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### National Oil Company Profiles

Oil potential seen in Illinois Sangamon arch Visual road map helps control drilling process
Japan's refiners facing hard choices, plant closings
Natural gas oversupply creating buyers' market







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# OIL&GAS JOURNA

Aug. 3, 2009 Volume 107.29

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#### REGULAR FEATURES

#### Cover

The BW Cidade de Sao Vicente floating production, storage, and offloading vessel pictured on the cover ran extended production tests of the first two wells drilled in the exciting presalt play in 2,170 m of water on Block BM-S-11, 280 km off Rio de Janeiro. Production from that discovery by Brazil's national oil company will likely put Petroleo Brasileiro SA among the world's top 5 integrated oil companies within a decade, say company officials. Since they control 90% of the world's oil resources, NOCs are a major factor in the global oil market. Some like Petrobras are expanding operations beyond their borders. Some like Petroleos Mexicanos struggle with depleting resources. And some like Petroleos de Venezuela SA become the focus of political ambitions and confrontations. NOCs face special challenges functioning as a government agency while at the same time competing as oil companies in a world market. OGJ

takes a look at these and other NOCs in a series of articles starting on p. 18.







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# Newsletter 1

Aug. 3, 2009

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#### General Interest — Quick Takes

#### Court lets MMS sales outside Alaska proceed

A federal appeals court clarified its order vacating the current federal offshore oil and gas leasing program on July 28 by saying that the ruling applies only to the Alaska portion of the plan.

The action clears the way for the US Minerals Management Service to proceed with lease sales on other areas of the Outer Continental Shelf. "We are moving forward with the planned Aug. 19 Gulf of Mexico lease sale," US Interior Secretary Ken Salazar said on July 29.

He sought the clarification on May 11 after the US District Court of Appeals for the District of Columbia decided on Apr. 17 that the Bush administration did not use sound science when it expanded leasing areas in the Beaufort, Bering, and Chukchi seas for the 2007-12 OCS plan. It issued an order vacating the program and ordered a rewrite after more thorough studies had been conducted.

Through the US Department of Justice, Salazar asked the court to clarify that the order applied only to the Alaskan parts of the 5-year plan, and that sales in other areas could proceed. The American Petroleum Institute also sought a similar clarification.

The new order stated that relief granted in the Apr. 17 opinion applied only to Alaska, "specifically leasing in the Chukchi, Beaufort, and Bering seas."

Salazar said, "I am pleased with the court's decision. With respect to the Arctic Ocean and Alaska, we will continue to work expeditiously to address the environmental issues identified by the court in the existing 2007-12 5-year plan."

In a July 29 statement, API encouraged DOI "to move quickly to redo the environmental sensitivity analysis and maintain all scheduled past and future leasing in Alaska so that exploration and production activity and future leases sales under the 2007-12 plan can take place in that state."

#### ICE agrees to be regulated after CFTC ruling

The InterContinental Exchange (ICE) agreed to be regulated after the US Commodity Futures Trading Commission (CFTC) effectively ruled that one of ICE's natural gas contracts should no longer be exempt.

The ruling came July 24 when CFTC, using new authority to apply regulatory and reporting requirements to exempt commercial markets with significant price discovery functions, ruled that ICE's Henry Financial LD1 Fixed Price Contract fit that description.

ICE declared itself a registered CFTC entity on July 27 and announced that it would begin submitting enhanced market statistics for its cash-settled Henry Hub gas swap market to the commission immediately. It said that clearing firms will begin providing large insider trading data to the CFTC, that ICE's data will be incorpo-

rated in the commission's weekly Commitment of Traders Report, and that the Henry Hub swap will be subject to position limits and accountability levels.

CFTC announced on June 9 that it would review the contract to determine whether it performed a significant price discovery function and should no longer be exempt, exercising authority for the first time which it received when the 2008 farm bill became law.

It based its July 24 decision on further analysis of the contract and its characteristics, including its high average daily trading volume, its reliance on the New York Mercantile Exchange's physically delivered gas futures contract, and trader usage of the ICE contract's prices.

With clear indications that the ICE contract satisfied these three conditions, the commission did not analyze possible material price reference and consequently reached no conclusion on this fourth qualifying condition, CFTC said.

ICE noted that it has worked with CFTC since October 2006 in developing regular over-the-counter market reporting, including large trader information.

"We appreciate the CFTC's use of its broad powers in the OTC markets to provide regulatory certainty and to underscore the integrity of these important contracts," said Jeffrey C. Sprecher, the exchange's chairman and chief executive.

#### NARUC backs regulation of hydraulic fracturing

State utility regulators approved a resolution at their summer convention in Seattle urging Congress to leave regulation of hydraulic fracturing to the states.

The resolution by the National Association of Regulatory Utility Commissioners' gas committee said the organization "has observed with great concern the current debate in Congress over the appropriate method for regulating the use of hydraulic fracturing to complete oil and gas wells."

US Reps. Diana DeGette (D-Colo.) and Maurice D. Hinchey (D-NY) introduced a bill on June 4 which would bring the process, which is used to recover gas from shale formations, under the Safe Drinking Water Act. US Sen. Robert P. Casey Jr. (D-Pa.) introduced similar legislation in the Senate the same day.

Doing so, NARUC's resolution said, "would add burdensome and unnecessary regulatory requirements to the drilling and completion of oil and gas wells, thereby increasing costs of producing domestic natural gas resources without any ancillary benefit to public health, safety, or the environment."

The resulting increased cost of producing domestic gas resources would reduce domestic supplies; raise costs to consumers; raise utility prices for consumers; reduce tax and royalty revenue for local, state and federal governments; and increase US dependence on

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#### d u S t

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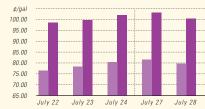
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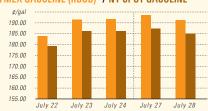
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<sup>1</sup>Reformulated gasoline blendstock for oxygen blending. <sup>2</sup>Nonoxygenated regular unleaded.

#### S С е O d

#### **US** INDUSTRY SCOREBOARD — 8/3

Latest week 7/17 Demand, 1,000 b/d	4 wk. average	4 wk. avg. year ago¹	Change, %	YTD average <sup>1</sup>	YTD avg. year ago¹	Change, %
Motor gasoline Distillate Jet fuel Residual Other products TOTAL DEMAND Supply, 1,000 b/d	9,175 3,298 1,358 614 4,162 18,607	9,111 3,704 1,578 686 4,466 19,545	0.7 -11.0 -13.9 -10.5 -6.8 -4.8	8,968 3,658 1,386 602 4,013 18,627	9,046 4,041 1,586 649 4,550 19,872	-0.9 -9.5 -12.6 -7.2 -11.8 -6.3
Crude production NGL production <sup>2</sup> Crude imports Product imports Other supply <sup>3</sup> TOTAL SUPPLY Refining, 1,000 b/d	5,170 1,926 9,335 2,703 1,859 20,993	5,121 2,267 10,058 3,153 1,448 22,047	1.0 -15.0 -7.2 -14.3 28.4 -4.8	5,248 1,885 9,295 2,877 1,697 21,002	5,116 2,136 9,826 3,221 1,550 21,849	2.6 -11.8 -5.4 -10.7 9.5 -3.9
Crude runs to stills Input to crude stills % utilization	14,450 14,806 83.9	15,432 15,689 89.1	-6.4 -5.6	14,450 14,806 83.9	14,934 15,266 86.8	-3.2 -3.0

Latest week 7/17 Stocks, 1,000 bbl	Latest week	Previous week¹	Change	Same week year ago¹	Change	Change, %
Crude oil	342,688	344,484	-1,796	295,330	47,358	16.0
Motor gasoline	215,391	214,578	813	217,085	-1,694	-0.8
Distillate	160,509	159,291	1,218	128,109	32,400	25.3
Jet fuel-kerosine	44,089	43,314	775	39,992	4,097	10.2
Residual	36,485	35,740	745	38,469	-1,984	-5.2
Stock cover (days) <sup>4</sup>			Change, 9	<b>%</b>	Change,	%
Crude	22.9	22.9	0.0	19.2	19.3	
Motor gasoline	23.5	23.5	0.0	23.2	1.3	
Distillate	48.7	48.6	0.2	30.6	59.2	
Propane	80.5	83.9	-4.1	47.3	70.2	
Futures prices <sup>5</sup> 7/24			Change		Change	%
Light sweet crude (\$/bbl)	65.86	61.27	4.59	135.34	-69.48	-51.3
Natural gas, \$/MMbtu	3.69	3.46	0.22	11.19	-7.50	-67.1

<sup>1</sup>Based on revised figures. <sup>2</sup>Includes adjustments for fuel ethanol and motor gasoline blending components. <sup>3</sup>Includes other hydrocarbons and alcohol, refinery processing gain, and unaccounted for crude oil. <sup>4</sup>Stocks divided by average daily product supplied for the prior 4 weeks. <sup>5</sup>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



#### BAKER HUGHES RIG COUNT: US / CANADA



Note: End of week average count

Note: Monthly average count

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foreign energy imports, it continued.

Oil and gas reservoirs are highly variable geologically and separated geographically across producing states in a manner that makes state regulatory agencies best suited by local expertise to regulate hydraulic fracturing and other exploration, development and production activities, the resolution observed.

It noted that the Interstate Oil & Gas Compact Commission urged Congress on Jan. 9 to not remove hydraulic fracturing's exemption from regulation under the SDWA after a survey of IOGCC's members found no known cases of groundwater contamination associated with hydraulic fracturing. •

#### Exploration & Development — Quick Takes

#### Anadarko finds oil at Vito in deepwater gulf

A group led by Anadarko Petroleum Corp. said the Vito exploration well cut more than 250 net ft of oil pay in subsalt Miocene sands and plans to drill two other prospects along trend in the deepwater Gulf of Mexico.

Vito went to 32,000 ft in 4,038 ft of water 170 miles south-southeast of New Orleans in Mississippi Canyon Block 984. The partners will evaluate data from Vito and set the timing for an appraisal well.

Anadarko plans to drill its Haleakala prospect to the west and Silverado to the east in 2010. Both target similar subsalt Miocene objectives.

Anadarko will move the Noble Amos Runner semisubmersible to the Caesar/Tonga development in the Green Canyon area.

Anadarko operates Vito with 20% working interest. Shell Offshore Inc. owns 55%, and StatoilHydro USA E&P Inc. has 25%. Shell will become Vito operator after the rig is released.

#### Mexico institute recommends upstream opening

The Mexico Competitiveness Institute (IMCO) has called for dramatic policy steps to confront Mexico's decline in the world economy.

The institute, which studies the relative competitiveness of 48 countries, reported that Mexico had fallen two places in the ranking to 32nd in the 3 years ended in 2007. Worse, it said that Mexico had retreated in eight of the 10 key variables that matter most.

Regarding energy policy liberalization, Mexico was the only country that scored zero on IMCO's index scale of zero to three.

The institute also took note of the fall in Mexican oil production, which since 2004 represented a 700,000 b/d drop that has been a severe blow to public finances.

Mexico may be facing its last opportunity to counter the trend—that is, before the aging of the Mexican population and the spread of poverty render societal changes irreversable.

With this dark landscape in view, it may not be surprising that IMCO should propose a course of action to maximize Mexico's potential petroleum rent by inviting private industry to take part in exploration and production activities and to be compensated on a competitive basis. Every year of delay in reversing the fall in oil production and fiscal flow costs the Mexican economy \$40 billion, IMCO estimated.

Each section of IMCO's report contained an invited essay. Preparing the essay on energy was George Baker of Houston, the only non-Mexican among 23 contributors. That essay focused on the natural gas value chain in Mexico.

#### **ECA presses Pennsylvania Marcellus work**

Energy Corp. of America, a private Charleston, W.Va., operator, is developing gas production from Devonian Marcellus shale in Greene County in the southwest corner of Pennsylvania.

In May, the company began a 3-year program to develop 10,000 acres it holds in the county. It is producing 8 MMcfd of gas from wells completed only in the Marcellus and more than 15 MMcfd from vertical wells in which it has commingled Marcellus gas with output from other formations.

Two rigs are drilling horizontal wells to the Marcellus, which lies at about 8,000 ft true vertical depth in Greene County. The company holds more than 1 million acres in the Appalachian basin on which the Marcellus varies in depth from 3,000 ft to 8,000 ft.

ECA has drilled 155 Marcellus vertical and horizontal Marcellus wells, and initial potentials of the completed wells have ranged from 500 Mcfd to 3 MMcfd. The wells produce little condensate.

ECA drilled one of the first horizontal wells in Greene County in 2007 as part of a joint venture with an industry partner, but it operates and wholly owns almost all of its wells.

The company owns more than 40 miles of pipeline and has sufficient capacity available on interstate systems to market its production.

#### CNX Gas expands Marcellus shale position

CNX Gas Corp., Pittsburgh, leased nearly 40,000 acres with Marcellus shale gas potential in Pennsylvania and West Virginia, bringing its total Marcellus position to 230,000 acres.

In one transaction, CNX leased 20,000 largely contiguous acres from NiSource Energy Ventures LLC, a subsidiary of Columbia Energy Group, in Washington and Greene counties, Pennsylvania, and Marshall County, West Virginia.

In a second deal, CNX leased 20,000 acres from its majority owner, CONSOL Energy Inc. These acres, though not contiguous, are generally located in and around CONSOL's coal operations in Washington and Greene counties, Pennsylvania, and Marshall, Monongalia, and Wetzel counties, West Virginia. CONSOL acquired the lands in connection with its mining operations, after the sale of CNX common stock in 2005.

The acreage in the two transactions have the potential to provide CNX with hundreds of Marcellus shale drillsites in an area where the company has averaged 3.5 bcf/well recoverable at its first eight horizontal wells.

Results of microseismic data analysis have enabled CNX to begin using 40-acre well spacing for the horizontal Marcellus shale program. It will be able to accelerate drilling once gas prices rebound.

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#### Cabot nails vertical Marcellus-Purcell interval

Cabot Oil & Gas Corp., Houston, is producing 39 MMcfd of Marcellus shale gas from seven horizontal and 20 vertical wells in northeastern Pennsylvania, where it notched a critical success with one of its latest vertical completions.

Cumulative recovery is 5.8 bcf since the company's first Marcellus well came on line a year ago in Susquehanna County.

A ninth rig is preparing to spud, and 18 more horizontal wells are to be drilled this year. Three other wells are completing, and 12 are waiting on completion or pipeline hookup.

The most recent horizontal completion, Teel-8H, flowed at an initial 10.3 MMcfd with a maximum spot rate of 12 MMcfd, and its 30-day average is 9.8 MMcfd.

The vertical Teel-6 had initial flow of 4.2 MMcfd from 370 ft

of lower and upper Marcellus, and Cabot believes the stimulation contacted most of that interval including the gassy Purcell limestone that separates them.

Cabot called Teel-6 "a critical event in the development of our Marcellus acreage" because the size and shape of its individual leases on its large acreage block limit much of the drilling to vertical

The \$1.4 million well is also the first at which the company stimulated the entire column, whereas it has fract its horizontal wells entirely in the lower Marcellus and only slightly in the curved section has it treated the upper Marcellus.

Cabot is hiking takeaway capacity at its Teel compression station to 70 MMcfd on Aug. 1 and 100 MMcfd a year later. •

#### Drilling & Production - Quick Takes

#### Tuned water may improve Saudi waterflooding

Minimal chemical alteration to injection water may help increase oil recovery, researchers at Saudi Aramco's EXPEC Advanced Research Center say.

"If the current lab results are demonstrated in the field, it will change the way we conduct waterflooding in the company," said Amin H. Nasser, senior vice-president of exploration and producing for Aramco. "The application of this approach will not be limited to mature fields but also to fields in early development stages."

At the laboratory scale, early tests indicate significant incremental oil recovery from Arab-D carbonate reservoirs, the company

Aramco's main seawater treatment facility, Qurayyah, processes millions of barrels per day of water for injection into the giant Ghawar and Khurais oil fields.

The research focuses on optimizing water properties such as salinity and ionic interactions without adding foreign fluids or chemicals.

"This research seems to have changed our perception of waterflooding from being a mere physical process—increasing reservoir energy and sweeping oil toward producers—to one that also entails chemical interactions between reservoir fluids and rocks," said Mohammed Y. Al-Qahtani, executive director of petroleum engineering and development for Aramco.

#### Indonesia wants lower cost-recovery write-offs

Members of Indonesia's House of Representatives, in a move to head off a potential budget shortfall, have urged the government's upstream watchdog BPMigas to reduce the cost recovery given to oil and gas contractors.

"For now, BPMigas should limit the amount of cost recovery," to \$10 billion from \$11.05 billion said Suharso Manoarfa, vicechairman of the House's budget committee, in a hearing with the government and the central bank.

The move aims to decrease the budget deficit in case the Indonesian Crude Price (ICP) falls to \$58/bbl at yearend or oil lifting is lower than the 960,000 b/d level set in the planned revision of the 2009 budget.

"If the ICP is \$58/bbl [during this year's second half], there

will be a 9 trillion rupiah deficit in state revenue," said Suharso, who also noted that during January-June, oil production reached 953,000 b/d and will need to reach 967,000 b/d for the remainder of the year to achieve the government target of 960,000 b/d for 2009.

Finance Minister Sri Mulyani Indrawati said she would ask the energy and mineral resources ministry to balance the amount of cost recovery spent and the amount of oil sold in order to prevent a negative net income in oil and gas revenue.

In April, the Indonesian government drafted new rules aimed at reducing national expenditure by redefining some cost components as downstream instead of upstream.

At the time, Indonesia's energy and mineral resources minister Purnomo Yusgiantoro said, "We hope that this will decrease spending on cost recovery in our state budget (OGJ, Apr 27, 2009, p. 37).

#### Shell orders pumps for St. Joseph field off Sabah

Shell Malaysia Exploration & Production BV placed an \$8 million order for Flowserve Corp. barrel-type injection pumps for its waterflood development in St. Joseph field, off Sabah.

Shell operates St. Joseph field under the North Sabah 1996 production-sharing contract with coventurer Petronas.

Shell expects water injection to start in 2010, according to a presentation to the International Petroleum Technology Conference, Kuala Lumpur, Dec. 3-5, 2008.

The presentation, "St. Joseph Field Waterflood Project: Fractured Water Injection Using Smart Well Technology," by Darryl Harris, Nicolette G. Du Rieu, and Keith Ian Rollett of Sarawak Shell Bhd., describes St. Joseph as a mature oil field that has been on production since 1981, with gas injection starting in 1996.

It says the scope of the waterflood development includes installation of a new offshore living quarters platform and seawater treatment and injection facilities plus drilling of six horizontal water injection wells and five infill wells.

The presentation says that the flood will involve the injection of treated seawater at a rate of 60,000 bw/d into a laminated reservoir with historical problems of controlling water and gas breakthrough through high permeability streaks.





It adds that smart technology will facilitate the injection under will proceed simultaneously in two zones with zones being alterfracturing conditions into five completed zones. It says injection – nated several times a year. 💠

#### Processing — Quick Takes

#### Plans suspended for New Brunswick refinery

Irving Oil and BP PLC have suspended plans to build a 300,000b/d refinery at St. John, NB (OGJ, Mar. 24, 2008, Newsletter).

The companies said an 18-month feasibility study determined the Eider Rock project "was not viable at a time of global economic recession and dampening forecasts for petroleum product demand in North America." Privately held Irving operates a 250,000-b/d refinery at St. John.

#### French crude oil imports down in first half

During the first half of 2009, France's hydrocarbon port of Fos-

sur-Mer on the French Riviera posted a 7% drop in oil imports intended for both for French and European refineries. By the end June, 30.06 million tons of hydrocarbons—both liquids and gases—were traded at Fos, 4% less than over the same 2008 period.

Input into French refineries suffered a drop as well, falling 3% vs. the same half in 2008. Besides the economic slump, this was also due to the technical shutdown of Total's Feyzin refinery and the Petroplus refinery at Reichstett for turnaround maintenance.

However, stockdraw that was carried out over the last month or two pushed up imports of refined products by 16% in June, stabilizing the first half's overall totals.

#### Transportation — Quick Takes

#### **Europe's LNG imports for July, August to set mark**

LNG shipments to Europe will increase by more than 40% in July and August, according to the latest edition of European LNG Report from market analysis firm Waterborne, Houston. This development, says Waterborne, will continue to depress natural gas prices on the continent. "We are adjusting our forecast numbers upward for European LNG imports in July and August based on strong import growth expected in the UK and Belgium," says Steve Johnson, Waterborne president.

Under shipment scenarios devised by Waterborne, total European LNG imports for July will exceed 4.5 million tonnes, setting a record for 1-month imports and representing a 40% increase over July 2008. For August, total European imports will reach nearly 4.2 million tonnes, a 45% jump over the same month last year.

Shipments to Spain will lead European importing countries in both months, reaching more than 1.8 million tonnes in July and more than 1.6 million tonnes in August, according to Waterborne. France will import 804,000 tonnes in July and 844,000 tonnes in August.

The UK will receive 732,000 tonnes of LNG in July followed in Augsut by 552,000 tonnes. Dragon LNG's terminal at Milford Haven, Wales, received its first commissioning cargo on July 14, weeks earlier than expected. "We are also projecting increased LNG shipments from Qatar into Milford Haven's South Hook terminal, which opened in May," says Johnson.

The July edition of the European Waterborne LNG Report looks at the effect of the Medgaz pipeline on Europe's LNG markets, if planned, new pipeline connections are built across the Pyrenees.

#### Woodside opts for Broome support base

Woodside Energy Ltd., Perth, has signed an option agreement with the Broome Port Authority to lease 15 hectares of land as a service and support base for its proposed Browse LNG development off Western Australia.

Woodside has an option period of 3 years in which to execute the minimum 25-year lease.

The Browse fields include Torosa, Brecknock, and Calliance,

which lie about 425 km north of Broome. Combined contingent resources are estimated at 14 tcf of dry gas and 370 million bbl of condensate. Woodside is still considering the type of facilities it will need to develop the field and where they will be located.

#### Santos issues FEED contract for Gladstone LNG

Santos Ltd., Adelaide, has issued a contract to Fluor Corp. for the front-end engineering and design of Santos's Gladstone LNG coalseam gas project in Queensland.

When completed, Gladstone LNG will produce 3-4 million tonnes/year of LNG from a gas supply of about 5.4-7 million cu m/year from Santos-operated coalseam gas fields in Queensland's Bowen and Surat basins.

The scope of the work for this contract, according to Fluor, includes preparation of an execution plan and cost estimate for engineering, procurement, and construction of upstream facilities required to deliver coalseam gas from Santos-operated, coalseam gas fields in central Queensland to the proposed Gladstone liquefaction plant near Gladstone. As operator of Gladstone, Santos has a 60% share of the project.

Malaysian state oil company Petronas holds 40% (OGJ Online, June 18, 2009). The joint venture will develop and operate the 435-km gas pipeline to Gladstone and the LNG liquefaction plant on Curtis Island at Gladstone.

#### Reward for help solving Dawson Creek bombings

EnCana Corp., Calgary, has doubled its reward offer to \$1 million for help in solving six bombings of its natural gas facilities in the Tomslake area near Dawson Creek, BC.

The company says the Royal Canadian Mounted Police is investigating the six bombings that occurred between October 2008 and July 2009 at three pipeline locations, a metering shed on an EnCana wellsite, and two wellheads.

The most recent attack on a wellhead occurred on July 1 and took 4 days to bring under control, EnCana says. 💠

Oil & Gas Journal / Aug. 3, 2009











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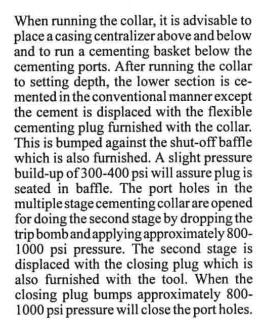
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◆ Denotes new listing or a change in previously published information.

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#### 2009

#### **AUGUST**

SPE Asia Pacific Health, Safety, Security and Environment Conference and Exhibition, Jakarta, (972) 952-9393, (972) 952-9435 (fax), email: spedal@spe.org, website: www.spe.org. 4-6.

SPE Asia Pacific Oil and Gas Conference and Exhibition. Jakarta, (972) 952-9393, (972) 952-9435 (fax), email: spedal@spe.org, website: www.spe.org. 4-6.

EnerCom's The Oil & Gas Conference, Denver, (303) 296-8834, email: kgrover@ enercominc.com, website: www.theoilandgasconference. com. 9-13.

ACS Fall National Meeting & Exposition, Washington, (202) 872-4600, e-mail: service@ acs.org, website: www.acs.org. 16-20.

Petroleum Association of Wyoming (PAW) Annual Meeting, Casper, (307) 234-5333, (307) 266-2189 (fax), email: suz@pawyo.org, website: www.pawyo.org. 18-19.

◆Coal-Gen Conference, Charlotte, (918) 831-9160, (918) 831-9161 (fax), email: registration@pennwell. com, website: www.coal-gen. com. 19-21.

IADC Well Control Conference of the Americas & Exhibition, Denver, (713) 292-1945,

(713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 25-26.

Summer NAPE, Houston, (817) 847-7700, (817) 847-7704 (fax), e-mail: info@napeexpo.com, website: www.napeonline.com. 27-28.

#### *SEPTEMBER*

Oil & Gas Maintenance Technology North America Conference, New Orleans, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.ogmtna.com.

◆Coal-Gen Europe Conference, Katowice, Poland, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@ pennwell.com, website: www. coal-gen-europe.com. 1-4.

EAGE Near Surface European Meeting, Dublin, +31 88 995 5055, +31 30 6343524 (fax), e-mail: eage@eage.org, website: www. eage.org. 7-9.

IAEE European Conference, Vienna, (216) 464-5365, e-mail: iaee@iaee.org, website: www.iaee.org. 7-10.

Offshore Europe Conference, Aberdeen, +44 (0) 20 7299 3300, e-mail: nbradbury@ spe.org, website: www.offshoreeurope.co.uk. 8-11.

GPA Rocky Mountain Annual Meeting, Denver, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@ gpaglobal.org, website: www. gpaglobal.org. 9.

GITA's GIS Annual Oil & Gas Conference, Houston, (303) 337-0513, (303) 337-1001 (fax), e-mail: info@ gita.org, website: www.gita. org/ogca. 14-16.







Turbomachinery Symposium, Houston, (979) 845-7417, (979) 847-9500 (fax), e-mail: inquiry@turbo-lab. tamu.edu, website:http://turbolab.tamu.edu. 14-17.

Annual IPLOCA Convention, San Francisco, +41 22 306 02 30, +41 22 306 02 39 (fax), e-mail: info@iploca. com, website: www.iploca.com. 14-18.

Polar Petroleum Potential 3P Conference, Moscow, (918) 584-2555, (918) 560-2665 (fax), website: www. aapg.org. 16-18.

◆Drilling Engineering Association-Europe: ERD and Associated Technology Meeting, Stavanger, +44 (0) 1483-598000, e-mail: Dawn. Dukes@otmnet.com, website: www.dea-europe.com. 17-18.

Annual Energy Policy Conference, Oklahoma City, (202) 580-6532, (202) 580-6559 (fax), e-mail: info@energyadvocates.org, website: www.energyadvocates. org. 20-22.

Multiphase User Roundtable-Mexico, Villahermosa, (979) 268-8959, (979) 268-8718 (fax), e-mail: Heather@petroleumetc.com, website: www.mur-mexico. org. 22-23.

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

SPE Eastern Regional Meeting, Charleston, W.Va., (972) 952-9393, (972) 952-9435 (fax), e-mail: spedal@ spe.org, website: www.spe.org. 23-25.

ERTC Sustainable Refining Conference, Brussels, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: org. 6-8. www.gtforum.com. 28-30.

DGMK Production and Use of Light Olefins Conference, Dresden, 040 639004 0, 040 639004 50, website: www.dgmk.de. 28-30.

IADC Advanced Rig Technology Conference, Houston, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: 9160, (918) 831-9161 www.iadc.org. 29.

Unconventional Gas International Conference & Exhibition, Fort Worth, Tex., (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.unconventionalgas.net. Sept. 29-Oct. 1.

ERTC Biofuels+ Conference, Brussels, 44 1737 365100, +44 1737 365101 (fax), e-mail: events@gtforum.com, website: www.gtforum.com. Sept. 30-Oct. 2.

#### **OCTOBER**

Interstate Oil and Gas Compact Commission Annual Meeting (IOGCC), Biloxi, Miss., (405) 525-3556, (405) 525-3592 (fax), e-mail: iogcc@iogcc.state. ok.us, website: www.iogcc. state.ok.us. 4-6.

SPE Annual Technical Conference and Exhibition, New Orleans, (972) 952-9393, (972) 952-9435 (fax), ewebsite: www.iadc.org. 23-24. mail: spedal@spe.org, website: International Oil & Gas Exwww.spe.org. 4-7.

> World Gas Conference, Buenos Aires, +54 11 5252 9801, e-mail: registration@ wgc2009.com, website: www. wgc2009.com. 5-9.

ISA EXPO, Houston, (919) 549-8411, (919) 549-8288 (fax), e-mail: info@ isa.org, website: www.isa.

Kazakhstan International Oil & Gas Exhibition & Conference (KIOGE), Almaty, +44 (0) 207 596 5233, +44 (0) 207 596 5106 (fax), e-mail: oilgas@ite-exhibitions.com, website: www.oilgas-events.com. 6-9.

- ◆Power-Gen Asia Conference, Bangkok, (918) 831-(fax), e-mail: registration@ pennwell.com, website: www. powergenasia.com. 7-9.
- Conference & Expo, Bangkok, (918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.renewableenergy- 19-23. world-asia.com. 7-9.

NPRA Q&A and Technology Forum, Ft. Worth, Tex., (202) 457-0480, (202) 457-0486 (fax), e-mail: info@ npra.org, website: www.npra. org. 11-14.

API Fall Petroleum Measurement Standards Meeting, Calgary, Alta., (202) 682-8000, (918) 497-5500, (918) (202) 682-8222 (fax), website: www.api.org. 12-15.

GPA Houston Annual Meeting, Houston, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@gpaglobal. org, website: www.gpaglobal. <u>org</u>. 13.

ploration, Production & Refining Exhibition, Jakarta, +44 (0)2078402100, +44(0)20 7840 2111 (fax), e-mail: ogti@oesallworld.com, website: www.allworldexhibi tions.com. 14-17.

Expandable Technology Forum, Louisiana Gulf Coast Oil Ex-Houston, +44 (0) 1483 598000, e-mail: sally.marriage@otmnet.com, website: www.expandableforum.com. 14-15.

SPE/EAGE Reservoir Characterization and Simulation Con-Summit, Tunis, +44 (0) 20 ference and Exhibition, Abu Dhabi, (972) 952-9393, (972) 952-9435 (fax), email: spedal@spe.org, website: www.spe.org. 18-21.

GSA Annual Meeting, Portland, ence & Exhibition, Manama, (303) 357-1000, (303) 357-1070 (fax), e-mail: meetings@geosociety.org, website: www.geosociety.org. 18-21.

◆Renewable Energy World Asia Oil Shale Symposium, Golden, Colo., (303) 384-2235, e-mail: jboak@mines.edu, website: www.mines.edu/ outreach/cont ed/oilshale/.

> Oil and Gas Transportation in the CIS and Caspain Region Annual Meeting, Moscow, +44 (0) 20 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 20-22.

SEG International Exposition and Annual Meeting, Houston, 497-5557 (fax), e-mail: register@seg.org, website: www.seg.org. 25-30.

SPE/IADC Middle East Drilling Conference & Exhibition, Manama, +971 4 390 3540, +971 4 366 4648 (fax), e-mail: spedal@spe.org, website: www.spe.org. 26-28.

◆PICT-Passive Inflow Control Technology Meeting, Copenhagen, +44 (0) 1483-598000, e-mail: Dawn.Dukes@otmnet.com, website: www.inflowcontrol. com. 27-28.

(337) 235-4055, (337) 237-1030 (fax), e-mail: lynette@lagcoe.com, website: www.lagcoe.com. 27-29.

North African Oil and Gas 7067 1800, +44 (0) 20 7242 2673 (fax), website: www.theenergyexchange.co.uk. 27-29.

Offshore Middle East Confer-(918) 831-9160, (918) 831-9161 (fax), e-mail: registration@pennwell.com, website: www.offshoremiddleeast.com. 27-29.

#### NOVEMBER

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

IPAA Annual Meeting, New Orleans, (202) 857-4722, (202) 857-4799 (fax), website: www.ipaa.org. 4-6.

GPA North Texas Annual Meeting, Dallas, (918) 493-3872, (918) 493-3875 (fax), e-mail: pmirkin@ gpaglobal.org, website: www. gpaglobal.org. 5.

Capture and Geological Storage of CO, Symposium, Paris, +33 1 47 52 67 21, +33 1 47 52 70 96 (fax), e-mail: patricia.fulgoni@ifp.fr, website: www.CO2symposium. com. 5-6.

Sulphur International Conference and Exhibition, Vancouver, China Conference & Exhibi-+44 20 7903 2058, +44 20 7903 2172 (fax), e-mail: 9393, (972) 952-9435 cruevents@crugroup.com, website: www.sulphurconference.com. 8-11.

Gas Turbine Users Internationposition (LAGCOE), Lafayette, al (GTUI) Annual Conference, Calgary, Alta., +9714 804 7738, +9714 804 7764 (fax), e-mail: info@gtui.org, website: www.gtui.org. 8-13.

> IADC Annual Meeting, Miami, (713) 292-1945, (713) 292-1946 (fax), e-mail: conferences@iadc.org, website: www.iadc.org. 9-10.

Multiphase User Roundtable-South America, Rio de Janeiro, (979) 268-8959, (979) 268-8718 (fax), e-mail: Heather@petroleumetc.com, website: www.mur-sa.org. 9-10.

API Fall Refining and Equipment Standards Meeting, Dallas, (202) 682-8000, (202) 682-8222 (fax), website: www.api.org/events. 9-11.

Digital E&P Event, Houston, (646) 200-7444, (212) 885-2733 (fax), e-mail: cambrosio@wbresearch.com, website: www.digitaleandp. com. 9-11.

Petroleum Association of Wyoming (PAW) Annual Oil & Gas Statewide Reclamation Conference, Casper, (307) 234-5333, (307) 266-2189 (fax), e-mail: cheryl@ pawyo.org, website: www. pawyo.org. 10.

Deepwater Operations Conference & Exhibition, Galveston, Tex., (918) 831-9160, (918) 831-9161 (fax), email: registration@pennwell. com, website: www.deepwateroperations.com. 10-12.

SPE International Oil and Gas tion, Beijing, (972) 952-(fax), e-mail: spedal@spe.org, website: www.spe.org. 10-12.

Oil & Gas Journal / Aug. 3, 2009





#### Journally Speaking

# A new semisubmersible unit



Sam Fletcher Senior Writer

The American Bureau of Shipping recently did a hazard identification study as the first step in preliminary planning and advice for WindFloat, a proposed semisubmersible platform for large offshore wind turbines.

Principle Power Inc., Seattle, acquired intellectual property rights to that wind energy concept in April. It's one of several offshore floater concepts under development, said ABS.

WindFloat is a three-column semisubmersible structure capable of supporting a wind turbine for marine application in a power range of 3.6-10 Mw. Its design dampens wave and turbine-induced motion so it can be placed in more than 50 m of water to take advantage of "superior" wind resources, said company officials.

Key components are the columns, truss, wind turbine tower, and water entrapment heave plates at the base of each column to minimize pitch and yaw. A closed-loop active ballast system mitigates wind-induced thrust forces, restoring the system to optimal efficiency after changes in wind velocity and direction. Total displacement with ballast would be 8,000 tons, with a hull draft of 20 m. The company specifies a rotor diameter of 120-150 m. A conventional catenary mooring system using prelaid drag-embedded anchors would hold it in place.

#### Study details

The ABS study focused on risks associated with design. "What if you have a collision? What if you damage the hull legs? What are the potential problems with the tow out of such a tall structure? These are just some of the areas we considered," said Ahmad Shafaghi, director of energy risk consulting at the ABS Consulting affiliate.

WindFloat has been in development for 6 years, with extensive design work and numerical modeling, stress and fatigue analysis, as well as multiple wave tank testing campaigns. "When designing the unit we looked at the synergies from oil and gas concepts—from fixed platforms to spars to a semisubmersible," said Dominique Roddier, coinventor of WindFloat and chief technology officer at Principle Power.

#### Rigs available

Considering the time and effort invested in designing and testing a new offshore facility, however, an outside observer can't help wonder why offshore wind pioneers don't simply use an already proven product—some of the many jack up rigs stacked along the Texas and Louisiana coasts. Offshore rigs could be converted into as stable of platforms for marine wind farms as they have been for drilling. Plus they've been tested far beyond the capabilities of a wave tank, having survived the real world of ocean currents and storms.

It wouldn't be the first time someone thought of putting a used rig to other uses. Back in the late 1880s Era Aviation Inc., then the aviation subsidiary of Houston drilling contractor Rowan Cos. Inc., was under contract for perimeter security flights at Vandenberg Air Force Base, Calif., site of satellite launches for

military and commercial organizations as well as testing of intercontinental ballistic missiles. As was its practice with all clients, Rowan sent a copy of its annual report to the air base where the cover photo of a Gorilla jack up rig caught the eye of a general who thought the unit would make a grand launching pad for rockets once the rig mast was removed.

Rowan executives were receptive to the idea since drilling was in an even bigger slump back then than now. The Air Force's idea was to erect a 5 million lb rocket over the rig's moon pool in the Vandenberg harbor and then tow the rig out beyond the 3-mile limit of California's offshore authority. There the rig would set up as it would at a drilling site; the rocket would be readied and fired by remote control from Vandenberg's onshore launch command.

Air Force officers toured jack ups to assess the feasibility of using them for offshore launches. It was estimated then a jack up launch platform could be custom-built for \$100 million, compared with \$3.3 billion for one Vandenberg launch pad that was never used. Nothing came of the plan, however. In time the market improved, and Rowan's rigs went back to work.

In 1999, however, Sea Launch Co. LLC—a consortium of US, Russian, Ukrainian, and Norwegian investors—began launching satellites for commercial customers from the converted semi-submersible Ocean Odyssey. The Long Beach, Calif.-based company says it has made 31 launches from an equatorial position in the Pacific Ocean. In June, however, it filed for bankruptcy protection under Chapter 11.

Oil & Gas Journal / Aug. 3, 2009











#### Four 58-MW Rolls-Royce Trent GTGs Available for Immediate Delivery

The Rolls-Royce Trent 60 is an advanced aeroderivative gas turbine that delivers up to 58 MW of electric power in simple cycle service. At 42% efficiency, the Trent 60 is highly fuel efficient. It offers operators fast delivery and installation times, and beneficial environmental performance. All or part of the following is available for immediate sale:

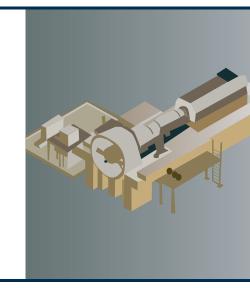
- » Four Trent 60 Dual WLE GTGs rated at 58 MW with a gross heat rate of 8,592 BTU/kWe.hr (LHV)
- » Dual fuel natural gas and liquid
- » Two left-handed units; two righthanded units
- » Four generators rated at 13.8 kV, 3 phase, 60 Hz, 0.85 power factor
- » Water injection system included
- » SCR and carbon monoxide conversion systems with 80-ft stacks
- » Acoustic abatement for SCR cladding and silencer
- » Water wash system
- » Special tools

- » GSUs
- » Two transformers able to handle two 58-MW units
- » GE Prolec 90/120/150 MVA (2 units), with a low voltage 13.8 kV Delta, and a 115 kV Wye HV winding
- » Price includes new transformer oil

#### Two New Alstom 50-Hz Combined Cycle 140-MW Steam **Turbine Generators Available for Immediate Shipment**

These steam turbine generators (STGs) are new, 140-MW Alstom two-cylinder (HP and IP/LP) reheat condensing steam turbine generator sets suitable for combined cycle outdoor operation with axial exhaust and air-cooled (TEWAC) generator. Initial steam conditions 1900 psia/1050°F/1050°F reheat. Units include manufacturer's performance guarantees and warranties. Units may be shipped directly to your site from Alstom's European manufacturing facility.

- » Units come complete with all normally supplied auxiliaries and include factory warranties covering manufacturing defects and performance guarantees.
- Configured as a two-cylinder machine with an HP turbine and a combined IP/LP turbine with an axial exhaust.
- » Steam inlet conditions are 1900 psia (nominal)/1050°F/1050°F.
- » Air-cooled TEWAC generator rated 165 MVA, 15.75 kV, 3 phase, 50 Hz, 3000 rpm.



#### Unused GE D11 HP/IP **Turbine Assembly Available** for Immediate Sale

#### All parts professionally stored in Pensacola, Florida

Unused GE D11 HP/IP turbine assembly and other miscellaneous parts including LP casings and 304-MW generator stator now available for immediate sale.

Solar Centaur 40 T4701S Turbine Generator Package Now Available

#### Offered by Williams Field Services Company exclusively through PennEnergy

Solar Centaur 40 T4701S Turbine Generator Package with approximately 60,000 accumulated hours at 50% load. Package was in service from 1999 until August 2007. Engine is BACT compliant with OEM 25 ppm Nox/50 ppm CO guarantee. Operates off SAB-type Ideal generator rated at 3500 kW, 4375 kVA and 13,800 volts at 60 Hz. Miscellaneous equipment includes inlet air filtration and simple exhaust systems, and auxiliary control console with start/stop/sync/control.



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#### Editorial

# Enriching a muted discussion

Three recent developments—one scientific and two polemic—should enrich discussion about human activity and climate change. In popular media and much of government, however, no such discussion exists. That this is so provides more cause for fear than does whatever global warming may result from the use of fossil energy.

The scientific development is publication of a paper in the American Geophysical Union's Journal of Geophysical Research suggesting that nonhuman influences account for most observed warming over the past 50 years. Australian researchers J.D. McLean of Applied Science Consultants, C.R. de Freitas of the University of Aukland, and R.M. Carter of James Cook University found a close relationship, with a 5-7 month delay, between the Southern Oscillation-El Nino phenomenon and two temperature records covering 1950-2008 and 1980-2008.

"Overall the results suggest that the Southern Oscillation exercises a consistently dominant influence on mean global temperature, with a maximum effect in the tropics, except for periods when equatorial volcanism causes ad hoc cooling," the researchers write in an abstract. The relationship "shows the potential of natural forcing mechanisms to account for most of the temperature variation."

#### Squelching doubt

According to another development, the researchers should expect trouble. In a paper entitled "Climate Money" published by the Scientific & Public Policy Institute, Washington, DC, Australian science writer Joanne Nova describes a well-funded political mechanism dedicated to squelching doubt about the need for urgent warming responses.

"The large expenditure in search of a connection between carbon and climate creates enormous momentum and a powerful set of vested interests," Nova writes, asserting that the US government has spent more than \$79 billion since 1989 on policies related to climate change. A paucity of funds and sometimes abusive resistance await those who question the carbon-climate link. "In this scientific debate," she argues, "one side is gagged while the other side has a government-funded media campaign."

The existence of this public-relations snare is nothing new. Massachusetts Institute of Technology climatologist Richard Lindzen is among scientists who have complained about it (OGJ, Apr. 24, 2006, p. 19). With the US Congress deliberating cap-and-

trade legislation with potential to overhaul US economic patterns, however, concern about the quality of debate seems hugely in order.

The third development is a triumph of packaging: a brochure published by the George C. Marshall Institute entitled "The Cocktail Conversation Guide to Global Warming." While breaking no new argumentative ground, the brochure cleverly compresses into one place several vital points that too seldom receive attention.

It notes, for example, that the ballyhooed "scientific consensus" is a mischaracterization of summaries written by government appointees of complex scientific reports produced every 5 years by the United Nations Intergovernmental Panel on Climate Change (IPCC). "These summaries leave out the assumptions and uncertainties contained in the longer assessment reports," the brochure says.

The brochure also raises questions about warming assumptions fundamental to the politics of behavior-changing response. Although emissions of greenhouse gases increased in the last half of the 20th century, global surface temperatures haven't risen since about 1998. And ocean temperatures, which may more accurately represent planetary conditions, have been monitored systematically only recently and show little, if any, recent warming.

#### Unanswered question

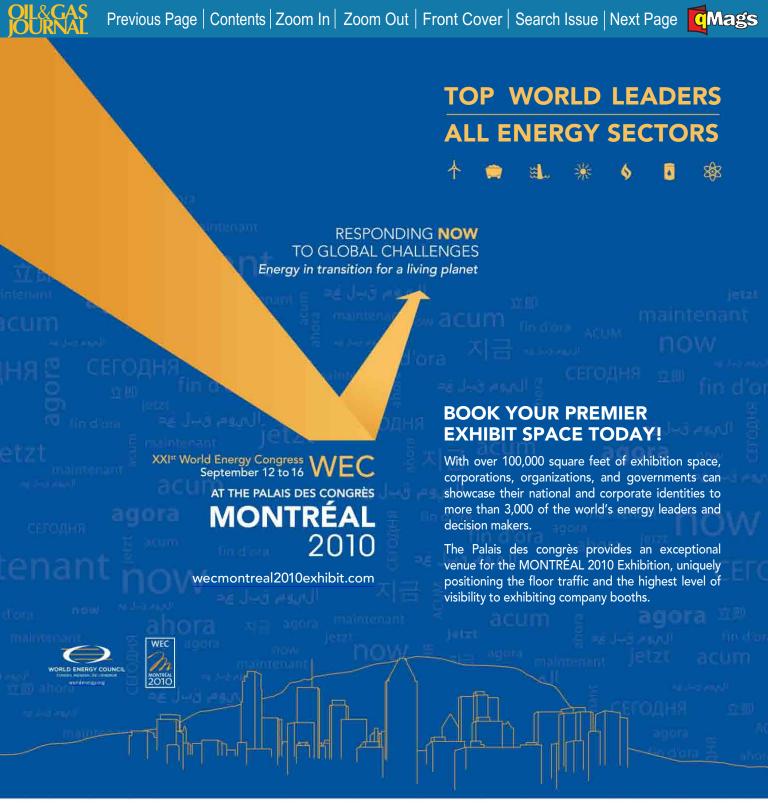
And how many people know how little warming can be directly attributable to the relatively slight human contribution to all carbon dioxide in the atmosphere? The brochure notes that the potential for troublesome warming depends on amplification of CO<sub>2</sub>—induced warming by related changes in cloud cover and water vapor. IPCC computer models all assume strong secondary warming from decreased cloud cover and increased water vapor in the atmosphere. Yet various physical observations suggest that net cloud and water-vapor changes might, on balance, have the opposite effect.

In fact, the Marshall Institute brochure calls uncertainty about cloud and water-vapor feedbacks "the most important question in global warming research today." Yet the popular wisdom is that the science is "settled," the debate over. And a determined effort remains in progress to raise energy costs painfully before a muted discussion can raise any more contrary questions.



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# <u>General Interest</u>

National oil companies control the vast majority of the world's oil reserves, produce most of the planet's crude, and own much of the oil and gas infrastructure, which makes them major forces in the industry.

But while competing as oil companies globally, NOCs face special challenges locally as agents of their governments with obligations to serve the

of their

nations.

Some are

successfully ex-

panding

opera-

Pemex, PDVSA, Petrobras: how strategies, results differ

Sam Fletcher Senior Writer

tions beyond their borders. Some are struggling with depleting resources. And some have become the focus of political ambitions and the center of confrontations.

Mexico's Petroleos Mexicanos (Pemex), Venezuela's Petroleos de Venezuela SA (PDVSA), and Brazil's Petroleo Brasileiro SA (Petrobras) are certainly

National Oil Company Profiles

the most talked-about and likely the most influential NOCs in the Western Hemisphere-each for different reasons.

Pemex and PDVSA are among the five largest suppliers of crude to the US. Petrobras has expanded around the world to meet the needs of its own huge market, the Western Hemisphere's third largest. Its prolific presalt discoveries off Brazil have the potential to lift it into the top echelons of integrated companies.

The contrasting histories, conditions, and directions of Pemex, PDVSA, and Petrobras illustrate the wide range of strategies that NOCs follow in response to their unique combinations of competitive and political pressures—and the full range of successes and failures.

#### Pemex struggles

Pemex is sole producer of crude, natural gas, and petroleum products in Mexico and the country's most important company. It is the biggest enterprise in Mexico, the biggest source of income for the Mexican government, and the third largest exporter of crude to the US, behind Canada and Saudi Arabia.

Once it was the model for other Latin American NOCs trying to develop their own resources. But Pemex's crude production has fallen for years due to 'steep decline rates from maturing oil fields (mainly Cantarell field), a lack of foreign investment, and a high tax burden on Pemex," said analysts in the Houston office of Raymond James & Associates Inc. The decline is so bad, they said, "Mexico may become an oil importer within the next 5 years."

Pemex's reserve replacement rates rank near the bottom and its costs near the top among NOCs. Its development of gas reserves appears to be stalled. And it is in dire need of technology to explore ultradeep waters of the Gulf of Mexico and of a large infusion of money to fund exploration and development. Yet Mexico appears determined to maintain its constitutional ban on foreign ownership of natural resources.

"Mexico is effectively closed to foreign investment. This inhibits the interchange of differing geotechnical ideas and denies Mexico sufficient risk capital to fully exploit its oil and gas resource," said Andrew B. Derman, partner and leader of international energy practice

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at Thompson & Knight LLP in Dallas. "Given Mexico's proximity to the US, it could be one of the hottest oil and gas plays on the planet. One would think that Mexico would exploit its resources now when there is a demand. Mexico may discover that exploitation mañana is not nearly as profitable."

Michael C. Lynch, president, Strategic Energy & Economic Research Inc., differs from the generally pessimistic consensus on Mexico. "I think Mexico will probably surprise many," he said.

Lynch said, "[Pemex's] first need has been capital; the government has a long tendency to starve them of money, and only recently has this been reversed. Mexican drilling activity is twice what it was a couple of years ago, and they have a lot of medium-sized fields that could make a serious contribution. (The decline in rigs rates has helped them, but the peso decline offset that somewhat). Deregulation and outside investment would certainly help, but capital is the main thing."

#### Pemex production

At the start of this year, Pemex claimed proved reserves of 14.3 billion boe of oil and gas, including 10.2 billion boe developed. It also had 14.5 billion boe of probable reserves and 14.7 billion boe possible. Proved gas reserves were 17.6 tcf, including 11.5 tcf of associated gas. Proved, probable, and possible gas reserves totaled 60.4 tcf. The largest concentration of reserves is offshore, primarily in the Campeche basin, where tropical storms and hurricanes sometimes disrupt operations.

Pemex's production dropped to 2.8 million b/d in 2008 from 3 million in 2007. Two thirds of its production is heavy Maya crude that averages 22° gravity and 3.5-4% sulfur content. Pemex retains its lighter crude for domestic consumption and exports Maya production to the US. Last year exports were down 16.8% to 1.4 million b/d of crude, with 1.2 million b/d going to the US.

From 2004-07, Mexico was the second-largest oil supplier to the US,

but fell to third in 2008 behind Canada and Saudi Arabia. Proximity of the US market and the sophistication of US refineries will continue to attract most of Mexico's oil exports, according to analysts at the US Energy Information Administration.

Production from Cantarell—once Mexico's biggest oil field and among the international giants—slipped below 700,000 b/d in May from peak production of 2.1 million b/d in 2004.

"The death of Cantarell has been much discussed," said oil analyst and investor Gregor Macdonald. However, he said, "What's less recognized is that the toppling of Cantarell has absolutely shattered Mexico's effort to halt the decline of oil exports."

Ku Maloob Zaap (KMZ) adjacent to Cantarell in the Gulf of Campeche is the largest source of new production growth. It recently overtook Cantarell as Mexico's biggest producer, with record output of 814,000 b/d in April. The KMZ complex produced 740,000 b/d of crude in 2008, up from 550,700 b/d in 2007. Production has doubled in the last 3 years with a nitrogen reinjection program similar to one at Cantarell. Pemex expects KMZ production to peak at 820,000 b/d before declining to 810,000 b/d next year.

Pemex is investing heavily in KMZ to offset Cantarell's decline. The field contains 18% of Mexico's non-Cantarell proved reserves. However, KMZ crude is heavier than Maya crude. Analysts report Pemex documents show KMZ's oil quality and production are falling due to encroachment of water and salt.

Some 20% of Pemex production is from onshore fields. The largest in the south, Puerto Ceiba, produced 50,000 b/d in 2008. The largest in the north is Arenque (10,000 b/d in 2008).

#### Potential contributor

The Chicontepec basin with 29 distinct fields spread over 2,400 sq miles northeast of Mexico City is potentially a large contributor to Pemex's future production. It contains 54% of Mexico's non-Cantarell proved reserves. Pemex

plans to invest \$11 billion over the next 4 years at Chicontepec. It currently produces 30,000 b/d, but Pemex hopes to increase production to 700,000 b/d by 2017. Pemex estimates Chicontepec contains possible reserves of 17.7 billion boe.

Most Chicontepec crude is heavy, some as heavy as 18° gravity. The reservoir is highly fractured and at low pressure, and the region lacks infrastructure for large-scale development. Low permeability makes extraction difficult. On top of that, some analysts suggest Pemex systematically exaggerates the recoverable oil in the basin.

Many industry observers believe Mexico's oil production has peaked and will continue to decline. In March, EIA forecast Mexico will produce 2.9 million b/d of oil in 2009 and 2.7 million b/d in 2010. Last year Mexico enacted legislation to reform its oil industry so Pemex could better curb the production decline. The reform permits Pemex to create incentive-based service contracts with private companies. Pemex received greater autonomy under the reforms, including the ability to issue its own debt and establish more flexible mechanisms for procurement and investment.

Mexico opened its downstream gas industry to private operators in 1995 but prohibits any company from participating in more than one function (transportation, storage, or distribution). Gas consumption has increased for domestic power generation to free up oil for export. But Mexico is a net importer of gas, and increased consumption means increased imports from the US or via LNG.

#### PDVSA's slide

PDVSA was created in 1975 when Venezuela first nationalized its oil industry. It's the largest employer in Venezuela and accounts for a third of the country's gross domestic product, 50% of the government's revenue, and 80% of Venezuela's exports earnings. It is among the five largest suppliers of crude to the US.

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### FNFRAL INTERFST

Venezuela has 99 billion bbl of proved oil reserves, the largest in South America (OGJ, Dec. 22, 2008, p. 20). Its gas reserves are 171 tcf.

In the 1990s, Venezuela increased opportunities for foreign and domestic oil companies under operating service contracts with PDVSA, granting operating rights to private-sector companies in selected fields with a cash fee paid per barrel of oil produced and delivered to PDVSA.

After President Hugo Chavez took office, however, he began raising taxes and royalties. Under threat of total nationalization, he forced companies to convert their operating service contracts into joint ventures with PDVSA as senior partner.

In 2002, nearly half of PDVSA's employees walked off the job in protest against Chavez's administration. But they lost the months-long strike, and Chavez fired 18,000 PDVSA workers. That, said critics, drained the company of technical knowledge and expertise. Industry analysts speculate the strike caused permanent damage to PDVSA's production capacity.

Labor troubles are again bubbling in PDVSA. Dissident union leaders say many of the 100,000 workers employed by PDVSA and some contractors are disgruntled about overdue pay, a 6-month delay in renegotiating a contract with oil workers, and government efforts to consolidate all unions into a progovernment, socialist organization. Meanwhile, PDVSA is incorporating thousands of workers from recently nationalized oil service contractors.

In May Venezuelan troops seized the assets of 60 foreign and domestic oil service companies in a conflict over \$14 billion owed by PDVSA. The company brought in more than \$120 billion in revenue in 2008, but this year it will likely make just \$50 billion.

Outside analysts estimate PDVSA needs to spend \$3 billion/year just to maintain present production from existing fields, many with decline rates of 25%/year or more. Meanwhile, the

government pulls billions from the company for nonoil investments.

#### Forced transition

In 2007, Chavez forced a transition of the four heavy oil projects to new structures giving PDVSA majority ownership. Of the six companies involved in the projects, ConocoPhillips and Exxon-Mobil Corp. walked away from massive investments.

Lynch said, "PDVSA is not so much in a downward spiral as a death spiral. They don't have enough trained people to maintain operations, the government has diverted too much of their funds elsewhere, but more important, the prospect of attracting outside assistance is becoming all but impossible as the government uses PDVSA's 'accounts payable' as a piggybank. Only massive change in the company and almost certainly in the government can fix things."

Derman said, "As PDVSA becomes increasingly more isolated and cashconstrained, its production and revenue are likely to continue falling." He said, "The short-term gains Venezuela achieved by effectively expropriating assets will precipitate long-term problems that will result in reduced production and reduced revenue. It is questionable whether the current strategy is sustainable."

Yet Derman reported, "Some companies are considering a contrarian strategy [of] entering Venezuela now, believing that Venezuela's strategy is not sustainable and that the rules will have to change again."

Crude from Venezuela's four major sedimentary basins has an average API gravity less than 20°. Much is also sour. PDVSA's true level of production is difficult to determine. Officials claim Venezuela's production capacity tops 3.4 million b/d. However, the Organization of Petroleum Exporting Countries reported Venezuelan oil production was up 23,000 b/d to 2.24 million b/d

In 2007, according to EIA, Venezuela exported 1.9 million b/d of oil. The US received most of that, importing 1.36

million b/d of crude and petroleum products, down from 1.42 million b/d in 2006. Venezuelan oil exports to the US have been declining since peaking at 1.77 million b/d in 1997. PDVSA's exports to China are on the rise, since the company has made a priority of diversifying sales away from the US. But sophisticated US refineries likely will still be processing Venezuela's heavy, sour crude for the foreseeable future.

#### The Petrobras contrast

Viewed against the problems of Pemex and PDVSA, Petrobras appears to be doing everything right. It has gone partially public with some trading of its stock. It's getting loans from China. It has developed an expertise and reputation for deepwater exploration and development that rivals the best of the IOCs, and it has taken that expertise into the Gulf of Mexico and foreign waters through its international operations. It has proven a profitable business partner for US service companies and IOCs. Recent discoveries have opened the promising presalt play in Brazilian waters. And it even has a major position in the production and market of ethanol.

Having worked with the company, Derman said, "Petrobras is unequivocally a first-rate organization with some of the most talented professionals anywhere." Its presalt play "is the most exciting discovery in many decades."

Derman said Petrobras's international expansion provides an added advantage for the NOC beyond the obvious benefits. "After working extensively in the international arena, Petrobras understands the host government perspective and the international oil company perspective," he said. "The professional thinking is at the cutting edge as the company is working in multiple places with a host of oil and gas companies. The challenge for Petrobras is to retain its professional staff, which is one of the best in the business."

Another thing that sets Petrobras apart from many NOCs is that it is

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developing oil supplies for the Brazilian market rather than for export. Brazil is the 10th largest energy consumer in the world and is eclipsed in the Western Hemisphere only by the US and Canada. The Brazilian government has worked toward energy security since the energy crisis of the 1970s drove it to explore for oil and develop ethanol. Today Brazilian and for the second state of the second sec

is self-sufficient in liquid fuels.

State-controlled Petrobras is the dominant player in Brazil with strong positions upstream, midstream, and downstream. A constitutional amendment ended Petrobras's monopoly in 1995. By 1997, regulators were in place to govern equally foreign and Brazilian oil companies. Exploration and production blocks are awarded competitively under a tax and royalty fiscal regime with the

average royalty rate of 10%.

Still, EIA reported, "Foreign-operated oil projects are rare in Brazil." Petrobras also has competition from private domestic companies. Yet it still controls over 95% of crude production in Brazil.

Petrobras's resources

OPEC recently reported, "Among all non-OPEC countries, Brazil is seen to be on the top of the list in terms of supply growth. Various fields will start up and ramp up in Brazil, such as Parque Da Conchas (BC-10), Cachalote, Frade, Marlim Leste Jubati, Marlim Leste P-53, Marlim Sul P-51, and Pinauna. Additionally, biofuel production is anticipated to grow by around 60,000 b/d in 2010. Average oil supply from Brazil is estimated to stand at 2.79 million b/d in 2010."

Petrobras's total production dipped to 2.505 million boe/d in June from 2.547 million boe/d in May. Domestic oil production fell to 1.927 million b/d in June from 1.989 million b/d in May due to scheduled outages in Marlim Sul and Marlim fields and end of production from the Capixaba FPSO. International crude production by Petrobras

climbed to 146,300 b/d from 136,300 b/d in May. Domestic gas output was 51.8 million cu m/day in June, up from 51 million cu m/day in May. Foreign gas production increased to 17.9 million cu m/day in June from 17 million cu m/day in May.

At the end of 2008, Petrobras's domestic proved reserves of oil, con-



densate, and natural gas totaled 14.093 billion boe, up 1.2% from 2007. Proved reserves of oil and condensate equaled 11.969 billion bbl. Brazil's proved reserves are the second-largest in South America after Venezuela's. Most are in the Campos and Santos basins off the southeast coast. Proved gas reserves were 337.6 billion cu m. These figures do not include presalt discoveries in the Santos basin that are being evaluated.

Petrobras's international proved reserves of oil, condensate, and natural gas totaled 992 million boe, down 9% from 2007. Proved reserves of oil and condensate were 496 million bbl. Proved natural gas reserves abroad amounted to 83.9 billion cum. Improved recovery from oil fields in Argentina and Peru and the addition of Cascade field reserves in the US were offset by production, a decrease of assets in Ecuador, and revaluation of Nigerian reserves.

#### Presalt exploration

In 2007 Petrobras announced the discovery of Tupi field in the Santos basin in a subsalt zone in 18,000 ft of water. Tupi is the biggest oil discovery since Kashagan field off Kazakhstan and the largest in the Americas since

1976. Moreover, oil in the subsalt zones appears to be lighter and sweeter than most of Brazil's existing production.

Additional subsalt discoveries include Carioca, Iara, and Guara. Preliminary industry estimates indicate recoverable subsalt oil and gas reserves could approach 56 billion boe.

In late June, the 4-BRSA-711-RJS (4-

RJS-647) well confirmed reserves estimates of 5-8 billion boe of 30° gravity oil and natural gas in the Tupi area. An extended production test of the first two wells, Tupi-1 and Tupi Sul, began in May from the BW Cidade de Sao Vicente floating production, storage, and offloading vessel in 2,170 m of water in Block BM-S-11, 280 km off Rio de Janeiro. The FPSO is capable of producing 30,000 b/d. Petrobras is operator with 65%

interest in the block. Partners are BG Group, 25%, and Galp Energia, 10%.

Petrobras expects to invest \$28.9 billion in the presalt play by 2013. Brazilian officials say the play will secure the country's energy self-sufficiency for half a century.

However, the great depths and pressures of subsalt deposits are technology challenges. The reserves also contain a high concentration of natural gas that will require additional facilities. As a result, said EIA, "Production from small pilot projects is possible in the next several years, but large-scale development of the subsalt reserves will likely not occur until well into the next decade."

Brazil is one of the largest producers of ethanol and the largest exporter of the fuel. EIA earlier forecast Brazil's ethanol production would reach 530,000 b/d in 2009. Most of the cars in Brazil are flex-fuel vehicles that can run on pure ethanol or an ethanol-gasoline mixture. Petrobras also has a dominant stake in the retail products market.

Natural gas production has developed slowly due to lack of pipeline capacity. EIA reported gas imports and high oil prices have increased substitution of gas for fuel oil for industry and power generation.







## GENERAL INTEREST

# China using loan packages to secure oil supplies

Leena Koottungal Survey Editor/NewsWriter

China is using its financial reserves to secure oil supplies from a variety of producing countries, ac-

cording to a recent report by Wood Mackenzie. The Chinese government in recent months has invested in some of the world's leading oil producing countries through loan packages.

Source: Company annual reports In April, China National Petroleum Corp. acquired a 50% share of upstream Mangistaumunaigaz of Kazakhstan for \$3.3 billion and loaned \$1.7 billion to KazMunaiGas. An additional \$5 billion loan was agreed between the China Export-Import Bank and Kazakhstan

Development Bank.

Through the deal, CNPC gained an estimated 420 million bbl of reserves and net production of 55,000 b/d. This production could be delivered directly

CHINA'S NOCS: A 2008 SNAPSHOT Oil Oil production reserves **Total Profit** revenue Million bbl Million \$ 1,578.3 30,297.7 18,128.1 6,385.6 CNPC 14,231.6 2,841.0 264,532.4 110,277.7 183,184.7 216,201.5 13,188.4 3,770.2 296.8 Sinopec

> to China with start-up of the Kazakhstan-to-China oil pipeline, expected in 2011.

> In February, China Development Bank committed to loan \$15 billion to

Russia's OAO Rosneft, majority-owned by the government, and \$10 billion to OAO Transneft, Russia's oil transport monopoly. In return, China will receive 300,000 b/d of crude from Russia at

market prices, starting in

China Development Bank and Sinopec Corp., China's leading refiner, signed a memorandum of understanding (MOU) with Petroleo Brasileiro SA for loans reportedly \$10 billion—to support future investment in upstream and refining by the

Brazilian national oil company (NOC). Plans to increase oil exports from Brazil to China also were outlined with annual trade expected to increase to 100,000 b/d in 2010 and more thereafter.





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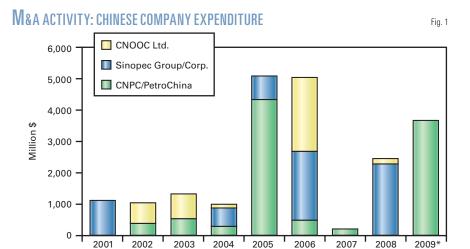


Petroleos de Venezuela SA and CNPC agreed to increase oil sales to 80,000-200,000 b/d under another round of accords signed in February. Meanwhile, Sinopec and PDVSA signed an MOU regarding joint study of field development opportunities in Venezuela.

#### The Angolan experience

The recent deals mirror Sinopec's successful strategy to obtain upstream holdings in Angola. Loans to the Angolan government and long-term crude supply deals helped Sinopec acquire 50% of deepwater Block 18 via Sonangol's right to preempt.

Sinopec subsequently leveraged its relationship with Sonangol, the Angolan NOC, into new opportunities in development and exploration. In 2005, a Sinopec-Sonangol joint venture took a 25% stake in Block 3/80 upon expiration of Total SA's development license. In Angola's 2006 exploration licensing round, the Sonangol-Sinopec venture



\*As of May 2009. Source: Wood Mackenzie estimates

was the most aggressive of the bidding companies, submitting three signature bonus bids totaling \$3 billion and capturing much of Angola's remaining prime deepwater acreage. Angola is now second only to Saudi Arabia as an oil supplier to China.

Until the deals of 2009, Sinopec's activities in Angola provided the most tangible evidence of Chinese "oil diplomacy" to develop overseas upstream interests. Chinese companies will seek to replicate Sinopec's success in the resource-rich countries that recently



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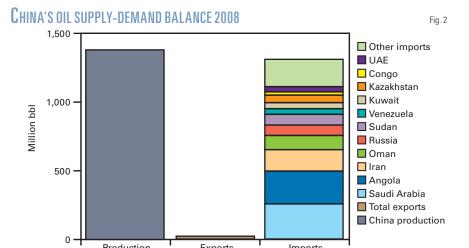








### GENERAL INTEREST



Source: Wood Mackenzie estimate based on data from the official journal "China Oil, Gas, and Petrochemicals"

obtained Chinese loans. For international oil companies (IOCs), it is this aspect of the recent Chinese loan-for-oil deals that provides the greatest potential for increased competition.

With Chinese influence spreading, the range of future opportunities available to others may diminish. As demonstrated in Angola, WoodMac says, this may even extend to more technically challenging areas such as deepwater exploration, previously the domain of major international oil companies.

#### Mergers on agenda

In the near term, CNPC-PetroChina Co., Sinopec Group, and CNOOC Ltd. are looking to mergers and acquisitions as ways to expand internationally. M&A investment by the Chinese companies since the start of the decade has been modest compared to outlays by their international oil company peers. However, the fall in oil prices over the last year has renewed Chinese interest in dealmaking. By leveraging their financial strength and long-term outlook on the fundamentals of the oil and gas business, WoodMac says, China's NOCs may expand their international holdings while the rest of the industry grapples with a weak near-term industry out-

Deals completed so far this year indicate that Chinese companies are taking

a more aggressive approach to international acquisitions.

In June, Sinopec moved to acquire Addax Petroleum for a cash consideration of \$7.2 billion representing the Chinese company's largest ever acquisition. When completed, the deal will expand Sinopec's upstream interests in West Africa and Iraq. CNPC also has been active. In February, it agreed to buy the Canadian company Verenex Energy Inc. for \$361 million, thereby acquiring a 50% interest in Block 47 in Libya (albeit completion of the deal remains outstanding with possible preemption by Libya's NOC).

The subsequent \$3.3 billion acquisition of the 50% stake in Mangistaumunaigaz in Kazakhstan brought CNPC's total acquisitions to nearly \$3.7 billion, the highest since 2005.

In July, the Chinese companies continued their acquisition efforts. In Angola, Sinopec and CNOOC agreed to a \$1.3 billion deal with Marathon to acquire a stake in Block 32. Recent press reports also point to the likely purchase of Talisman's assets in Trinidad and Tobago by a CNOOC-Sinopec joint venture for \$323 million.

#### Future activity

According to the WoodMac report, all three Chinese NOCs have the resources to make larger mergers and acquisitions.

CNPC-PetroChina can aim considerable financial firepower at M&A opportunities. Supported by a strong balance sheet and potential financing from the Chinese government, it might be able to make a deal worth in excess of \$20 billion. With the market capitalization of many middle-size international companies falling well below this level, CNPC has many potential targets if conditions become conducive to a large deal.

However, Chinese companies may question the attractiveness of large corporate deals. Acquisition targets of sufficient scale, growth potential, and an operational fit with the Chinese companies are few. Identifying acquisition targets that align with the Chinese companies' ambitions is challenging, said the WoodMac report.

This is particularly true for CNPC-PetroChina. It would take a major acquisition to impact its upstream business. With relatively few companies in the middle-capitalization category involved in oil and gas development outside North America, China's supermajor has scant pickings.

Even if the Chinese companies identify a compelling acquisition target, closing the deal could prove challenging. CNOOC's unsuccessful try for Unocal in 2005 illustrated the political opposition that Chinese oil companies face in overseas takeovers. Reigniting political antagonism toward Chinese expansionism via another high profile takeover bid is not high on China's political agenda.

With probably strong competition from IOCs for attractive acquisitions, it's debatable whether Chinese companies would have the appetite for a major deal. Lack of experience in such deals and integration concerns are likely to subdue Chinese takeover desires. Nevertheless, WoodMac expects no let-up in China's overseas oil and gas investment activities. A continued stream of acquisitions alongside further initiatives to access overseas resource opportunities, either independently or through joint ventures with leading IOCs, is expected. •

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# Gazprom grapples with dents to revenues, investments

Uchenna Izundu International Editor

The dramatic fall in gas prices over the past year has dented revenues and investment plans of OAO Gazprom, the world's largest gas producer.

In June Alexander Medevev, deputy chief executive of Gazprom, said he expects an 11% drop in exports this year to 142.1 billion cu m and a 38% drop in export revenues to \$40 billion.

European customers are expected to pay over \$2.80/thousand cu m for Russian gas in 2009. Medvedev said despite the crisis, gas consumption in Europe was higher in fourth-quarter 2008 and first-quarter 2009 than in the warm spring of 2006-07. "Temperatures play a bigger role than GDP dynamics," he said.

The company doesn't expect to return to 2008 production levels until after 2012.

"I think they are right," said Jonathan Stern, director of gas research at the Oxford Institute for Energy Studies. "Gazprom is dependent on the global and national economy, and there is nothing that they can do to change that picture." In 2020, gas is expected to constitute 82% of the group's net income with oil being 14% and power, 4%

With Gazprom being inextricably tied to the Kremlin and a major political tool in its foreign policy, the company has benefited from the government's drive to exert greater control over the energy industry.

Chris Weafer, a strategist at Uralsib Bank in Moscow, said this was a major transition year for Russia as Vladimir Putin's presidency had focused on stability and restructuring. Now his successor, Dmitry Medvedev, wants to push a controversial reform agenda and attract foreign investment. This, however, has been delayed by the economic crisis and the conflict with Georgia.

"For Russia to get out of the commodities boom-to-bust cycle, the government will need to more clearly adopt policies—monetary, fiscal, and budgetary—to make that happen," Weafer said.

#### Investment program

Gazprom outlined a 920.4 billion-ruble (\$26.3 billion) spending plan for 2009, but it will set priorities for its projects in the turbulent market. Top production ventures are Zapolyarnoye, Bovanenkovskoye, Urengoiskoye, Shtok-

#### Gazprom's key 2008 statistics

Gas reserves: 33.1 trillion cu m
Condensate reserves: 1.3 billion tonnes
Oil reserves: 1.6 billion tonnes
Gas production: 549.7 billion cu m
Condensate production: 10.9 million
tonnes
Oil production: 32 million tonnes

Source: Gazprom

man, and Severo-Kamennomisskoye fields.

With major projects in frontier areas being capital-intensive and technically challenging, there have been concerns about delays. Bovanenkovskoye gas field's start-up has been postponed from the third quarter of 2011 to the third quarter of 2012 because of the global economic crisis.

In a memorandum on bond placement, the company said the deadlines for the \$20 billion Shtokman gas-condensate project could be reviewed "depending on the situation on the natural gas market." A company spokesman told OGJ there had been no decision to delay the 23.7 billion cu m/year Shtokman pipeline gas and LNG development, which is due to start in 2013, and the works are progressing according to the

initial plan. "An updated investment decision on Shtokman is scheduled to take place in March 2010," she said.

Andrew Neff, senior energy analyst with IHS Global Insight, said over the next 3-5 years Gazprom would have to reconcile its long-term upstream investments with demand projections that have radically changed over the last year. "Gazprom has to diversify its own export markets as well by making inroads into Asia-Pacific and North American gas markets. Also, the economic downturn and the pressure on oil indexation in Gazprom's European gas contracts could force Gazprom to abandon oil indexation in favor of some other pricing mechanism."

Neff said Gazprom should research and identify a new gas price mechanism to replace oil indexation or take steps to defend it.

In Russia, the company sells gas at regulated prices for heat and power. The practice has curbed available capital for reinvestment in the industry and reduced efficiency incentives internally, according to a report by KPMG LLP. "However, in November 2006 the Russian government decided to incrementally increase domestic prices towards market levels. Ageing fields and insufficient export pipelines are also a concern going forward."

#### Establishing trust

One major challenge for Russia is regaining Europe's trust as a reliable gas exporter considering its strained relationship with Ukraine, a key transit country for Russian gas carried by pipeline to Western Europe. Gazprom currently supplies 25% of Europe's gas but aims to have a 29% market share in 2020. The spats with Ukraine have forced Gazprom to pursue other supply routes, such as the proposed 30 billion cu m/year South Stream pipeline with Eni SPA and 27.5 billion cu m/year Nord pipeline.







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Pushing Ukraine and other former Soviet Union countries to pay market prices is a major headache. Ukraine is struggling to pay for the gas because of the impact of the financial crisis on its economy. In January Gazprom stopped supplies for 20 days because the countries could not agree on future gas and transit prices. Gazprom lost well over \$1.1 billion in direct revenues because of the dispute. In response to erratic payments, Gazprom in June threatened to cut gas again if Naftogaz Ukrainy, Ukraine's national gas company, did not pay for the gas.

The European Commission urged Ukraine to reform its gas industry and is working with international financial institutions, Ukraine, and Russia to reach an agreement on payments.

#### Presence overseas

Gazprom is an example of an NOC contributing to its country's economic growth.

"NOCs are more proactive and innovative on their relationships with the future in mind, and they are investing in countries to access reserves such as China and Russia in Africa and Latin America," said Johan Nell, head of upstream at Accenture.

One of its latest deals was the signing of a protocol in June with Nigerian National Petroleum Corp. to form a joint venture, named Nigaz, to conduct gas exploration, production, and transportation and to build power generation facilities in Nigeria. The venture could be worth up to \$2.5 billion. Other areas of importance are North Africa, Latin America, and Asia.

# Sonatrach maintains investments despite low crude oil prices

Uchenna Izundu International Editor

Despite declines in oil and gas prices, Sonatrach, the Algerian national oil company, is maintaining its investment program.

The company has expansion plans in traditional areas such as refining and LNG and is venturing into desalination schemes, power generation, and petrochemicals.

It estimated the 2008-12 investment program would cost \$45 billion but said 2009-13 spending would total \$64 billion, boosted by the 60 discoveries it made last year. This budget includes \$1.5 billion/year for exploration.

If oil prices fall to \$30/bbl, Sonatrach will review future projects but not those already planned.

A major project under way is the \$2.6 billion modernization and expansion of Sonatrach's 300,000 b/d Skikda refinery. Samsung Engineering Co. has a

3-year engineering, procurement, and construction contract to upgrade most of the refinery, from crude distillation unit through aromatics facilities, in a project that will increase crude capacity to 330,000 b/d.

Samsung also will add plants for the production of isomerate (700,000 tonnes/year), paraxylene (220,000 tonnes/year), and benzene (200,000 tonnes/year).

A Sonatrach unit, Naftec, operates all four of Algeria's refineries, which have capacities totaling 450,000 b/d. Algeria wants to raise total refining capacity to 1 million b/d by 2013.

Sonatrach is also adding a 4.7-million-tonne/year train at its LNG export terminal at Arzew, where existing capacity is 16.4 million tonnes/year. The new train is due online in 2012.

Earlier this year the NOC let a \$1.1 billion contract to SNC-Lavalin Group Inc., Montreal, to build a gas gathering

system, gas processing plant, and carbon dioxide injection facilities to serve four gas fields in eastern Algeria (OGJ Online, June 16, 2009). The facilities will treat about 353 MMscfd. Residue gas will move more than 1,000 km to Arzew for liquefaction.

Sonatrach also has awarded five contracts totaling \$61 million to Italian engineering company Maire Tecnimont SPA for conceptual design and frontend engineering design of expansion of the Algerian gas transmission network. Completion is slated for August 2010.

#### Licensing results

Samuel Ciszuk, energy analyst for the Middle East and North Africa at IHS Global Insight, said Sonatrach's challenges over the next 3-5 years would be the risk of a delay in its upstream gas exploration, development, and production because of poor results in its latest licensing round.

A December offering of 11 licenses drew limited interest from foreign companies, which complained of poor acreage and financial strains (OGJ Online, Dec. 16, 2008).

Ciszuk said the setback makes "the operation and investment in the whole southwestern area look less certain to move ahead successfully. Gas from that area is necessary to feed future Algerian export commitments and domestic need, and now its development pace has been delayed by at least a year."

In July, Algeria invited operators to bid for 25 blocks it said have "high-potential petroleum resources (OGJ Online, July 1, 2009)."

Energy and Mines Minister Chakib Khelil said Algeria would work with companies that have technology to handle unconventional gas rather than those that want to swap reserves in other countries.

While Sonatrach says cooperation with international oil companies has always been important, experience has been mixed. For example, the company's relationship with Repsol YPF and Gas Natural broke down over a gas gathering and processing project in the

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Gassi Touil region of eastern Algeria, forcing Sonatrach to work alone. Gas from the project is to feed the LNG train under construction at Arzew.

Sonatrach in June let a 42-month turnkey engineering, procurement, and construction contract to JGC Corp.

for the project, which will handle 12 million cu m/day from seven gas fields (OGJ Online, June 12, 2009).

Ciszuk said: "Sonatrach's relationship seems a bit hit-and-miss sometimes, with quite hard attitudes sometimes and long good relationships in some cases. The company would do good to spread a more business-minded culture throughout its domestic upstream parts—although compared with Libya, for instance, Sonatrach is of course very savvy."

# Innovation urged in NOC, IOC relations with suppliers

Alexandre Oliveira Accenture London

National oil companies (NOCs) and international oil companies (IOCs) are under greater pressure than in previous down-cycles due to the last year's sharp falls in petroleum prices and demand. This time, the accelerating decline in output from mature fields requires oil majors to invest in new, more complex assets and territories. Companies not only have to maintain capital expenditure against the backdrop of lower commodity prices, they also face intense competition from companies in emerging markets that either control vast reserves or have aggressive plans to secure them.

The squeeze on capital and operating costs is therefore inevitable. But oil companies should not repeat past cycles by aggressively cutting costs to the detriment of the industry's value chain, especially technology investment. They must move beyond today's somewhat adversarial supplier relationships if they are to reduce costs without endangering their long-term performance.

Meanwhile, NOCs and IOCs should also support their own local suppliers by finding innovative ways to encourage foreign investment that maximize local content and enable sustainable industrial development, creating direct and indirect employment in a framework that nurtures new competitive capacity.

Whatever the medium-term outlook for oil demand and prices, both NOCs and IOCs are entering uncharted waters. Some NOCs face demands on revenues by local treasuries protecting government budgets. And IOCs, needing to satisfy shareholders with healthy reserves-replacement ratios, have to fund robust capital expenditure commitments. They are therefore driven to minimize the gearing, or financial leverage, required to support such expenditure and to mitigate the rise in upstream exploration and production costs. These have risen 230% since 2000, according to Bernstein Research.

No surprises, then, that oil majors have turned to their main suppliers, the oil field service (OFS) companies. Hiring rates for drilling rigs are being renegotiated at 10-30% lower than previous levels. Total SA expects reductions in supplier costs of up to 20%, BP PLC of up to 40%. Royal Dutch Shell PLC's outgoing Chief Executive Jeroen Van der Veer recently said: "If the business environment stays very lousy, then we expect very large procurement savings from all our suppliers."

The commodity-price surge under the last cycle played a major part in the industry's consequent capacity crunch and high prices. Due to the fragmentation of the value chain over the last decade, operators have sought to improve efficiencies in areas of excellence and specialty, but sectors such as the seismic industry have suffered long-term damage as large cost cuts prevented necessary long-term investments.

#### Identifying efficiencies

So how does the industry find an equitable relationship with its suppliers?

There's no doubt that the \$300 billion OFS sector will have to identify efficiencies itself. Cost reductions will be found through more advanced supplychain management systems and shared-service infrastructures, for instance. These are particularly important for OFS firms operating in multiple markets where new-found standard processes can help diminish costs. Industry restructuring will also inevitably play its part as low company valuations result in a possible wave of consolidation.

But as industry interdependence rises, oil companies themselves must adopt an entirely new approach to supplier relationships and procurement. Today, for example, NOCs and IOCs will often procure services at the lowest headline cost in an attempt to minimize short-term outlay. This can often result in rewarding suboptimal suppliers and raising longer term expenditure. In what effectively boils down to a commoditized transaction, contracts are less likely to be awarded to the most innovative business model or to the most technically advanced solutions. Instead, the transaction can add costly management resources and processes.

IOCs must therefore ensure that procurement is led by a search for value creation to distinguish more effectively between lowest headline costs and lowest true total cost of ownership. Procurement should also be pursued with a relentless drive for higher levels of performance across all areas of the integrated value chain, including advancement in the health, safety, and environmental impact.

During the coming cycle, this prin-

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ciple should also be adopted by more NOCs. This not only reflects the growing power of NOCs and the reserves they control, but it also follows from the increasing levels of cooperation between IOCs and NOCs. The sustainable exploitation of new fields demands a healthy support for suppliers—local and international—as these regions seek to create skills-rich labor forces that they currently lack.

#### On line markets

A major advance for local suppliers in recent years has been the establishment of transparent online markets aligned to NOCs' needs. Petrobras's Petronect, a pioneering joint venture, is one such example. In addition, Brazil's Ministry of Petroleum established a model for local capability and capacity enhancement that is now being followed elsewhere.

The Nigerian Petroleum Exchange (Nipex), the electronic marketplace for the Nigerian oil and gas industry,

which has been operating since the end of 2005, has improved the efficiency of procurement itself, with savings of up to 15% through faster, more transparent setting of technical specifications, and the reverse auction system. But it has also helped to increase local content from about 14% to over 30%. Angola's Sonangol has established an online marketplace, which helps vendors win new business by participating in a growing supplier network.

But local marketplaces are not a panacea in themselves. It still remains for the presiding NOC to choose whether to use an efficient online marketplace to hold auctions and pursue procurement by headline cost or to adopt a comprehensive approach that rewards optimal suppliers who can deliver lower total costs over the long term. Combining the two elements of value creation is critical for a sustainable future.

#### Cuts necessary

The outlook for the economy and

the oil industry may be uncertain today. But it is clear that significant cuts in supplier costs are necessary and that strong demand will at least resume in emerging markets.

It is also clear that technology innovation will continue to be the essential backbone that supports the industry.

It is against this backdrop that a more equitable approach to supplier relationships is required to ensure the sustainability of the industry's value chain in both mature and emerging markets.

#### The author

Alexandre Oliveira is the Global Upstream Oilfield Services lead for Accenture. His work focuses on strategy, process, and performance improvement. Prior to joining Accenture in 2003, Oliveira was vice-president of sales for Baker Hughes globally. His upstream career



began in 1979 at Schlumberger. Oliveira has also worked for Statoil and Western Atlas. He is an engineering graduate of Imperial College, London.

# Congress members urge CFTC to set energy position limits

Nick Snow Washington Editor

Two members of Congress urged the US Commodity Futures Trading Commission to establish and enforce position limits for all energy commodities as opening witnesses at the first of three CFTC hearings on the matter.

US Sen. Bernard Sanders (I-Vt.), who questioned CFTC Chairman Gary G. Gensler's commitment to regulate aggressively as the Senate considered Gensler's nomination, began by conceding that Gensler's actions since taking the CFTC's helm have been impressive. "But they will all be for naught unless they are followed by aggressive actions by the CFTC to prevent excessive speculation in oil and gas trading," Sanders warned.

US Rep. Bart Stupak (D-Mich.), chairman of the House Energy and

Commerce Committee's Oversight and Investigations Committee, concurred with Sanders, stating, "A number of reports, market experts, and regulators agree that reform of the derivates market is necessary. Physical hedging, long used to provide liquidity, transparency, and set market prices, is no longer possible due to the manipulation action of financial traders."

Other witnesses warned that adopting regulations that are too strict could damage markets. "We have not seen empirical evidence that index funds and speculators distort prices, as has been widely alleged, nor is there any proof that putting position limits on these market participants will have any positive effect," said Craig Donohue, chief executive of CME Group, the parent company of the New York Mercantile Exchange. "We are deeply concerned that inappropriate regulation of these

markets will cause participants to move to dark pools and other unregulated markets, causing irrevocable harm to the entire US economy."

Ben Hirst, senior vice-president and general counsel for Delta Airlines, testified on behalf of the Air Transport Association of America. He said, "The objective should be to allow sufficient speculation to provide sufficient liquidity to enable the market to function efficiently, and no more. While it may not be possible to determine this limit with scientific precision, a reasonable surrogate might be the level of speculative activity on regulated exchanges 10 or more years ago, before the recent explosion of speculation in commodities."

#### Clear skies and storms

In his opening statement which began the hearing, Gensler said he







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# **USGS** monitoring ecological impacts

markets are stable," he said. Gensler added that he was pleased to read in Donohue's written testimony that CME supports adoption of a hard-limit regime, including singlemonth and all-months limits, calling it a significant development. But Gensler added that three basic questions remain: What formula should be used to determine where position levels are set? Should they be set by the CFTC or by individual exchanges? Should noncommercial exemptions be provided for financial risk management?

thought CFTC should seriously con-

sider setting position limits in energy markets. "As a regulator, we have to

ensure for market integrity both when the skies are clear and when there are

storms on the horizon. As we consider the effects of large, concentrated positions on the markets, our regulations should address times of volatile or uncertain markets as well as when the

Gensler noted that in CFTC's position limit exemptions for agriculture commodities, there are three different categories: commercial parties with physical inventory and sales, commercial parties with physical anticipatory needs, and noncommercial entities such as swap dealers. "The commission is taking a close look at whether to eliminate these hedge exemptions for certain swap dealers and possibly create a new risk management exemption," he said.

Noting that he has introduced legislation requiring the CFTC to use its emergency powers and giving it new authority to curb excessive speculation, Sanders questioned giving any position limit or reporting exemptions to any noncommercial trading entity. "I think the American people would have a hard time understanding why large financial firms are being treated the same way as large trucking companies and other bona fide users of oil products. We have reached a point where the overwhelming majority of trades are conducted by speculators," he said.

#### Carbon futures market

Stupak said he has introduced a simi-

■he US Geological Survey has assessed domestic energy resources for more than 125 years. While its evaluations also cover coal, oil shale, and uranium, its major activity remains oil and gas, where it forecasts and prioritizes volumes of undiscovered, technically recoverable resources.

Now, a fact sheet posted July 23 on its web site describes how USGS has also begun to assess and monitor environmental impacts associated with energy development.

"Using its integrated-multidisciplinary expertise in geology, biology, hydrology, and geography, USGS created the Ecological Assessment and Monitoring process to evaluate the consequences of resource extraction, production, distribution, and use on ecosystems," it says.

Environmental impact assessments depend first on the energy resources being considered; then on landscapes, habitats, and biota at risk; and finally the objectives of the agency charged to manage the resources, according to the fact sheet, entitled "Ecological Assessment and Monitoring for Energy Resource Development."

#### Identifying stressors

The report by Tom Owens, of USGS's Center for Biological Informatics in Denver, on the environmental assessment and monitoring (EAM) process begins with strategic planning. Once a petroleum province is identified, stakeholders begin to identify factors, called stressors, which can influence the ecosystem and shape resource management

"Most stressors are sociopolitical

or economic in nature and may be affected by expanding economies and populations, commercial and industrial development, and increased standards of living. When examined cumulatively, the oil and gas wells, infrastructure, and human activities that directly affect the landscape may be substantial" in energy resource areas, it observes.

A conceptual model is developed next to link drivers, stressors, effects, and end points for planning purposes. It can indicate how stressors may produce cumulative effects, such as when suppressants used to control road construction dust can potentially damage plant communities, the report says.

#### What it provides

Complementing the US Environmental Protection Agency's existing processes, a USGS EAM can initially characterize the at-risk landscape by conducting a baseline biological resources inventory, the fact sheet continues.

"Depending on the resource management questions and technical issues linked to the assessment and monitoring needs of [DOI's] resource-management bureaus, existing data and information may be analyzed and evaluated within the context of uncertainty sufficient for resource management needs," it says.

In the face of climate change and other shifting baselines, these resource management bureaus and their USGS partners may develop assessment, monitoring, and surveillance programs critical to the longterm sustainability of ecosystems and their resources, the report says. \*





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lar bill, which became part of HR 2454, that contained a global climate change measure cosponsored by House Energy and Commerce Committee Chairman Henry A. Waxman (D-Calif.) and Energy and Environment Subcommittee Chairman Edward J. Markey (D-Mass.). The House approved HR 2454 by a vote of 219-212 on June 26. "This legislation creates an economy wide cap-and-trade program for carbon dioxide and other greenhouse gas emissions," Stupak said. "Companies will hedge their risks and lock in prices for these carbon credits in a new carbon futures market. The CFTC should have authority to regulate any carbon futures market with strong regulations from the start to prevent price volatility from excessive speculation," he said.

Stupak noted that since 1991, when the CFTC authorized the first bona fide hedging exemption to a swap dealer (J. Aron & Co., which is owned by Goldman Sachs), "15 different investment banks have taken advantage of this exemption, even though they do not have a legitimate anticipated business need." NYMEX has granted 117 hedg-

ing exemptions for West Texas Intermediate crude contracts since 2006, many of which are for swap dealers without physical hedging positions, Stupak continued. "Swaps are currently excluded from requirements for position limits designed to prevent excessive speculation. An estimated 85% of futures purchases tied to commodity index speculation come through swap dealers," he said.

Gensler noted that position limits are designed to prevent undue market concentration. "To the extent that financial parties, such as money managers, hedge funds, and swap dealers participate in the futures markets, position limits have the potential to increase liquidity by reducing the positions of the largest traders. Position limits can enhance liquidity by promoting more market participants rather than having one party that has so much concentration so as to decrease liquidity," he said.

Stupak also said he would like to see foreign boards of trade, such as the InterContinental Exchange and the Dubai Exchange, with significant energy trading operations in this country operate under the same regulations as domestic commodities exchanges. "The CFTC does not have the authority to regulate foreign markets that act as price-setting markets dominated by US energy trading. CFTC must enforce standards on all markets to eliminate loopholes," he said.

Sanders said his bill contains a similar provision, as well as a conflict of interests section that would bar investment firms from issuing commodity price forecasts from one division while holding a significant position in another unit. "Frankly, the American people are tired of record-breaking Wall Street profits and excessive compensation packages while Americans are losing their jobs. They're tired of hedge funds betting that the subprime market will get worse. And they're sick of Wall Street betting that the price of oil will go up while Americans pay millions at the gas pump," he declared.

CFTC will hold two more hearings on energy commodity position limits and exemptions on July 29 and Aug.

# California drops offshore oil plan from emergency budget

Nick Snow Washington Editor

California's state assembly on July 24 passed an emergency budget package but deleted a bill that would have potentially authorized the first new oil and gas activity off the Santa Barbara coast in 40 years.

The assembly, by a 30-42 vote, cut the bill championed by Gov. Arnold Schwarzenegger after the senate approved the full package by a 21-18 vote. Schwarzenegger and minority and majority leaders of the senate and assembly included it when they reached a tentative emergency budget agreement on July 20 for the legislature to consider.

It potentially would have provided \$100 million initially and up to \$2.3

billion of royalty payments from the 13-year lifespan of Plains Exploration & Production Co.'s proposed Tranquillon Ridge project. It also would have overturned the State Lands Commission decision in January to reject it, which opponents argued would have created a dangerous precedent.

"The project was not included in the final budget," said Western States Petroleum Association Pres. Joe Sparano on July 28. "The governor indicated he would sign it without the project and without a shift of gasoline taxes from cities and counties, which were to be revenue sources. He probably will have to make more line item cuts to close about a \$1 billion revenue gap to balance the budget," he said.

Sparano told OGJ, "We continue

to have less revenues than we might. California still is importing more than 40% of the crude it uses. This would have been a good thing for California's energy supplies, and for its revenues and jobs. It's no longer included in the budget."

In Houston, Steve Rusch, Plains E&P's vice-president for environmental, health, safety, and government affairs, said on July 26 that the independent producer still wants to work with California leaders to make the Tranquillon Ridge project a reality.

"The T-Ridge project is a unique opportunity for California and [Plains E&P] to significantly accelerate the end of oil production and drilling operations offshore, for California to receive tremendous initial value and offsets in







the form of large land donations and alternative energy support, and for California to receive a several billion dollar revenue stream to help bridge the current fiscal crisis," Rusch said.

The project won support from Santa

Barbara area environmental organizations as well as Schwarzenegger because it proposed drilling into state waters from an existing platform in federal waters. Plains E&P also would have ter-

minated its existing California offshore operations in 14 years and would have removed all related onshore processing facilities at the end of the project instead of continuing its current program for 30 or more years. •

# Senators introduce OCS revenue-sharing bill

Nick Snow Washington Editor

US Sens. Mary L. Landrieu (D-La.) and Lisa Murkowski (R-Alas.) introduced legislation on July 27 that would guarantee coastal states a 37.5% share of federal revenue from new oil and gas production off their shores.

"This long overdue legislation would recognize contributions of host states, while [providing incentives for] them to undertake new and responsible offshore development," said Landrieu, who has introduced similar bills for several years. "Coastal communities should not shoulder the risks and responsibilities of OCS production without reaping some of the rewards. This bipartisan bill would finally change the inequitable regime that sends 100% of revenue to federal treasury."

Murkowski, the Senate Energy and Natural Resources Committee's ranking minority member, added, "It will serve as the foundation for Alaska and other states to balance local economic and environmental concerns with national energy security. Considering the economic and energy challenges we as a nation face, now is the time to get this right."

The 37.5% share of rents, royalties, and bonuses from new oil and gas development in adjacent federal waters would match the share Alabama, Louisiana, Mississippi, and Texas receive under the 2006 Gulf of Mexico Energy Security Act, which Landrieu and Murkowski's predecessor as ranking minority member, Pete V. Domenici (R-NM), cowrote. That bill opened more than 8 million acres in the gulf for

federal leasing.

"As our nation weans itself off foreign oil and transitions to the next generation of energy, we need OCS production in US waters to get us there," Landrieu said. "Coastal states will play a key role in building that 'energy bridge' if Congress can guarantee them their fair share of revenue and conservation royalties. This approach has worked in Louisiana, and it can for other states as well."

Murkowski said, "There are real local costs associated with energy production, from the need for bigger ports

and airports to the need for schools and housing for energy workers and their families. Providing more local aid will let Alaskans better handle the costs associated with energy production that benefits the entire nation."

Their bill also would authorize the US Secretary of Defense to annually review the prohibition against oil and gas development in certain parts of the gulf for defense training purposes to determine if the restriction should be lifted. It also would permit leasing of the Destin Dome area near the Florida Panhandle. •

# Speakers see changed, maybe relocated, US industry

**Bob Tippee** Editor

The US oil and gas industry will emerge from its doldrums structurally changed and perhaps relocated, according to a scenario that took shape at the RMI Oilfield Breakfast Forum in Houston July 28.

"This isn't an exploration and production industry any more," declared Jim Wicklund, principal and energy portfolio manager of Carlson Capital LLC, Dallas.

With natural gas abundant and prices low in comparison with oil, publicly owned independent producers have shifted from drilling mainly for gas toward a new emphasis on oil.

Furthermore, Wicklund said, "Gas

exploration in the US has ceased" because of the growing domination of shale plays and the consequent reorientation to development and related technologies.

Wicklund called on oil and gas company executives to focus on longterm objectives, saying they "must not let short-term investors dictate strategic direction."

During questions, Wicklund agreed with a fear expressed in a presentation by Larry Dickerson, president and chief executive officer of Diamond Offshore Drilling Inc., of a migration of operating and service companies away from the US

Dickerson said drilling rigs generally are leaving the Gulf of Mexico because of hurricanes, aging infrastructure, and









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the availability of more-appealing contracts elsewhere.

"We're losing the base of operations that runs this industry," he said.

And tax proposals of the administration of President Barack Obama and others under consideration by Congress threaten to impose burdens that would push companies—or at least their headquarters—away from the US and possibly diminish Houston's role

as a global center of industry technical innovation.

"Why drive that out of the country?" Dickerson asked. "I don't know."

Wicklund agreed that the industry is "poised to leave the US if it [the tax regime] gets too onerous."

Wicklund, Dickerson, and Joseph Ash, Devon Energy Corp. vice-president of offshore exploration, all cited politics as the industry's biggest challenge of the next 12 months.

Ash said uncertainty about future taxation represents a stronger impediment now than it usually does to plan-

A fourth speaker, Munawar Hidayatallah, chief executive of Allis-Chalmers Energy Inc., pointed to a different challenge: the continuing banking and liquidity crisis. 💠

# Poten: Abu Dhabi gas demand could limit sour gas for LNG

Abu Dhabi Gas Liquefaction Co. is considering plans to increase LNG production at its complex on Das Island beyond 2019, when its 4.7-million tonne/year LNG sales contract with Tokyo Electric Power Co. (Tepco) expires, according to Poten & Partners, New York, an industry consultancy.

The expansion option would include replacing smaller existing trains with a much larger new one. It would depend upon expanding gas production to cover growing domestic demand and reinjection into oil fields, while freeing up extra offshore gas for LNG export.

With domestic energy demand growing at 10%/year, said Poten, Abu Dhabi has decided to move forward with a plan to invest as much as \$50 billion in developing large onshore and shallow-water sour-gas reserves. But freeing up extra gas for LNG could prove to be a very tall order, according to Poten's analysis.

#### Consumption, plans

Standing at more than 6 trillion cu m, the UAE's gas reserves are the world's fifth largest. Much of the gas, however, is either already locked into the gas caps in Abu Dhabi's oil fields or needed for reinjection.

With official oil reserves of 98 billion bbl, the gas reinjection requirement will continue for many years. Abu Dhabi National Oil Co. (ADNOC) injects 18 billion cu m (bcm)/year into its oil fields; this is projected to increase

#### ABU DHABI GAS INFRASTRUCTURE



by 8%/year through 2020.

With the country almost exclusively dependent on gas-fueled electric power generation, says Poten, total gas consumption is projected to reach close to 90 bcm/year by 2018, doubling the 50 bcm including reinjection used in 2008. The UAE has already tapped gas supplies from Qatar via the Dolphin pipeline to meet its needs, but its own

large sour-gas reserves in the past had been considered too costly to develop.

ADNOC has now decided to go ahead with the onshore Shah sour-gas development, although it is hoping to reduce the cost of this 1-bcfd, \$10-12 billion project by 30%. ADNOC and partner ConocoPhillips signed the joint-venture agreement on July 9 (OGJ Online, July 10, 2009).







The project consists of developing wells, pipelines, and gas plants with corrosion-resistant material throughout to handle 23% hydrogen sulfide and 10% carbon dioxide gas. The sulfur and condensates would be removed and exported through the port of Ruwais, while the treated lean gas would be fed back into the domestic market.

This level of capital expenditure implies a cost of \$4/MMbtu for the gas, says Poten. In hopes of lowering these costs, ADNOC issued tenders for four large construction packages even before concluding a final agreement with ConocoPhillips. The tenders cover gas gathering systems, wells, gas pipelines, processing plant, off site facilities, utilities, and sulfur recovery. Officials expect the project to start up in 2015.

#### Sulfur pipeline

Notably missing, Poten points out, is a tender for a 136-km liquid-sulfur pipeline connecting the Shah field to Ruwais, where the sulfur, more than 4.2 million tonnes/year, is to be granulated and exported to global markets. It is understood the sulfur pipeline package was not released due to a lack of qualified bidders.

Sulfur is already trucked from the Habshan gas-treatment plants to Ruwais. That option is hardly viable for the expansion, says Poten, as it would add more than 600/day 20-tonne truckloads of molten sulfur to the traffic on the main western highway. Any delays in the pipeline would therefore be controversial.

Once Qatar's current projects are fully operational, the gulf area will be exporting huge quantities of sulfur, perhaps more than can be absorbed in the global market, according to Poten's analysis. The alternative to exporting would be to cast the sulfur in giant blocks in the desert, an option that has not been acceptable to ADNOC in the past but would remove the need for the pipeline or trucking.

#### **IGD**

Receiving much less publicity is the

### Watching the World

Eric Watkins, Oil Diplomacy Editor

Blog at www.ogjonline.com



### Better red than unemployed

The Venezuelan government is fast politicizing the country's oil and gas industry, now requiring workers to support the socialist revolution of President Hugo Chavez if they plan on keeping their jobs.

"We are convinced that the majority of the working sector in the oil industry supports (Chavez's socialist) Revolution," said Oil Minister Rafael Ramirez. "So...we are going to discuss the collective agreement with those revolutionary sectors of oil workers."

Ramirez was referring to longdelayed talks with oil workers to establish a new 3-year collective bargaining agreement on pay and benefits. And, underscoring the need to be politically correct, he said the negotiations would resume after union elections take place.

Those remarks echo earlier ones in which Ramirez actually said Venezuela's oil workers will be suspected of conspiring against Chavez's socialist revolution if they do not join socialist workplace groups.

#### No counter-revolutionaries

"By now, there should not be a single counter-revolutionary in the heart of our company, our industry," Ramirez said at a rally with workers taken on by state oil company Petroleos de Venezuela SA after it nationalized dozens of oil service companies earlier this year. "There cannot be a single PDVSA installation where socialist committees do not exist," said Ramirez, who has long spearheaded Chavez's drive to bring politics into Venezuela's main industry.

"Whoever is not in a committee will be suspected of conspiring

against the revolution," the minister said.

According to Ramirez, Venezuela is nearing its target of "liberating" 8,000 oil workers from recently nationalized private companies and hiring them to work for the state-run oil company—under the umbrella of socialism.

Ramirez last week said 6,900 former employees of private local and foreign companies are now on the PDVSA payroll—sending the company payroll to 80,000 workers.

#### Severe pressure

The figure is nearly double what it was when Chavez took office in 2001, and industry analysts warn that it will put severe pressure on PDVSA's financial health, especially given the drop in oil prices.

If the Chavez regime has any concerns about that, Ramirez is not the one to ask. "Costs are being reduced in a process that has had no problems," the minister said.

To keep the public focused away from any such problems, however, the Chavez regime has again raised doubts about the US, saying a recent decision by Washington, DC, to land troops in neighboring Colombia is part of a wider plot. "It's an act of aggression toward our country," Ramirez said of the plans that would allow US military personnel to operate from bases in Colombia, which shares a 1,400-mile border with Venezuela. "We are worried about what's happening," he said.

"Now that the Yankees want to set up four bases in Colombia...it forces us to review our relations with Colombia," intoned Chavez.









# GENERAL INTEREST

\$7-8 billion Integrated Gas Development project (OGJ Online, July 16, 2009). IGD will generate an additional 1 bcfd (10.34 bcm/year) through construction of a 38-km pipeline from offshore fields to Das Island where the gas will be partially processed. It will then be piped to an onshore plant in Ruwais for final processing and use in the domestic market.

The project is scheduled for completion by 2014. ADNOC has awarded a \$402-million engineering, procurement, and fabrication contract to majority government-owned National Petroleum Construction Co. The contract covers part of the offshore pipeline construction and is scheduled for completion by mid-2012.

ADNOC plans an additional four tender package releases for IGD in the next few months, covering gas development work in the onshore Bab field and the offshore Umm Shaif field.

IGD's first phase will deliver 500 MMcfd from Bab, followed by a second 500-MMcfd offshore phase. The offshore component reduces potential gas reserves available for any future LNG production increase at Das Island, signaling the importance to ADNOC of meeting the demand for domestic gas.

Meanwhile, ADNOC is taking

measures to fill an immediate supply gap. The week of July 20, the firm announced a new contract for Qatar to supply 400 MMcfd of "interruptible" gas via the Dolphin pipeline, which currently delivers 2 bcfd of Qatari North field gas from Ras Laffan to Abu Dhabi. The pipeline has 1.2 bcfd of unused capacity and the contract is intended to supply gas in the summer to meet peak power-generation demand.

Elsewhere in the UAE, Golar LNG plans to station its 125,000 cu m Golar Freeze as a floating regasification and storage unit at Jebel Ali for 10 years from 2011 to fuel growing power demand (OGJ, July 27, 2009, p. 33). ◆

# Shell Gas & Power to push ahead with floating LNG

Shell Gas & Power Developments BV, The Hague, signed an agreement July 28 in Paris with a consortium of Technip and Samsung for design, construction, and installation of several floating LNG (FLNG) facilities over a period of up to 15 years, according to an announcement from Shell.

The companies also signed a contract for front-end engineering and design for Shell's 3.5 million tonne/year "FLNG solution."

Shell conceived its technology, said the announcement, to place gas liquefaction directly over offshore gas fields and thereby precluding long-distance pipelines and extensive onshore infrastructure.

The concept's key dimensions are about 450 m by 70 m, with a 3.5 million tpy LNG capacity, plus associated LPG and condensate production, taking total liquid production potential to more than 5 million tpy. Estimated topsides weight is more than 50,000 tonnes, said the announcement.

Shell's FLNG design is, according to the company, "suitable for more distant offshore fields, designed to operate under harsh metocean conditions and process a wide range of gas compositions."



The broad operating parameters of the Shell design mean it can be redeployed, said Shell. Its standardized "design one—build many" approach permits "material repeatability gains" during design and construction. After completing the FEED phase, Shell said it will examine key aspects of each potential FLNG project in its portfolio before considering a final investment decision.

"This innovative alternative to traditional onshore LNG plants provides a commercially attractive and environmentally sensitive approach for monetization of offshore gas fields," said Shell. •











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# Exploration & Development

The Silurian carbonate succession of the Sangamon arch in west-central Illinois includes hydrocarbon reservoirs that have produced chiefly from dolomitized nonreef facies (Fig. 1A).

Nearly 30 million bbl of oil have been produced from the Middle Silurian (Niagaran) Racine formation along the southeastern flank of the arch in Macon, Christian, and Sangamon coun-

the upper sequence. However, in a large area of the Sangamon arch, few wells have tested the lower sequence, and hydrocarbon production to date has been chiefly from the carbonate reservoirs in the uppermost part of the upper sequence of the Racine formation.

Although most of the wells drilled thus far in the Mount Auburn trend have only tested the upper sequence,

> this study indicates that the Lower Racine sequence also may have excellent potential for additional discoveries.

Detailed studies of the available subsurface data, including well cuttings, cores, and geophysical logs, have revealed the

presence of patch reefs and associated reservoir facies in the lower sequence of the Racine formation in the Mount Auburn trend of the Sangamon arch (Fig. 1B).

The presence of Niagaran reef reservoirs in the Sangamon arch area has only recently been documented.2 This report concentrates on the northeastern

# Oil potential seen in Silurian reef-related reservoirs in Illinois Sangamon arch

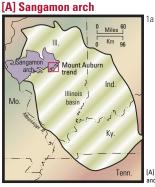
Yaghoob Lasemi Illinois State Geological Survey Champaign, Ill.

ties. An intra-Niagaran unconformity subdivides the Racine formation into two depositional sequences1 comprising several producing dolomite horizons (Fig. 2).

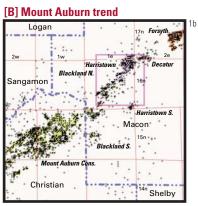
Reported initial production in the area indicates that the rocks of the lower sequence may have a greater hydrocarbon reservoir potential than

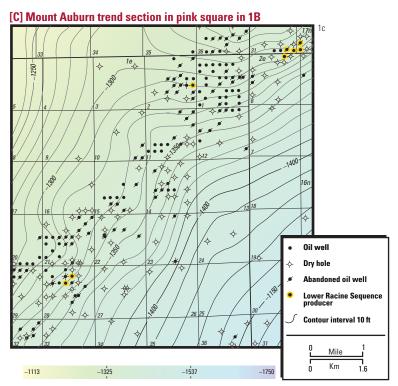
#### MOUNT AUBURN TREND IN SANGAMON ARCH, ILLINOIS BASIN

Fig. 1



[A] From Buschbach and Kolata<sup>2</sup>





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portion of the Mount Auburn trend in Macon County (Fig. 1B), where patch reef or reef-related reservoirs have been identified in the lower Racine sequence. The reservoir facies were described and classified using the textural schemes of Dunham<sup>3</sup> and Embry and Klovan.4

# Geological background

The Sangamon arch is a broad southwest-trending structure in west-central Illinois that was formed as a result of upward warping during Silurian and Devonian times.<sup>5</sup>

It is located on

the gently sloping ramp area, just northwest of the Illinois basin, where the uppermost Silurian and Middle to Upper Devonian deposits are absent. The Silurian succession of the Illinois basin consists chiefly of carbonate rocks and is a part of the Silurian-Middle Devonian Illustran Magazanus that constitutes.

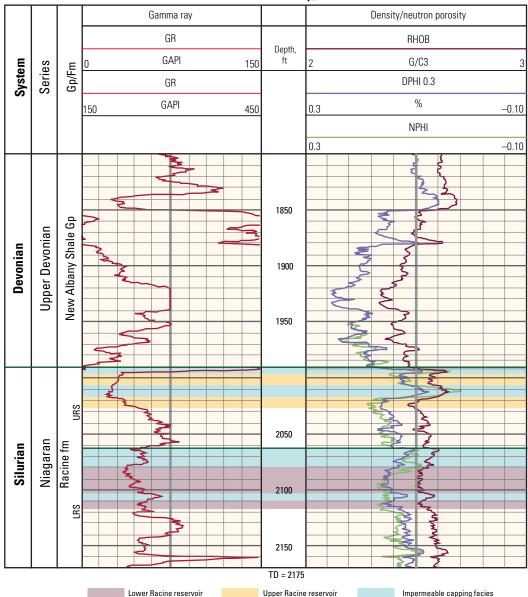
Hunton Megagroup<sup>6</sup> that constitutes the upper part of the Tippecanoe Sequence of Sloss.<sup>7</sup>

Deposition of carbonates on the Sangamon arch was terminated as a result of the worldwide pre-Middle Devonian sea level fall<sup>7 8</sup> and upwarping

DEVELOPED RESERVOIRS IN UPPER PART OF LOWER AND UPPER RACINE

#### Typical log of a Mount Auburn trend well

API No. 121152170300 Pawnee Oil & Gas Inc. Garver 1 2-16n-1e, Macon County, III.



of the arch during Late Silurian through Middle Devonian times.<sup>5</sup> Prolonged exposure of the arch resulted in partial erosion of the Silurian deposits and formation of an uneven topography that was later buried by the Upper Devonian to lowermost Mississippian organic-rich New Albany shale.

In the Sangamon arch area, the upper part of the Silurian carbonates is classified as the Niagaran Racine formation (Fig. 2), which is equivalent to the Moccasin Springs formation of southern Illinois (based on the stratigraphic classification scheme of Willman and Atherton for western Illinois). It is

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# Exploration & Development

#### CORE OF A DOLOMITIZED REEF FACIES OF MAINLY CORAL SKELETONS



characterized by interbedded limestone, dolomite, silty argillaceous dolomitic limestone or dolomite, and calcareous shale.

#### Structure and entrapment

The Mount Auburn trend, located along the southern flank of the Sangamon arch, encompasses a number of oil fields and covers parts of Macon and Christian counties in west-central Illinois (Fig. 1B).

As shown by the structure contour map of the top of the Silurian deposits, the direction of the regional dip in the study area, on the whole, is towards the southeast (Fig. 1C). No structural closures are present in the area, and minor closures in some areas of the Sangamon arch are the consequence of postdepositional erosion and formation of uneven topography at the sequence

A combination of depositional and diagenetic stratigraphic traps controlled petroleum entrapment in the Mount

Auburn trend, and the reservoirs are sealed by lime mudstones to packstones that were deposited in quiet-water environments following the flooding stages of high frequency sea level cycles. Erosion at the sequence boundaries locally has resulted in partial or total removal of the interval that could otherwise include porous reservoir facies.

#### Production history

Commercial production from the Middle Silurian Racine formation in the Sangamon arch area began in 1925 with the discovery of Decatur field in Macon County, followed by the discovery of Mount Auburn Consolidated field in 1943 and Roby field in 1949 in Christian and Sangamon counties, respectively.

Several other fields have been discovered since 1949. Nearly 30 million bbl of oil have been produced from these fields (production report compiled by Bryan G. Huff at Illinois State Geological Survey) chiefly from the dolomitized

nonreef carbonate reservoirs in the upper part of the Silurian succession.

In 1962, Atkins and Hale completed the Dipper No. 1, in 28-16n-1e, in Blackland North field in Macon County, for an initial production of 3,120 b/d of oil, the highest reported in the Sangamon arch area. The main oil-saturated zone is in a reef and reef rudstone facies at 2,003-37 ft in the upper part of the lower Racine sequence. The cumulative production of the Dipper well has been over 123,000 bbl of oil, and it is still producing through gravity drive mechanism.

An offset to the southwest, the Atkins and Hale Whitley No. 1, was completed in the same zone with an initial production of 350 b/d of oil. It produced 93,000 bbl of oil before it was abandoned in 1971. These two wells have produced nearly one half of the field's total cumulative production. In Blackland North field, 61 wells have been completed in the Middle Silurian Racine formation. All wells, except for the two wells mentioned above, were completed as upper Racine producers.

During 1983-92 seven wells were completed in the lower Racine in Decatur, Harristown, and Mount Auburn Consolidated fields as marginal producers. The oil-saturated intervals of these wells all occur at the same horizon as the Dipper and Whitley wells described above.

More than 20 ft of very porous oil saturated interval was encountered in the Pawnee Oil Corp. Garver No. 1, in 2-16n-1e, in Harristown field (Fig. 2) and in the Elder No. 1, in 12-15n-1w, in Mount Auburn Consolidated field. Position of the wells in relation to the regional dip, and perhaps problems during completion, may have resulted in their low productivity.

#### Reservoir facies

The reservoirs of the lower Racine in the Mount Auburn trend are porous dolomitized coral reef or reef rudstone facies (Fig. 3) in the upper part of the lower Racine sequence.

The reef and reef rudstone facies

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consist of coarsely crystalline dolomite containing poorly preserved fossils and skeletal molds of reef-building organisms (mainly corals) with intercrystalline and moldic porosities of up to 25%. The reef-building skeletons are recognizable in cores and hand samples (Fig. 3), but the detail of their structure has been lost due to pervasive dolomitization so that in thin sections only a very faint relic of the original fossil is visible (Fig. 4).

The reservoir facies are of limited lateral and vertical extent that can reach a total thickness of up to 30 ft (9 m) and constitute the upper part of meter-scale, shallowing-upward cycles (Fig. 2). They were deposited along a southwest-trending ramp margin that was roughly parallel to the Mount Auburn trend and graded basinward into muddy open-marine carbonates below wave base and landward into ramp restricted facies similar to numerous modern and ancient examples. <sup>10-12</sup>

#### Patch reef vs. pinnacle reef

The known productive reefs in the Illinois basin are Middle to Late Silurian age pinnacle reefs as much as 700 ft (210 m) thick<sup>13 14</sup> that nearly all developed along the NE-SW trending platform margin that faced the deep Illinois basin,<sup>15-17</sup> possibly along a distally steepened ramp margin.

The small Niagaran patch reefs of the Mount Auburn trend, on the other hand, developed on the very gently sloping monoclinal ramp platform of the Sangamon arch (ramp platform of Ahr). Reef-building metazoans typically form laterally and vertically extensive buildups along platform margins, where nutrient supply is abundant and depositional energy is very high. 10 19

Because the depositional wave and current energy was relatively weak in the homoclinal ramp setting of the Sangamon arch, only small patch reefs were developed instead of the large pinnacle reefs that developed along the southern Illinois platform margin.<sup>15-17</sup>

Whitaker<sup>20</sup> had envisioned a broad gently sloping ramp for the entire Il-

#### Organic residue of original skeletons in part of Fig. 3



Note partial dissolution of dolomite rhombs (white arrow) to form larger pore spaces Sample impregnated with blue-dyed epoxy to highlight pore space

linois basin and proposed that pinnacle reefs of considerable size were randomly developed across the southern half of Illinois, including the deep basinal area of the Illinois basin. He further suggested that much of the thickness of pinnacle reefs in the shelf areas (including the Sangamon arch) were reduced as a result of pre-Devonian erosion.

The results of this study, however, do not support Whitaker's interpretation. The Springfield East example, the Aladdin Oil No. 1 Scott, in 21-15n-4w, which Whitaker (1988) cited as a remnant pinnacle reef producer is, in fact, a nonreef dolomitized mudstone to packstone reservoir; detailed inspection of cores has revealed the absence of any reef structures or fossils of reef-building organisms in this well.

Whitaker<sup>20</sup> also mentioned Decatur field in Macon County as being a remnant pinnacle reef producer without providing any evidence to support his conclusion. Five wells were completed in Decatur field in 1983 (see above) that had a total cumulative production of nearly 14,000 bbl of oil. However, the actual amount of oil produced may have been much higher than reported (S.T. Whitaker, personal communica-

tion, 2009).

Neither cores nor samples are available, but well-to-well geophysical log correlation with other fields in the study area, nevertheless, indicates that the wells were completed in the reservoir rocks equivalent to the reefs described in this study. In these wells (Watters Oil and Gas Co. Nolan No. 3, 36-17n-2e, Macon County, for example), the reservoir occurs at about 50 ft (15 m) below the base of the New Albany shale and displays meter-scale shallowing upward cycles of deeper marine, dense argillaceous limestone or calcareous shale to porous dolomite. If this were a remnant pinnacle reef core, one would expect it to be in immediate contact with the New Albany shale without any intervening impermeable shale or limestone intervals.

#### Acknowledgment

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provement of the manuscript. S. Lang, an independent petroleum geologist, provided core samples of Elder Well No. 1. Publication authorized by the director, Illinois State Geological Survey.

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#### India

Gujarat State Petroleum Corp. and GeoGlobal Resources Inc., Calgary, are starting development of Tarapur 1 oil field in western India's Cambay basin.

Full field development is to involve 17 wells by the end of 2009. An engineering report attributes 1.753 million stb of proved developed nonproducing oil reserves to the first six wells. Geo-Global's interest is 14%.

Production in May from the first three wells totaled 8,155 bbl of oil and 3.6 MMscf of gas. In June the three wells averaged 466 b/d and 420 Mcfd.

#### Louisiana

Portrush Petroleum Corp., Vancouver, BC, signed an agreement with an undisclosed operator to develop a 1,200-acre prospect in Pointe Coupee Parish 30 miles northwest of Baton Rouge, La.

Portrush will review all existing technical data on the prospect, a downtrown fault trap in the fairway of the Oligocene and Eocene producing trends and possibly prospective in the Frio, Vicksburg, Cockfield, Sparta, and Wilcox sand series.

An initial well would be drilled to 11,600 ft. If it is successful, five wells will be required to complete development.

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## **q**Mags

# Drilling & Production

Drilling supervisors at GDF Suez E&P Deutschland GMBH have used a visual road map to control drilling operations since March 2008.

ave o to Drilling

Fig. 1 shows one of the wells drilled. The drilling process assistant software includes a database that holds records of all area or rig specific drilling sequences, previous lessons learned, and lost-time accidents.

The program also allows for the transfer of all essential sections of the drilling program into a one-page visual roadmap for each standard drilling, casing-liner, and cement sequence.

Another feature of the software includes one-page visual roadmaps for all standard drilling sequences such as motor and measurement-while-drilling, window milling, underreaming, coring, completions, sidetrack, etc.

Also created are one-page visual roadmaps for all critical drilling sequences. These pages indicate how to avoid and react to stuck pipe, well control, mud loss, and other critical situations.

Each page combines all operational sequences, previous lessons learned and lost-time accidents. Fig. 2 shows a sample page.

The software includes a list of prechecks and preparations to be carried out for each sequence. This list confirms

that required checks and preparations took place.

The software also helps drilling engineers plan drilling programs.

#### **Implementation**

The market conditions in 2008 had forced drilling contractors and service companies to carry out their services with many new employees.

To ensure that everyone was aware of the procedures to follow, GDF Suez E&P Deutschland implemented this software to improve communications

among parties. The software allowed the drilling team to exchange, combine, and use all available experience and skills. The software did not replace the drilling program or procedures but acted as an on site process planner, communicator, and controller.

The software implementation included a review of all well data, lost time, and lost-time accidents for each drilling area, rig type, and service company.

The senior drilling supervisor reviewed the draft drilling process assistant software to make sure that it included his experiences and lessons

learned while drilling previous wells in each area.

The company implemented the software during 1 year while drilling and completing a high-pressure-high-temperature horizontal well and several slim-hole and standard wells in Germany.

#### Measurable processes

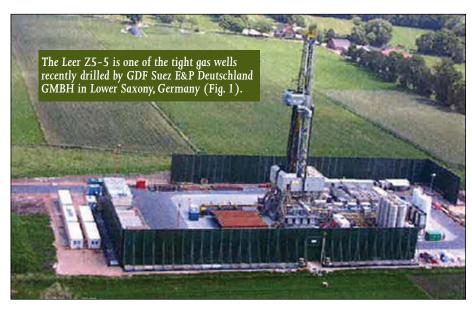
The following lists some examples of measurable processes that the software is intended to help avoid and correct by having the drilling team check each reference page and check list before commencing the drilling and completion sequence.

During the implementation phase,

# Visual road map helps control drilling process

Bernd Reinboth GDF Suez E&P Deutschland GMBH Westoverledingen, Germany

**Arno Op de Weegh** Consultant Houston



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# LLING & PRODUCTION

#### **U**RILL 16-IN. HOLE SECTION Fig. 1 Pick up Pick up 950 m Pick up 16-in. Run in hole and bit and steerable wash down Pull out of Make up Make up Tag bottom Circulate hole hole and running too and wear and jet wellhead assembly for cement job to top of cement Drill 16-in 5 1/2-in hottomb rack back assembly (BHA) pump carbide Tool and presection talk. 20 3/4-in. wear Wiper trip? Confirm wellhead landing point. bushing in place. Make up connections as per specification sheet. All crossovers as per specifications. Check stack up Pump 3,000 L/min and maximum 3,800 L/min. Weight on bit 5-25 tonnes. Surface 80-100 rpm. heights. Drift drill pipe. Have high-Maximum 30 m/hr rate of penetration in clay. In case of pack-off, circulate hole clean. Use viscosity pill available.

#### **Efficiency issues**

Prepare BHAs. Check casing-cement check list. Check stuck pipe-kick-connection action. Check trip and inspect BOP stack up drawings for required parts.

high-viscosity sweeps. Maximum dogleg l°/30 m from 200 m. Maximum dogleg 2.5°/30 m from 270 m. Mud weight 1.22. In case clay is observed at about 450 m, exchange mud while drilling. First TD with 2-m rat hole when wellhead lands. Section TD 20 m in Holland formation. Pump 7.5 cu m high-viscosity pill at TD.

16-in. bits and BHA equipment Wear bushing and running tool

Not closing V door when not in use. Not using tag For combined lifting use good communication. Person did not watch walkway for good support. Not landing elevator to remove links. Not engaging parking brake at all times. Not using mouse hole to handle pipe. Not inspecting derrick daily for loose objects. Not checking bolts of automatic driller. Not having all winch lines secured before moving blocks. Driller did not check link tilt position.

**Avoid main failures** 

Keep string moving-rotating at all times! Losses below 18 5/8-in. shoe. Low circulation rate and high rate of penetration causing hole pack off. Tight hole in lower section. Poor hole cleaning at 20°. Accidental sidetrack during wiper trip. Fail to get casing to bottom. Not able to achieve required build up in Tertiary. Team to discuss hole cleaning plan. Do not reuse stab in seals. Avoid stick-slip and high BHA vibrations. Check saver sub. Grease drill pipe shoulder and box. Use drill pipe guide. Start and stop pumps slowly. Measure drift and record all string components. Ream all dog legs above 2°/30 m. It is more important to avoid pack-off than planned nudge. Rotate string prior start up pumps in stages to avoid high equivalent circulating density. Create ECD operating window for drillers. Trip on ECD and not on time. Avoid collision risk with well Slot 4. Record torque-drag-circulating pressures during hole section. Avoid wiper trips to reduce accidental side track risk. Cover hole at all times!

there were no company or drilling contractor lost-time accidents.

Some of the lost-time incidents that the software helped to avoid during the implementation phase were:

- Stuck pipe situations by listing the immediate steps to take when problems arose
- · Lost time by calling for in time checks of required drilling tools.
- A previous stuck-pipe incident by recommending a change to a heavyweight drill pipe as the bottomhole assembly in an 8½ in. hole section.
- · A previous waiting time on wrong or missing parts by having a checklist of all wellhead, blowout preventer, and wear-bushing parts.
- Previous washouts and mud losses by recommending drilling the 17½-in. hole section with minimum pump rate.
- · Previous sidetracks by recommending casing check trips with bull nose pipe.

In the standard drilling practices section of the software, some of the practices called for to avoid previously encountered incidents were:

- Not laying down 5-in. drill pipe and picking up 3½-in. drill pipe until landing of the 7-in. casing. This recommendation is in case the 7-in. casing could not be set and the 5-in. drill pipe was required for reaming or check trips.
- · Rechecking factory make-up for all pretorqued connections to avoid losing tools in hole.
- · Circulating bottoms up completely or circulating each liner joint to bottom in case of hole problems to avoid stuck pipe situations.
- · Baker locking bull nose and underreamer nozzles to avoid fishing jobs for drilling tools.
- Not function-testing the motor with a polycrystalline-diamond-compact (PDC) bit inside casing to avoid casing and bit damage.
- · Not running junk baskets through window because the basket will hang up and create a stuck-pipe situation.
- Not storing or transporting ditch magnets and measurement-while-drill-

ing tools together to avoid MWD tool failures.

- Installing a 1 or 2-in. reducer valve in the cement head to reduce cement drop and suction problems.
- Using a dedicated cementwater mix tank to avoid contaminating cement water.
- Using proper pump start-up practices to avoid mud losses.
- Using standard checklist procedures to prevent the cement stinger stab-in sub OD from not sealing in the casing collar.

#### **Acknowledgment**

The authors gratefully acknowledge the support and assistance of Heinz Wendel and Joachim Wagener of GDF Suez. ◆

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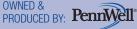










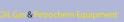




















# ROCESSING

Japanese refiners face a surplus of capacity at a time of massive global refining surpluses.

Analysis by the East-West Center, Honolulu, of Japan's oil-product demand and exports outlook estimates Japan's excess refining capacity for 2009 at 780,000 b/d, 990,000 b/d for 2010, and 1.4 million b/d for 2015. These estimates are based on current refining

# Japan's refiners facing hard choices, must seek alliances to ease closings

Tomoko Hosoe East-West Center Honolulu

capacity and assume 93% yield for main petroleum fuels.

To optimize production, logistics, and commercial competitiveness, Japan's refiners must make strategic and innovative decisions because petroleum will continue to be a vital mineral used mainly for transportation and as feedstock for petrochemical production. And petroleum remains an important commodity for Japan's energy security.

Forming alliances and joint ventures will help refiners ease the costly and socially and culturally complex processes of closing regional refineries. In particular, strategic alliances that come with crude supplies or product export outlets will help Japanese refiners prolong their refineries' lives.

Countries like Vietnam, Indonesia, and to an extent China that have oil but insufficient refining capacity should be interested in such opportunities with Japanese companies so that they can reduce oil-product import dependency while avoiding at that same time large investments to build their own refineries. Japanese refiners can utilize their existing refineries and support energy security in the region as well.

The inevitable conclusion, however, is that substantial refining capacity in Japan must close. We expect refining margins to become more negative in line with global refining 2010-11, resulting in closures in Japan of 0.5

million b/d to 1 million b/d starting in 2011. Although many Japanese refiners are unwilling to entertain this dire prospect, it is difficult to see any other option.

#### Petroleum product demand

Following a 2.8% decline in 2007, Japan's petroleum product demand fell further in 2008, by 4.4% to 4.6 million b/d. Demand for all products, except fuel oil, contracted on a year-on-year basis. Fuel oil demand, including crude oil for direct burning, increased by 7.1% due to large-scale nuclear power plant shutdowns and a consequent increase in thermal-power generation.

Tokyo Electric Power Co.'s 8.21 Gw Kashiwazaki-Kariwa nuclear power plant remained closed through 2008, while more maintenance shutdowns, including some unplanned, took place in Japan. Gasoline demand contracted by 4.4% compared with 2007, to 985,000 b/d in 2008, amid high prices and a slowdown in consumer spending.

Gas oil demand fell by 7.8%, mainly as a result of reduced land transportation by trucks, which reflects sagging industrial activity. Naphtha demand contracted by 8.2% and will likely remain weak for the foreseeable future amid increasing competition from ethylene crackers in the Middle East and China.

Reduced exports, restricted corporate investments, and dull consumer spending will put further downward pressure on the Japanese economy. Forecasts of Japan's economic growth rates for 2009 are expected to be lower than 4.0% vs. 2008, with marginal growth envisioned in 2010, assuming an economic recovery in Western countries.

We forecast Japan's oil-product demand in 2009 will contract by 5.8%. Demand from the industrial sector will continue declining; specifically, fuel oil will be worst hit by the downturn of industrial production, and demand will decline by 21%, compared with 2008.

Total power generation is also forecast to decline by more than 4% as power demand from the industrial and





commercial sectors declines noticeably due to the economic recession. In addition, the situation with the troubled Kashiwazaki-Kariwa nuclear power plant is improving, easing the power sector's fuel oil demand. TEPCO resumed operation of one of the seven reactors in May and will resume the second as early as August.

TEPCO's fuel demand has been already falling this year due to weak demand. For January-May 2009, Tokyo's low-sulfur fuel oil consumption fell by 39%, compared to the same period a year earlier, and direct use of crude oil fell by 59%.

Gasoline demand will be almost flat compared with demand for 2008 instead of dropping continuously because drivers are encouraged to drive more as retail gasoline prices are falling and expressway tolls have been reduced.

The maximum toll for passenger cars on expressways across Japan (except for the Tokyo and Osaka metropolitan areas) was reduced to 1,000 yen (US\$10) for unlimited distances on weekends and national holidays from Mar. 28, as part of economic stimulus measures. Japanese consumers had often refrained from driving because of expensive tolls.

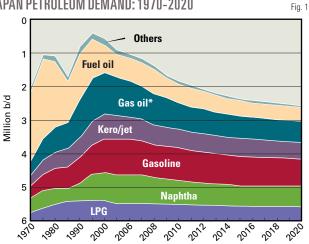
For the medium term, after 2010, Japanese demand will likely be affected by such structural factors as an aging and shrinking population and its changing lifestyle. The National Institute of Population and Social Security Research forecasts that the total population will decrease to 122 million in 2020 from 128 million in 2007.

The pace of aging is also rapid, i.e., the ratio of population aged at and older than 65 at 21.5% in 2007 is envisioned to increase to 28.4% in 2020 and 30.0% in 2030. As a result, the share of the productive population (aged between 15 and 64) is forecast to decline to 59.5% in 2020 and to 59.2%

in 2030, from 65.0% in 2007.

Since the labor force is one of the main factors supporting economic activities, population economists hold that the declining productive population will cap economic growth, unless productivity increases with technological innovation and some effective measures taken by the government and

#### JAPAN PETROLEUM DEMAND: 1970-2020



\*Gas oil includes bunker gas oil. Fuel oil includes direct use of crude and bunker fuel.

private sectors to increase the labor force. Also, the declining population with an aging society will lead to less spending in households and dull consumer spending.

For the medium and long term, energy use and oil consumption will be affected. Aging in particular will directly and negatively affect driving and new car sales. Furthermore, the younger generations now are less interested in owning cars. For them, a car is no longer the status symbol as it used to be. With the economic downturn, many also prefer saving instead of spending money and therefore rely on Japan's well-established transportation system to get around instead.

Energy efficiency in various goods, including electrical appliances in household and automobiles will continue improving. New technologies such as sophisticated hybrid cars and electric vehicles will all weigh on oil demand. Based on the above, we forecast Japan's

average growth rate for 2010-15 at -2.5%/year and for 2015-20 to be -1.3%/year (Fig. 1).

#### Refining capacity

Japan has 4.8 million b/d of refining capacity after Nihonkai Oil closed its 40-year-old Toyama refinery in March 2009. It was the smallest refinery the

Nippon Oil group owned, with its main objective being to supply LSFO to Hokuriku Electric Power. With this closure, the Nippon Oil group owns 1.3 million b/d of refining capacity (Fig. 2).

Three of the refiners listed in Fig. 2 have foreign firms as their shareholders. Saudi Aramco is a 15% stakeholder in Showa Shell, Abu Dhabi's IPIC is a 20% stakeholder in Cosmo Oil, and Brazil's Petrobras is an 87.5% stakeholder in Nansei Sekiyu in Okinawa. Tonen General is ExxonMobil's subsidiary.

Nippon Oil, Japan's leading refiner, and Nip-

pon Mining Holdings (Japan Energy) announced plans to merge by setting up a joint-venture holding company in April 2010. They will reduce their combined crude distillation capacity by 400,000 b/d accordingly. This reduction includes closure of the Toyama refinery and change in ownership of the Osaka refinery. The 115,000 b/d Osaka refinery, to be owned jointly by Nippon Petroleum & Refining and China National Petroleum Corp. will become an export-oriented refinery, as CNPC is considering marketing all the products from the Osaka refinery. Meanwhile, the total capacity of the two Mizushima refineries (455,000 b/d each)—one each owned by Nippon Oil and Nippon Mining Holdings—will be reduced through rationalization.

In the future, Japan's demand cut of the barrel is forecast to continue to be lightened. Some investment plans have been made to cope with the changing demand pattern—which continues to

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### Procfssing

#### JAPANESE REFINERS<sup>1</sup>

Nippon Oil Group<sup>2</sup> 1,317,000 b/d

Japan Energy Group<sup>3</sup> 475,000 b/d

Tonen General Group<sup>4</sup> 836,000 b/d

<sup>1</sup>As of 2009; 4,835,000 b/d

<sup>2</sup>Includes Nippon Oil and Kyushu Oil

<sup>3</sup>Includes Japan Energy and Kashima Oil.

<sup>4</sup>Includes Tonen General and Kyokuto Petroleum.

<sup>5</sup>Includes Showa Yokkaichi, Seibu Oil, Toa Oil, and Fuji Oil.

Cosmo Oil 635,000 b/d Idemitsu Kosan 640,000 b/d Show Shell Group<sup>5</sup> 707,000 b/d Others: Nansei Sekiyu, 100,000 b/d Taiyo Oil, 120,000 b/d Teikoku Oil, 5,000 b/d

lighten with industrial demand declining significantly—and optimize existing capacity, along with eyeing more product exports. In view of the envisioned decline in fuel-oil demand, the following two refiners plan to add new units:

Taiyo Oil to add a 25,000-b/d residue fluid-catalytic-cracking unit at the Kikuma refinery by fourth-quarter 2010 and Cosmo Oil to add a 25,000b/d coker at the Sakai refinery by April

Except for these two, there will be no major investments in conversion units until 2015, as refiners reduce crude distillation unit capacity in the face of falling domestic demand and growing difficulty in exporting refined products.

#### Product balances

In 2008, Japan's total product output fell 2.0% (81,000 b/d) to 3.9 million b/d. Output would have been much lower if Japan's nuclear power plants were operating normally. Japanese refiners have been supplying additional LSFO to electric utilities because of a series of nuclear-power plant shutdowns that led to increased thermal-power generation. TEPCO had to substitute the 8.21-Gw base-load nuclear power generation capacity with thermal power generation and power purchases throughout 2008.

Increased exports helped refiners ease throughput cuts as well. Japan's product exports increased to 375,000 b/d in 2008 from 267,000 b/d in 2007. It should be noted that we treat bonded bunker sales and bonded jet-fuel sales as domestic demand; therefore exports represent only genuine exports.

Diesel exports increased to 220,000 b/d in 2008—which accounts for nearly 60% of Japan's total exports, from 142,000 b/d in 2007. Asia—mostly China and Singapore—accounted for 55% of Japan's total exports, followed by Oceania (Australia and New Zealand, 25%), Europe and CIS (8%), North America (6%), South America (Brazil, Chile, and Colombia, 6%), and the Middle East (1%).

Meanwhile, product imports in 2008 declined by 1% compared with 2007, with naphtha and LPG being imported much less than in the previous year.

Refiners will continue reducing fueloil output because of the "whitening" of the demand barrel. (Whitening of the demand barrel refers to the product mix growing lighter in hydrocarbon weight.) There are some plans to add conversion units, including cokers, to meet the changing demand pattern. The product balance outlook, however, will highly depend on how much products Japanese refiners will export.

In our view, Japanese exports to Asia

	JAPAN: FORECAST PRODUCT BALANCES Table 1								
Output Imports Exports Demand 1,000 b/d									
2008 LPG Naphtha Gasoline Kero/jet Diesel Fuel oil Other Total	145 376 977 638 1,136 538 126 <b>3,936</b>	433 420 10 7 6 91 3 <b>970</b>	3 1 13 65 220 56 17 <b>375</b>	507 780 985 589 919 526 103 <b>4,409</b>					
<sup>2</sup> 2009 LPG Naphtha Gasoline Kero/jet Diesel Fuel oil Other <b>Total</b>	142 361 991 607 1,029 463 110 <b>3,703</b>	350 380 2 10 5 28 3	10 50 150 60 10 <b>280</b>	492 741 983 567 884 431 103 <b>4,200</b>					
<sup>2</sup> 2010 LPG Naphtha Gasoline Kero/jet Diesel Fuel oil Other Total	140 365 981 608 879 443 106 <b>3,522</b>	350 340 — 10 5 20 3 <b>728</b>	 15 50 120 50 10 <b>245</b>	490 705 966 568 764 413 99 <b>4,005</b>					
<sup>2</sup> 2015 LPG Naphtha Gasoline Kero/jet	142 333 1 893 572	280 280 — 10	— 15 50	422 613 878 532					

<sup>1</sup>Contains ethanol: 2008, 2,000 b/d; 2009, 5,000 b/d; 2010, 25,000 b/d; and 2015, 62,000 b/d. <sup>2</sup>2009-15 are

370 91

3,158

Diesel Fuel oil Other

Total

6 23 3

602

50 10

3,535

225

including China will decline due to emerging new refining capacity for selfsufficiency. The Asian product market is expected to be a battlefield of product sales, and competition will become fierce. We must keep in mind that market competition will come from national oil companies that aggressively export to emerging markets, for example, India's Reliance Industries Ltd.

Furthermore, the global environment surrounding the refining industry is restraining product exports from Japan to the US. Since second-quarter 2008, US demand declined initially because of higher prices. But demand continues to decline because of economic recession. The US has become a large gas oil exporter, looking for export markets in Latin America and Europe. Given that these changes had taken place in the past year, the US market has little room

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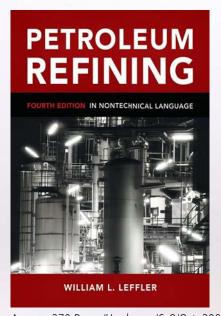
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## Processing

for product imports.

Especially with the economic downturn, it seems difficult for Japanese refiners to depend too much on exports on a full-cost basis. We believe, however, that there will be opportunities for Japanese refiners to export on a marginal basis; opportunities will be open if refiners seek a marginal profit through exports.

Based on FGE's outlook for product demand and imports-exports, Table 1

summarizes Japan's product balance outlook. Japan's total exports for 2009 are forecast to fall to 280,000 b/d, of which gas oil accounts for 150,000 b/d, and further to 245,000 b/d in 2010.

#### Industry reorganization

Obviously declining domestic oil demand has a substantial impact on Japanese refiners—excess refining capacity over domestic demand. Our

Mar.

Apr.

demand outlook and product exports indicate Japan's excess capacity (based on current refining capacity and assuming 93% yield for main petroleum fuels) for 2009, 2010, and 2015 are, respectively, 780,000 b/d, 990,000 b/d, and 1.4 million b/d. Even assuming that Nippon Oil and Nippon Mining Holdings remove 400,000 b/d from the market (including the Osaka refinery), there still remains excess capacity. Japanese refiners are facing a surplus problem at a time of massive global refining surplus.

In order to optimize production, logistics, and commercial competitiveness, refiners must make strategic and innovative decisions because petroleum is an economic necessity and will continue to be a vital mineral to be used mainly for transport fuels and feedstock for petrochemical.

Forming alliances and joint ventures will become more important for the industry in order to help ease the costly, as well as socially and culturally complex processes of closing regional refineries. Especially, strategic alliances that come with crude supplies or product export outlets will help Japanese refiners prolong their refineries' lives.

The strategic alliance between Nippon Oil and China's CNPC to operate Nippon Oil's Osaka refinery is one such new model, in which Nippon Oil will own 51% and CNPC 49%. Under the new plan, the Osaka refinery will be converted to an export-oriented refinery. CNPC will supply crude oil to the refinery and market all the refined products.

Indeed, this alliance will give Nippon Oil the alternative to keep the Osaka refinery operating.

Such countries as Vietnam and Indonesia that have oil but insufficient capacity should be interested in such JV opportunities with Japanese companies, as they can reduce product import dependency while avoiding investing large amounts to build their own refineries. Japanese refiners can utilize their existing refineries and help the energy security situation in the region as well.

#### Nelson-farrar cost indexes

Refinery construction (1946 basis) (Explained in OGJ, Dec. 30, 1985, p. 145)

1962	1980	2006	2007	2008	2008	2009	2009
Pumps, compressors,	etc.						
222.5	777.3	1,758.2	1,844.4	1,949.8	1,922.1	2,006.2	2,015.7
Electrical machinery							
189.5	394.7	520.2	517.3	515.6	515.5	514.6	515.0
Internal-comb. engine		0=0=	0740				4 040 =
183.4	512.6	959.7	974.6	990.9	984.6	1,017.4	1,018.7
Instruments	F070	1 100 0	1 0070	1 0 4 0 1	1 000 5	1 005 0	1 200 2
214.8	587.3	1,166.0	1,267.9	1,342.1	1,330.5	1,395.0	1,389.3
Heat exchangers 183.6	618.7	1,162.7	1,342.2	1,354.6	1,374.7	1,253.8	1,253.8
Misc. equip. average	010.7	1,102.7	1,542.2	1,354.0	1,374.7	1,200.0	1,200.0
198.8	578.1	1,113.3	1,189.3	1,230.6	1,225.5	1,237.4	1,238.5
Materials component	070.1	1,110.0	1,100.0	1,200.0	1,220.0	1,207.1	1,200.0
205.9	629.2	1,273.5	1,364.8	1,572.0	1,558.9	1,313.1	1,261.2
Labor component		,	,	, -	,	,	, -
258.8	951.9	2,497.8	2,601.4	2,704.3	2,665.5	2,785.5	2,785.5
Refinery (Inflation) Ind							
237.6	822.8	2,008.1	2,106.7	2,251.4	2,222.9	2,196.5	2,175.8

#### Refinery operating (1956 basis) (Explained in OGJ, Dec. 30, 1985, p. 145)

·	1962	1980	2006	2007	2008	Apr. 2008	Mar. 2009	Apr. 2009
Fuel cost								
Labor cost	100.9	810.5	1,569.0	1,530.7	1,951.3	2,107.2	859.2	854.1
	93.9	200.5	204.2	215.8	237.9	220.7	265.4	264.3
Wages	123.9	439.9	1.015.4	1.042.8	1,092.2	1.035.1	1,170.2	1,152.6
Productivity			, -	,		,	,	·
Invest., mair	131.8 nt., etc.	226.3	497.5	483.4	460.8	468.9	440.9	436.1
Chamainal an	121.7	324.8	743.7	777.4	830.8	820.2	804.6	797.0
Chemical co	96.7	229.2	365.4	385.9	472.5	454.4	397.6	386.6
Operating in Refinery	dexes							
•	103.7	312.7	579.0	596.5	674.1	675.3	568.0	562.8
Process unit	103.6	457.5	870.7	872.6	1,045.1	1,090.8	661.9	657.2

\*Add separate index(es) for chemicals, if any are used. See current Quarterly Costimating, first issue, months of January, April, July, and October These indexes are published in the first issue of each month. They are compiled by Gary Farrar, OGJ Contributing Editor. Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the months of January, April, July, and October.

Oil & Gas Journal / Aug. 3, 2009







In conclusion, the sharper-than-expected 2008 demand decline illustrates clearly that the base of Japanese refiners' business is deteriorating quickly. The global economic recession is indeed worsening the environment surrounding Japan's refining industry in 2009.

Along with the suggested strategic alliances and JVs, there is an inevitable conclusion that substantial refining capacity in Japan needs to close. We expect refining margins to become more negative in line with the global refining business in 2010-11, resulting in refinery closures in Japan (in a range of 500,000 b/d and 1 million b/d) starting in 2011.

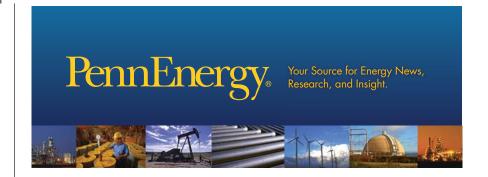
Many Japanese refiners are unwilling to entertain these dire prospects, but it is difficult to see any other option. We believe the refiners will need to plan and adjust to the tough circumstances lie ahead. The merger between Nippon Oil and Nippon Mining Holdings will certainly make other Japanese refiners reassess their business strategies, and consequently, another wave of industry reorganization would take place. +

#### The author

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Processing

# Coker design achieves cycle times, throughput needs at Kansas refinery

Don Mulraney Art Stefani CB&I Houston

Coby Stewart Frontier El Dorado Refining El Dorado, Kan.



Over the last few years, Frontier Refining's plant in El Dorado, Kan., has undergone a major refinery reconfiguration to facilitate processing a greater proportion of very heavy crudes. The

project added a new vacuum unit and revamped several existing units for processing the heavier crude oil feed.

These modifications produced significant constraints on the coker unit, due to the lack of sufficient coke-drum volume. Frontier evaluated running shorter drum cycles, but review of the drum's vapor velocity indicated severe foaming and carryover would likely result.

In addition, coke-drum reliability was decreasing because of frequent drum cracks. Frontier evaluated several

> options for repairing the existing drums, but most were deemed unacceptable due to the extended unit downtime that would have been required to complete the work.

CB&I had been advising Frontier on these drum evaluations, including the anticipated coke make increase. Frontier and CB&I concluded the existing coke drums should be replaced with larger drums.

#### Scope of project

In 2006, CB&I was contracted to evaluate the existing coker to determine its suitability to process the new feed. With the exception of the coker feed preheat train, blowdown steam condensing, and the larger coke drums, the existing unit was capable of handling the new feed composition.

CB&I and Frontier set the coke drum's size based upon the new feed and Frontier's expected future expansion capacity: 26 ft diameter and 70 ft. It was determined that the existing coke drum's piping and valving would be acceptable for the new capacity, which set the scope of the new coke drum's structure as follows:

- Two new vertical plate coke drums.
- · New foundation and elevated table top.
  - Steel structure.
- Ruhrpumpen decoking system and new jet pump.
- DeltaValve automated bottom and top unheading devices.
- Piping, valving, and controls to tie the new drums into the existing coke drum isolation system.

The new structures and remote cutting buildings can be seen alongside the existing drums in Fig. 1. In addition, Frontier elected to install a coke handling and conveying system through a separate arrangement.

#### Features

The Frontier structure design continued the focus on operator safety and a low-maintenance installation. One consideration of the design approach was to minimize the time for the operator to be on the structure during the coke cutting part of the cycle. The heavier feedstock to be processed by this unit is a known shotcoke producer and therefore subject to blowouts. For this reason, removal of operating personnel from the

This view shows the completed Frontier El Dorado coker alongside an existing coking structure (Fig. 1).

Based on a presentation to the 2009 NPRA Annual Meeting, San Antonio, Mar. 22-24, 2009.

structure was considered a necessity.

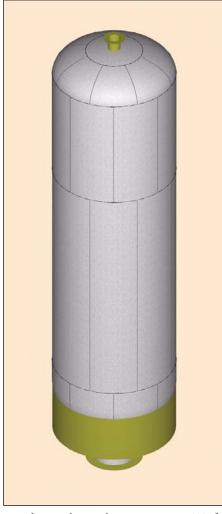
Of the several available technology features, the following were selected for the coker design:

- Vertical Plate Coke Drum technology (CB&I design); gives longer coke-drum life and is more tolerant to operating upsets.
- T-Rex skirt shell attachment; for reduction of stresses in the shell to avoid shell cracks.
- DeltaValve unheading devices (bottom and top); industry-accepted approach to removing operating personnel from the hazardous environment of the bottom and top head during the unheading step. Also, improves the efficiency of unheading step by decreasing the time required to unhead the drum, leaving more time for the other decoking steps. These devices also reduce ongoing unheading maintenance costs.
- Remote cutting station (Ruhrpumpen control system and DeltaValve control system); moves the cutter's station from the top deck and allows the unheading control of the drums to occur at a location off the coke drum structure.
- Auto switch cutting tool (Ruhrpumpen design); allows the operator to switch the tool from boring to cutting mode without having to be on the coke drum's structure.
- State-of-the-art decoking control system; 100% electronic system.

#### Vertical plate technology

In the past decade, demand for delayed-coking capacity has been steadily increasing due to the financial benefits of processing heavier and lower-quality crudes. To keep up with this demand, many refiners with delayed-coking units have chosen to shorten the heat-up and cool-down parts of the decoking cycle.

This action, however, reduces the useful life of the coke drums because the severe operational thermal cycling causes the steel plate and the weld to be stressed with each cycle. Also, due to their different relative strengths, the drum may bulge and eventually crack



Depending on plate size limitations, up to 70% of the circumferential weld seams can be eliminated, resulting in a cylindrical shell section that can endure the most severe thermal cycles (Fig. 2).

near the circumferential weld seams. This leads to the coke drums being taken offline to make needed repairs or partial shell replacements.

Although industry recognizes that shorter, more severe cycles cause the bulging and cracking to appear sooner, only a few refiners have the option of increasing cycle time because of current refining economics.

Recent efforts to improve the reliability and life span of coke drums have focused on mitigating the stiffening effect of the weld seams, which increases stress and is chiefly responsible for distortion and cracking. These measures have included:

- Decreasing the weld metal's yield strength to be within a closer percentage of the base metal's yield.
  - "Blend grinding" the weld profile.
- Using higher alloy clad materials to construct the coke drums.
- Maintaining a uniform shell thickness throughout the coke drum (there are often step reductions in thickness from one shell course to the next based on each shell's specified design pressure).
- Specifying materials greater than 2 in. thick.

Although several of these proposed specifications have indeed responded to some of the issues of thermal cycling, none of them has been effective in preventing coke-drum distortion entirely.

In 1997, CB&I conducted its own analysis of coke-drum distortion and cracking and concluded that the best solution would be to eliminate circumferential weld seams. Incorporating technology and expertise from other applications, CB&I developed a method for successfully fabricating shell plates with the long side oriented vertically.

This process allows for the fabrication of cylindrical shell sections of up to 46 ft without a circumferential weld seam. Depending on plate size limitations, up to 70% of the circumferential weld seams can be eliminated, resulting in a cylindrical shell section that can endure the most severe thermal cycles (Fig. 2).

Since 2000, CB&I has completed 11 vertical plate coke-drum retrofit projects and 6 new coke drums, including 2 for the Frontier project. Frontier and CB&I chose the vertical plate technology to take advantage of the improved reliability and life span.

#### T-Rex skirt attachment

Several alternative skirt designs have been developed to counter skirt-weld failures. One such design is the T-Rex skirt, a culmination of best practices and lessons learned from years of fabricating and repairing coke drums.

Recently, a finite-element analysis

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# **Q**Mags

## Processing



The T-Rex design was used on the Frontier coker project to take advantage of the reliability improvement (Fig. 3).



Shown are the open design and monorail system of the bottom unheading valve (Fig. 4).

was performed on the T-Rex design, the results of which were compared to those for the conventional design configuration. This was a transient thermal analysis to establish the model temperature profile over the load cycle time history.

The results of the thermal load tests

showed that the T-Rex configuration has lower stress levels for the critical charge-and-quench thermal cycles. The T-Rex design was used on the Frontier coker project to take advantage of the reliability improvement (Fig. 3).

#### Delta valve unheading

The bottom unheading device has substantially improved delayed-coker design and safety. By creating a completely sealed connection from the bottom of the coke drum down through the discharge chute, the unheading device isolates personnel, equipment, and the environment from exposure to hydrocarbons, hot coke, water, and steam.

With the addition of the bottom unheading device, the following benefits are realized:

- Substantial savings in time, up to 2 hr, to implement the unheading and reheading portions of the decoking cycle.
- Reduced operating and maintenance expenses.
  - Fewer coke-drum operators.
- Operators are not required to be on the structure when the drum heads are removed.
- The bottom DeltaValve device also has throttling capability so as not to overwhelm the primary crushing and transportation systems.
- The deck design provides substantial open area that benefits operator safety and ease of maintenance.

For the Frontier project, the bottom unheading device is supported by a dual-purpose monorail system. While the primary function is to support the weight of the unheading valve, the monorails were extended to allow the removal of the unheading valve from the unit without the need of any assistance crane. Fig. 4 shows the open design and monorail system of the bottom unheading valve.

The traditional approach to top unheading, as with bottom unheading, was labor intensive. The operators working on the top head were exposed to upsets within the coke drum expel-

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## Processing



Fig. 5 shows the camera display for the operator.



Fig. 6 shows the containment dome with the drillstem parked.

ling hot steam, fumes, and coke. With the top head of the Frontier coker connected to the containment dome that is vented to a more remote location, operators' exposure to coke-drum upsets is reduced.

#### Remote cutting

The remote cutting shelter consists of two buildings, one containing the control panels and camera monitors for the operator to unhead and decoke the drum and a second to house the

input/output panels, variable frequency drives, and programmable logic controller. The operator shelter is centered facing the chutes to allow operators to observe the coke leaving the drum.

The interior of the cutting shelter consists of two sets of panels, one for each drum, controlling the decoking equipment. The cutting shelter also houses the DeltaValve top and bottom control panels. Also included are readouts for coke-drum acoustics and vibration that the operator uses to determine when the coke drum's wall is reached, as well as the camera system located on the structure.

The camera system consists of four tilt-and-pan cameras operated from the cutting shelter. These cameras have low light, zoom, and panning capabilities if required by the location.

Two of the cameras are mounted near grade to provide views where the coke chutes are located. These cameras provide two additional angles to prevent a loss of line-of-sight in case of heavy steam in one direction due to the prevailing winds. A third camera is in the top unheading deck to provide general monitoring of the area as well as the location of the cutting tool and the rotation of the drill stem.

The fourth camera is about half way up the derrick structure with the primary function of providing a view of the rotation of the hoist cable. Fig. 5 shows the camera display for the operator.

#### Auto-switch cutting tool

The auto-switch cutting tool allows the operator to switch from boring mode to cutting mode without needing to remove the cutting tool from the drum. The switch is done by cycling the pressure to the cutting tool.

Properly used, this enhances operator safety by not requiring operator presence on the structure with a full coke drum open to the environment. This operation is performed very quickly, thereby providing time for use in other steps in the decoking cycle.

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#### Containment dome

The cutting tool floating containment dome has several advantages:

- Self alignment of the drillstem guide to centerline of the derrick to compensate for any banana effect. This reduces the potential for a stuck tool due to cutting tool/drillstem channeling.
- Centering of drillstem guide with dampening springs to reduce the im-

pact from blowouts.

- A permanent parking place for the drillstem and cutting tool when the drum is in the coking cycle. The stem does not have to be tied off when not in use.
- The dome acts as a venting chamber for fumes that are expelled when the top head is opened and to dissipate heat during the coking cycle. The dome is vented to a more remote location.
- Containment for coke pieces that are expelled during a blowout.

Fig. 6 shows the containment dome with the drillstem parked. The line from the side of the dome is the vent, which is directed to a remote location. The dome itself is mounted directly on the top DeltaValve unheading device.

#### Decoking

The decoking system supplied by Ruhrpumpen is a totally electronic control system that is electrically powered. The hoist and drill stem drive are both electric-motor driven. This eliminates the intermediate step of a hydraulic power unit or pneumatic-driven equipment.

The electric-drive electronic-control nature of the system facilitates the ability to control the decoking system remotely. Also included in the system is a stem free-fall arrestor.

Since its start-up in mid-2008, the Frontier El Dorado delayed coker has achieved its desired design cycle times and is capable of additional throughput.

#### The authors

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developing refining and petrochemical projects, especially for unique technologies and businesses. He holds BS and MS degrees in chemical engineering from the University of Texas at Austin.



Coby W. Stewart is currently manager for maintenance and reliability at Frontier Refining's El Dorado, Kan., refinery. Previously, he spent more than 28 years in construction, turnaround, and maintenance in the oil and natural gas, petrochemical, and refining industries.

Stewart holds degrees from Texas State Technical College and LeTourneau University.

Arthur N. Stefani is currently vice-president of delayed coking with CB&I Lummus, Houston. His responsibilities include working with clients to develop coking projects, as well as ensuring that the technical content of all EPC delayed coking projects meets the highest



industry standards. He has held technical management positions with all prominent delayed-coking licensors. Stefani holds a BS in chemical engineering from Manhattan College, New York City.



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# **q**Mag

# TRANSPORTATION

Natural gas buyers everywhere stand to from the current global gas oversupply. The timing, duration, and extent of the oversupply, however, will vary between regions, with differ-



ent implications for different sellers and buyers. The current market favors

buyers that can access spot gas, while others are likely to be overcontracted, with associated competitive and contractual problems.

Natural gas oversupply creating buyers' market

Noel Tomnay Stephen O'Rourke Wood Mackenzie Edinburgh

#### Background

While many factors have shaped the global gas market in recent years, some stand out:

- Expectations of robust economic growth triggered huge growth in gas demand expectations globally.
- Declines in North American production led to a massive anticipated increase in LNG import requirements.
- A lack of project sanctions for major new developments globally curtailed long-term gas supply availability.
- Direct competition between gas and oil in the Asia market, particularly China, led to high-value pricing.
- Oil prices reached record levels, profoundly influencing gas price expectations

In aggregate these factors created a market strongly favoring sellers over buyers.

More recent events, however, have shifted market balance away from sellers. The combination of the global slide into economic recession, the dramatic growth in gas availability from unconventional sources in North America, and the largest wave of new LNG supply ever to hit the global market has contributed to a global gas glut, driving spot prices for gas down everywhere. Unfortunately for sellers, this situation looks to get worse and the market is increasingly favoring buyers.

This article considers the extent of the oversupply of gas, the measures suppliers may take to alleviate the oversupply, and the implications for the dynamics between sellers and buyers of gas in the Pacific and Atlantic basins.

#### Pacific supply-demand

Up to 2008 the Pacific basin had to call on short-term LNG from the Middle East and the Atlantic to meet demand (Fig. 1). This situation has changed. Economic contraction has lowered near-term LNG demand in the primary Asia Pacific LNG markets of Japan, Korea, and Taiwan. A number of major Asian LNG buyers have nominated reduced LNG offtake under some of their long-term supply contracts in line with downward quantity tolerances, affecting supply projects in the Pacific and Middle East. At the same time some 34 billion cu m/year of new Pacific LNG projects (excluding Middle East) are coming on line 2009-10, including Sakhalin-2, Tangguh, and Pluto, resulting in an oversupplied Pacific LNG market.

A number of factors will address near-term Pacific market oversupply.

- China and India's demand elasticity will enable further short-term sales of LNG, but this will be limited. India has shown the greatest spot appetite to date, but demand has been restricted by the recent start-up of deliveries of domestic gas from the Krishna Godaveri basin and the force majeure outage at the recently completed Dahej regasification terminal, now lifted. The recent industrial slowdown has restricted China's appetite, which in the near-term will also be affected by regasification capacity constraints.
- Some LNG suppliers, both in the Pacific and the Middle East, will choose not to sell LNG at low prices, particularly national oil companies or governments with a diminished remaining gas resource base such as Brunei. Some gas will be kept in the ground, therefore.
- Some gas previously earmarked for LNG export will be redirected to higher-value uses such as the domestic market or LPG extraction, as is occurring in Indonesia.
  - Atlantic Basin LNG underpins

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some existing LNG contracts with Asian customers; for example, BG supply deals with Asian customers. These cargoes could be swapped with available Pacific LNG, providing customers with product of a specification with which they may be more familiar and reducing transport costs in the process.

• It also seems likely some spot cargoes of Pacific LNG will be routed into the US West Coast and Atlantic markets over the next couple of years.

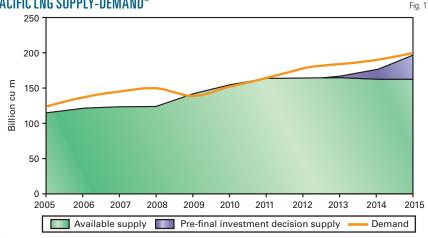
But prices of spot sales of gas are likely to remain subdued to 2011. From 2012 Wood Mackenzie estimates the Pacific will once again require incremental LNG from the Middle East or the Atlantic to balance the market. Strong medium-term growth in China's LNG import requirements predicate this estimate.

Chinese buyers are in advanced stages of negotiations for contracting more than 10 million tonnes/year of LNG from several potential new projects. Other Asian buyers are seeking LNG in the same time period due to the expiry of contracts in Indonesia, Brunei, and Malaysia. This supplier competition, combined with uncertainty about which new projects under consideration will actually progress to final investment decision (FID), is contributing some uncertainty in the market, particularly for 2013-14 supply.

This medium-term supply-demand picture still favors sellers, providing price support in the negotiation of long-term contracts. Analysis, however, suggests the Pacific market east of India requires only a further 36 billion cu m/ year of new LNG in 2015, while the combined potential output capacity of PNG LNG, Queensland Curtis, GLNG, Ichthys, and Donggi—all ostensibly chasing FID within the next 18 months—is 57 billion cu m/year when fully operational. Qatar could also decide to re-market flexible Atlantic LNG into the Pacific and lock in the market ahead of these new LNG projects.1

A raft of FIDs on new LNG projects in the Pacific could show an oversupply developing in 2015 and beyond and

#### PACIFIC LNG SUPPLY-DEMAND\*



\*Years run April-March. Source: Wood Mackenzie Global Gas Model

would change the pricing dynamic to one favoring buyers. As the likelihood of FID on new volumes becomes more concrete, the strength of sellers in subsequent negotiations deteriorates.

Prospective sellers are already offering concessions to buyers in anticipation, concessions thought unthinkable a year ago, such as project equity and volume flexibility. While indexation at more than 14% Japanese crude cocktail (JCC) in recent agreements, however, is lower than the oil-parity prices sellers were used to demanding, current pricing arrangements still reflect residual seller strength, for now.

#### Atlantic supply-demand

Economic contraction has reduced near-term demand for gas in both Europe and North America. But the results in the Atlantic Basin, both in terms of supply-demand balance and pricing, depend on how major gas producers interact with Europe.

#### Europe

Over the next 2-3 years continued infrastructure development, such as Algeria's Medgaz pipeline to Spain and Russia's proposed Nord Stream pipeline to Germany has the potential to increase the availability of piped gas from major suppliers to Europe, while reduced domestic demand for gas in many sup-

plier countries, most notably Russia, has increased export availability.

LNG available to Europe is also increasing. In 2008 some 18 billion cu m of LNG moved from the Atlantic to markets in the Pacific, but reduced Pacific demand means Atlantic LNG will now seek markets closer to home. Close to half of the new Qatargas-2 and Ras Laffan-3 LNG projects, with combined nameplate capacity of more than 40 billion cu m/year, is coming on line in 2009-10, earmarked for markets in Northwest Europe.

Wood Mackenzie estimates 140 billion cu m/year of discretionary pipe gas and flexible LNG will compete for an average contestable European market of about 70 billion cu m/year between 2010 and 2012. The contestable pipe-LNG market in Europe is that part of gas demand for which discretionary pipe gas and flexible LNG compete. This excludes most European demand, including that covered by firm take-orpay contracts. It also excludes markets in which physical constraints prevent competition and a minimum volume will continue to be supplied.

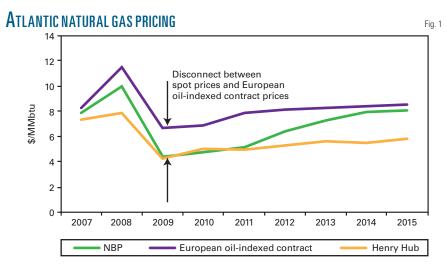
A number of factors can address European oversupply.

• Major suppliers may delay development of new projects for which large amounts of capital expenditure remain outstanding. For example, Algeria's de-

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## TRANSPORTATION



Source: Wood Mackenzie Global Gas Model

cision to delay the Skikda LNG replacement completion—for which 80% of the capital still needed to be spent—to 2013 from 2011.

- Major piped-gas suppliers to Europe, including Russia, Norway, Algeria, and the Netherlands, may elect to back out discretionary gas to accommodate new LNG and sustain reasonable spot price levels in Europe. But major piped-gas suppliers may elect to remain in the market, maximizing market share while driving down prices to shut out new LNG.
- Qatar may attempt to defend European price levels to support LNG prices in Asia. Instead of maximizing LNG supply to Europe, which on its surface would provide a higher netback than the US when prices in the two centers are connected (as is likely over the next few years), Qatar may elect to send more LNG to North America
- Other LNG suppliers will simply prefer to send gas to North America because of better netbacks; e.g. Trinidad and some African suppliers, depending on pricing dynamics.

This oversupply puts European spot prices at risk of being established by the alternative available market, which for many LNG suppliers will be North America, allowing prices in North America to set the price in Europe over the next few years (Fig. 2).

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Wood Mackenzie forecasts spot prices for gas in Europe will be lower than the oil-indexed levels typical in the long-term contracts making up more than 80% of Europe's traded gas, giving great benefit to gas buyers able to access spot gas. Buyers with long-term contracts will also nominate down to take-or-pay levels to maximize their ability to purchase spot gas.

A prolonged disconnect between spot prices and contract prices could lead some buyers to seek to renegotiate the pricing levels in their long-term contracts via price re-opener clauses. Potential buyers negotiating new long-term contracts will also consider themselves in a favorable position. Some buyers, including those in both western and eastern Europe, may find a more willing response from LNG sellers keen to identify new markets for product.2 Others may seek greater volume flexibility on pipe contracts to enable them to deepen their procurement portfolio.

Not all buyers, however, will benefit. The reduced demand outlook will leave some over-contracted; their take-or-pay offtake commitments under long-term contracts requiring them to take more gas than needed. Such buyers will seek to carry-forward some of their offtake commitments.

Wood Mackenzie also sees ma-

jor current pipeline suppliers of gas as holding a strong position when negotiating terms of long-term supply contracts. The sanctioning of new LNG projects in the Atlantic will inevitably fall victim to subdued price levels, and the failure to develop LNG projects combined with a lack of other gas supply alternatives to Europe will help sow a return to pricing power for the major piped-gas exporters. These events will likely cause spot prices to trend back to levels consistent with long-term contracts by 2013.

#### North America

The North American market is also over-supplied. North America was expected to be short of indigenous gas to meet demand and would have to compete for LNG in the global gas market. But dramatic increases in availability of indigenous gas from unconventional sources, particularly shale gas, have given North America the potential to be essentially self-sufficient in gas for some time, removing the need for large volumes of LNG to meet demand.

Infrastructure and contracts, however, remain in place to route a lot of new LNG to North America, and as long as Europe and the Pacific are long gas the large liquid market of North America will be the market of last resort for LNG. These factors have led to a marked decrease in the number of active rigs in the US, from a peak of more than 1,600 in 2008 to levels closer to 700 today, as suppliers seek to remove sub-economic gas from market.

LNG is likely to displace indigenous gas in North America, requiring further reductions in drilling rigs in the nearterm as the market seeks a new clearing price encouraging development of sufficient indigenous supplies to balance the market. Effectively higher LNG imports will lead to lower North American prices and buyers in North America will continue to benefit from the oversupply. The attractiveness of the price, however, will depend on the tactics of such major

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supplying countries as Russia, Norway, and Qatar. •

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#### The authors

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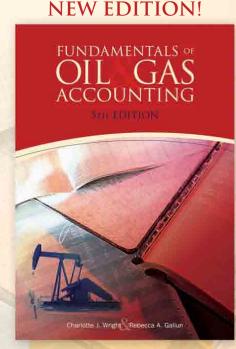
oil companies, majors, independents, and utilities on Pacific basin gas. Tomnay also has developed and led a number of Wood Mackenzie multiclient studies and research products addressing gas issues. He joined  $Wood\ Mackenzie\ in\ 1998$ , having started his career as a facilities engineer with BP International and has worked in the UK, Indonesia, and Eastern Africa. He earned a bachelors of engineering (1989) from the University of Glasgow, is a chartered engineer, and holds an MBA from the University of Edinburgh.



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delivering the Wood Mackenzie base case to global gas model clients. He previously led the Australasia upstream research team at Wood Mackenzie. O'Rourke holds a masters in business studies from University College, Dublin.

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A full suite of systems for testing bioethanol, a sugar-based fuel made from such crops as sugarcane, corn, or wheat,

is also available. This line consists of an EcoAnalytix trace metals analyzer based on the Optima 7000 ICP-OES for testing Group I and Group II metals and phosphorus, alcohol system for determining the right blend of ethanol in gasoline by GC, and bioethanol fermentation system for monitoring fermentation broth. The 14C determination by LSC system available for biodiesel can also be used in qualifying bioethanol.

Source: PerkinElmer Inc., 940 Winter St., Waltham, MA 02451.

#### New drill shoe product line

A new product line called the Dragon-BITE drill shoe marks this firm's entry into the industry's casing and liner segment.

The product complements the company's existing well construction technologies-TD SOLUTIONS and SlimWELL. TD SOLUTIONS is a range of individual downhole products and services to reduce 212, 1970 AE IJmuiden, the Netherlands. nonproductive time. SlimWELL slims down the well profile while maintaining

well integrity and intervention ability without reducing the final hole size. SlimWELL has the potential to reduce well construction costs by as much as 50%, enhance safety, and reduce environmental impact.

Source: Caledus, 4 Rubishaw Terrace, Aberdeen AB10 1XE, UK.

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The OAS connects to an offshore installation through the combination of smart electronics, measuring the vessel movements with a patented connection sequence.

Source: Offshore Solutions BV, Postbus

#### ervices/Suppliers

#### Aker Solutions ASA,

Oslo, has appointed Karl Erik Kjelstad

executive vice-president and member of the executive management team in Aker Solutions, effective Oct. 1. He is also chairman of Aker Philadelphia Shipyard ASA, Aker Oilfield Services Ltd., and Aker DOF Deepwater. Previously, Kjelstad



Kjelstad

was senior partner and president of Aker ASA's Maritime Technologies. He has been with the Aker Group since 1998. Kjelstad was president and CEO of Aker Yards ASA during January 2003-June 2007. Prior to joining Aker, he was senior consultant at he held various management positions in TTS Group. Kjelstad has an MS in marine engineering from the Norwegian University of Science and Technology.

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

#### Baker Hughes Inc.,

Houston, has announced that the American Society of Mechanical Engineers (ASME) will designate the Hughes Christensen two-cone drill bit as a Historic Mechanical Engineering Landmark. The award recognizes this drilling technology as one of the nation's most important mechanical engineering achievements. ASME officials will present Baker Hughes with the honor during a ceremony at the Baker Hughes drill bit technology facility in The Woodlands, Tex., on August 10, 2009—the 100th anniversary of the PA Consulting Group. From 1992 to 1996, two-cone drill bit patent. The Hughes two- A&M University. Kneen is a CPA and CFA. cone drill bit launched Hughes Tool Co., a forerunner of Baker Hughes.

ing, drilling, formation evaluation, comple- every major offshore market worldwide.

tion, and production products and services to the worldwide oil and gas industry.

#### GulfMark Offshore Inc.,

Houston, has named Quintin V. Kneen CFO, succeeding Edward A. Guthrie, executive vice-president and CFO, who has retired. Kneen was named senior vice-president, finance and administration of the company in December 2008 after joining the company in June 2008 as vicepresident, finance. Previously, he was vicepresident, finance and investor relations, for Grant Prideco Inc., serving in executive finance positions at Grant

Prideco since June 2003. Prior to joining Grant Prideco, Kneen held executive finance positions at Azurix Corp. and was an audit manager with Price Waterhouse LLP. He holds an MBA from Rice University and a BBA in accounting from Texas

GulfMark provides marine transportation services to the energy industry through Baker Hughes provides reservoir consult- a fleet of offshore support vessels serving

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#### IMPORTS OF CRUDE AND PRODUCTS

	— Distri 7-17 2009	cts 1–4 — 7-10 2009	— Dist 7-17 2009	trict 5 — 7-10 2009 — 1,000 b/d	7-17 2009	— Total US — 7-10 2009	*7-18 2008
Total motor gasoline	1,015	917	11	14	1,026	931	1,145
Mo. gas. blending comp	827	666	11	/	838	673	760
Distillate	252	159	U	0	252	159	102
Residual	221 74	283	53 19	54 57	274 93	337 76	151 63
Jet fuel–kerosine		19					
Propane-propylene	86	155	3	5	89	160	75
Other	201	127	101	86	302	213	795
Total products	2,676	2,326	198	223	2,874	2,549	3,091
Total crude	8,257	8,260	946	1,289	9,203	9,549	9,806
Total imports	10,933	10,586	1,144	1,512	12,077	12,098	12,897

#### PURVIN & GERTZ LNG NETBACKS—JULY 24, 2009

	Liquefaction plant							
Receiving terminal	Algeria	Malaysia	Nigeria	Austr. NW Shelf MMbtu ——————	Qatar	Trinidad		
Barcelona Everett Isle of Grain Lake Charles Sodegaura	6.04 2.96 2.04 1.16 4.20	4.07 1.18 0.46 -0.44 5.87	5.27 2.63 1.59 0.98 4.46	3.98 1.28 0.37 -0.29 5.60	4.62 1.63 0.85 -0.11 4.94	5.20 3.22 1.59 1.66 3.60		
Zeebrugge	4.57	2.87	4.08	2.77	3.32	4.12		

Definitions, see OGJ Apr. 9, 2007, p. 57.

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

	*7–24–09	*7–25–08 —\$/bbl —	Change ———	Change, %
SPOT PRICES				
Product value	74.24	135.50	-61.26	-45.2
Brent crude	66.71	128.17	-61.46	-47.9
Crack spread	7.53	7.32	0.20	2.8
<b>FUTURES MARKET PR</b>	RICES			
One month				
Product value	75.76	138.77	-63.01	-45.4
Light sweet				
crude	65.86	126.44	-60.58	-47.9
Crack spread	9.90	12.34	-2.44	-19.8
Six month				
Product value	76.16	141.36	-65.20	-46.1
Light sweet				
črude	71.78	128.39	-56.61	-44.1
Crack spread	4.38	12.97	-8.59	-66.2

<sup>\*</sup>Average for week ending.

#### Crude and product stocks

District -	Crude oil	—— Motor Total	gasoline —— Blending comp.¹	Jet fuel, kerosine ——— 1,000 bbl ———	Distillate	oils ——— Residual	Propane- propylene
PADD 1 PADD 2 PADD 3 PADD 4 PADD 5	14,160 82,603 180,909 16,269 48,747	56,512 51,767 71,703 6,151 29,258	39,212 24,945 39,165 2,074 24,185	10,455 7,780 15,504 536 9,814	67,512 33,760 43,659 3,471 12,107	14,798 1,182 15,484 228 4,793	3,529 27,367 33,939 11,608
July 17, 2009 July 10, 2009 July 18, 2008 <sup>2</sup>	342,688 344,484 295,330	215,391 214,578 217,085	129,581 128,868 108,836	44,089 43,314 39,992	160,509 159,291 128,109	36,485 35,740 38,469	66,443 64,404 45,311

<sup>&</sup>lt;sup>1</sup>Includes PADD 5. <sup>2</sup>Revised.

#### REFINERY REPORT—JULY 17, 2009

	REFII				REFINERY OUTPUT		
District	Gross inputs	ATIONS ——— Crude oil inputs D b/d ————	Total motor gasoline	Jet fuel, kerosine	——— Fuel Distillate —— 1,000 b/d ——	oils ——— Residual	Propane- propylene
PADD 1 PADD 2 PADD 3 PADD 4 PADD 5	1,276 3,316 7,365 575 2,637	1,348 3,290 7,196 573 2,372	2,371 2,249 2,966 298 1,352	65 231 701 33 428	417 884 2,029 180 542	101 43 354 10 96	59 266 707 <sup>1</sup> 58
July 17, 2009	15,169 15,528 15,331	14,779 15,105 15,112	9,236 8,956 9,210	1,458 1,500 1,543	4,052 4,034 4,625	604 562 650	1,090 1,112 1,101
	17,672 Opera	ble capacity	85.8% utilizati	on rate			

<sup>1</sup>Includes PADD 5. <sup>2</sup>Revised.

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





<sup>\*</sup>Revised.
Source: US Energy Information Administration
Data available in OGJ Online Research Center.

Source: Purvin & Gertz Inc.
Data available in OGJ Online Research Center.

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

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

#### **OGJ** GASOLINE PRICES

	Price ex tax 7-22-09	Pump price* 7-22-09 — ¢/gal ——	Pump price 7-23-08
(Approx. prices for self-s	ervice unles	(anilosen habe	
Atlanta	194.6	241.1	410.2
Baltimore	196.8	238.7	401.2
Boston	202.2	244.1	404.2
Buffalo	193.7	254.6	416.9
Miami	207.6	259.2	417.5
Newark	197.6	230.2	394.1
New York	186.5	247.4	409.8
Norfolk	196.8	235.2	393.2
Philadelphia	199.5	250.2	406.9
Pittsburgh	197.6	248.3	400.2
Wash., DC	212.7 198.7	251.1 245.5	407.9
PAD I avg	130.7	240.0	405.6
Chicago	200.6	265.0	438.9
Cleveland	200.0	246.4	399.5
Des Moines	197.0	237.4	396.5
Detroit	203.0	262.4	409.2
Indianapolis	190.0	249.4	399.2
Kansas City	182.4	218.4	394.5
Louisville	203.5	244.4	402.6
Memphis	182.6 201.0	222.4 252.3	390.0 410.2
Milwaukee MinnSt. Paul	196.4	232.3	400.2
Oklahoma City	177.0	212.4	386.9
Omaha	177.0	218.4	399.1
St. Louis	180.4	216.4	392.9
Tulsa	173.0	208.4	385.8
Wichita	178.0	221.4	379.9
PAD II avg	189.2	234.4	399.0
Albuquorquo	192.7	229.1	389.2
Albuquerque Birmingham	191.0	230.3	397.2
Dallas-Fort Worth	195.0	233.4	399.5
Houston	191.9	230.3	395.5
Little Rock	188.1	228.3	396.5
New Orleans	194.6	233.0	398.2
San Antonio	197.5	235.9	392.9
PAD III avg	193.0	231.5	395.6
Cheyenne	212.7	245.1	398.0
Denver	211.7	252.1	414.8
Salt Lake City	205.2	248.1	408.0
PAD IV avg	209.9	248.5	406.9
Los Angeles	214.3	281.4	448.3
Phoenix	205.0	242.4	415.3
Portland	220.0	263.4	423.3
San Diego	216.3	283.4	446.7
San Francisco	224.3	291.4	453.8
Seattle	221.5	277.4	432.4
PAD V avg	216.9	273.2	436.6
Week's avg	197.7	243.3	406.1
June avg	214.6	260.2	404.2
May avg	179.0	224.6	372.9
2009 to date	168.3	213.9	_
2008 to date	304.7	348.5	_

\*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

	20
7-17-09 ¢/gal	7-17-09 ¢/gal
Spot market product prices	
Motor gasoline (Conventional-regular)	Heating oil No. 2 New York Harbor 161.85
New York Harbor 171.98 Gulf Coast	Gulf Coast 159.10 Gas oil
Los Angeles	ARA
Antwerp (ARA) 170.67 Singapore 168.69	Residual fuel oil
Motor gasoline (Reformulated-regular)	New York Harbor 141.98 Gulf Coast 150.31
New York Harbor 177.35 Gulf Coast	Los Angeles
Los Angeles 190.10	Singapore 144.53

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

#### BAKER HUGHES RIG COUNT

	7-24-09	7-25-08
Alabama	4	3
Alaska	7	3 7
Arkansas	45	57
California	19	44
Land	19	44
Offshore	0	0
Colorado	44	110
Florida	1	2
Illinois	1	1
Indiana	2	2
Kansas	19	12
Kentucky	9	12
Louisiana	137	187
N. Land	85	75
S. Inland waters	7	24
S. Land	12	31
Offshore	33	57
Maryland	0	1
Michigan	Ö	2
Mississippi	13	10
Montana	0	12
Nebraska	Ö	0
New Mexico	43	84
New York	2	5
North Dakota	42	70
Ohio	8	13
Oklahoma	79	207
	46	25
Pennsylvania	1	23
Texas	345	926
	2	7
OffshoreInland waters	0	1
		15
Dist. 1	11	
Dist. 2	15	35
Dist. 3	29	63
Dist. 4	30	87
Dist. 5	79	185
Dist. 6	42	125
Dist. 7B	13	30
Dist. 7C	18	.71
Dist. 8	51	134
Dist. 8A	10	32
Dist. 9	18	46
Dist. 10	27	95
Utah	17	49
West Virginia	21	26
Wyoming	31	76
Others—HI-1; NV-1; VA-5;	7	12
Total USTotal Canada	943 180	1,957 435
Grand total	1,123	2.392
	1 <b>,123</b> 257	393
US Oil rigs US Gas rigs	675	1,555
Total IIS offehore	37	67
Total US offshore Total US cum. avg. YTD	1,111	1,832
Total GO calli. avg. 11D	1,111	1,032

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,	Rig count	7-24-09 Percent footage*	Rig count	7-25-08 Percent footage*
0-2,500	41	9.7	90	3.3
2,501-5,000	71	66.1	144	49.3
5,001-7,500	118	24.5	244	11.8
7,501-10,000	210	5.2	480	3.7
10,001-12,500	185	9.1	485	2.6
12,501-15,000	133	_	329	_
15,001-17,500	123	_	145	_
17,501-20,000	49	_	89	_
20,001-over	32	_	35	_
Total	962	11.2	2,041	6.5
INLAND I AND	14 911		33 1.952	
OFFSHORE	37		56	

\*Rigs employed under footage contracts. Definitions, see OGJ Sept. 18, 2006, p. 42.

Source: Smith International Inc. Data available in OGJ Online Research Center.

#### **OGJ** PRODUCTION REPORT

	<sup>1</sup> 7-24-09 ——— 1,000	<sup>2</sup> 7-25-08 b/d ——
(Crude oil and lease	e condensate)	
Alabama	20	21
Alaska	656	640
California	640	647
Colorado	61	66
Florida	7	6
Illinois	29	27
Kansas	100	103
Louisiana	1,409	1,349
Michigan	16	16
Mississippi	61	60
Montana	89	84
New Mexico	165	164
North Dakota	184	173
Oklahoma	175	181
Texas	1,310	1,317
Utah	58	61
Wyoming	150	144
All others	66	74
Total	5,196	5,133

<sup>1</sup>OGJ estimate. <sup>2</sup>Revised.

Source: Oil & Gas Journal.

Data available in OGJ Online Research Center.

#### **US** CRUDE PRICES

	7-24-09 \$/bbl*
Alaska-North Slope 27°	40.78
South Louisiana Śweet	68.25
California-Kern River 13°	59.45
Lost Hills 30°	67.90
Wyoming Sweet	57.55
East Texas Sweet	64.00
West Texas Sour 34°	58.50
West Texas Intermediate	64.50
Oklahoma Sweet	64.50
Texas Upper Gulf Coast	57.50
Michigan Sour	56.50
Kansas Common	63.50
North Dakota Sweet	54.00
*Current major refiner's posted prices except North Cl	ono logo

\*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

\$/bbl¹	7-17-09
United Kingdom-Brent 38°	60.25
Russia-Urals 32°	60.04
Saudi Light 34°	59.69
Dubai Fateh 32°	61.69
Algeria Saharan 44°	60.70
Nigeria-Bonny Light 37°	61.54
Indonesia-Minas 34°	63.06
Venezuela-Tia Juana Light 31°	59.67
Mexico-Isthmus 33°	59.56
OPEC basket	60.66
Total OPEC <sup>2</sup>	60.54
Total non-OPEC <sup>2</sup>	59.29
Total world <sup>2</sup>	59.99
US imports <sup>3</sup>	58.06

<sup>1</sup>Estimated contract prices. <sup>2</sup>Average price (FOB) weighted by estimated export volume. <sup>3</sup>Average price (FOB) weighted by estimated import volume.

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

#### **US** NATURAL GAS STORAGE<sup>1</sup>

	7-17-09	7-10-09 —— bcf –	7-17-08	Change,
Description of the	1.040		751	
Producing region Consuming region east	1,043 1,467	1,032 1,411	751 1.299	38.9 12.9
Consuming region west	442	443	334	32.3
Total US	2,952	2,886	2,384	23.8
	A 00	A 00	Change,	
	Apr. 09	Apr. 08	%	
Total US <sup>2</sup> ·······	1,903	1,436	32.5	

<sup>1</sup>Working gas. <sup>2</sup>At end of period. Source: Energy Information Administration Data available in OGJ Online Research Center.

Oil & Gas Journal / Aug. 3, 2009







#### Statistics

#### PACE REFINING MARGINS

	May 2009	June 2009	July 2009 — \$/bb	July 2008 I	– 2009 v Change	s. 2008 – Change, %
US Gulf Coast						
West Texas Sour	5.87	6.66	6.46	9.95	-3.49	-35.1
Composite US Gulf Refinery	5.30	6.14	5.40	14.24	-8.84	-62.1
Arabian Light	4.33	5.55	5.08	6.84	-1.76	-25.8
Bonny Light	3.66	3.38	3.10	0.53	2.57	489.5
US PADD II						
Chicago (WTI)	9.62	11.63	7.17	12.21	-5.05	-41.3
US East Coast						
NY Harbor (Arab Med)	3.97	3.22	3.74	7.25	-3.51	-48.4
East Coast Comp-RFG	5.73	5.54	4.76	3.41	1.36	39.8
US West Coast						
Los Angeles (ANS)	15.38	14.96	12.44	5.50	6.94	126.2
NW Europe	4.04	0.44		0.00	0.05	07.4
Rotterdam (Brent)	4.04	2.44	1.44	2.30	-0.85	-37.1
Mediterranean	0.40	4.40	0.00	F 0F	4.40	00.0
Italy (Urals)	2.48	1.19	0.60	5.05	-4.46	-88.2
Far East	2.42	0.40	1 70	2.20	0.50	22 E
Singapore (Dubai)	2.42	0.40	1.73	2.26	-0.53	-23.5

Source: Jacobs Consultancy Inc. Data available in OGJ Online Research Center.

#### **US** NATURAL GAS BALANCE **DEMAND/SUPPLY SCOREBOARD**

	Apr.	Apr. 10tai . Mar. Apr. 2009-2008 — YTD —				2009-2008	
	2009	2009	2008	change	2009	2008	change
				— bcf —			
DEMAND							
Consumption	1,736	2,155	1,814	-78	8,894	9,284	-390
Addition to storage	354	199	295	59 10	732	550	182
Exports Canada	69 43	107 79	79 47	-10 -4	400 287	398 249	2 38
Mexico	24	24	28	-4	101	136	-35
LNG	2	4	4	<u>-2</u>	12	13	-1
Total demand	2,159	2,461	2,188	-29	10,026	10,232	-206
SUPPLY							
Production (dry gas)	1,732	1,796	1,679	53	3,938	6,764	-2,826
Supplemental gas	. 6	6	. 5	1	23	16	. 7
Storage withdrawal	107	296	106	1	1,653	1,997	-344
Imports Canada	312 256	325 292	321 289	-9 -33	1,319 1,170	1,424 1,313	-105 -143
Mexico	230	1	203	_33 0	7,170	3	-143 4
LNG	56	32	32	24	142	108	34
Total supply	2,157	2,423	2,111	46	6,933	10,201	-3,268
<b>NATURAL GAS IN UNDERG</b>	ROUNE						
		Apr. 2009	Mai 2009	9 200	9	Apr. 2008	Change
	-			bo	f		

	——— bcf -		
4,246 1,656 <b>5,902</b>	4,242 1,761 <b>6,003</b>	4,223 1,436 <b>5,659</b>	29 467 <b>496</b>

Source: DOE Monthly Energy Review.

Data available in OGJ Online Research Center. NOTE: No data at press time.

#### Worldwide NGL PRODUCTION

	A	4 month average Apr. Mar. — production -			pro	inge vs. evious
	Apr. 2009	2009	— produ 2009 1,000 b/d –	2008	Volum	year —— e – %
Brazil. Canada	81 490 379 1,851 200	81 640 374 1,850 200	82 610 371 1,804 200	87 685 368 1,835 200	-5 -75 3 -32	-5.6 -11.0 0.8 -1.7
Other Western Hemisphere Western Hemisphere	211 <b>3,212</b>	210 <b>3,354</b>	208 <b>3,274</b>	200 <b>3,375</b>	8 <b>–101</b>	3.8 <b>–3.0</b>
Norway United Kingdom Other Western	288 143	300 149	290 145	294 179	-4 -34	-1.3 -18.9
Europe Western Europe	10 <b>441</b>	10 <b>460</b>	10 <b>445</b>	10 <b>483</b>	-38	−0.6 <b>−7.8</b>
Russia Other FSU Other Eastern	405 150	402 150	404 150	420 150	-17 —	-3.9 —
Europe Eastern Europe	15 <b>570</b>	15 <b>567</b>	15 <b>569</b>	16 <b>586</b>	−1 <b>−17</b>	−4.2 <b>−2.9</b>
Algeria	338 70 80 131 <b>619</b>	338 70 80 131 <b>619</b>	342 70 80 131 <b>623</b>	353 70 80 132 <b>635</b>	-11  -1 -12	-3.0  -1.0 - <b>1.9</b>
Saudi Arabia United Arab Emirates Other Middle East	1,377 250 835	1,345 250 835	1,335 250 835	1,440 250 875	-106 -40	-7.3 -4.6
Middle East	2,462	2,430	2,420	2,565	-145	-5.7
Australia China India Other Asia-Pacific Asia-Pacific TOTAL WORLD	69 650 — 169 <b>888</b> <b>8,192</b>	61 650 — 169 <b>880</b> <b>8,309</b>	63 650 — 169 <b>882</b> <b>8,212</b>	60 620 — 180 <b>861</b> <b>8,504</b>	2 30 11 <b>21</b> - <b>292</b>	3.8 4.8 — —6.3 <b>2.4</b> — <b>3.4</b>

Totals may not add due to rounding. Source: Oil & Gas Journal. Data available in OGJ Online Research Center.

#### **O**XYGENATES

	Apr. 2009	Mar. 2009	Change 1,000	YTD 2009 bbl	YTD 2008	Change
Fuel ethanol Production Stocks	19,220	19,837	-617	76,722	65,098	11,624
	14,845	15,652	-807	14,845	11,539	3,306
MTBE Production Stocks	1,485	1,526	-41	5,758	6,358	-600
	1,142	1,066	76	1,142	1,727	-585

Source: DOE Petroleum Supply Monthly.

Data available in OGJ Online Research Center. NOTE: No data at press time.

#### **US** HEATING DEGREE—DAYS

	June 2009	June 2008	Normal	2009 % change from normal		Total degree—day . 1 through June : 2008		% change from normal
	2003	2000	IVUIIIIAI	IIUIIIIai	2003	2000	INUITIIAI	livilliai
New England	28	121	63	-55.6	41	116	69	-40.6
Middle Atlantic	79	199	117	-32.5	112	197	140	-20.0
East North Central	146	168	147	-0.7	177	176	198	-10.6
West North Central	201	179	192	4.7	252	206	266	-5.3
South Atlantic	370	399	319	16.0	760	773	679	11.9
East South Central	371	365	296	25.3	588	541	488	20.5
West South Central	507	510	431	17.6	1,001	963	857	16.8
Mountain	188	257	229	-17.9	372	358	373	-0.3
Pacific	73	140	100	-27.0	144	197	157	-8.3
US average*	222	266	213	4.2	399	414	375	6.4

<sup>\*</sup>Excludes Alaska and Hawaii. Source: DOE Monthly Energy Review. Data available in OGJ Online Research Center.

Oil & Gas Journal / Aug. 3, 2009









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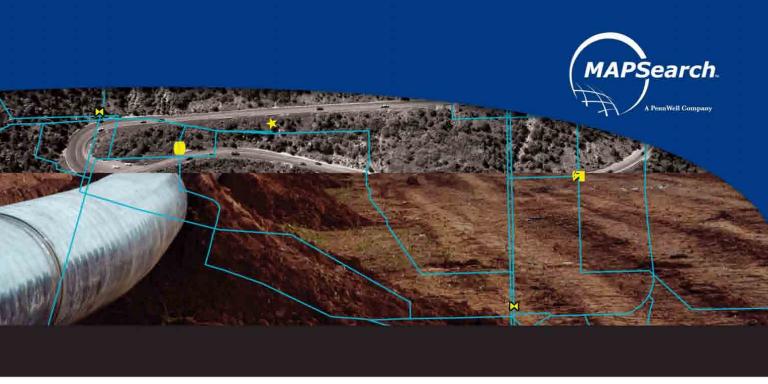
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Oil & Gas Journal / Aug. 3, 2009





From the Subscribers Only area of

### OIL&GAS JOURNAL. -onli

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#### **Needy California** takes a new look at big oil project

Fiscal distress is nudging California toward a measured embrace of-gasp!-oil and gas development.

Staggering under a budget deficit of \$26 billion, the government will try to maneuver around opposition to a plan to develop the Tranquillon Ridge prospect off Santa Barbara (OGJ Online, July 23, 2009).

With extraordinary concessions, Plains Exploration & Production Co. last year won

The Editor's Perspective

by BobTippee, Editor

the approval of hypersensitive Santa Barbara County and antioil environmentalists for production of perhaps 100 million bbl of oil from beneath state waters via Platform Irene on federal acreage.

The concessions included an agreement to cease all production off California and to remove onshore processing facilities when Tranquillon Ridge production ceased in about 15 years. In January, however, the State Lands Commission, including Lt. Gov. John Garamendi, rejected the lease. Garamendi said the state didn't want to imply acceptance of offshore drilling anywhere (OGJ, Feb. 23, 2009, p. 18).

Now, Gov. Arnold Schwarzenneger is reported to have made Tranquillon Ridge revenue part of a fiscal deal with the legislature. The package includes \$100 million in advance royalty and the expectation of \$1.8 billion in royalty over the project's life.

Generally opposed to drilling off California, Schwarzenneger has voiced support for Tranquillon Ridge development because of the reliance on directional drilling from an existing platform in federal waters.

And, of course, he needs the revenue. Desperately.

Although supporters of the project include such environmental groups as the quintessentially Californian Get Oil Out, the proposal is controversial.

Some Californians, including Garamendi, want to infect the rest of the US with their costly energy delusions.

"We are taking dirty money," he said of the suggestion that the state earn money from resource development.

And he added, "Big Oil has offered to California \$100 million to seduce the state into granting the first new oil drilling lease in California since the Santa Barbara oil spill 41 years ago."

This may be the first time an independent producer has been characterized as Big Oil. But it's hardly the first time a California politician spouting off about energy has betrayed an impressively limited grasp of relevant facts.

(Online July 24, 2009; author's e-mail: bobt@ogjonline.com)

Market Journal

by Sam Fletcher, Senior Writer

#### A \$60-70/bbl price band

Strong rallies in both equity and commodity markets in late July pushed frontmonth crude contracts above \$68/bbl in New York and \$70/bbl in London just 2 weeks after the price dipped below \$60/bbl in a more pessimistic market.

That rapid rebound prompted analysts at KBC Market Services, a division of KBC Process Technology Ltd. in Surrey, UK, to ask, "Is this becoming a new price band, this time set by the market and not by the Organization of Petroleum Exporting Countries?"

The rally started with better than expected earnings at a number of companies and improved economic data. The Federal Reserve raised its 2010 growth forecast and trimmed the amount of the 2009 contraction. But the bull market run was not supported by any major improvement in supply and demand. "The only rationale that explains the run-up is that expectations of a better tomorrow are growing. This perception also prevents the whole complex toppling over under the weight of stocks," said KBC analysts. "In the real world, oil stocks are almost brimming over the top of the tanks and, with the exception of China and a few other places, demand remains firmly in the doldrums."

China's second-quarter gross domestic product was up 16.4% from the previous quarter and 7.9% from a year ago. "The oil data seem to confirm the improvement in the Chinese economy," said Paul Horsnell, a managing director and head of commodities research at Barclays Capital in London. China's oil demand in the second quarter was up 5.2% from a year ago, having fallen 3.1% in the first quarter. Had Chinese demand continued its first-quarter weakness into the second quarter, global oil demand would have been 600,000 b/d lower, Horsnel said.

Meanwhile, KBC analysts said, "There are still plenty of skeptics out there who believe that even if the bottom of the recession is near, the recovery will be slow and could even be reversed when the stimulus packages lavished on economies around the world wear off." They warned, "If the current more-positive outlook for the global economy turns sour—and there are many respected commentators still talking about the W-shaped recession—the much anticipated oil demand will be pushed further out into the future and the sheer weight of stocks could lead to a major correction in product prices that will drag crude down too."

#### Good signs for marine rigs

The deepwater market is showing evidence of firming, and a sharp increase in tender activity for jack up rigs suggests that market may be nearing bottom, too, said analysts at FBR Capital Markets & Co. in Arlington, Va.

For jack up rigs, they said, "We have already seen several tenders for significant term work in major markets such as the Middle East, and inquiries to rig owners are picking up. We believe that as many of these come to fruition, global fleet utilization should stabilize" toward the end of this year. However, FBR analysts said, "Demand is far short of a rebound in day rates, and we continue to believe current levels will persist for some time."

On the other hand, FBR increased its rate forecasts for ultradeepwater rigs by \$75,000/day after Brazil's Petroleo Brasileiro SA (Petrobras) contracted Transocean Ltd.'s Cajun Express semisubmersible unit for roughly \$500,000/day. The rig is a Sedco Forex Xpress 2000 design semisubmersible unit capable of operating in moderate environments and water depths of 8,500 ft.

Petrobras signed a \$558.5 million, 3-year contract for the rig to drill in ultradeep waters off Brazil. Within a year of executing that contract, Petrobras has the right to convert it to a 5-year contract valued at \$894.3 million. The contract term is expected to commence in the first quarter of 2010 following the completion of the rig's current contract. That deal highlights the strength and resiliency of the high-end deepwater market, analysts said. As a result, FBR raised its ultradeepwater rate forecasts to \$475,000/day for most high-end rigs.

'Although few data points exist, the contract, combined with an uptick in activity from independent and major operators, leads us to believe \$60/bbl and above oil will provide meaningful support to the fifth- and sixth-generation market. We expect a sharp differentiation, however, between newer and high-end rigs vs. older upgraded rigs," FBR analysts said.

Day rates are forecast on a rig-by-rig basis, with relatively newer fourth-generation rigs up by \$25,000-50,000 to \$400,000-450,000/day. "Lower-end floaters, such as those built in the 1970s and 1980s, should continue to see significant pressure," analysts said.

(Online July 27, 2009; author's e-mail: samf@ogjonline.com)







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