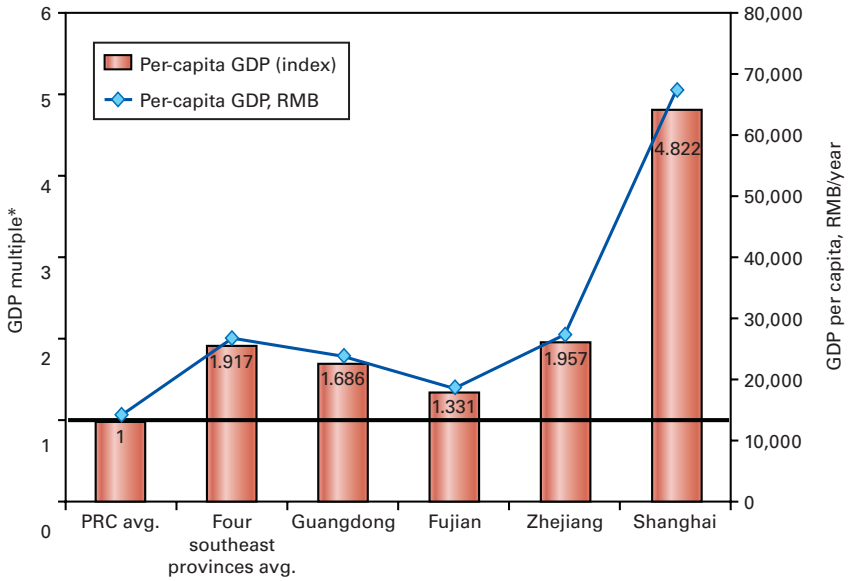
Greater participation by Chinese firms in the LNG spot market could also increase liquidity in East Asia, because South Korea's KOGAS uses spot trading to help account for seasonal demand shifts and is already a leading global LNG spot market player.

Utilities in Southeast China also appear to be interested in LNG as a way to meet residential and industrial gas supply needs. Guangdong and the surrounding Pearl River Delta are economic powerhouses with some of China's fastest growing electricity demand. Gas-fired power is competitive in these areas because serious rail bottlenecks raise coal delivery costs and cause supply interruptions for coal-fired power plants. In addition, oil-fired power plants in Guangdong are being shut down as China struggles to restrain rapid oil demand growth.[1] Finally, because it burns cleanly, gas is also favored over oil and coal for power generation in the badly polluted southeast.

China Gas, one of the country's largest pipeline gas distributors, expected to take its first LNG shipment in September.[4] The company experienced a 145% surge in gas sales between April 2006 and March 2007 and is looking to expand its distribution operations to eight more cities. These events may mark the emergence of residential demand, a new gas-demand driver independent of electrical generation.

CHINESE GDP, LNG IMPORTING ZONES

Fig. 1



*Each province's GDP per capita as multiple of PRC per capita; baseline = 1.
Source: China Energy, December 2006

Asian LNG competition

Increased Chinese LNG demand will sharpen competition for LNG supplies in East Asia, particularly because Indonesia is looking to curtail export volumes sharply in order to meet domestic gas needs. Growing Chinese LNG import demands will also have geopolitical consequences. Australia, Indonesia, Malaysia, and Iran are seen as prime LNG sources.

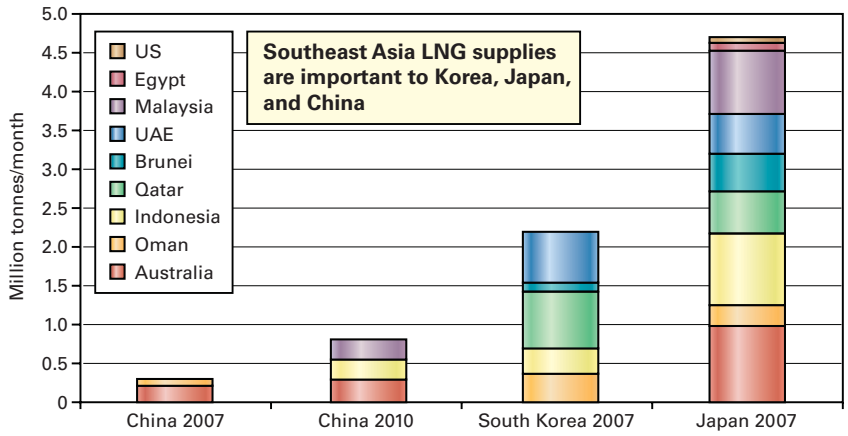
The close bilateral ties between LNG producers and consumers will also influence China's foreign policy. This means that China will oppose actions that might harm Iran's energy development. In the case of Australia, a staunch US ally will find itself in the diplomatically delicate position of balancing deep strategic ties to the US and a burgeoning economic relationship with the PRC.

Finally, LNG shipments will travel the same sea lanes that oil imports do, posing an additional sea lane security issue in Southeast Asia and the Indian Ocean by 2020.

As Fig. 2 shows, Southeast Asian LNG supplies are already very important to Japan and South Korea. Given that the region lacks the LNG production

EAST ASIAN LNG SNAPSHOT: APRIL 2007

Fig. 2



Sources: Platts, IEEJ

growth potential of the Middle East, China's growth as an LNG importer combined with its stated preference for sourcing supplies close to home likely means increased competition for future Southeast Asian LNG supplies.

Chinese companies may also seek to expand their role in the LNG value chain. Such moves would be logical, given that Chinese companies seek to maximize rent capture and ensure supply security in the oil business by becoming active in every link of the value chain. Chinese firms are seeking upstream stakes in fields slated to feed LNG projects. China's shipyards are building vessels to serve domestic LNG projects and are eying the global LNG carrier market.

Finally, growth in China's LNG sector will create near and medium-term commercial opportunities for engineering and construction firms capable of building LNG terminals and providers of LNG ship technology and materials, among others.

Seeking upstream stakes

Chinese energy producers will seek equity stakes in LNG projects to book reserves and possibly gain a say in where supplies go. Chinese drilling and service companies will pursue business in countries where Chinese firms have upstream stakes in LNG projects. If CNOOC and other Chinese national energy producers gain large upstream stakes, their service-provider subsidiaries such as COSL could latch onto new business.

China's push into global energy services markets will be a major energy services theme during the next 10-15 years for both oil and gas. Chinese firms have been able to hone their skills in a large domestic market (world's fifth largest oil producer and 16th largest gas producer) that gives them a strong base for jumping into the global energy service sector.

Great Wall Drilling Co. now provides drilling services in 26 countries and is the leading drilling contractor in Kazakhstan, Venezuela, Sudan, Egypt, and Pakistan.[5] China exported $500 million worth of drilling equipment in 2005 (growth of 26.1%/year from 2002-05) and now counts the US as its single largest export market.[6]

While Chinese firms such as BOMCO can supply rigs at discounts of as much as 25% relative to Western firms, over at least the next 5 years, the advanced services of Halliburton, Schlumberger, and other Western service providers will be irreplaceable for developing LNG feed fields, many of which lie offshore and in other complex environments where multinational service providers' technology and equipment still dominate.

Chinese firms weaker

North American, European, Japanese, and Korean firms currently dominate LNG-related engineering and construction, as they conduct both design work, as well as actual construction of liquefaction plants, loading wharves, regas facilities, and storage tanks. Prominent firms in the field include CBI, KBR, Samsung, and Tokyo Gas.

Chinese firms currently have no presence in the global LNG construction sector. If they move to gain market share, their primary value proposition would likely be low cost and a higher appetite for political risk, rather than the innovation, sophisticated technologies, and long-standing reputation that provide Western firms' primary value added. Fig. 3 maps current Chinese LNG terminal projects, as well as their lead contractors.

If Chinese engineering and construction firms choose to compete for LNG terminal construction contracts, they may push for "national firms preferred" policies. For example, current Chinese government policy emphasizes hauling Chinese LNG imports on Chinese-made ships. Similar policies favoring Chinese engineering and construction firms for building future LNG import facilities (and possibly liquefaction facilities if a Chinese national energy company is the main upstream shareholder) would foster these companies' international competitiveness by enabling them to gain experience prior to entering intense international bidding.

In the 10-15 year time frame, Chinese shipyards will likely come to play a more significant role in LNG carrier production. China's burgeoning maritime academies could also help turn out badly needed LNG carrier officers and crewmen who, if they gained sufficient English language proficiency, could work for Chinese and international LNG shippers.

With the current orderbook, the world LNG fleet will require an estimated 5,000 or more new officers, double the current number.[7] This number could climb further because many current of-

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ficers have been at sea for more than 25 years and are nearing retirement. LNG crewing and officer training are therefore areas where China could positively affect the global LNG market. According to Poten & Partners, China is building training facilities aboard one of its newbuild LNG carriers.[8]

Naval expansion

China's growing LNG imports may fuel blue water naval expansion. In the case of LNG sea lanes of communication security, being able militarily to protect one's supply lines may in fact turn out to be far more important than in the case of oil. LNG is physically more difficult to handle than oil and is not as easily tradable. LNG is still sold primarily on the basis of long term take-or-pay contracts, with only about 10-12% of global volumes traded as spot cargoes. And even these spot cargoes change hands once or twice before reaching the final end user, whereas oil cargoes commonly pass through a dozen or more buyers and sellers before finally reaching the end user.

As a result, ties between LNG producers and consumers tend to be very direct. LNG projects are typically served by dedicated tankers that carry LNG on one route (for example, Qatar-Japan), and cargoes are rarely resold at sea.

From a military perspective, this would make shipments much easier to interdict because—in contrast with oil cargoes—it would be relatively simple to determine where an LNG cargo was headed. This means that a consumer nation has a strong motivation for possessing the capacity militarily to defend its LNG supply lanes. LNG carriers being built to serve Chinese terminals are currently either Hong Kong or PRC flagged, making it even simpler to justify using naval power to defend them during a crisis.

Looking ahead

China's primary source of influence on the East Asian and global LNG markets in the next 5 years will be as a consumer of and competitor for supplies, particularly from Indonesia (falling production), Malaysia, Australia, and possibly Sakhalin. Chinese sources express a preference for obtaining LNG from these areas, as they are "close to home" and shipments do not need to pass through the Malacca Strait.

If Iran begins producing and exporting LNG, China will almost certainly take large volumes, deepening its energy interests in Iran and possibly sharpening tension with the West over Iran's nuclear program.

Insofar as specific segments of the LNG value chain are concerned, Chinese shipping firms will serve the Chinese market but will face stiff international competition from Japanese, Korean, North American, and European shippers. China's main contributions to the global LNG shipping sector would likely come from providing ship officers and crewmen, as well as building some LNG carriers (in the 10-year time frame). Although Chinese shipbuilders are making great strides, more technically advanced South Korean yards will likely capture the majority of LNG carrier orders.

CNOOC and other Chinese producing firms will seek upstream project stakes, and their service subsidiaries will be active in countries from which China is obtaining LNG. As southern and eastern Chinese power producers increase the share of gas-fired generation, it is possible that they could seek upstream stakes in LNG projects that feed their plants.

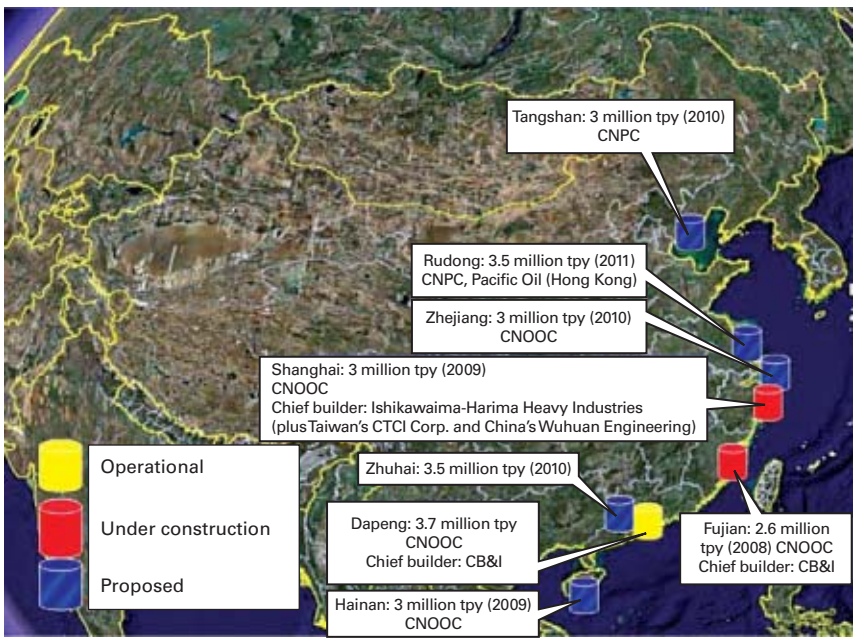
Western and Japanese power producers and utilities such as Gaz de France and Tokyo Gas now seek upstream stakes in LNG projects to ensure supply security for their plants and industrial and residential consumers.

For the foreseeable future, Chinese construction and engineering firms will enter the LNG construction business based on political rather than economic advantages. In Iran, for instance, KBR and other Western firms are effectively shut out by US sanctions. If tensions continue, Iran may have no choice but to rely on Chinese firms to help it build LNG infrastructure. China's growing LNG demand could exert profound strategic and commercial effects on the relatively undeveloped global LNG market. Existing LNG consumers and suppliers in East Asia will need to make adjustments to deal with China's rise.

As the LNG market continues to

Chinese terminals

Fig. 3



globalize, Atlantic Basin consumers in Western Europe and North America will feel the market effects of China's growing LNG use. This will be particularly true as the US becomes a top global LNG importer. China and the US have the highest growth potential of new LNG importers worldwide and may become major demand-side shapers of the new global LNG market. ✦

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Crankcase fumes-disposal system for generator sets

The maker of the AIRSEP crankcase fumes-disposal system has packaged its systems for easy field installation on large generator sets.

The AIRSEP system processes engine crankcase fumes, coalesces the oil from the fumes back to liquid, and then returns the oil back to the engine crankcase. It also captures the fine oil mist that can often lead to radiator fouling, turbo or aftercooler fouling, or excessive emissions if left unchecked, the firm notes.

The kit uses specially designed side mount brackets that mirror the engines' control panel brackets. This helps expedite installation and helps ensure a uniform package on engines.

Source: **Walker Engineering Enterprises,** 9255 San Fernando Rd., Sun Valley, CA 91352.

Brochure includes details on firm's oil field units

A new 20 page brochure describes the six units that make up this company's expansion of services: LTI Drilling Systems, LTI Forestry Products, LTI Mining Products, LTI Offshore Products, LTI Power Systems, and LTI Steel Products. The brochure also covers business principles, global locations, and company history.

Source: **LeTourneau Technologies Inc.,** Box 2307, Longview, TX 75606

New laser alignment tool

The new 2D Microgage laser alignment tool offers precision measuring, machine alignment, and calibration.

It combines a compact laser transmitter with a receiver and digital display. As the laser moves across the receiver in a vertical or horizontal direction the display provides a reading of the motion, accurate to 0.0001 in. It will operate over a distance of 100 ft with a bright red beam that is quickly adaptable to a number of applications. Several simple accessories allow for alignment of straightness, runout, parallelism, squareness, bore alignment, shaft alignment, and flatness measuring, the company says.

The two-axis tool operates on batteries for added convenience, and all components are machined of solid aluminum with a hard anodized coating for wear resistance. A sealed, pushbutton keypad and large LCD display help make the tool easy and convenient to use in demanding environments. A serial and USB interface connect to a laptop or PC and link to popular spreadsheets for plotting and analyzing data for maintenance records, customer compliance, and other uses.

Source: **Pinpoint Laser Systems Inc.,** 3 Graf Rd., Unit 14, Newburyport, MA 01950.

Imports of crude and products

	Districts 1-4		District 5		Total US		
	9-28 2007	9-21 2007	9-28 2007	9-21 2007	9-28 2007	9-21 2007	*9-29 2006
	1,000 b/d						
Total motor gasoline	1,032	1,034	122	18	1,154	1,052	1,114
Mo. gas. blending comp.	608	531	28	18	636	549	750
Distillate	192	314	—	—	192	314	304
Residual	335	341	—	7	335	348	208
Jet fuel-kerosine	85	118	27	150	112	268	200
Propane-propylene	159	167	6	1	165	168	224
Other	639	590	32	32	671	622	(97)
Total products	**3,050**	**3,095**	**215**	**226**	**3,265**	**3,321**	**2,703**
Total crude	**8,905**	**9,224**	**1,348**	**1,218**	**10,253**	**10,442**	**10,513**
Total imports	**11,955**	**12,319**	**1,563**	**1,444**	**13,518**	**13,763**	**13,216**

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

Purvin & Gertz LNG netbacks—Oct. 5, 2007

Receiving terminal	Liquefaction plant					
	Algeria	Malaysia	Nigeria	Austr. NW Shelf	Qatar	Trinidad
	$/MMbtu					
Barcelona	6.63	4.64	5.81	4.54	5.24	5.79
Everett	5.72	3.60	5.33	3.69	4.19	6.02
Isle of Grain	7.53	5.33	6.87	5.22	5.94	6.94
Lake Charles	4.51	2.58	4.26	2.75	3.02	5.14
Sodegaura	5.47	7.33	5.67	7.35	6.66	4.91
Zeebrugge	6.41	4.32	5.81	4.22	4.90	5.83

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

Crude and product stocks

District	Crude oil	Motor gasoline		Jet fuel, kerosine	Fuel oils		Propane-propylene
		Total	Blending comp.[1]		Distillate	Residual	
	1,000 bbl						
PADD 1	14,461	50,418	23,929	10,656	58,992	14,479	4,809
PADD 2	64,683	47,082	15,386	7,205	29,079	1,267	23,156
PADD 3	174,343	59,800	26,094	12,149	32,702	15,650	28,376
PADD 4	14,577	5,613	1,662	572	2,602	360	[1]2,913
PADD 5	53,691	28,412	20,445	10,264	12,582	5,652	—
Sept. 28, 2007	**321,755**	**191,325**	**87,516**	**40,846**	**135,887**	**37,408**	**59,254**
Sept. 21, 2007	**320,617**	**191,366**	**87,321**	**41,751**	**137,060**	**37,960**	**58,912**
Sept. 29, 2006[2]	**328,122**	**215,052**	**96,525**	**42,699**	**151,466**	**42,754**	**69,993**

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

Refinery report—Sept. 28, 2007

District	Refinery operations		Refinery output				
	Gross inputs	Crude oil inputs	Total motor gasoline	Jet fuel, kerosine	Fuel oils		Propane-propylene
					Distillate	Residual	
	1,000 b/d						
PADD 1	1,524	1,537	1,727	80	495	136	80
PADD 2	3,088	3,118	2,012	197	871	49	176
PADD 3	7,296	7,234	3,116	586	1,993	317	627
PADD 4	569	561	273	24	158	15	[1]152
PADD 5	2,791	2,704	1,570	454	557	181	—
Sept. 28, 2007	**15,268**	**15,154**	**8,698**	**1,341**	**4,074**	**698**	**1,035**
Sept. 21, 2007	**15,165**	**15,018**	**8,722**	**1,372**	**4,131**	**664**	**999**
Sept. 29, 2006[2]	**15,642**	**15,273**	**8,902**	**1,484**	**4,178**	**538**	**1,001**
	17,448 operable capacity		**87.5% utilization rate**				

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

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

OGJ crack spread

	*10-5-07	*10-6-06	Change	Change, %
	$/bbl			
SPOT PRICES				
Product value	88.69	65.95	22.73	34.5
Brent crude	77.74	57.45	20.29	35.3
Crack spread	10.95	8.50	2.45	28.8
FUTURES MARKET PRICES				
One month				
Product value	87.59	66.86	20.74	31.0
Light sweet crude	80.58	59.78	20.80	34.8
Crack spread	7.01	7.07	–0.06	–0.9
Six month				
Product value	91.81	77.07	14.75	19.1
Light sweet crude	77.23	64.94	12.29	18.9
Crack spread	14.59	12.13	2.45	20.2

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

OGJ GASOLINE PRICES

	Price ex tax 10-3-07	Pump price* 10-3-07	Pump price 10-4-06
	¢/gal		
(Approx. prices for self-service unleaded gasoline)			
Atlanta	240.4	280.1	216.7
Baltimore	225.1	267.0	224.7
Boston	222.1	264.0	233.1
Buffalo	219.9	280.0	240.2
Miami	249.4	299.7	237.9
Newark	228.1	261.0	233.4
New York	218.9	279.0	247.5
Norfolk	224.3	261.9	217.1
Philadelphia	225.3	276.0	238.6
Pittsburgh	225.3	276.0	236.1
Wash., DC	240.6	279.0	242.2
PAD I avg.	229.0	274.9	233.4
Chicago	247.9	298.8	247.4
Cleveland	231.5	277.9	213.8
Des Moines	230.6	271.0	202.8
Detroit	243.4	292.6	224.8
Indianapolis	242.9	287.9	214.8
Kansas City	240.1	276.1	210.8
Louisville	251.4	288.3	207.8
Memphis	217.7	257.6	222.1
Milwaukee	245.4	296.7	232.8
Minn.-St. Paul	249.9	290.3	220.8
Oklahoma City	233.8	269.2	208.8
Omaha	225.6	272.0	220.4
St. Louis	225.9	261.9	218.2
Tulsa	230.4	265.8	206.1
Wichita	223.5	266.9	213.8
PAD II avg.	236.0	278.2	217.7
Albuquerque	237.4	273.6	225.9
Birmingham	224.5	263.2	212.0
Dallas-Fort Worth	223.8	262.2	207.0
Houston	229.1	267.5	211.0
Little Rock	223.3	263.5	215.0
New Orleans	230.8	269.2	229.0
San Antonio	226.2	264.6	224.7
PAD III avg.	227.9	266.3	217.8
Cheyenne	246.5	278.9	247.1
Denver	245.6	286.0	254.9
Salt Lake City	238.4	281.3	261.3
PAD IV avg.	243.5	282.1	254.6
Los Angeles	226.4	284.9	261.9
Phoenix	257.4	294.6	241.4
Portland	250.5	293.6	261.8
San Diego	238.3	296.8	265.9
San Francisco	234.3	292.8	277.0
Seattle	237.4	289.8	271.8
PAD V avg.	240.7	292.1	263.3
Week's avg.	**234.0**	**277.6**	**231.0**
Sept. avg.	**236.3**	**280.4**	**253.3**
Aug. avg.	**237.2**	**280.8**	**296.7**
2007 to date	**229.6**	**273.2**	—
2006 to date	**221.2**	**264.8**	—

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

REFINED PRODUCT PRICES

	9-28-07 ¢/gal		9-28-07 ¢/gal
Spot market product prices			
Motor gasoline (Conventional-regular)		Heating oil No. 2	
New York Harbor	208.25	New York Harbor	219.88
Gulf Coast	209.00	Gulf Coast	219.80
Los Angeles	223.75	Gas oil	
Amsterdam-Rotterdam-Antwerp (ARA)	192.35	ARA	225.29
Singapore	201.60	Singapore	222.50
Motor gasoline (Reformulated-regular)		Residual fuel oil	
New York Harbor	204.00	New York Harbor	138.88
Gulf Coast	203.00	Gulf Coast	148.21
Los Angeles	225.75	Los Angeles	158.30
		ARA	142.10
		Singapore	150.35

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

BAKER HUGHES RIG COUNT

	10-5-07	10-6-06
Alabama	5	4
Alaska	4	7
Arkansas	48	26
California	38	35
Land	37	31
Offshore	1	4
Colorado	109	93
Florida	0	0
Illinois	0	0
Indiana	2	0
Kansas	13	8
Kentucky	11	10
Louisiana	154	191
N. Land	58	58
S. Inland waters	28	20
S. Land	27	43
Offshore	41	70
Maryland	1	1
Michigan	1	1
Mississippi	13	13
Montana	12	17
Nebraska	1	0
New Mexico	66	91
New York	6	6
North Dakota	43	37
Ohio	13	99
Oklahoma	198	186
Pennsylvania	17	15
South Dakota	1	1
Texas	843	791
Offshore	5	13
Inland waters	1	2
Dist. 1	25	22
Dist. 2	32	26
Dist. 3	58	52
Dist. 4	89	97
Dist. 5	174	137
Dist. 6	123	115
Dist. 7B	40	47
Dist. 7C	59	41
Dist. 8	121	94
Dist. 8A	19	28
Dist. 9	38	43
Dist. 10	59	74
Utah	44	42
West Virginia	33	25
Wyoming	68	108
Others—NV-3; TN-5; VA-3	11	7
Total US	**1,755**	**1,724**
Total Canada	**332**	**449**
Grand total	**2,087**	**2,173**
Oil rigs	318	288
Gas rigs	1,431	1,432
Total offshore	48	88
Total cum. avg. YTD	**1,760**	**1,628**

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	10-5-07 Rig count	10-5-07 Percent footage*	10-6-06 Rig count	10-6-06 Percent footage*
0-2,500	59	5.0	50	—
2,501-5,000	110	59.0	84	45.2
5,001-7,500	219	22.8	229	18.7
7,501-10,000	440	2.7	398	4.0
10,001-12,500	435	2.2	420	1.9
12,501-15,000	276	—	274	0.3
15,001-17,500	111	—	109	—
17,501-20,000	68	—	73	—
20,001-over	33	—	34	—
Total	**1,751**	**7.9**	**1,671**	**6.3**
INLAND	39		39	
LAND	1,661		1,565	
OFFSHORE	51		67	

*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]10-5-07	[2]10-6-06
	1,000 b/d	
(Crude oil and lease condensate)		
Alabama	16	20
Alaska	754	670
California	666	680
Colorado	51	62
Florida	6	7
Illinois	31	27
Kansas	95	97
Louisiana	1,314	1,392
Michigan	14	14
Mississippi	48	48
Montana	91	97
New Mexico	167	157
North Dakota	108	114
Oklahoma	165	172
Texas	1,325	1,342
Utah	45	49
Wyoming	143	142
All others	60	72
Total	**5,099**	**5,162**

[1]OGJ estimate. [2]Revised.

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

US CRUDE PRICES

$/bbl*	10-5-07
Alaska-North Slope 27°	67.75
South Louisiana Sweet	81.25
California-Kern River 13°	69.90
Lost Hills 30°	77.90
Southwest Wyoming Sweet	73.22
East Texas Sweet	77.25
West Texas Sour 34°	72.00
West Texas Intermediate	77.75
Oklahoma Sweet	77.75
Texas Upper Gulf Coast	74.25
Michigan Sour	70.25
Kansas Common	76.75
North Dakota Sweet	68.25

*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]	9-28-07
United Kingdom-Brent 38°	77.96
Russia-Urals 32°	75.43
Saudi Light 34°	75.77
Dubai Fateh 32°	75.61
Algeria Saharan 44°	80.09
Nigeria-Bonny Light 37°	80.96
Indonesia-Minas 34°	79.08
Venezuela-Tia Juana Light 31°	74.77
Mexico-Isthmus 33°	74.66
OPEC basket	69.46
Total OPEC[2]	76.52
Total non-OPEC[2]	75.18
Total world[2]	75.91
US imports[3]	73.50

[1]Estimated contract prices. [2]Average price (FOB) weighted by estimated export volume. [3]Average price (FOB) weighted by estimated import volume. NOTE: No new data at presstime.

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

US NATURAL GAS STORAGE[1]

	9-28-07	9-21-07	Change
	bcf		
Producing region	965	951	14
Consuming region east	1,864	1,831	33
Consuming region west	434	424	10
Total US	**3,263**	**3,206**	**57**
	July 07	**July 06**	**Change, %**
Total US[2]	**2,894**	**2,779**	**4.1**

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

Statistics

International rig count

Region	Land	Sept. 2007 Off.	Total	Sept. 06 Total
WESTERN HEMISPHERE				
Argentina	75	—	75	83
Bolivia	4	—	4	3
Brazil	18	22	40	32
Canada	348	3	351	446
Chile	1	—	1	1
Colombia	41	1	42	26
Ecuador	11	—	11	11
Mexico	72	32	104	82
Peru	6	1	7	4
Trinidad	—	3	3	7
United States	1,718	65	1,783	1,739
Venezuela	60	13	73	81
Other	3	—	3	2
Subtotal	**2,357**	**140**	**2,497**	**2,517**
ASIA-PACIFIC				
Australia	13	11	24	18
Brunei	2	3	5	4
China-offshore	—	21	21	18
India	56	29	85	85
Indonesia	41	21	62	48
Japan	2	1	3	2
Malaysia	—	15	15	11
Myanmar	7	—	7	8
New Zealand	3	2	5	3
Papua New Guinea	2	—	2	3
Philippines	—	—	—	1
Taiwan	—	—	—	—
Thailand	2	6	8	9
Vietnam	—	6	6	10
Other	1	2	3	4
Subtotal	**129**	**117**	**246**	**224**
AFRICA				
Algeria	30	—	30	29
Angola	—	3	3	4
Congo	2	1	3	1
Gabon	2	1	3	2
Kenya	—	—	—	—
Libya	13	1	14	10
Nigeria	4	7	11	12
South Africa	—	—	—	—
Tunisia	3	2	5	3
Other	3	1	4	3
Subtotal	**57**	**16**	**73**	**64**
MIDDLE EAST				
Abu Dhabi	10	4	14	14
Dubai	1	—	1	2
Egypt	40	11	51	37
Iran	—	—	—	—
Iraq	—	—	—	—
Jordan	1	—	1	1
Kuwait	11	—	11	14
Oman	49	—	49	40
Pakistan	19	—	19	19
Qatar	4	9	13	11
Saudi Arabia	68	10	78	74
Sudan	—	—	—	—
Syria	19	—	19	23
Yemen	16	—	16	16
Other	1	—	1	2
Subtotal	**239**	**34**	**273**	**253**
EUROPE				
Croatia	1	—	1	1
Denmark	—	2	2	4
France	1	—	1	1
Germany	5	—	5	5
Hungary	2	—	2	3
Italy	4	1	5	7
Netherlands	1	3	4	5
Norway	—	15	15	12
Poland	2	—	2	1
Romania	2	1	3	2
Turkey	5	—	5	4
UK	1	24	25	26
Other	7	—	7	5
Subtotal	**31**	**46**	**77**	**76**
Total	**2,813**	**353**	**3,166**	**3,134**

Definitions, see OGJ Sept. 18, 2006, p. 42.
Source: Baker Hughes Inc.
Data available in OGJ Online Research Center.

Oil import freight costs*

Source	Discharge	Cargo	Cargo size, 1,000 bbl	Freight (Spot rate) worldscale	$/bbl
Caribbean	New York	Dist.	200	169	1.42
Caribbean	Houston	Resid.	380	139	1.30
Caribbean	Houston	Resid.	500	107	1.01
N. Europe	New York	Dist.	200	197	2.63
N. Europe	Houston	Crude	400	145	2.85
W. Africa	Houston	Crude	910	82	1.79
Persian Gulf	Houston	Crude	1,900	46	1.87
W. Africa	N. Europe	Crude	910	82	1.32
Persian Gulf	N. Europe	Crude	1,900	45	1.31
Persian Gulf	Japan	Crude	1,750	58	1.38

*September 2007 average.
Source: Drewry Shipping Consultants Ltd. Data available in OGJ Online Research Center.

Waterborne Energy Inc. US LNG imports

Country	Sept. 2007	Aug. 2007	Sept. 2006	Change from a year ago, %
	MMcf			
Algeria	2,880	3,080	—	—
Egypt	12,020	14,710	5,900	103.7
Equatorial Guinea	—	3,030	—	—
Nigeria	3,030	14,380	8,890	–65.9
Qatar	—	6,060	—	—
Trinidad and Tobago	23,830	48,190	26,670	–10.6
Total	**41,760**	**89,450**	**41,460**	**0.7**

Source: Waterborne Energy Inc.
Data available in OGJ Online Research Center.

Baker Oil Tools workover rig count*

Region	June 2007	June 2006	Change, %
Gulf Coast	277	328	–15.5
Midcontinent	259	311	–16.7
Northeastern	90	88	2.3
Rocky Mountains	255	251	1.6
Southeastern	195	198	–1.5
West Texas	325	338	–3.8
Western	147	133	10.5
Total US	**1,548**	**1,647**	**–6.0**
Canada	486	760	–36.1
Total N. America	**2,034**	**2,407**	**–15.5**

*Wells over 1,500 ft deep and tubing out of the wellbore. Excludes rigs on rod jobs. Definitions, see OGJ Sept. 18, 2006, p. 42. Source: Baker Hughes Inc. Data available in OGJ Online Research Center.
NOTE: This data has been discontinued. The table will not appear in future editions.

Propane prices

	Aug. 2007	Sept. 2007	Aug. 2006	Sept. 2006
	¢/gal			
Mont Belvieu	118.61	129.50	113.77	101.18
Conway	118.64	128.76	112.09	97.58
Northwest Europe	119.28	124.72	107.54	104.76

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

Muse, Stancil & Co. refining margins

	US Gulf Coast	US East Coast	US Mid-west	US West Coast	North-west Europe	South-east Asia
	$/bbl					
Sept. 2007						
Product revenues	94.78	88.01	95.29	92.32	87.58	82.14
Feedstock costs	–80.04	–79.01	–71.92	–73.53	–76.71	–79.27
Gross margin	14.74	9.00	23.37	18.79	10.87	2.87
Fixed costs	–2.06	–2.38	–2.32	–2.70	–2.32	–1.80
Variable costs	–1.93	–1.33	–1.72	–3.05	–2.88	–0.91
Cash operating margin	**10.75**	**5.29**	**19.33**	**13.04**	**5.67**	**0.16**
Aug. 2007	11.27	5.36	21.68	12.20	5.94	1.66
YTD avg.	13.82	7.53	20.10	22.55	6.21	2.51
2006 avg.	12.49	6.01	14.99	23.73	5.88	1.06
2005 avg.	12.53	6.98	12.31	20.55	5.51	1.52
2004 avg.	6.16	3.70	6.64	11.76	5.08	1.83

Source: Muse, Stancil & Co. See OGJ, Jan. 15, 2001, p. 46
Data available in OGJ Online Research Center.

Muse, Stancil & Co. gasoline marketing margins

Aug. 2007	Chicago*	Houston	Los Angeles	New York
	¢/gal			
Retail price	305.25	269.76	286.01	293.35
Taxes	57.15	38.40	58.51	51.07
Wholesale price	234.89	213.17	212.97	216.58
Spot price	226.96	199.23	202.29	201.35
Retail margin	13.54	18.19	14.53	25.70
Wholesale margin	7.93	13.94	10.68	15.23
Gross marketing margin	**21.47**	**32.13**	**25.21**	**40.93**
July 2007	33.62	27.15	20.02	37.05
YTD avg.	25.75	22.32	19.45	31.12
2006 avg.	19.74	20.34	18.03	27.90
2005 avg.	19.77	16.26	20.39	27.13
2004 avg.	22.49	17.49	23.61	30.38

*The wholesale price shown for Chicago is the RFG price utilized for the wholesale margin. The Chicago retail margin includes a weighted average of RFG and conventional wholesale purchases.
Source: Muse, Stancil & Co. See OGJ, Oct. 15, 2001, p. 46.
Data available in OGJ Online Research Center.
Note: Margins include ethanol blending in all markets.

Muse, Stancil & Co. ethylene margins

	Ethane	Propane	Naphtha
	¢/lb ethylene		
Sept. 2007			
Product revenues	61.82	96.70	115.77
Feedstock costs	–36.70	–73.73	–111.89
Gross margin	25.12	22.97	3.88
Fixed costs	–5.38	–6.36	–7.19
Variable costs	–4.18	–4.90	–6.52
Cash operating margin	**15.56**	**11.71**	**–9.83**
Aug. 2007	16.09	15.94	–0.33
YTD avg.	14.47	15.44	–7.34
2006 avg.	19.55	22.53	1.77
2005 avg.	14.43	20.68	1.28
2004 avg.	9.00	12.03	0.51

Source: Muse, Stancil & Co. See OGJ, Sept. 16, 2002, p. 46.
Data available in OGJ Online Research Center.

Muse, Stancil & Co. US gas processing margins

Sept. 2007	Gulf Coast	Mid-continent
	$/Mcf	
Gross revenue		
Gas	5.73	4.70
Liquids	1.36	3.80
Gas purchase cost	6.38	6.32
Operating costs	0.07	0.15
Cash operating margin	**0.65**	**2.03**
Aug. 2007	0.46	1.57
YTD avg.	0.33	1.19
2006 avg.	0.26	0.97
2005 avg.	–0.06	0.25
2004 avg.	0.07	0.33
Breakeven producer payment % of liquids	50%	45%

Source: Muse, Stancil & Co. See OGJ, May 21, 2001, p. 54.
Data available in OGJ Online Research Center.

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This report explains how the protean nature of condensate allows it to be used in a wide range of sectors: as a refinery slate component; in specialized distillation towers called condensate splitters; in direct feed to ethylene crackers; in gasoline blending and as a substitute for gas in turbine power generation. It can be defined as a base material, a blending component, a feedstock or a boiler feed.

See website for Table of Contents and sample tables, charts and graphs.

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Oil traders know output gains trim a market cushion

A production increase coordinated by the Organization of Petroleum Exporting Countries isn't always what it appears to be.

Much of the price response depends on how much oil the group's heavy hitters can produce but don't before the output change.

By definition, when OPEC raises production, idle capacity falls. The latter effect can

The Editor's Perspective

by Bob Tippee, Editor

spook the market enough to offset price moderation sought by the former.

The market needs its cushions against supply disruptions. When those cushions are thin, traders get nervous.

For now, one of the market's two cushions, inventory, looks stout. The other cushion, spare capacity, looks—well, interesting.

In August, according to the International Energy Agency, spare capacity of the 10 OPEC members other than Algeria and Iraq, which don't have quotas and produce as much as they can, totaled 3.3 million b/d. A year earlier it was 2.27 million b/d.

Against the production numbers that yielded the recent figure, the 500,000 b/d production increase OPEC announced Sept. 11, effective Nov. 1, would lower spare capacity to 2.8 million b/d.

That's still up from last year—and the 3 prior years—but is it enough?

The answer depends on how much oil traders think the market might need in a hurry. In 2002-03, the market lost supply in sequential, sudden increments of 2-2.5 million b/d from Venezuela, Nigeria, and Iraq.

Spare capacity at the current level could cover such losses. But then there's Iran, another place where anything can happen. In August the Islamic Republic produced, by IEA's reckoning, 3.87 million b/d. Loss of Iranian oil would make all that oil in storage very important while it lasted.

While welcome, the past year's growth in spare production capacity offers little comfort. It happened because OPEC cut production. Total sustainable capacity of quota-bound OPEC members actually fell August-to-August by 170,000 b/d.

If there's warming news in any of this, it's that capacity losers include the three producers that worry the market most. So potential losses from disruptions in Venezuela, Nigeria, and Iran are less, however slightly, than they were before.

But that's stretching. Demand's still rising. The market remains under strain.

(Online Oct. 5, 2007; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

Crude price rebounds then settles

Crude futures prices rebounded more than $10/bbl in the first 3 weeks of September to a record high of $83.90/bbl Sept. 20 on the New York Mercantile Exchange then fluctuated in a $5/bbl range below that, subsequently closing at $81.22/bbl Oct. 5.

Olivier Jakob, managing director of Petromatrix GMBH, Zug, Switzerland, noted for the third consecutive week benchmark US crude futures had traded "in a very narrow range but still near record highs." Although West Texas Intermediate had declined, it was "still $21.45/bbl higher than a year ago," Jakob said.

Many analysts credited the weakness of the dollar for helping to keep energy prices at higher levels than otherwise could be expected. In late September into early October, the US dollar sank to its lowest level against the euro since 2004. The dollar index inched up just 0.4% Oct. 5 amid reports European finance ministers were trying to bring the euro down from record highs against the weakened dollar. That same day US officials said the economy improved with strong employment figures for September.

"Concerns over worrisome economic indicators have undermined oil prices on fears of a slowdown in oil demand growth," said analysts at KBC Process Technology Ltd. in Surrey, UK. They predicted, "Crude oil prices will not hold above $80/bbl, and this will lead to liquidation of speculative length and a sharp drop in oil prices, sooner rather than later."

The Societe Generale Group in Paris said increased refinery maintenance and retreating refining margins should pull down crude prices through reduced demand. "Refining margins are poor everywhere on a sharp fall last week, except in Singapore," group analysts reported Oct. 8. Even so, they said, "It will take time for lower runs to tighten product balances."

'Bullish' indicators

However, analysts in the Houston office of Raymond James & Associates Inc. said: "The global oil outlook looks as bullish as we have seen in many years. We are looking at meaningful oil inventory reductions, despite the following (very conservative) supply-demand assumptions. First, we believe the oil market will continue to overestimate non-OPEC's ability to grow production; this is a trend that will likely continue for the next decade. Second, since non-OPEC oil supply is not going to be able to meet the rising demand, the world is going to be increasingly dependent on the Organization of Petroleum Exporting Countries' ability to increase production. We are assuming that key OPEC producers ramp back up 2008 production to peaks seen in late 2005. Finally, limited oil supply growth forces us to model a slowdown in oil demand growth in both the US and Asia."

Raymond James forecast worldwide oil demand will grow only 1.5% vs. the Paris-based International Energy Agency estimates of 2.4% growth in 2008. "Even with lower demand growth assumptions and Saudi Arabia returning to late 2005 production highs, global oil inventories are likely to fall again in 2008. Ultimately, as worldwide inventories continue to fall and mature oil fields continue their production declines, we expect oil prices to maintain their bullish trajectory. Accordingly, we are increasing our 2008 oil price forecast from $70/bbl to $80/bbl and setting our initial 2009 forecast at $85/bbl," Raymond James analysts said.

Still, KBC analysts point out the "virtual disappearance" of US demand growth in the third quarter. "US expansion appears to have been curtailed as falling house prices dent both consumer confidence and construction activity," they said.

After falling in August, US gasoline inventories were down to 191.3 million bbl in the last week of September. "While this is a massive 22 million bbl below the record high level for this time of the year in 2006, the peak demand season is over, and the threat of hurricane disruption is fast receding. The front month NYMEX gasoline crack has fallen below $3/bbl, which appears to belie stated market concerns over tightness in gasoline. Moreover, it seems to suggest that the current high level of speculative length in gasoline (47,000 contracts) could be vulnerable to liquidation," said KBC analysts.

US distillate fuel stocks were at 135.9 million bbl in the same week—an "adequate level" said KBC analysts. "Thus, with forecasts of a comparatively mild fourth quarter, speculators might also be carrying a high level of exposure on No. 2 heating oil with a net long position of 37,000 contracts, especially when refinery output rises later in October as the current period of US refinery maintenance draws to a close. Any sell-off in either gasoline or heating oil would also impact on the price of crude," they said.

(Online Oct. 8, 2007; author's e-mail: samf@ogjonline.com)

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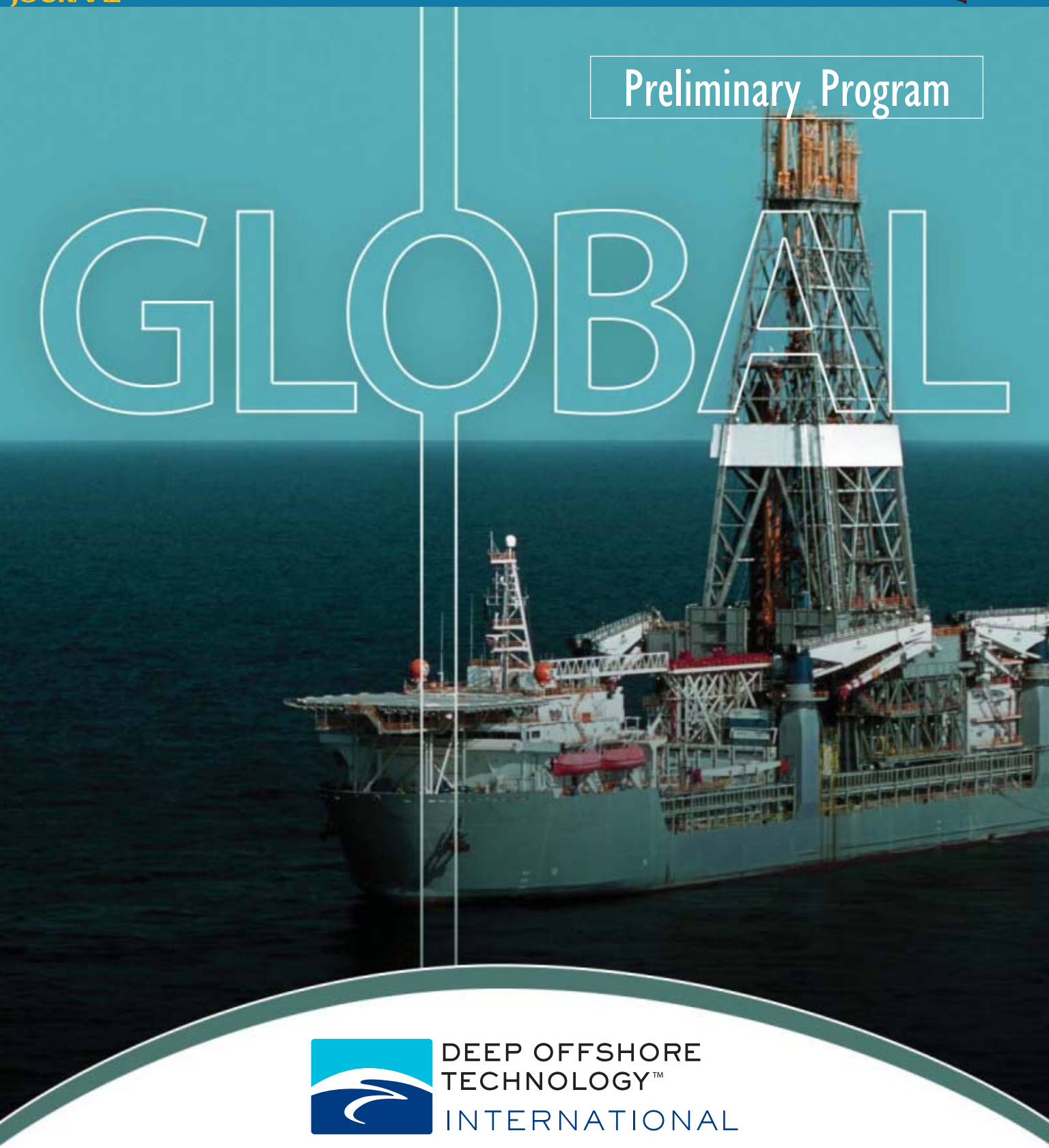

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The theme for this event, "Risks, Resources & Rewards" captures three key challenges facing the deepwater industry - safely and successfully managing risks, completing projects on time and under budget with limited resources, and assuring profitability in the face of increasing costs and difficult operating environments.

As most of you know, improved commodity prices have been accompanied by significant increases in the cost of equipment and services. At the same time, the industry is faced with an inadequate supply of trained and experienced personnel in virtually every engineering and technical discipline. Meanwhile, the search for hydrocarbons is moving into more hostile environments and greater water depths. The challenge for all operating companies is to apply the right technology to safely deliver vital oil and gas to the world's growing economies while returning adequate value to the shareholders.

More than ever, the industry must rely on innovation in technology to unlock deepwater assets. New and improved technology - much of which you will see presented at DOT in Houston - must provide the capabilities to succeed in the face of these challenging circumstances.

The mission of DOT is to provide an annual forum dedicated to the advancement of the deep offshore industry that addresses these technical challenges. The conference provides an unparalleled networking opportunity for attendees to share technology and address issues with experts in their respective fields and to gain an understanding of the changes that are taking place within those technologies. DOT also encourages the development of young professionals. This initiative has resulted in a growing number of papers authored by young engineers. Newcomers to the industry have found DOT to be an effective forum at which to quickly gain an understanding of key deepwater technologies.

This year's program will focus on lessons learned from recent field developments, emerging technical solutions, and areas where new challenges still remain. This year's conference features the high-quality selection of papers participants have come to expect, with special emphasis on the unique challenge of subsea boosting and processing and expanded discussion of riser technology.

On behalf of the Advisory Board, I welcome you to DOT Houston 2008. I believe you will find this year's program stimulating, engaging, and beneficial as we anticipate the highest attended DOT yet.

I look forward to seeing you on the show floor.

Eldon Ball
Director, Offshore conferences
Editor-in-Chief, *Offshore* magazine
PennWell Corporation

DOT Mission Statement

DOT is recognized as the leading forum addressing technical issues related to exploration, development, and production of oil and gas in deep and ultra deepwater basins around the world. As our industry confronts new challenges, the sharing of deepwater experience will play a critical role in improving the quality, safety, and economics of future endeavors.

The mission of DOT is to provide an annual forum dedicated to the advancement of the deepwater exploration & production. The conference addresses the technical challenges to safely and cost-effectively develop deepwater reserves, and encourages the development of young professionals.

DOT 2008 Advisory Board

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David Walters . . . . . *2H Offshore*
Steve Whitaker . . . . *HESS Corp.*

Who Attends DOT

DOT is vital to industry leaders who seek information and emerging technology with which to plan future deep offshore operations. DOT has a multi-national audience that provides a professional setting for making contacts and other business arrangements. DOT exhibitors have consistently recognized this conference as having the highest caliber of professionals in attendance. Exhibitors are exposed to technical specialists, key department managers, operating vice presidents, and leaders who influence purchasing decisions and bid lists.

Experts from around the world will gather in Houston to learn about the complexities of exploration and production under extreme conditions. Attending DOT provides to listen to topical discussions about

- Projects and Lessons Learned
- Subsea and Risers
- Drilling and Construction

Event Overview

The DOT International Conference & Exhibition is the most significant deepwater event in the world. This event offers:

- A unique gathering of the worlds leading executives, managers, and engineers from major and independent E&P companies.
- Original reports on the current and future state of technology in this frontier environment delivered by key personnel involved in groundbreaking projects.
- A renewed focus on subsea tieback technology and equipment, viewed at the strategic level with case studies and reports on application technologies.
- Geopolitical and economic evaluations of the future of deep offshore technology around the globe with input from major, independent, and state-owned operators.

Technical Focus Areas

- Lessons Learned – Field Development
- Lessons Learned in Deepwater Operations
- Frontier Areas
- Marginal Field Developments
- Workforce and Demographics
- Aging Deepwater Structures
- Redeployment of DW Assets
- Changing Market Dynamics
- Metocean (Hurricanes, Geotechnical)
- Riser Technology/Riser Fatigue
- Well Construction/Petroleum Technology
- Field Architecture and Economics
- Flowlines and Pipelines
- Completion Design in Deepwater
- Flow Assurance
- Station Keeping
- Project Execution and Management
- Model Testing
- Risk and Reliability
- Subsea Technology
- Advanced Materials
- Integrated Operations (e-Field)
- Seabed Boosting and Processing
- Construction/Installation
- Technology Qualification and Implementation
- Floating Facilities
- Long Distance Tiebacks
- Intervention

Conference Value

DOT International Conference & Exhibition is a highly-focused event developed to provide maximum relevance and benefit for both exhibitors and attendees. This pivotal conference has grown to become the authoritative conference for key offshore E&P decision makers worldwide in that the information shared can be immediately be applied to most situations today and tomorrow.

DOT also provides a rich learning and marketing environment for exhibitors as the conference brings:

- A unique gathering of the world's leading executives, managers, and engineers from major and independent E&P companies.
- Original reports on the current and future state of technology in this frontier environment delivered by key personnel involved in groundbreaking projects. A renewed focus on the ultra deepwater spectrum between 1,600 and 3,000 meters, viewed at the strategic level with case studies and reports on first-application technologies.
- An overview of the geopolitical and economic influences shaping the future of deepwater theaters around the globe with input from major independent and state-owned operators and producers.

Why Exhibit?

As a company interested in the latest complexities of the offshore market you cannot afford to miss this event. Exhibiting at this forum will provide opportunities to make instrumental connections that hold the key to successfully enter this revitalized market.

Exhibiting will provide opportunities to:

- Meet strategic decision makers face to face
- Build meaningful relationships
- Increase brand awareness and build brand value
- Source new suppliers

Exhibitor Benefits:

- Client invitations – providing them with free admission to the exhibit floor
- Listing on the DOT website – giving attendees direct access to your website
- Listing on-line and in the official DOT 2008 Conference Program – includes company contact information and a 30-word description of your company

Cost to Exhibit:

DISCOUNTED VALUE: Beginning with our Stavanger, Norway conference, if a company exhibits at two consecutive DOT conferences they will receive a 10% discount in the Space Only exhibit rate - no matter the booth space size!

Exhibitors at DOT benefit from a select audience and multiple opportunities to:

- Increase brand awareness thus building brand value
- Meet strategic decision-makers in person
- Build and maintain meaningful business relationships
- Source new suppliers

Space cost at DOT International in Houston show is US$ 47.00 per square ft of space (minimum 100 square ft). Shell Scheme is available for an additional US$ 19.75 per square ft (minimum 100 square ft).

Sponsorships Provide Extra Value

Supplement your show presence by signing on as one of our show sponsors. There is no better way to increase your company awareness and visibility while emphasizing a commitment to the deep offshore market. Sponsorships opportunities include:

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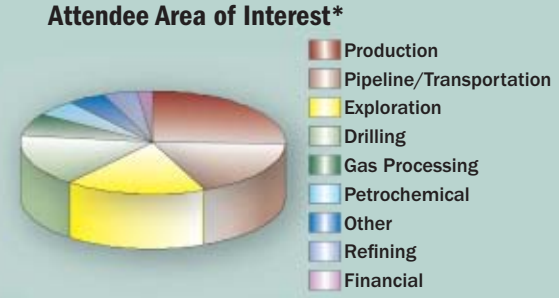
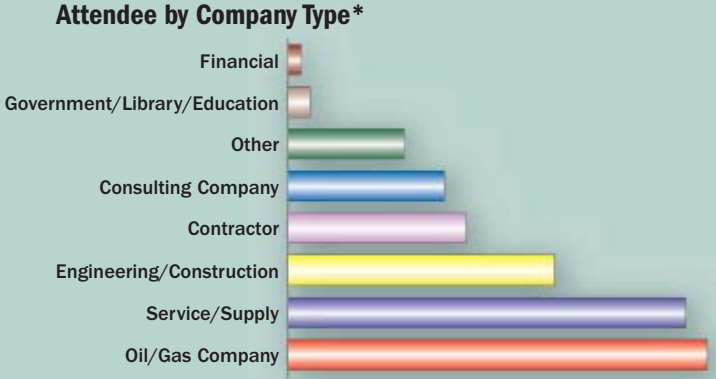
DOT Houston 2006 Attendee Demographics

Attendee by Job Title*

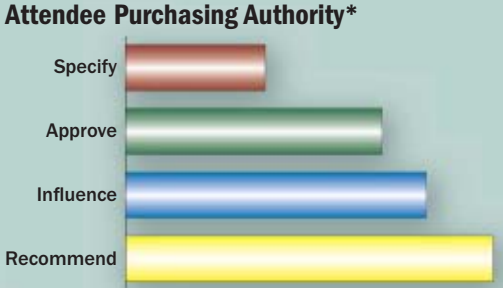
Attendee Area of Interest*



Attendee by Company Type*



Attendee Purchasing Authority*



* DOT 2006 Houston Demographics Report

DEEP OFFSHORE TECHNOLOGY INTERNATIONAL 2008 PRELIMINARY CONFERENCE PROGRAM

TUESDAY, FEBRUARY 12, 2008

08:30 a.m. - 10:00 a.m. **WELCOME & INTRODUCTION**

HOUSTON WELCOME

CHAIRMAN'S REMARKS

KEYNOTE ADDRESS

DRILLING CONTRACTOR PERSPECTIVE

CONSTRUCTION CONTRACTOR PERSPECTIVE

10:00 a.m. - 10:30 a.m. **COFFEE BREAK**

TUESDAY, FEBRUARY 12, 2008

10:30 a.m. - Noon SESSION 1:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

FLOATING FACILITIES 1 – Chair: John Murray – *FloaTEC* / Co-Chair: Pete Strake – *Hydro*

10:30 a.m. – 11:00 a.m. Application of Response Based Analysis Methods to a Turret Moored FPSO
Iwan Aryawan – *LR EMEA*

Modeling FPSO responses is important for predicting the loads on the structure and the operational envelope. The modeling must represent the interaction of the FPSO response characteristics and the environmental conditions.

11:00 a.m. – 11:30 a.m. Confidence in Global Response Design Verification of Ultra-Deepwater Floating Systems
Dr Wei Ma – *Chevron*

This paper investigates limits and uncertainties in the prediction and verification of global responses for ultra-deepwater floating facilities. Current model test basins can only model floaters with complete moorings and risers in prototype water depths.

11:30 a.m. - Noon Use of Innovative Concepts & Technologies to Reduce Cost of FPSO for Deepwater Developments
Vu Van-khoi – *TOTAL EP*

The current design of FPSO's leads to expensive projects for deepwater developments. This paper examines ways to reduce costs.

TRACK 2 Subsea Technology • Riser Technology

SUBSEA TECHNOLOGY 1 – Chair: Paul Hansen – *Chevron* / Co-Chair: Bill Boyle – *Subsea 7*

10:30 a.m. – 11:00 a.m. 3D Modeling Improves Deepwater Umbilical Design Dependability
Mark Dixon – *DeepSea Engineering & Management*

Until recently, interactions between internal components of an umbilical have been more or less neglected in modeling for fatigue prediction. In deeper waters, and with larger umbilicals, such interactions can contribute significantly.

11:00 a.m. – 11:30 a.m. Development, Qualification and Implementation of the All Electric Subsea Production System – The Future is All-Electric; and it is Here
Robert Lopez – *Cameron*

Implementation of the world's first all electric subsea production system has created interest from operators.

11:30 a.m. – Noon 200 - 500+ km TieBack in Deepwater
Marc Fullenbaum – *Alcatel Submarine Networks*

There is a growing need to effect remote subsea offshore connectivity in real time.

TRACK 3 Flow Assurance • Well Construction • Field Development

FLOW ASSURANCE 2 – Chair: Steve Bledsoe – *MCS* / Co-Chair: Steve Whitaker – *HESS Corp.*

10:30 a.m. – 11:00 a.m. Prediction of Hydrate Deposition Formed by Restrictions
Majed Abdi – *Memorial University of Newfoundland*

Hydrates can pose a major risk in all high pressure natural gas transport lines including connecting lines and manifold systems in all offshore production facilities.

11:00 a.m. – 11:30 a.m. Innovative Subsea Loop Configuration for Longer TieBacks
Boris Carlier – *Saipem S.A.*

This paper presents an innovative loop configuration as an alternate to the conventional production loop configuration that is often used for deepwater oilfields, especially offshore West Africa.

11:30 a.m. – Noon Temperature Retention during Long-Term Wellbore Shut-In: Deepwater Case History of an Insulating Packer Fluid
Paul Javora – *BJ Services Company*

Thermal insulating packer fluids are widely used in deepwater completions. Undesired heat loss to surrounding environments accelerates the formation of gas hydrate, paraffin and asphaltene deposition, which creates significant flow assurance concerns.

Noon - 1:30 p.m. LUNCH

TUESDAY, FEBRUARY 12, 2008

1:30 p.m. - 3:00 p.m. SESSION 2:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

FLOATING FACILITIES 2 – Chair: Baljit Singh – *Repsol YPF E&P* / Co-Chair: Richard D'Souza – *KBR/Granherne Americas*

1:30 p.m. – 2:00 p.m. Sensitivity Analysis of Deepwater Floaters to the New GoM Environmental Criteria
John Murray – *FloaTEC*

In view of the recent hurricane conditions that have passed through the Gulf of Mexico, the American Petroleum Institute is making recommendations to assess the behavior of existing installations of deepwater floaters.

2:00 p.m. – 2:30 p.m. Environmental and Design Challenges in an Arctic Environment for Production Facility – Offshore Sakhalin Deepwater
Nagan Srinivasan – *NOV*

The Arctic Ocean has the potential to produce oil and gas economically. Although it is a challenging environment, fields could be developed to produce hydrocarbons economically.

2:30 p.m. – 3:00 p.m. Optimization of a Floating Platform to Transfer GTL Technology Offshore
Jim Lye – *BPP Technical Services*

Significant volumes of oil-associated gas have been produced offshore without a viable market or nearby effective use. In addition, there are even larger volumes of condensate-associated and dry gases known to exist in remote deepwater locations.

TRACK 2 Subsea Technology • Riser Technology

SUBSEA TECHNOLOGY 2 – Chair: Jeff Schrull – *ADDAX Petroleum – OPE Inc* / Co-Chair: Nico Vandenworm

1:30 p.m. – 2:00 p.m. Dual Subsea Chokes with HIPPS for High Pressure Reserve Development
Weihong Meng – *Fluor Corporation*

As more deepwater high pressure reservoirs are discovered in the North Sea and in the Gulf of Mexico, usually associated with high reservoir temperature, significant challenges are presented in material selection, design, and installation methods.

2:00 p.m. – 2:30 p.m. All Electric Subsea Systems – Delivering the Electrical Power
Svend Rocke – *VetcoGray Scandinavia*

There is a new resolve in the subsea industry, both from the operators and suppliers, to qualify and install all-electric subsea production systems. The motivation for the change to all-electric is due to the environmental pressures now in place.

2:30 p.m. – 3:00 p.m. Long Arctic Subsea TieBack Control Buoy
Brendan Campbell – *Force Technology*

One of the major challenges of arctic development is the remote location coupled with the risk of ice collisions. TOTAL has reviewed the various options for production facilities for these artic conditions.

TRACK 3 Flow Assurance • Well Construction • Field Development

FLOWLINES & PIPELINES 1 – Chair: Lee Noris – *Scandpower* / Co-Chair: Todd Stevens – *ExxonMobil*

1:30 p.m. – 2:00 p.m. Multiphase Flow Assurance Design for Long Gas-Condensate Pipelines – Field Experience and Uncertainty Assessment
Gunnar Flaten – *Statoil ASA*

The design of long gas-condensate pipelines aims to optimize the transport of the produced fluids to a processing plant. The design process involves balancing hydraulic capacity and multiphase flow assurance issues, such as liquid management and hydrate condensates.

2:00 p.m. – 2:30 p.m. Evaluation of Landslide Impact on Deepwater Submarine Pipelines
Chiara M. Traverso – *D'Appolonia S.p.A.*

The push of the petroleum industry into ever greater water depths has led to a tangible increase in project geohazards. One of the most significant hazards on the continental shelf is submarine landslides.

2:30 p.m. – 3:00 p.m. Techniques for Detection of Water Intrusion in Pipelines and Hydrates Using Radioisotopes
Scott Vidrine – *Tracerco*

The paper will discuss the use of radioisotopes in detecting the presence of water intrusion into new pipelines, the intrusion of water into the outer jacket of a pipe-in-pipe design, and hydrate detection.

3:00 p.m. - 3:30 p.m. COFFEE BREAK

TUESDAY, FEBRUARY 12, 2008

3:30 p.m. - 5:00 p.m. SESSION 3:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

FLOATING FACILITIES 3 – Chair: Bob Lewis – *Devon Energy* / Co-Chair: Uri Nooteboom – *INTEC Engineering*

3:30 p.m. – 4:00 p.m. Dynamic Positioned FPSO for use in Ultra Deepwaters and or Hurricane Areas
Stig B. – *FPS Ocean AS*

During the last decade the exploration and production of oil and gas reserves has been directed into remote areas without infrastructure, deeper waters and hurricane areas. Although solutions for development of these fields exist, they are costly.

4:00 p.m. – 4:30 p.m. A Dynamically Positioned Loading Terminal
Tor Kvillum – *Grenland Group Technology AS*

The HiLoad DP is a new system for offshore loading, where off-loading will be effected by means of a dynamically positioned loading terminal. The loading terminal will be capable of docking onto a standard oil tanker.

4:30 p.m. – 5:00 p.m. Connection Hull–Topsides: Principles, Designs and Returns of Experience
Guillaume Gourdet – *Bureau Veritas*

In the seven last years, several findings have highlighted the importance of the system connecting the topsides structure to the hull. This area at the border between hull design and topsides design is of utmost importance for the production integrity.

TRACK 2 Subsea Technology • Riser Technology

SUBSEA TECHNOLOGY 3 – Chair: Joel Sanden – *Anadarko Petroleum Corp.* / Co-Chair: David Walters – *2H Offshore*

3:30 p.m. – 4:00 p.m. Leaking Subsea Valves; Identification, Quantification and Monitoring by Using Ultrasonic Systems
Hans A. Wagner – *ClampOn Inc.*

This paper will discuss the challenges in the oil and gas industry regarding leak identification, quantification and monitoring of critical subsea valves. In today's subsea installations, not many monitoring systems are in place.

4:00 p.m. – 4:30 p.m. Synergies Between Injection Network Design and Virtual Flow Metering
John Friedemann – *VetcoGray Scandinavia*

Virtual flow metering systems are dependent upon a reliable and well designed valve and instrumentation system, which should then consider all of the operational conditions for the application.

4:30 p.m. – 5:00 p.m. The New Generation of Deepwater Umbilical Designs – Challenges, Issues and Solutions
Mark Dixon – *DeepSea Engineering & Management*

Umbilicals are traditionally robust subsea components, which is valid to water depths of around 4,500-6,000 ft. Beyond this, depending on project specifics such as vessel type, umbilical size/weight, harshness of environment, etc, umbilicals require special attention.

TRACK 3 Flow Assurance • Well Construction • Field Development

FLOWLINES & PIPELINES 2 – Chair: Steve Whitaker – *HESS Corp.* / Co-Chair: Bob Kipp – *WorleyParsons Sea*

3:30 p.m. – 4:00 p.m. Thermal Expansion Management of Deep Water Flowlines: Design Concepts
Philip Cooper – *KW Ltd*

Current deepwater projects typically require insulated flowlines operating at high temperature, presenting a range of design challenges related to thermal expansion. This paper describes the development of design solutions to mitigate lateral buckling.

4:00 p.m. – 4:30 p.m. Single Production Flowline Concepts Applicable to Marginal Field Development
Michel Vaché – *DORIS/ADC*

In West Africa, most hydrocarbon assets exceeding 600 million barrels of estimated oil recovery have been developed with a subsea architecture based on production loops. Such subsea loop arrangements are associated with hydrate management relying on production flowline concepts.

4:30 p.m. – 5:00 p.m. Deepwater Pipeline Repair – Lessons Learned and New Advances
Bo Povloski – *Oil States Industries, Inc.*

As the offshore oil industry goes deeper and deeper, the need to repair deepwater pipeline components has become more frequent. Since the Hurricane Season of 2006 in the Gulf of Mexico, there has been a high focus for many companies to have a system in place.

5:00 p.m. - 6:30 p.m. EXHIBITION HALL NETWORKING RECEPTION

WEDNESDAY, FEBRUARY 13, 2008

08:30 a.m. - 10:00 a.m. SESSION 4:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

RISK & RELIABILITY – Chair: Jeff Schrull – *ADDAX Petroleum* / Co-Chair: Lee Noris – *Scandpower*

08:30 a.m. – 09:00 a.m. Deepwater Asset Protection – Terrorism at Sea
Stephan Kroecker – *SeaAway*

All offshore companies, consortiums and associated funding institutions, have a vested interest in the physical protection of rigs, workers and fields. This trend will only increase over the coming decades as the commodity becomes more valuable.

09:00 a.m. – 09:30 a.m. Cost-Risk Re-Assessment with Interim API Bull-EX
Peter Marshall – *Moonshine Hill Proprietary*

New met-ocean criteria for the Gulf of Mexico are being implemented in API Interim Bulletins and MMS emergency regulations. Design wave heights in the Central "hot spot" region are being increased by up to 30%, forces by up to 60%.

09:30 a.m. – 10:00 a.m. A New Subsea Integrity Management Strategy with Novel Inspection Techniques for Reliable Operation of Subsea Facilities
Henning Arnoy – *FORCE Technology*

A safe and reliable operation of subsea equipment and related facilities is increasingly important for the future development of oil and gas fields in deepwater areas. Subsea equipment is generally designed with high safety margins (robust) for normal operations.

TRACK 2 Subsea Technology • Riser Technology

SUBSEA BOOSTING & PROCESSING – Chair: Joel Sanden – *Anadarko Petroleum Corp.* / Co-Chair: Mark Dixon – *DeepSea Engineering*

08:30 a.m. – 09:00 a.m. Subsea Boosting Technologies for Deepwater Reserve Development
Weihong Meng – *Fluor*

This presentation reviews the applicability of traditional wellbore artificial lift methods, and the new subsea boosting technologies: gas lift, ESP, and hydraulic pumps, comments on the newly-developed subsea multiphase pump systems and subsea processing.

09:00 a.m. – 09:30 a.m. Wet Gas Compressor Technology has Matured and is Ready for Pilot Installation
Nils Arne Solvik – *Framo Engineering AS*

Subsea multiphase booster pumps are now recognized as proven technology. More than 50 pumps are delivered by Framo Engineering and units are in commercial operation both subsea and topside in China, Australia, the North Sea and outside West Africa.

09:30 a.m. – 10:00 a.m. 1,200 Horsepower ESP Subsea System Offshore Brazil Enhances Production at Jubarte Field
Ignacio Martinez – *Baker Hughes Centrilift*

As ultra deepwater discoveries enter the production phase, new technologies are required to economically bring these reserves to market.

TRACK 3 Flow Assurance • Well Construction • Field Development

WELL CONSTRUCTION / DRILLING TECHNOLOGY I – Chair: Bob Lewis – *Devon Energy* / Co-Chair: Richard D'Souza – *KBR/Granherne Americas*

08:30 a.m. – 09:00 a.m. Long Term Integrity of Subsea Wells
Lars Tore Haug – *DNV*

Is the structural integrity of subsea wells taken into account when increased oil recovery programs are initiated? DNV has developed a methodology for evaluation of long term integrity of subsea wellheads.

09:00 a.m. – 09:30 a.m. 2,000,000 lb. Landing String Development Extends the Limits of Tubular Manufacturing and Handling Technologies
James Brock – *Grant Prideco, L.P.*

Operators are setting larger OD and heavier casing to depths in excess of 22,000 feet. These heavier casing strings require landing strings with setting capacity approaching 2,000,000 lbs.

09:30 a.m. – 10:00 a.m. Wired Pipe Applications for Deepwater Well Construction
Maximo Hernandez – *IntelliServ Inc.*

Wired drill Pipe provides the drilling industry with the only high speed telemetry system that in its short existence has already generated major milestones for the Industry.

10:00 a.m. - 10:30 a.m. COFFEE BREAK

WEDNESDAY, FEBRUARY 13, 2008

10:30 a.m. - Noon SESSION 5:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

LESSONS LEARNED 1 – Chair: Steve Whitaker – *HESS Corp.* / Co-Chair: Derek Disney – *KBR Energy & Chemicals*

10:30 a.m. – 11:00 a.m. Deepwater Advancements – Technology and Operational Needs and Development in the Past and for the Future
Baljit Singh – *Repsol YPF E&P*

Over the past few decades technology advancements have been made for water depths in excess of six to eight times of that envisaged in the early/late 1990s.

11:00 a.m. – 11:30 a.m. Integrity Management and Life Extension of Flexible Pipe
Tim O'Sullivan – *MCS*

During 2002, MCS authored: "Monitoring Methods & Integrity Assurance for Unbonded Flexible Pipe" for UKOOA. Since 2002 lessons have been learnt in terms of the management and operation of flexible pipes.

11:30 a.m. – Noon Pipeline Inspection at 7,000 ft.
Leith McDonald – *Lloyds Register*

In 2006 BP US Pipelines and Logistics commissioned a baseline ROV survey of the Mardi Gras Pipelines, with many techniques and technologies being utilized for the first time in the Gulf of Mexico.

TRACK 2 Subsea Technology • Riser Technology

RISER TECHNOLOGY 1 – Chair: Steve Bledsoe – *MCS* / Co-Chair: Todd Stevens – *ExxonMobil*

10:30 a.m. – 11:00 a.m. Taking SCR's Deeper – Qualification of Nickel-Based Welds for Deepwater Steel Catenary Risers
Mark Crawford – *ExxonMobil Development Company*

Steel catenary risers and offloading lines have limited lifetime expectancies due to fatigue critical regions containing girth welds. If girth weld fatigue performance is improved to combat the deleterious effects of fatigue, enhanced girth welds can be improved.

11:00 a.m. – 11:30 a.m. Qualification of High Strength Solutions to Improve Fatigue Performance of Deepwater Steel Catenary Risers
Rajiv Aggarwal – *Granherne, Inc.*

This paper presents the design development and qualification work undertaken in a JIP during 2004 to 2007, for two out of total four fatigue design solutions for Steel Catenary Riser (SCR) Touch Down Zone (TDZ).

11:30 a.m. – Noon Carbon Fiber and High-Strength Steels: Future Directions for Material Selections in Deepwater Risers and Flowlines
Neal Prescott – *Fluor Corporation*

As more oil and gas reservoirs are discovered in deepwater in all parts of the world, significant challenges are presented in material selection, design, and installation methods of subsea pipelines and risers with respect to thermal insulation.

TRACK 3 Flow Assurance • Well Construction • Field Development

WELL CONSTRUCTION / DRILLING TECHNOLOGY 2 – Chair: Paul Hansen – *Chevron* / Co-Chair: Bill Boyle – *Subsea 7*

10:30 a.m. – 11:00 a.m. Surface BOP Operations from a Multi-Service Vessel
Colin Johnston – *Helix Energy Solutions Group*

The Q4000 multi-service vessel is converted to accommodate surface BOP, high pressure riser and subsea shut off device for drilling and completion operations. The system incorporates a 16" high pressure riser system to enable slimbore completion.

11:00 a.m. – 11:30 a.m. Development of a New Carrier-Conveyed Sampler with Improved Reliability and Safety In HPHT Environments
Cyrus Irani – *Halliburton*

A significant aspect of any well test operation is the recovery of representative bottomhole samples. This can be done in an openhole environment using wireline formation tester tools or in a cased-hole environment using tubing-conveyed samplers.

11:30 a.m. – Noon Solid Expandable Tubulars Help Turn Marginal Wells into Significant Producers
Cameron Radtke – *Enventure Global Technology*

Originally thought primarily as a contingency technology to mitigate downhole challenges, solid expandable tubulars are now being applied as enabling systems in wellbore construction, in field development, and for well and field revitalization.

Noon – 1:30 p.m. LUNCH

WEDNESDAY, FEBRUARY 13, 2008

1:30 p.m. – 3:00 p.m. SESSION 6:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

LESSONS LEARNED 2 – Chair: Todd Stevens – *ExxonMobil* / Co-Chair: David Walters – *2H Offshore*

1:30 p.m. – 2:00 p.m. Simultaneous Operations During the Atlantis Field Development
Geir Karlsen – *BP America*

Atlantis is located in 7000-ft water-depth in Green Canyon block 743. BP operates the field with BHP as partner. The sixteen producers and five injectors, at the main well center, tie back to the production quarters (PQ), 2 miles to the south.

2:00 p.m. – 2:30 p.m. Evolution of Hybrid Riser Towers for Ultra Deepwater in the Gulf of Mexico
Jean-Francois Saint-Marcoux – *Acergy*

There is a rapidly increasing interest within the O&G industry for field development in ultra deep waters of the Gulf of Mexico (3000 m or more). For a number of the discoveries, the produced fluid is at high pressure and temperature.

2:30 p.m. – 3:00 p.m. Optimized Materials Selection for High Integrity Subsea Systems
E. J. Wright – *ExxonMobil Development Company*

Key to the success of many offshore project developments is the design, fabrication and installation of optimized subsea systems. The systems include wellheads and trees, well tubulars, manifolds, jumpers, flowlines and pipelines.

TRACK 2 Subsea Technology • Riser Technology

RISER TECHNOLOGY 2 – Chair: Majid Al-Sharif – *Helix Energy Solutions Group* / Co-Chair: Bob Kipp – *WorleyParsons Sea*

1:30 p.m. – 2:00 p.m. A Hybrid Fairing System for Suppressing Vibration and Drag Loads of Marine Risers
Li Lee – *Shell Global Solutions (US) Inc.*

Marine risers used in offshore drilling and production operations may experience vortex-induced vibration (VIV) in ocean currents. VIV is detrimental to the risers as it can cause rapid fatigue damage.

2:00 p.m. – 2:30 p.m. Practical Experience from Retrofitting Fairings on Deepwater Risers and Pipelines
Christopher West – *Shell Global Solutions (US), Inc.*

This paper presents lessons learned from numerous projects where vortex-induced vibration (VIV) suppression fairings were installed, in-situ, on deepwater tubulars by a remotely-operated vehicle (ROV).

2:30 p.m. – 3:00 p.m. Benchmarking of Two Classes Of VIV Suppression Device Based on High Reynolds Number and High-Mode Number Tests
Kenneth J. Schaudt – *Oceanic Consulting, AIMS, MIT, MIt*

Strakes and flow-splitters have been proven to be highly effective at reducing vortex induced vibration. Extensive tests were run on two configurations, a 15D pitch strake and a 2D aspect ratio flow splitter using a 0.325 m diameter by 6 m long rigid cylinder.

TRACK 3 Flow Assurance • Well Construction • Field Development

COMPLETION DESIGN IN DEEPWATER – Chair: Dave Walters – 2H Offshore / Co-Chair: Pete Stracke – *Hydro*

1:30 p.m. – 2:00 p.m. Key Completion Strategies Meet Completion Goals In Chevron's BBLT Offshore Angola Development
Kenneth Johnson – *Halliburton*

The Chevron Benguela Belize Lobito Tomboco (BBLT) development project, located 50 miles offshore Cabinda, Angola, is a major project from which 200,000 BOPD are expected.

2:00 p.m. – 2:30 p.m. Inflow Control Devices (ICD) – Past, Present, & Future
Danny Turick – *BJ Services Co.*

Since their inception in Norway, ICDs have been used in wells around the world with very good success and they have evolved into different types to address different oilfields needs.

2:30 p.m. – 3:00 p.m. Use of Swellable Elastomers to Enhance Cementation in Deepwater Applications
Tim Davis – *TAM International, Inc.*

A lot of time is invested in developing a truly integrated approach that can shorten the planning and study timeframe and reduce uncertainty for drilling in the deepwater arena. Few opportunities present themselves as candidates to implement new technology.

3:00 p.m. - 3:30 p.m. COFFEE BREAK

WEDNESDAY, FEBRUARY 13, 2008

3:30 p.m. – 5:00 p.m. SESSION 7:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

LESSONS LEARNED 3 – Chair: Majid Al Sharif – *Helix Energy* Solutions Group / Co-Chair: Derek Disney – *KBR Energy & Chemicals*

3:30 p.m. – 4:00 p.m. Offshore Heavy Oil Processing and Planned De-Bottlenecking: A Successful Enterprise Case
Roberto Oliveira – *Petrobras*

As the offshore exploration activities expand, looking for new crude oil reserves presents two different challenges: the primary processing of heavy oil; and the maintenance of the current oil production on the existing mature fields.

4:00 p.m. – 4:30 p.m. Saipem Group Experience on the Development of Optimised Design Procedures for Subsea Tie-In System
Abed El-Chayeb – *Saipem SA*

The Saipem Group has been deeply involved in the design, construction and installation of deepwater subsea systems, down to 1400 m w.d. In most of the cases, the verification of the subsea tie-in system represented a critical element of the project execution.

4:30 p.m. – 5:00 p.m. Hydrate Inhibition in Ormen Lange Subsea Gas Compressions Station Pilot
Geir Elseth – *Hydro*

Hydrate inhibition in the Ormen Lange Subsea Gas Compression Station pilot will provide some 20% of the UK's gas consumption in the years to come.

TRACK 2 Subsea Technology • Riser Technology

RISER TECHNOLOGY 3 – Chair: Richard D'Souza – *KBR/Granherne Americas* / Co-Chair: Jeff Schrull – *ADDAX Petroleum*

3:30 p.m. – 4:00 p.m. Standardization of Deepwater Riser Systems
Tim Eyles – *2H Offshore Engineering Ltd*

Across the multitude of current deepwater and ultra deepwater developments there is little commonality in the selected riser designs, even between those with similar environmental and process conditions.

4:00 – 4:30 p.m. Advanced Design Methodologies for SCRs
Frank Grealish – *MCS*

For South Atlantic projects the riser system is delivered as part of a large SURF EPCI contract. The design procedure and methodologies used for the risers/SCRs therefore must be compatible with the schedule constraints within the EPCI contract.

4:30 p.m. – 5:00 p.m. Riser Systems for Ultra Deepwater: Status and Challenges
Hervй Quintin – *Acergy*

As production is moving into deeper waters, standard riser system concepts are reaching some limits and have to be improved in order to extend, in a safe, reliable and cost effective manner, to ultra deep waters (2,000m – 3,000m).

TRACK 3 Flow Assurance • Well Construction • Field Development

CONSTRUCTION / INSTALLATION 1 – Chair: Nico Vandenworm – *OPE Inc.* / Co-Chair: Bob Lewis – *Devon Energy*

3:30 p.m. – 4:00 p.m. Changing Market Dynamics
Robert Duffin – *Acergy*

The problem of servicing today's buoyant market and at the same time protecting yourself for the next downturn – An Offshore Contractors View. Recent years have seen a transformational change within the offshore construction sector.

4:00 p.m. – 4:30 p.m. Next Generation Crane Vessel
Alain Wassink – *GustoMSC*

A monohull heavy lift vessel has always been a compromise between the required stability during a heavy lift of the maximum capacity, the motion characteristics of the vessel when performing routine lifts during preparation, and execution of an installation.

4:30 p.m. – 5:00 p.m. Offshore Platforms Sizing Optimization Through Genetic Algorithms
Mauro Costa de Oliveira – *Petrobras*

The definition of the main dimensions of an offshore production platform is usually a complex problem due to the several variables that have influence over the behavior of the unit.

5:00 p.m. – 7:30 p.m. EXHIBITION HALL NETWORKING RECEPTION

THURSDAY, FEBRUARY 14, 2008

08:30 a.m. – 10:00 a.m. SESSION 8:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

INTEGRATED OPERATIONS – Chair: Baljit Singh – *Repsol YPF E&P* / Co-Chair: Lee Noris – *Scandpower*

08:30 a.m. – 09:00 a.m. Distributed Fiber Optic Temperature Sensing System for Buried Subsea Arctic Pipelines
Benjamin Eisler – *INTEC Engineering*

Offshore arctic conditions pose many design challenges to the safe operation of subsea pipelines. The pipeline route may be exposed to ice gouging and permafrost thaw settlement.

09:00 a.m. – 09:30 a.m. Embedded Sensor for Offshore Component Life Extension
Nate Ames – *Edison Welding*

The offshore oil and gas industry is actively seeking methodologies for moving into deeper water. One technique under investigation is to embed reactive sensor materials/devices (for crack detection, corrosion monitoring, vortex induced acceleration/motion).

09:30 a.m. – 10:00 a.m. Real-Time Dynamic E-Field Solution Brings Flow Assurance Technology to Operations Offshore West Africa
Javier Canon – *SPT Group Inc.*

This paper describes experiences gained implementing a dynamic e-field software solution in an oil-dominant subsea development offshore West Africa. The solution combines a rigorous transient multiphase flow and thermal simulation model together with real-time technology.

TRACK 2 Subsea Technology • Riser Technology

RISER TECHNOLOGY 4 – Chair: Nico Vandenworm – *OPE Inc.* / Co-Chair: Mark Dickson – *DeepSea Engineering*

08:30 a.m. – 09:00 a.m. "Plug and Play" Deepwater Minimum Production Riser System
Jean-Luc Legras – *Acergy*

As operators progress in deepwater reservoirs, smaller isolated zones are identified. Contractors need solutions for this inevitable refinement process.

09:00 a.m. – 09:30 a.m. Developments in Riser Technology for the Next Generation Ultra-Deep HPHT Wells
Roy Shiling – *BP America*

BP is currently looking at the next generation of development projects in the US GoM deepwater operating region. These wells will involve HPHT requirements together with requirements for sour service compliant materials.

09:30 a.m. – 10:00 a.m. Design Options of Top Tensioned Risers for XHPHT Development in Ultra-Deepwater
Lixin Xu – *Technip*

Dry tree risers have been successfully used with floating production systems in a wide range of deepwater applications (up to 8,000 ft.), in particular, in the Gulf of Mexico (GoM).

TRACK 3 Flow Assurance • Well Construction • Field Development

CONSTRUCTION / INSTALLATION 2 – Chair: John Murray – *FloaTEC* / Co-Chair: Pete Strake – *Hydro*

08:30 a.m. – 09:00 a.m. Corrosion Protection -– Robust Retrofit of a Gravity Based Production Structure in Frozen Artic High Scour Conditions
Michael Surkein – *ExxonMobil Development Company*

Cathodic protection retrofit of a gravity based structure located in Russian waters was completed using a uniquely designed (one of a kind) impressed current system consisting of semi-remote anode sleds.

09:00 a.m. – 09:30 a.m. FPSO Hull Refurbishment: Theoretical and Practical Execution
Taco Terpstra – *Gusto*

These last months have seen an important increase of FPSO conversions due to two circumstances: new-building shipyards slots un-availability, and fast-track project needs linked to the relatively high price of oil barrel.

09:30 a.m. – 10:00 a.m. Going into 2000 m+ Waters: Are Pipe-in-Pipes Getting too Heavy for Installation?
Christian Geersten – *ITP Interpipe*

The typical pipe-in-pipe consisting of an inner pipe designed for the wellhead shut-in pressure and an outer pipe designed for hydrostatic pressure is running into installation capacity limits as water-depths increase beyond 2000-2500m.

10:00 a.m. – 10:30 a.m. COFFEE BREAK

WEDNESDAY, FEBRUARY 13, 2008

10:30 a.m. – Noon SESSION 9:

TRACK 1 Floating Facilities • Lessons Learned • Integrated Operations Sponsored by: DNV

STATION KEEPING & MOORING – Chair: Richard D'Souza – *KBR/Granherne Americas* / Co-Chair: Majid Al-Sharif – *Helix Energy Solutions Group*

10:30 a.m. – 11:00 a.m. Bending Effects on the Fatigue Performance of Mooring Line Chains
Author TBD – *Saipem SA*

Since the unexpected rupture of chains in the chain hawse of the Girassol buoy, industry attention has been paid to the bending fatigue phenomena. Understanding of the involved mechanism has now been improved.

11:00 a.m. – 11:30 a.m. Acoustic Frequency Management in the Atlantis Field
Geir Karlsen – *BP America*

BP Atlantis is located in 7000-ft water-depth in Green Canyon block 743.The producers and the injectors tie back to the Production Quarters (PQ), two miles south of the well center. A comprehensive SIMOPS Plan handles the acoustic frequency management.

11:30 a.m. – Noon Development and Construction Status for a Novel Dynamically Positioned Offshore Loading Terminal
Claes Olsen – *Remora ASA*

As oil is discovered in increasingly deeper waters, Remora has identified a need for a more suitable offshore loading system than the traditional moored buoy system. A novel technology including a DP based loading vessel has been developed to meet this need.

TRACK 2 Subsea Technology • Riser Technology

FLOW ASSURANCE 1 – Chair: Lee Noris – *Scandpower* / Co-Chair: Jeff Schrull – *ADDAX Petroleum*

10:30 a.m. – 11:00 a.m. Synergies between Injection Network Design and Virtual Flow Metering
John Friedemann – *VetcoGray Scandinavia*

It is well known that virtual flow metering systems are dependent upon a reliable and well designed valve and instrumentation system. A well designed system should then consider all of the operational conditions for the application.

11:00 a.m. – 11:30 a.m. Stabilization of Gas Coning in Horizontal Wells Using Automatic Feedback Control
Vidar Alstad – *Hydro Oil & Energy Research Centre Porsgrunn*

The daily production optimization of wells on Grane depends on keeping the desired stable flow rates from the wells in order to fully utilize the available topside processing capacity.

11:30 a.m. – Noon Long-Distance Step-Out – How Far Can We Go?
Christian Geersten – *ITP Interpipe*

Recent advances in subsea power distribution such as implemented by Statoil have changed perspectives on extremely long tie-backs. For fluids other than dry gas, long tie-backs were mostly academic.

TRACK 3 Flow Assurance • Well Construction • Field Development

FIELD DEVELOPMENT – Chair: Paul Hansen – *Chevron* / Co-Chair: Uri Nooteboom – *INTEC Engineering*

10:30 a.m. – 11:00 a.m. MARS (Multiple Application Re-injection System): an Investment in Future Field Productivity and Flexibility
Ian Donald – *DES Operations*

Historically, intervention on subsea wellheads is a high risk/high cost activity. Routine field shutdowns for maintenance or simple service activities are cost prohibitive due to lost production revenues and intervention costs.

11:00 a.m. – 11:30 a.m. Fiscal Metering Solution for Subsea TieBacks
Hans Olav Hide – *MPM*

A metering system to perform multiphase measurements at fiscal standards provides new alternatives for subsea tiebacks..

11:30 a.m. – Noon Remote Power Generation for Deployment of New Subsea Technologies` onto Deepwater Marginal Fields
Christian Cermelli – *Marine Innovation & Technology*

A power generation platform is a viable solution to marginal and remote fields developments. Many deepwater marginal fields can be produced economically if they are tied back to a nearby production facility.

THURSDAY, FEBRUARY 14, 2008

Noon – 1:30 p.m. **LUNCH**

CHAIRMAN'S CLOSING REMARKS

INDUSTRY CLOSING PRESENTATION

AWARDS CEREMONY

"The DOT Conference was important as it focused on various deepwater applications. Emerging new technologies were highlighted throughout the show and were captured very well by PennWell's organization of paper presentations and long list of enthusiastic exhibitors."

Jackie Cortez, Marketing Specialist / *Aker Kvaerner*

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- Monday, February 11 1:00 a.m. - 6:00 p.m.
- Tuesday, February 12 7:30 a.m. - 6:00 p.m.
- Wednesday, February 13 7:30 a.m. - 6:00 p.m.
- Thursday, February 14 7:30 a.m. - 12:00 p.m.

Exhibition Hours

- Tuesday, February 12 9:00 a.m. - 6:00 p.m.
- Wednesday, February 13 9:00 a.m. - 6:00 p.m.
- Thursday, February 14 9:00 a.m. - 1:30 p.m.

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February 12 - 14, 2008
Houston, Texas / George R. Brown Convention Center

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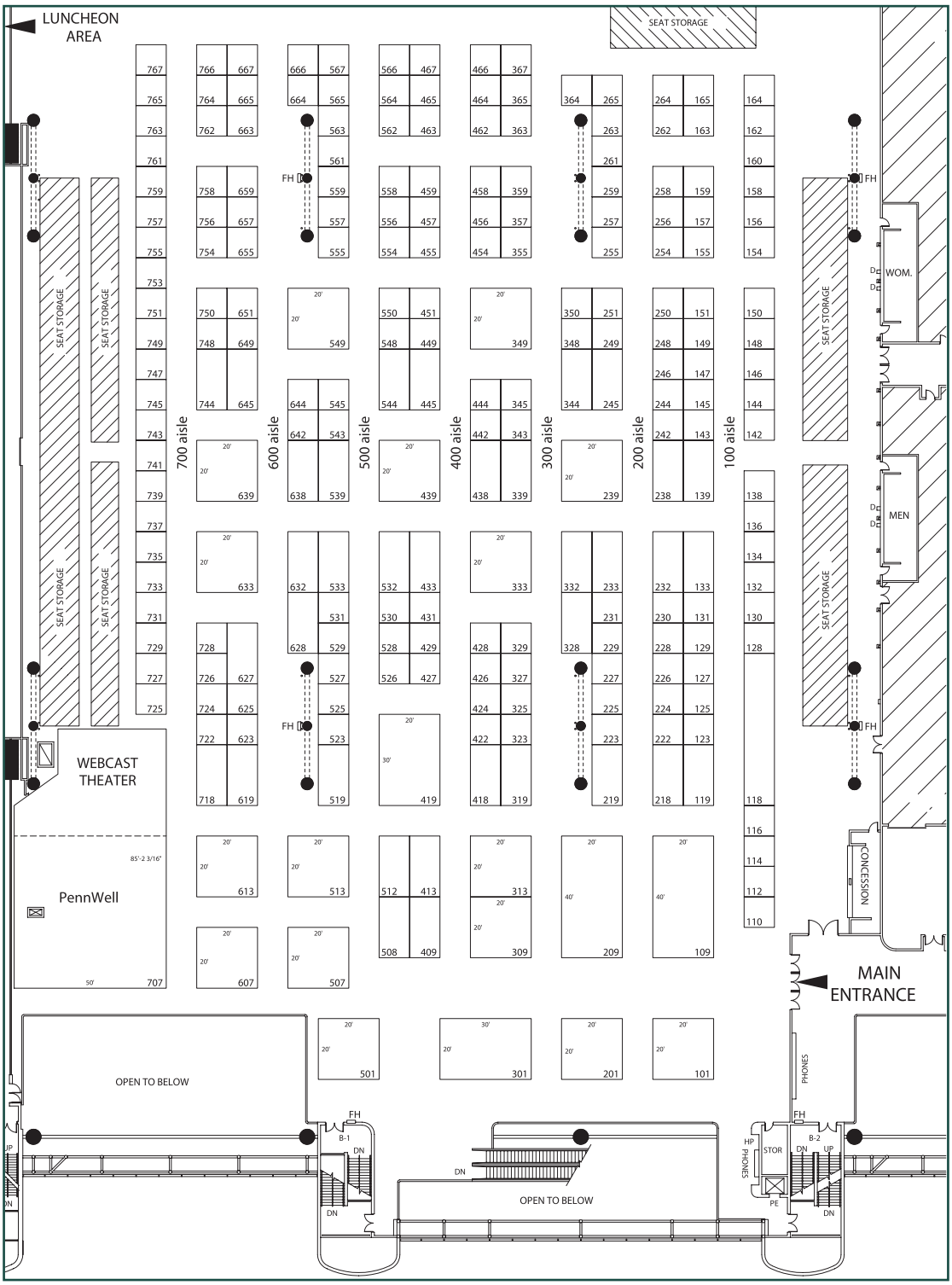
DOT 2008 Floor Plan



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