

Petroleum *review*

APRIL 2003



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Oil sands

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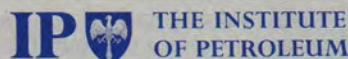
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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

| | |
|-----------------------------------|-----------------------------------|
| mn = million (10 ⁶) | kW = kilowatts (10 ³) |
| bn = billion (10 ⁹) | MW = megawatts (10 ⁶) |
| tn = trillion (10 ¹²) | GW = gigawatts (10 ⁹) |
| cf = cubic feet | kWh = kilowatt hour |
| cm = cubic metres | km = kilometre |
| boe = barrels of oil equivalent | sq km = square kilometres |
| t/y = tonnes/year | b/d = barrels/day |
| | t/d = tonnes/day |

No single letter abbreviations are used.

Abbreviations go together eg. 100mn cfy = 100 million cubic feet per year.

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Front cover: Enormous wood bison sculptures mark the entrance to the Syncrude site

Photo: www.syncrude.com

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Post-war pipe dreams

Virtually the moment that the conflict in Iraq started spot oil prices fell by \$4-\$5/b. Many predict that they could fall much further. The view is based on three strands – first, that the war will be short and swift (something we all earnestly pray for); second, is the near 2mn b/d seasonal fall in demand going into 2Q2003; and the third is the likely return of spare production capacity with Venezuelan production having re-attained a claimed 3mn b/d. This represents a swing in the supply/demand balance of over 3.5mn b/d. Suddenly the low level of stocks around the world becomes a relatively minor problem.

However, the situation is not without risks. A great deal of nonsense has been talked about oil as the cause and motivation of the conflict in Iraq. However, as high level officials in the US Administration have noted, as soon as the conflict is over, oil, or rather investment in Iraqi oil fields, becomes a key concern.

Suppressed tensions

Winning the war may prove rather easier than winning the peace. History casts a long shadow over Iraq and the late addition of the northern Ottoman Province of Mosul to the British mandate for Baghdad and Basra Provinces in the 1920s, precisely because oil was expected to be found there, is the cause of many of today's tensions. The incorporation of Mosul effectively killed off the prospects of the independent Kurdistan agreed under the Treaty of Versailles in 1920. It also led to a lingering resentment by Turkey at the loss of this most economically important of Ottoman Provinces (once oil had been found at Kirkuk in 1927).

These suppressed tensions now risk becoming conflicts and it seems helpful that American forces appear determined to capture Kirkuk quickly. The irony is that heavy investment will be required to develop new fields in the north (see p14) as the main Kirkuk reservoir is heavily depleted.

The main oil field region in the south of the country is subject to a different sort of tension. It is in this region that Russia and France, among others, have 'contracts' (see *Petroleum Review*, December 2000) for reserves totalling around 40bn barrels – 59% of known reserves in undeveloped fields if reserves estimates supplied by Yuri Shafranik (p18) are right.

One can understand the irritation and anger towards France and Russia about their signing of contracts with Saddam Hussein. However, by doing no work they complied with UN sanctions. In order to facilitate investment, international law has established the rights of holders of contracts made with legally recognised governments. This is why Libya still recognises US companies' claims to their fields despite the US Government's Iran-Libya Sanctions Act (ILSA). It may be embarrassing and irritating, but if these fields are to be developed, the current contract holders will have to be recompensed. Their reluctance to sanction bombing of their assets may not be very attractive but is quite logical. It is also worth noting that three countries being so readily vilified by the US and UK all have massive Muslim minorities – Germany, predominantly Turkish, France, predominantly Algerian, while Russia has a continuing conflict with Muslim Chechnya.

The ending of the Iraqi conflict will require a great deal of fence-mending and political reconciliation both inside and outside Iraq.

Resource potential

Turning to the resource potential in later years, not only is it reasonable to anticipate large-scale investment in Iraq but also in neighbouring oil and gas producing states. The hope is that this will induce supply competition, which will augment national incomes and oil supplies, but at lower oil prices.

For the last decade the US has been promoting an East-West energy corridor to take oil and gas supplies from the Caspian region to Ceyhan on the Mediterranean coast. Russia is keen to offer transit via Russia for Caspian oil and gas. However, pipelines work both ways. The newly expanded Samara-Atyrau pipeline (see p18) could, once the East-West links are built, take Siberian crude to Ceyhan. Similarly, Middle East pipelines flowing south to load through the Gulf could flow north to load through the Mediterranean. Competition to supply could in these circumstances replace Opec enthusiasm to restrict supply.

Chris Skrebowski

The opinions expressed here are entirely those of the Editor and do not necessarily reflect the view of the IP.



TNK International of Russia has launched a new website at www.tnk.com that is designed to inform a wide audience of financial analysts, press, foreign partners and potential investors about the company's activities, covering operating and financial results as well as plans for growth and development. TNK International is a holding company jointly owned by the Alfa Group and Access Industries/Renova. It unites stakes in Tyumen Oil Company, Onaco, Rusia Petroleum and the gas producer Rospan International.

Quest Offshore is to soon publish what it claims is the industry's first map focusing on possible and probable floating production systems for the US Gulf of Mexico. In addition to indicating the locations of anticipated systems, the map will also show the relevant infrastructure for the region. Visit www.questoffshore.com/Home/ForecastMapping/ for more information.

Saab Rosemount has unveiled a new virtual front man, Albert, at its website at www.tankintelligence.com who has been designed to demonstrate and explain the Tank gauging specialist's Tank Intelligence™ concept.

ABS Nautical System has launched a new area on its website at www.abs-ns.com/support-frame.html where clients can directly enter and submit suggestions and enhancements to the site. The link is for clients only and is password protected.

Thales GeoSolutions (Pacific) has launched an online information system aimed at providing submarine cable owners with added protection for their cable systems. The site – www.CableAwareness.com – provides basic cable positional data and cable awareness charts to the fishing community and other marine users over the Internet on behalf of the cable owners.

The Offshore Europe Partnership, a joint venture between Spearhead Exhibitions and the Society of Petroleum Engineers, together with recruitment company Worldwideworker, are to soon launch a new international recruitment initiative. The initiative will provide an online forum – at www.oilcareerfair.com – in conjunction with an onsite career fair at Offshore Europe that is to be held in Aberdeen between 2-5 September 2003. The website will feature areas for both job candidates and participating companies who are seeking qualified oil and gas professionals.

Visit www.cswip.com to download current requirement documents for the Certification Scheme for Welding and Inspection Personnel. Useful training and examination links can be found at www.twi.co.uk under the Training and Qualification section.

UK

UK Energy Minister Brian Wilson has inaugurated BP's enhanced oil recovery (EOR) project for the Magnus field in the North Sea, claimed to be the largest project in the world to pump gas into an oil field to increase production. The £310mn project will recover over 60mn extra barrels of oil.*

Murphy Oil's UK subsidiary Murphy Petroleum has agreed to sell its interests in certain UK North Sea properties for consideration of \$36mn. The North Sea assets include a 13.82% interest in the Ninian field.*

Technip Offshore UK has been awarded a fast-track EPIC contract from BG International for the subsea installation elements of the BG-operated Blake Flank development project in the Outer Moray Firth. The contract, worth £10mn, includes the tie-back of two subsea production wells and one water injection well to the existing Blake production manifold.

A raft of North Sea oil and gas opportunities are to be opened up by their owners to potential new developers. In all, 77 blocks and discoveries are to be made available under the Fallow Initiative, a joint government-industry project to ensure that North Sea assets are fully exploited.

The Venture Production-operated Sycamore field in block 16/12a in the UK sector of the North Sea has just started production, a month earlier than scheduled.

DNO has reconstituted and renamed the West Heather and North Terrace

Complete news update

The 'In Brief' news items in *Petroleum Review* represent just a fraction of the news we regularly publish on the IP website @ www.petroleum.co.uk via the 'News in Brief Service', together with our daily News 'ticker' on the main home page.

Furthermore, those news stories marked with an asterisk (*) in the magazine are covered in more detail on the News in Brief Service.

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NEWS *Upstream*

UK oil and gas needs to sharpen competitive edge

The UK offshore oil and gas industry needs to sharpen its competitive position vis-à-vis the rest of the world's producing regions and focus on improving capital and operating efficiency to deliver the future potential of the North Sea. That was the message from Bruce Dingwall, UKOOA President, at a recent meeting with journalists in London.

Launching the Association's 2002 Economic Report entitled *Competing in a Global Economy*, Dingwall highlighted current efforts to improve North Sea competitiveness and maximise the recovery of indigenous reserves that will help supply UK energy needs for the next 40 years.

The report confirms the impact of the UK offshore oil and gas industry on the UK economy. Key facts for 2002 are:

- About half of the UK oil and gas reserves, 24–32bn boe, are yet to be produced.
- Oil and gas production declined slightly to 4.2mn boe/d, with a value of £21bn, or some 2.4% of gross added value.
- 260 offshore oil and gas fields were under development or in production.
- Approximately £3.5bn was invested in capital expenditure and 18 new projects received funding approval for £1.3bn.
- The industry supported over 265,000

jobs across the UK.

- Wood Mackenzie ranked the attractiveness of UKCS exploration 31st out of 57 areas in the world.
- \$5.1bn in assets changed ownership.
- Treasury receipts from the industry amounted to some £4.9bn, the total tax contributions from the industry amounting to £190bn since North Sea activity began in the mid-1960s.

The report draws attention to the challenge ahead as the UKCS enters the mature stage of its development with current tax rates of 40% to 70%. Unit operating costs are forecast to rise by 20% by 2010, while production is on a downward trend, now 10% below the 1999 peak.

As part of the drive towards improving competitiveness, the industry is working with government through Pilot to address supply chain and commercial efficiency, as well as fallow acreage and discoveries. Work is also being carried out through the UK Norway North Sea Cooperation Work Group to look at closer cross-border cooperation on a range of issues, including transportation and infrastructure, operational synergies and mutual open market access.

The report is available online at www.oilandgas.org.uk under the Industry Issues section.

Tullow deals

Tullow, the independent oil and gas exploration company, is raising £14.3mn through a share placing and has agreed terms on a credit line of up to \$250mn (£160mn) to fund acquisitions.

The move came as the company announced a North Sea asset swap under which it will swap a 25% stake in its southern gas basin block 53/4a (excluding the producing Welland field) for Shell's entire 24.805% interest in Inner Moray Firth block 20/7a located 18 km east of the Buzzard field.

Tullow will retain a 50% holding and operatorship in block 53/4a that contains the undeveloped Wissey gas discovery.

The company also reports that an exploration well, 20/7a-4, which spudded on 9 March, will test the Squirrel prospect that has a reserve potential of up to 100mn barrels.

Middle East gas

Iran is advocating the creation of a regional gas market stretching from the southern Gulf to Iran, which has the world's second largest reserves at an estimated 23tn cm, most of it in undeveloped fields, reports *Stella Zenkovich*. South Pars, an extension of Qatar's North field, is the biggest, other notable fields being the 1.33tn cm North Pars, the 181bn cm Khuff (Dalan) reservoir of the Salman oil field, the onshore Nan-Kangan fields, the 368bn cm Aghar and Dalan fields in Fars Province, and the Sarkhun and Mand fields.

Recent discoveries include the 22.6bn cm Zirch field in Bushehr Province, the 113bn cm Homa field in Fars Province and the 396bn cm Tabnak field in the south. Iran is trying to develop these gas fields with foreign help. So far, eight of the 30 phases of South Pars have been awarded to foreign contractors.

Catalina gas key to Colombian supply

ChevronTexaco subsidiary Texas Petroleum Company and state-owned Ecopetrol have signed an agreement for incremental gas production from the Guajira region in the northeastern coastal region of Colombia. The Catalina project will provide the basis for the country's natural gas supply and distribution through 2016.

The two company's currently supply more than 80% of Colombia's gas demand from Chuchupa, the country's sole offshore field, and Ballena, an onshore field located in Guajira State. Together, the fields produce 500mn cf/d of gas. The new agreement will enable the companies to develop and produce an additional 1tn cf of gas reserves that are still in the area.

The gas produced from Catalina will be distributed mainly in the northern and central regions of Colombia. However, gas may also eventually be exported to Venezuela if a gas pipeline project under study by both countries demonstrates the feasibility of connecting the gas producing fields of Guajira with the Maracaibo region of Venezuela.

Russian PSA update

The Russian Prime Minister Mikhail Kasyanov held a government meeting on 18 February to discuss the issue of production sharing agreements (PSAs), reports UFG. The meeting, however, did not bring good news for possible participants in PSA projects, states the analyst, who reports that 'ahead of the second Duma reading on PSA taxation, the government has said that PSA status will only be applied under "exceptional circumstances".'

UFG believes that this will substantially limit the future use of PSAs. It is understood that the above wording means that any new licence should first be tendered or auctioned under the national regime. In the event that no one is interested in the licence, it will be placed under the PSA regime.

Tengiz agreement

The Kazakh authorities are reported to have reached an agreement with the ChevronTexaco-led consortium developing the Tengiz oil field, following disputes over the consortium's plan to finance a \$3.5bn expansion of the field using the project's oil revenues. The Kazakh Government argued that such a proposal would eat into its tax receipts and the expansion project was shelved.

Under the new agreement it is understood that the consortium will pay \$810mn to the Kazakh Government, \$600mn of which is tax payments to be paid in instalments through 2005. The consortium is also to take out a loan to finance the Kazakh Government's share of the cost of the expansion.

Stage One of Shakh Deniz sanctioned

The partners in the Shakh Deniz gas and condensate field in the Azeri sector of the Caspian Sea are reported to have sanctioned the \$3.2bn first stage of the project's development. Some \$2.3bn will be spent on upstream expenditure, the remaining \$900mn on midstream, including a new gas export pipeline to Turkey via Azerbaijan and Georgia, running parallel to the Baku-Tbilisi-Ceyhan oil pipeline that is currently under construction.

Stage one is targeting production of 8.4bn cm/y of gas and 40,000 b/d of condensate from 2006. Total recoverable reserves are put at 625bn cm of gas and 750mn barrels of condensate. Gas sales contracts have already been signed for the supply of 6.3bn cm/y to Botas of Turkey, up to 800mn cm/y to GIOC of Georgia, and up to 1.5bn cm/y to Azerbaijan.

Partners are BP (25.5%), Statoil (25.5%), Socar (10%), LukAgip (10%), NICO of Iran (10%), TotalFinaElf (10%) and Turkey's TPAO (9%).

- Statoil has been named commercial operator covering gas sales, contract administration and business development for Shakh Deniz. This appointment also covers the South Caucasus Pipeline system for gas transport to markets in Azerbaijan, Georgia and Turkey.

View the latest job vacancies under the 'Careers' section of the IP website

@ www.petroleum.co.uk

In Brief

fields in block 215 of the UK sector of the North Sea, about 8 km from the Heather platform. They will be considered one field and named Broom.

Europe

*The Irish authorities have approved the plan of development for the Seven Heads gas field in the Celtic Sea offshore Ireland. The project partners plan to recompleat well 48/24-5A and to drill five additional production wells that will be linked to a subsea manifold that is connected by subsea pipeline to the nearby Marathon-operated Kinsale Head facilities. First gas is due before the end of 2003.**

Norsk Hydro has confirmed that it intends to award Aker Kvaerner the Nkr950mn contract for front-end engineering, detail engineering, procurement and project management support for the Ormen Lange onshore gas processing plant in Norway.

Norway's Ministry of Petroleum and Energy is seeking nominations for acreage to be included in its 18th round of licensing that will be held in 2004.

*OMV reports that it has made the largest oil and gas discovery in its home country in 25 years. Exploratory drilling in the Weinviertel region of Lower Austria encountered about 4.5mn boe.**

The producing life of Statoil's Glitne development in the North Sea will be extended by up to 18 months after the licensees decided to drill a new production well. This means that output could continue through 1H2005.

Petroleum Geo-Services reports that output at its Varg oil field in the North Sea will double to 25,000 b/d after the successful drilling of a second well.

UWG Group has been awarded a contract by Danish operator Dong for the design, fabrication, project management and installation of two, 10-slot subsea templates in the Nini and Cecile fields in the North Sea.

ATP Oil & Gas of the US is understood to have acquired a 50% stake in the North Sea L-06d block from Dutch company NAM. The block is understood to hold unspecified volumes of gas, following a discovery in 1990. First production is slated in 2004.

North America

Kellogg Brown & Root, a division of Halliburton, has won a Pentagon contract to assess and rehabilitate possible damage to Iraq's oil infrastructure.*

Marathon Oil replaced 262% of its worldwide crude oil and natural gas production during 2002, excluding net sales of reserves in place. These reserves were added at a competitive cost of \$4.61/boe through acquisitions, discoveries, extensions, revisions and improved recovery. Total reserves increased 237mn boe, or 23%, at year-end 2002, to approximately 1,283mn boe.

EnCana has closed the sale of its 10% stake in a Canadian oil project for about C\$1.07bn.

Anadarko Petroleum has drilled a natural gas discovery in the Saddle Hills area of Alberta, expanding the proven and probable reserves from 90bn cf previously to 130bn cf of gas from this multi-zone play.

J Ray McDermott has received a commitment from BP to begin fabrication of the Atlantis topsides. Fabrication is expected to complete in May 2005.

ChevronTexaco has reported proved reserves of 7.8bn boe at the end of 2002, excluding 0.3bn barrels of Canadian Syncrude.

Middle East

Kuwaiti Petroleum Chief Executive Officer Nader Al Sultan has said that the Sheikdom has reached its maximum oil output of 2.4mn b/d.

The discovery that some Saudi Aramco employees are said to be sympathetic to al Qaida and have been discussing sabotage plans has led to security being greatly increased around Saudi Aramco's oil fields and processing centers and the company is on a 'very high state of alert'.

CSIS, the Institut Francais du Petrole (IFP) and Simmons & Company International have launched an 18-month study of the production capacities of the world's largest oil fields in Saudi Arabia, Iran, Iraq, Kuwait and the UAE. The project will produce a detailed analysis of the Persian Gulf states' oil reserves and their ability to meet sharply rising global energy demand.*

NEWS Upstream

UKCS output slightly down in 2002

Full-year figures from The Royal Bank of Scotland *Oil and Gas Index* show that both oil and gas production fell by 2% in 2002. UK oil production was 19% below its 1999 high, but gas output has peaked in the past three years.

UK oil production in December 2002 was up 3% on the month at 2,230,434 b/d, but down 8% on the year. Gas output was up 4% on the month at 11,561mn cf/d, but down 8.4% on the year.

Senior Economist Tony Wood said: 'With Brent crude having averaged \$26/b since October 1999 and the commitment in the recent UK Energy White Paper to long-term fiscal stability, the UK remains an attractive investment location. Macro-political uncertainty has constrained industry investment globally for the past 12 months. However, the UK is well placed to benefit from higher industry spending this year.'

| Year Month | Oil production (av. b/d) | Gas production (av. mn cf/d) | Av. oil price (\$/b) |
|------------|--------------------------|------------------------------|----------------------|
| Dec 2001 | 2,425,159 | 12,621 | 18.60 |
| Jan 2002 | 2,270,322 | 12,303 | 19.30 |
| Feb | 2,247,395 | 11,732 | 20.20 |
| Mar | 2,153,321 | 11,640 | 23.80 |
| Apr | 2,230,781 | 11,175 | 25.70 |
| May | 2,106,088 | 10,227 | 25.50 |
| Jun | 2,142,356 | 9,128 | 24.10 |
| Jul | 1,938,677 | 7,569 | 25.70 |
| Aug | 1,831,386 | 8,744 | 28.40 |
| Sep | 2,001,329 | 8,699 | 28.40 |
| Oct | 2,133,641 | 10,033 | 27.60 |
| Nov | 2,165,277 | 11,132 | 24.20 |
| Dec | 2,230,434 | 11,561 | 28.30 |

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Anadarko details production start-ups

Anadarko Petroleum has authorised the construction of an \$86mn production platform for its Tarantula discovery in South Timbalier block 308 in the shallow waters of the Gulf of Mexico. The fixed, four-leg platform will have a capacity of 100mn cf/d of gas and 30,000 b/d of oil. First production is expected in 4Q2004. The company also reports that its Pardner discovery in Mississippi Canyon blocks 400 and 401 is due onstream in June 2003 at a rate of 3,000 b/d. The field is to be developed via a subsea tie-back to a facility located on West Delta block 152.

In addition, the company reports that six delineation wells have been drilled to date on its Marco Polo field in deepwater Green Canyon block 608. A tension leg platform (TLP) is currently under construction and is scheduled for installation in late 2003. First production is slated for 1Q2004. The TLP is designed to process 120,000 b/d of oil and 300mn cf/d of gas. The K2 discovery, located on nearby Green Canyon block 562, is being considered as a potential subsea tie-back to Marco Polo, which could mean first production in early 2005.

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Nigerian focus for Bonga topsides

Shell Nigeria Exploration and Production Company (SNEPCO) has announced that, as part of its commitment to increase local content in its operations, three modules for the topsides of the Bonga FPSO have been successfully fabricated in Warri, Delta State, and shipped out to the FPSO topsides integration yard. According to SNEPCO Chairman, Ron van de Berg: 'This is the first ever fabrication and shipment of modules for an FPSO from anywhere in Africa.'

The constructed modules include a 400-tonne flare boom, an 84-tonne sales gas metering module and a 182-tonne lay down module that all form part of the FPSO topside contract currently being executed by Amec, whose contract includes facilities for processing oil, water and gas, and water injection for reservoir pressure maintenance.

Construction of the modules was

undertaken by Daewoo Nigeria. Some 10% of the materials were sourced locally, while the ocean-going tug for the transport barge was supplied by local company Merchantbuck, who also supplied the river tugs and river dredging to enable access to the Daewoo yard.

Various other subcontracts for the fabrication of components for the Bonga FPSO are ongoing in several other locations in Nigeria.

Bonga will increase Nigeria's crude oil reserves by some 600mn barrels.

● Five members of the Institute of Petroleum's Student Chapter at Newcastle University – K Sadeghi, S Kazemi, S Mazaheiri, Y Han and W Lee – recently visited Amec's Tyneside yard to view fabrication work on two modules and the topsides for the Bonga project.

Newbuild vessel one of only six in world



The *Grampian Explorer*, a multi-role ROV and platform supply vessel, was christened at Aberdeen Harbour on 7 March 2003. Intended for both the home and international marketplace, the 72 metre x 16 metre UT755-L design vessel – one of only six in the world – represents a £11mn investment by the Craig Group.

Green light for Greater Angostura

BHP Billiton (operator, 45%) and partners TotalFinaElf (30%) and Talisman Energy (25%) have approved the phase one development of the Greater Angostura oil and gas project in block 2c offshore Trinidad and Tobago.

Phase one covers the engineering, construction and installation of production and transportation facilities. Three wellhead platforms are to be tied into

a central production platform, with an expected initial output of 80,000 b/d.

Oil will be transported to an onshore terminal in Guayaguayare Bay for export. The associated gas will initially be reinjected into the reservoir, and later marketed during the development phase of the field's gas zone.

First production is scheduled for early 2005.

In Brief

France's anti-war stance has been driven by an attempt to retain TotalFinaElf's €75bn contracts to develop the Majnoon and Bin Umar oil fields in southern Iraq according to claims by the Pentagon, writes Stella Zenkovich.

Saudi Aramco reports that its large-scale Qatif-Abu Sa'fah development project in the Eastern Province is on track for an October 2004 completion. The new onshore and offshore facilities along the Gulf coast will have the capacity to produce 800,000 b/d of oil and 350mn cfd of associated gas. The new capacity will offset normal reductions in certain mature oil fields and is not aimed at increasing the company's overall production capacity that currently stands at 10mn b/d.

A report from the Centre for Global Energy Studies based in London says oil production from a post-war Iraq could challenge Saudi Arabia within a decade. Iraqi production could reach 3.5mn b/d within two years with a \$5bn investment in neglected oil fields, rising to 8mn b/d over nine years.

BP, Eni, Petronas, TotalFinaElf and Statoil are reported to be among the bidders for the development phase 11 of Iran's South Pars gas project.

Heritage Oil Corporation's Tibat-1 well in Omani block 8 has tested 10–12mn cfd of gas, with associated condensate production rates of 75 b/d.

TotalFinaElf's Balal field offshore Iran has produced first oil at an initial rate of 20,000 b/d. Three additional producers wells are currently being drilled and are due onstream by the end of 1H2003. Partners are TotalFinaElf (46.75%, operator), Eni (38.25%) and Bow Valley (15%).

Russia & Central Asia

Ukraine's largest natural gas producer UkrGazVydobuvannya (UGV) plans to start up five new natural gas fields this year.

Gas well development specialists from Sinopec have arrived in Turkmenistan to commence a three-year project to refurbish old gas wells.*

China Petrochemical Corporation (Sinopec Group) plans to pay \$615mn for a 8.33% stake in the group that is

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In Brief

operating the Kashagan project in Kazakhstan, following in the footsteps of its smaller mainland rival, CNOOC, which earlier bought an 8.33% shareholding from BG International. The sale of the two 8.33% holdings will mean BG no longer has a share in the project or concession.

Kazakhstan is planning to increase oil output by 24% to 52.7mn t/d (1.05mn bld) in 2003, to 56.0mn tonnes in 2004 and to 61.2mn tonnes in 2005.*

The Japanese Azerbaijan Oil Company (JAOC) is reported to have made a gas discovery at its Atashgah field offshore Azerbaijan in the Caspian Sea. Reserves have yet to be estimated.

Lukoil and Itera are reported to be planning the joint development of the Kandym group of oil and gas fields in Uzbekistan. Reserves are put at 6.35tn cf of gas. It is thought the companies may also target development of the Ustyurt field, thought to hold 60tn cf of gas and 12tn boe.

ChevronTexaco is understood to have refused to drill a second exploration well on the Absheron prospect in the Azeri sector of the Caspian Sea, which is required under its licensing agreement. The first well was drilled in 2001 and came up dry. It cost some \$78mn to drill and is thought to be the most expensive well drilled to date in the Caspian.*

KazMunaiGas, the Kazakh state oil company, has estimated that the giant Kurmangazy field situated on the marine boundary between Russia and Kazakhstan may hold as much oil as the nearby Kashagan field, somewhere between 7bn and 9bn barrels of proven oil reserves and as much as 38bn barrels of probable reserves.

The Turkmenistan Ministry for Oil, Gas and Mineral Resources said plans are to increase oil production in the country by 400% in 2003. The Ministry said that output will rise from 3.6mn barrels to 18.4mn barrels.

Asia-Pacific

South Korean refining company LG-Caltex Oil Corporation is understood to have acquired a 15% stake in ChevronTexaco's offshore block A located in the Cambodian sector of the Gulf of Thailand. It is the company's first move into the upstream arena.

ChevronTexaco's stake in the block has reduced to 55%. Japan's Mitsui & Company holds the remaining 30%. Block reserves are put at 400mn barrels of oil and up to 3tn cf of gas. A second well is to be drilled soon; the first was abandoned in February 2003 as it was not commercially viable.

Unocal Thailand and its co-venturers expect to invest \$300mn on crude oil and natural gas projects in 2003 to support Thailand's drive to reduce imported energy.

TotalFinaElf (60%) has signed a production sharing agreement with the Brunei National Petroleum Company for block J in the deep offshore waters of Brunei Darussalam. Partners are BHP Billiton (25%) and Amerada Hess (15%).

BG Group, India's state firm Oil and Natural Gas Corporation (ONGC) and Reliance Industries have agreed to jointly operate the Panna-Mukta and Tapti oil and gas fields.

First production has begun from ExxonMobil's Bintang gas field in the South China Sea. The field is expected to produce about 1tn cf of gas with a peak production rate of 355mn cfd.

Reliance Industries is understood to have discovered gas in the Krishna-Godavari Basin offshore India's east coast, boosting the company's total estimated gas reserves to over 9tn cf.*

CNOOC (China National Offshore Oil Corporation) is understood to have discovered oil with its BZ 34-15 exploration well in Bohai Bay. The find, which tested at 740 b/d, is located just 3 km from the company's producing BZ 34-2 field.

BHP Billiton (50%) and Woodside Energy (50%) have announced an oil discovery with the Sybarrow-1 exploration well in WA-255-P in the Exmouth Sub Basin offshore Western Australia.*

Latin America

Schlumberger Oilfield Services, in partnership with ICA Fluor Daniel, has been contracted to recover gas and both light and heavier oil from the Chicontepec field. The four-year, \$500mn project is the largest integrated oilfield services contract ever awarded in Mexico.

Pemex has confirmed the existence of 2,700 new oil-bearing structures that have the potential of tripling the company's reserves.

Opec's crude oil output in February was at its highest level since August 2001 at 27.3mn bld thanks to a surge in output from Venezuela.

BP is to transfer to Perenco its 60% stake in the Boqueron field in eastern Venezuela, together with its 100% interest in the Desarrolla Zulía Occidental (DZO) field in the west, for \$160mn. BP's share of production from the two fields averaged 26,100 bld of oil in 2002.

Pemex has revealed the details on eight blocks in the Burgos Basin of northeastern Mexico that are to be offered to private companies for exploration and development on the basis of its controversial new multiple service contracts.

Petrobras has released its revised request for bids to carry out the construction of two major drilling and production platforms, the P-51 and P-52, valued at approximately \$500mn each, which are to be installed on the Roncador and Marlim Sul fields offshore Brazil.*

Africa

Energy Africa has signed a farmout agreement with ChevronTexaco to acquire a 20% interest in block L in Equatorial Guinea's Rio Muni Basin.

Nigeria's associated and non-associated gas reserves have been estimated at more than 120tn cf. The country's gas reserves/production ratio is put at 109 years.

Tullow Oil has signed a production sharing contract with the Gabonese Government for the Kiarsseny Marin area in the highly prospective Northern Gabon offshore basin. Tullow will operate the concession with a 100% interest.*

Egypt is progressing briskly to develop its 120tn cf probable and 58tn cf proven gas reserves, with the first upstream licensing round run by state Egyptian Gas Holding Company (Egas), solely for gas blocks, slated to take place shortly, writes Stella Zenkovich.

Lundin Petroleum, the Swedish independent oil company, is prepared to dilute its 40% stake in the \$200mn first phase of development of exploration block 5a in southern Sudan.

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TNK and Sibneft divest Slavneft assets

Two of Russia's largest oil groups, TNK and Sibneft, have agreed to unwind their joint investments by divesting their 98.5% mutual shareholding and splitting the assets of Slavneft, the former state-controlled oil company that they jointly bought late last year.

Under the agreement the companies will evenly divide Slavneft's exploration and production assets, as well as its network of fuel retailing outlets. The

refining assets will be managed by optimising capacity utilisation at the various refineries, with the possibility of swapping throughput capacities between TNK and Sibneft refineries.

In addition, TNK has agreed to purchase Sibneft's 1% interest in Onaco and 38% stake in Orenburgneft. This will take place in lieu of the previously announced exchange of those shares for an 8.6% stake in TNK International.

Aid in the pipeline

Finance Corporation (IFC) of the World Bank is leading an aid deal to encourage local companies to maintain and manage pipelines sending natural gas and oil from central Asia to the European Union, writes *Keith Nuthall*. The IFC (which is initially injecting \$250,000), BP, Norway's Statoil, the German aid agency GTZ and the Baku Enterprise Centre, Azerbaijan, will launch a programme to help local businesses benefit from petro-projects, notably the Baku-Tbilisi-Ceyhan pipeline to Turkey.

Meanwhile, the IFC is also investing \$155,000 in a similar scheme to allow African companies to benefit from the Chad-Cameroon pipeline project. Here, the IFC is subscribing 25% of the shares of the new FINADEV SA, Chad's first private commercial microfinance institution. The IFC stressed the pipeline has generated more than 12,000 jobs and more than \$410mn in local procurement.

Opec oil revenues

The United Arab Emirates and its partners in the six-nation GCC are reported to have earned nearly \$107.4bn in 2002 compared to around \$106.1bn in 2001. Oil export earnings by the UAE, one of the biggest Opec producers, remained unchanged at \$17.9bn as it had to cut output in line with an agreement between Opec and other producers to support oil prices.

According to the London-based CGES (Centre for Global Energy Studies), the basket of Opec crude averaged \$26.2 last year compared to \$24.3 in 2001. Production was also higher as it averaged nearly 25.7mn b/d compared to 25.4mn b/d in 2001.

Opec's total oil export revenues remained almost static at 173.4bn in 2002 (versus 173.1bn in 2001) because of higher domestic oil consumption in most member states.

Total consumption grew from 5.1mn b/d to 5.2mn b/d.

Cell spar first destined for GoM

ABS is classing what is claimed to be the oil and gas industry's first cell spar, destined for Kerr-McGee's Red Hawk field in deepwater Garden Banks block 877 in the Gulf of Mexico. Red Hawk is expected to complete within two years of project sanction, with first gas scheduled for 2Q2004.

The cell spar – a third generation design – is expected to provide the industry with continued opportunities to lower fabrication costs, reducing the complexity of steel fabrication by simplifying the design concept, thus increasing operator flexibility in selecting where the hull can be built. First and second generation designs required specialised shipyard fabrication and have all been

constructed in European and Far East yards, requiring subsequent transport to Gulf of Mexico waters.

The cell spar's new hull concept features six outer cylinders or cells surrounding an inner cell, all connected by framing decks at regular intervals rather than a single large caisson unit; a polyester mooring system that is more buoyant than traditional chain-wire systems and offers improved payload options; and a topside-operated compressed air ballast system. Strakes or spiral vanes all along the cylinders will help reduce vortex-induced vibration.

Initial gas throughput capacity is set at 120mn cf/d, with a potential increase to 300mn cf/d.

UK

UK energy regulator Ofgem has announced that the buy-out price for the second year of the Renewables Obligation will be set at £30.51/MWh.*

The UK Government has approved plans to build 60 wind turbines in the Thames Estuary and in the Irish Sea offshore Cumbria.*

Although there are currently only 12 offshore wind farms currently operational globally, a further 123 projects are in the various stages of planning, according to a new service from energy analyst Douglas-Westwood. 'The World Offshore Wind Database' contains detailed information on all existing and identified future offshore wind projects, with over 50 separate data parameters.

London-based risk consultancy Control Risks Group and Hunt & Palmer International, the global aircraft charter broker, have formed a partnership to provide business with emergency planning and evacuation capabilities for clients worldwide.

A new full 'healthcare' service is being launched by Furmanite to take control of steam systems, with reported potential estimated cost savings of between 30% and 40%.

ABB, Accenture, Intel and Microsoft have formed an alliance that aims to help manufacturers bridge the gap between plant floor operations and enterprise IT systems through the provision of a full range of computing diagnostics, solution design, development and integration services.

Vestas Celtic Wind Technology, based in Macrihanish, Argyll & Bute, Scotland, has secured a contract to carry out all the offshore work on behalf of Powergen Renewables for the £75mn offshore wind farm project at Scroby Sands, located 3 km east of Great Yarmouth. Some 30 wind turbines are to be built, that will produce enough power for 41,000 homes.

Cogent, the UK Sector Skills Council for the Oil and Gas Extraction, Chemicals Manufacturing and Petroleum Industries, has produced two new CD-Roms that are claimed to 'transform the way new workers can gain competency in the required HSE legislation and good practices before they go offshore'.*

Europe

Eni recently announced that the Norwegian company Fortum Petroleum, which it wholly acquired on 20 November 2002, has changed its name to Eni Norge.

Petroleum Geo-Services has posted a 2002 full-year net income loss of \$1,392mn and an operating profit loss of \$629.5mn. In addition, the company reports that the New York Stock Exchange has suspended trading of its shares.*

Despite the difficult market conditions Aker Kvaerner has delivered its best result for five years – posting a 2002 profit of Nkr1,015mn and transforming the Group's debt situation into a net interest-bearing receivable of Nkr613mn.

The European Commission has unveiled proposals that will make the discharging of oil and other pollutants at sea a criminal offence.

TotalFinaElf has posted a 2002 net income of €5.94bn, a 22% fall from the previous year's figure.

North America

Marathon Oil will sell \$400mn (£253mn) in assets this year to pay down its debt and boost spending on international oil projects, reports Philip Fine. The company identified the assets as non-core oil and gas production, and refining and marketing.

William Wise, the embattled Chief Executive of US gas pipeline giant El Paso, will retire by the end of 2003, writes Philip Fine. The announcement came in February just one week after El Paso said it would sell nearly \$3bn (£1.9bn) more in assets than originally planned in a bid to reduce its debt.

Halliburton has reported a 4Q2002 loss of \$602mn, compared to a year-earlier profit of \$139mn.*

EnCana has posted a 4Q2002 profit of C\$429mn (\$283mn), up from C\$90 in 4Q2001.

The US' Devon Energy Corporation has announced that it will buy Ocean Energy for \$3.5bn in stock, reports Monica Dobie, creating the largest America-based independent oil and

Renewables focus in White Paper

The new Energy White Paper from the UK Government has detailed a strategy to reduce harmful carbon emissions over the next 50 years with a major expansion in renewable energy and energy efficiency. Commenting on the publication of the White Paper, Trade and Industry Secretary Patricia Hewitt said: 'Our country needs a new energy policy. We need to make sure we have secure energy at affordable prices, but we need to use energy more efficiently and urgently address the impact we make on the environment.'

She continued: 'Climate change is a clear and present danger. Without urgent action to reduce carbon emissions, the Earth's temperature is currently set to rise faster than at any time in the last 10,000 years.'

The White Paper sets out four goals for the government's energy plan:

- Work towards cutting emissions of carbon dioxide by 60% by 2050.
- Maintain the reliability of energy supplies.
- Promote competitive energy markets in the UK and beyond.
- Ensure that every home is adequately and affordably heated.

The document does not contain proposals for building new nuclear power stations, but does not rule out the possibility that at some point in the future new nuclear build might be necessary to meet carbon targets. Any further decision to proceed with the building of such facilities will only follow a public consultation.

Hewitt also announced a number of practical measures and targets:

- An ambition to double the share of electricity from renewables by 2020 from the existing 2010 target of 10%.
- £60mn in new money for renewable projects, bringing spending on renewable energy up to £348mn in total over four years.
- Reforming planning rules to unblock hurdles to renewable energy.
- A new carbon trading system to come into effect from around 2005 that will give energy suppliers and consumers incentives to switch to cleaner fuels.
- Speeding up changes to building regulations and setting tougher standards for energy efficiency in new homes, refurbishments and electrical products.
- New incentives for energy suppliers to help customers improve energy efficiency.
- The creating of a new Energy Research Centre to help develop the latest cutting edge energy technologies.
- Setting up of Fuel Cells UK to put UK industry at the forefront of clean fuel technologies.
- Supporting cleaner coal technology and establishing an investment aid scheme.
- Working with EU and car manufacturers to improve vehicle efficiency.

Looking at the role that carbon dioxide capture and storage might play in longer-term energy security, the Energy White Paper states that there is a strong case to examine more closely what might be done to help stimulate the take-up of EOR in the North Sea. A detailed implementation plan is to be set up to establish what needs to be done to get a demonstration project off the ground. The study will reach conclusions within six months.

The White Paper also reminds of the measures for promoting a shift to low-carbon vehicles and fuels that were brought together in the 'Powering Future Vehicles' strategy (published July 2002).

Although welcoming the ambitious target to cut carbon dioxide emissions by 60% by 2050, the Institute for Public Policy Research warned that the Energy White Paper could put investment in renewable energy projects at risk. It stated that: 'The White Paper is chronically short on detail. It is frustrating that the government doesn't have the nerve to commit to formal 2020 targets for renewable energy and energy efficiency. This will send an extremely negative message to financial institutions considering whether to invest in renewable energy projects in the UK, at a time when political and regulatory risk is a huge factor for capital markets.'

The CBI also gave a cautious welcome to the new energy plan, saying that business wants a competitive low-carbon UK economy. However, it cautioned that Ministers may have too much faith in the willingness of other countries to cooperate and may not have done enough to promote new technologies. It also commented that: 'We are also concerned that the measures could impact disproportionately on specific business sectors. The government's energy tax – the Climate Change Levy – may have had a laudable aim, but it was an unnecessary body blow to hard-pressed manufacturers.'

A full copy of the UK Government's Energy White Paper can be found at www.dti.gov.uk/energy/whitepaper/index.shtml

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gas production company. Oklahoma-based Devon, which took over Anderson Exploration of Calgary in 2001 for \$4.6bn and Northstar Energy, also of Calgary, in 1998, will assume \$1.8bn of Houston-based Ocean's debt.

Middle East

Saudi Arabia would like Russian companies to invest in its energy sector to help its efforts to further develop the country's economy. Oil Minister Ali al-Naimi told reporters during a trip to Moscow.*

Saudi Arabia has booked 14 tankers to move 29.5mn barrels of crude oil to the US for May deliveries.*

Qatar's Emir H H Sheikh Hamad bin Khalifa Al Thani has opened the Natural Gas Liquids (NGL-4) plant in Messaieed Industrial City. It is the world's biggest NGL plant.

Britain has eased the path for more sales to Iran's oil industry. Export credit agency ECGD has said it will provide support for UK exporters trading with the National Iranian Oil Company for contracts of up to \$20mn, without the need for the Iranian company to enter into a structured finance arrangement.

Russia & Central Asia

BP and the Alfa/Access Renova Group (AAR) are to name their Russian joint venture company TNK-BP. Chairman of the Advisory Board is Mikhail Friedman with BP's Rodney Chase as Deputy Chairman. BP Group Vice President Robert Dudley has been appointed TNK-BP President and CEO.

Kazakhstan is negotiating to join the Baku-Tbilisi-Ceyhan project in order to give it an alternate export route for oil. The BTC project is aimed at bringing Caspian Sea oil to western markets without going through Russia or Iran.

The Russian state has acquired majority control of Gazprom, the national gas monopoly, in a move that could clear the way to the long-delayed liberalisation of the two-tier market in the company's shares.

With Russian oil companies still prevented by Transneft from delivering crude by pipeline to Ventspils, they have increased rail shipments to the port, reports UFG. February saw a new

high in the volumes of crude oil and refined products transhipped by rail, an increase of 15% month-on-month to 1.1mn tonnes.

Ruhrgas has raised its stake in Gazprom to 5.7% through the purchase of an additional 0.7% of shares in the local market.*

The Russian Commission on Protective Measures in Foreign Trade has set crude oil export duty at \$40.30/t (\$5.53/b) and refined product export duty at \$36.30/t from 1 April for a period of two months, reports UFG.

A \$265mn Turkish-Greek deal has been signed by Turkish Energy Minister Mehmed Guler and Greek development minister Akis Tsochadzopoulos to construct a 170-km pipeline – 120 km in Turkey, 50 km in Greece – by 2005, writes Stella Zenkovich. The pipeline will carry gas from the Caspian region, between Karacabey in western Turkey and Komotini in northeastern Greece.

The Kremlin has authorised the construction of a new oil pipeline to China, according to sources close to the government.*

Lukoil is reported to have increased its stake in the 171,000 b/d oil producer Lukoil-Permneft to 100% after acquiring a 27% stake in the company for \$398mn.

Yukos is planning to raise crude oil exports via non-Transneft routes, reports UFG. The company aims to deliver to Sinopec in China 32,000 b/d in 2003 and 50,000 b/d in 2004, versus just 18,000 b/d in 2002.

Russia is understood to be planning to increase annual gas exports to southern Europe via Bulgaria to Greece, Macedonia and Turkey from 12bn cm to 18bn cm.

Lukoil is planning to open an office in Cairo by March 2003 because of the company's increasing exploration and development activities in Egypt.

Gazprom, Russia's giant gas monopoly, has launched the largest corporate bond in emerging market history, taking advantage of growing demand from international investors for Russian assets. The \$1.75bn bond comes a week after BP, the international oil company, made one of the largest foreign direct investments in Russia, worth \$6.75bn.

Asia-Pacific

BG is understood to have expanded its \$750mn Tapti natural gas and LNG

project in India. Gas from the offshore basin is to be supplied to a 615-MW gas-based power station and a 2,000-MW capacity mega power station operated by National Thermal Power Corporation at Pipavaav.

The North West Shelf Venture reports that Australia LNG Pty Ltd has changed its name to North West Shelf Australia LNG Pty Ltd. The Venture has also appointed John Banner as President of the organisation, seconded from ChevronTexaco.

BG has announced plans to invest some \$1bn in India over the next three to five years, although investment will depend to a large extent on the development of a gas market in the country.*

The North West Shelf LNG Sellers have finalised a seven-year LNG sale and purchase agreement with Korea Gas Corporation (Kogas). Initial LNG volumes will be delivered in late 2003, building to 0.5mn t/y in 2004.

PetroChina has confirmed construction will commence in March on the western half of the giant West-to-East Pipeline Project, the multinational joint venture that will carry gas from Xinjiang in China's Far West to the country's industrial east coast population centres. It is expected that gas will flow to the east by early 2004.

Africa

ConocoPhillips has announced a licence agreement with El Behera Natural Gas Liquefaction Company for application of ConocoPhillips' proprietary liquefaction technology at a LNG facility to be located at Idku, Egypt.*

At the summit of the Economic Commission of West African States (ECOWAS) in Dakar, Senegal, the heads of state of Benin, Ghana, Nigeria and Togo signed a treaty providing the legal and fiscal framework for the building of the \$500mn, 620-km West African Gas Pipeline (WAGP) project set to supply Nigerian gas to five cities in the other three countries.*

Virgin Atlantic is operating what it claims is the first-ever direct flight service between London Gatwick and Port Harcourt in Nigeria. For further details, visit www.virgin.com/atlantic

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UK

The Institute of Petroleum is pleased to announce that the Shell Group has adopted the IP's Tank Cleaning Safety Code as its primary guidance document for use by Shell managers and personnel worldwide. The Code provides health, safety and environmental guidance and recommendations for the cleaning of tanks used for storing oil and liquid petroleum products. For more details, visit www.petroleum.co.uk

By the end of 2003 over one-quarter of directors in the UK fuels industry will be over 60 years old according to a new report from Plimsoll. According to the analyst, the average salary last year was £47,000, having fallen some 6%. Top earners, however, can earn as much as £141,000.

The UK fuel cell technology industry can become a significant player in the world fuel cell market, according to a new report published by the UK Department of Trade and Industry (DTI) and the Carbon Trust. The report calls for an industry forum to be established to develop a 'vision' for fuel cells in the UK, with the aim of raising the profile of the sector and to create the right conditions for investment. It would act as a central liaison point for producers, government and academia. A copy of the report can be found at www.thecarbontrust.co.uk or from www.dti.gov.uk/energy

UK Trade and Industry Secretary Patricia Hewitt has referred to the Competition Commission the completed acquisition by Centrica of Dynegy Storage and Dynegy Onshore Processing UK, which owned and operated the Rough gas storage facility in the UK.*

Europe

Shell Hydrogen is to provide funding and technological know-how for the construction of a hydrogen refuelling station in Luxemburg. The project is part of a EU initiative to demonstrate how fuel cell buses could provide clean urban transport across the continent.

Technip-Coflexip has secured a €50mn contract from TotalFinaElf for the design and construction of a gasoline hydrotreating unit for its refinery at Antwerp in Belgium as part of the oil company's 'Clean Gasoline Project'.

Long-term Russia/Middle East oil agreement

Lukoil, having started exports through oil swaps via Iran last November, is planning a long-term agreement initially for 1mn t/y to start in 2Q2003, reports Stella Zenkovich. Russian crude is being used in Iran's northern refineries for local consumption in return for an equivalent amount of Iranian crude delivered to Russia's designated buyers at Iran's Gulf oil terminals, sharply reducing costs of exports to non-European buyers currently loaded on tankers in Novorossiysk.

For Iranian swaps, Russian crude is being delivered by Lukoil subsidiary

Nizhnevolzhskneft from Astrakhan and Volgograd to Iran's Caspian port of Neka, recently enlarged, to be carried further into Iran through the 16-inch diameter Nekas-Sari pipeline built last year by a Chinese consortium.

As a corollary to the mutually beneficial – albeit for the time being small-volume – arrangement, Russia is reported to have toned down its insistence to act as intermediary between Iran and Azerbaijan in a controversy over the status of the Caspian and the sharing of offshore areas and, thus, oil and gas reserves.

Hydrogen-powered scooter first

After a decade of research and development, Josef Zeitler from Speinshart in Germany and owner of Independent Energy Systems (INENSY) claims to have developed the world's first hydrogen-powered 2-stroke scooter with technical approval from TÜV of Germany.

The inventor solved the problem of hydrogen storage by using a 50-bar pressure tank developed by HERA Hydrogen Storage Systems. In the case of an accident the tank will freeze in order to ensure no fire or explosion, explains Zeitler. A pressure sensor transmits data to a computer chip that sends the necessary information regarding the proper hydrogen mixture to the fuel injection jet. The process of refilling is made possible via a newly developed system consisting of pressure tanks and a hydrogen generator. The tank can be filled within three to four minutes in complete safety. The whole system works on solar power and water to produce hydrogen.

The AQWON scooter has a top speed of 50 km/h and costs €5,600. For more information, visit www.AQWON.com

News from the European Commission

Greece and Turkey have agreed to build a €250mn, 285-km gas pipeline between Komotini in Greek Thrace, with Karacabey, in Turkey, near Istanbul, reports Keith Nuthall. The European Commission views the initiative as a key link carrying central Asian natural gas into the European Union. Gas from the project will initially reach Italy. The agreement involves cooperation between the Greek Natural Gas Company (DEPA) and Turkish gas company BOTAS. EU Energy Commissioner Loyola de Palacio hailed this 'genuine commercial cooperation between gas companies' as helping to ensure Europe's energy supply.

Other EU news includes:

- The European Investment Bank (EIB) is lending €150mn to a special fund to counter the damage caused by the Prestige disaster in Galicia, Asturias and Cantabria. It will be operated by local savings banks and cover recovery project costs.
- The European Commission has approved TotalFinaElf's acquisition of Mobil Gas' gas supply business in Britain. Brussels had investigated whether the deal would harm competition in the British industrial and commercial gas market, but it concluded that enough alternative supplies would be offered by large rivals.
- The EIB is planning to lend Egypt up to €150mn to develop a second 750-MW dual-fired (natural gas and light fuel oil) combined-cycle gas turbine (CCGT) generation module at a new power station under construction at Nubariya.
- The European Bank for Reconstruction and Development (EBRD) has drawn up plans to lend \$6mn to Azeri-German joint venture EUPEC PipeCoatings Azerbaijan, which is to apply coatings to the Caspian region's growing oil and

Call for diesel fuel duty protection

The Freight Transport Association (FTA) has told the UK Treasury that UK industry must have protection from short-term fuel escalation bearing in mind the sensitive international situation and that duty on diesel must not increase in the Budget. The FTA is also calling for closer joint working between industry and government regarding the operational details of the forthcoming lorry road user charging arrangements and for amendments to vehicle excise duty systems.

FTA Chief Executive Richard Turner points out that world crude oil prices have increased bulk diesel prices from 58.4 p/l in March 2002 to 64.5 p/l today. This is equivalent to an increase in diesel duty of 7.3 p/l in real terms. Turner says that the 2003 Budget must freeze diesel duty for another year. 'With fuel constituting close to 40% of lorry operating costs, movements in the price have substantial effects on overall cost which eventually impact on manufacturing and retail prices,' he said.

eGasStation signs up BP in forecourt deal

eGasStation Europe, which is based in Gateshead, UK, has signed its first major contract in the UK to supply remote wet stock management services to the BP UK network of fuel retail locations.

The company's wet stock services programme will help BP detect and immediately respond to any emerging petroleum product leaks, troubleshoot site equipment inaccuracies (such as miscalibrated pumps), and improve the

overall site profitability.

Martin McTague, Managing Director of eGasStation Europe, told *Petroleum Review*: 'Obviously, we are delighted to have signed our first European contract with BP Oil UK as they are part of one of the largest oil companies in the world. We are confident that the lifecycle cost to fuel retailers of introducing remote management services to their site operations will be offset against the significant cost savings.'

Greenenergy signs up Tesco for green supermarket fuelling first

Tesco's Hatfield service station is the first of the supermarket's fuel retail network to sell Greenenergy's GlobalDiesel fuel, a blend of 5% biodiesel and 95% ultra-low sulphur diesel that is claimed to offer a 5% reduction in greenhouse gases, up to 20% reduction in harmful particulate emissions and a 1% improvement in fuel economy. The forecourt – located close to the A1, one of the busiest routes into and out of London – serves some 750,000 customers with over 22mn litres of fuel a year.

The site is also selling LPG. LPG currently fuels some 4,000 cars in the UK and, due to its environmentally friendly properties, is exempt from the £5 daily congestion charge to enter central London.

The aim of the project is to hydrotreat the gasolines from the FCC unit without lowering the octane rating.

Gas Natural of Spain has made a formal takeover bid for Iberdrola that values the Spanish power producer at around €15.3bn (\$16.7bn). The hostile offer is targeting at least 75% of Iberdrola's shares.

Norsk Hydro has sent out equipment for what will be the first commercial hydrogen fuelling station in Reykjavik, Iceland. It is planned to open the facility on 24 April 2003.*

The US and the European Union are to sign a research cooperation deal on hydrogen fuel technology, writes Keith Nuthall. It will be an annexe to an existing research cooperation agreement, formalising continued cooperation in this field. At a recent meeting in Brussels both sides discussed intensifying research cooperation over carbon dioxide capture and storage, observation systems and carbon cycle research.

Shell Erdgas, a member of the Royal Dutch Shell Group of Companies, has closed a deal with E.ON, the German utility company, regarding the sale of its shareholding in Ruhrgas, a major German gas distributor.

A joint venture has been established by Statoil and Naturgas Fyn of Denmark in a bid to secure a larger share of Danish gas sales when the market is liberalised on 1 January 2004. The new company – Statoil Gazelle – will be 70% owned by Naturgas Fyn. However, Statoil has an option to increase its initial 30% stake.

Repsol YPF, Europe's fifth-largest oil group, reported full-year results well below analysts' forecasts but managed to increase its net profit by 90% in 2002 to €1.95bn (\$2.11bn). Analysts had forecast profits in the range of €2.18bn–2.22bn. Pre-tax profits also rose to €2.85bn against €2.5bn last year.

Sweden's Skanska construction group has picked Statoil as its principal supplier of automotive fuels, lubricating oil and heating oil in a deal worth Nkr500mn.

The planned expansion of the Fluxys LNG gas terminal at Zeebrugge in Belgium could add as much as 50% to throughput capacity as well as

UK Deliveries into Consumption (tonnes)

| Products | †Jan 2002 | †Jan 2003 | % Change |
|--------------------------------|-----------|-----------|----------|
| Naphtha/LDF | 70,375 | 200,212 | 184 |
| ATF – Kerosene | 741,127 | 934,572 | 26 |
| Petrol | – | – | – |
| of which unleaded | 1,624,466 | 1,477,511 | –9 |
| of which Super unleaded | 41,208 | 73,634 | 79 |
| ULSP (ultra low sulfur petrol) | 1,583,258 | 1,403,877 | –11 |
| Lead Replacement Petrol (LRP) | 49,053 | 19,702 | –60 |
| Burning Oil | 414,951 | 199,095 | –52 |
| Automotive Diesel | 1,349,973 | 1,263,078 | –6 |
| Gas/Diesel Oil | 588,151 | 536,936 | –9 |
| Fuel Oil | 212,445 | 268,946 | 27 |
| Lubricating Oil | 74,598 | 70,232 | –6 |
| Other Products | 600,305 | 916,012 | 53 |
| Total above | 5,725,444 | 5,886,296 | 3 |
| Refinery Consumption | 410,116 | 405,306 | –1 |
| Total all products | 6,135,560 | 6,291,602 | 3 |

† Revised with adjustments All figures provided by the UK Department of Trade and Industry (DTI)

In Brief

boosting maximum send-out capacity, according to the company. The facility currently has a throughput capacity of 5bn cmly and a daily send-out capacity of 264 GWh/d. Fluxys LNG is 92% owned by Fluxys, 7% by Tractebel and 1% Shell.

North America

US President George W Bush has committed \$1.2bn (£760mn) to developing hydrogen-powered fuel cell technology, writes Philip Fine. Part of that will include \$720mn in new funding over the next five years to develop the technologies and infrastructure to produce, store, and distribute hydrogen for use in fuel cell vehicles and electricity generation.

Lodestar Corporation of Peabody, Massachusetts, has recently launched PricingExpert, a pricing and quotation solution for gas distributors and retailers. The system compares supply and demand data with customer data and business rules to calculate price quotes tailored to specific customers and to manage the quotation process. Companies can use it to optimise service offerings to customers and to create new customers from prospects, converting a series of manual steps into one integrated business process, reports Lodestar. For more information, visit www.lodestarcorp.com

General Motors and Shell are to soon unveil plans for the first hydrogen fuel pump at a US retail petrol station. The facility, to be based in Washington DC, would allow the refilling of six demonstration fuel cell vehicles built by GM.

US regulators have accused Unocal of trying to reap billions of dollars in fraudulent commissions by monopolising patents for low-emission gasoline sold in California.

US-based General Motors has announced a new, multi-million dollar campaign to promote the use of corn-based ethanol fuel E85 as an alternative to petrol.

Nymex is to introduce futures contracts based on the differentials between the Nymex Division light, sweet crude oil contract and Mars Blend crude oil, Light Louisiana Sweet (LLS) crude oil, West Texas Sour (WTS) crude oil, and West Texas Intermediate (WTI) crude oil delivered in Midland.

It is reported that ExxonMobil may spend in excess of \$1bn on the construction of combined heat and power plants in North America and the Asia-Pacific by 2005. It already has plans for four facilities in the US, and is to expand in Asia after completing a plant in Singapore.

US gas storage inventories will end the withdrawal season at an all-time low of 700bn cf, according to analyst Raymond James and Associates. *

InterContinentalExchange (ICE) has announced an agreement with Prebon Energy aimed at 'increasing price transparency in the OTC (over the counter) energy markets and bringing greater efficiencies in the trade confirmation process'. The companies are to jointly develop functionality enabling Prebon to securely submit its brokered trade records to ICE's eConfirm platform and its trade database used in compiling market indices. Prebon is reported to be the first voice broker to make use of ICE's digital infrastructure in this manner.

Marathon Ashland Petroleum (MAP), through its wholly owned retail unit Speedway SuperAmerica, has signed an agreement to sell its 193 convenience stores in Florida, South Carolina, North Carolina and Georgia to Sunoco for \$140mn plus store inventory.

Russia & Central Asia

A total of 140,000 tonnes of crude oil and gas condensate have been supplied during January and February to the Seydi oil refinery in eastern Turkmenistan. Uzbekistan supplies the raw material from the Kokdumalak oil and gas condensate field on the Uzbek-Turkmen border.

Asia-Pacific

China's largest oil company PetroChina has agreed with the country's biggest shipping firm, COSCO, to set up a joint venture to market marine fuels. The deal gives PetroChina an entry into the domestic ship fuel market and takes advantage of COSCO's extensive distribution network.

Coles Myer, Australia's biggest retailer, is believed to be in talks with Shell over buying or taking a stake in the oil giant's Australian service station network. Reports state that Coles might acquire the network and a quarter of the local fuel retailing market for more than A\$250mn (\$151.9mn).

Shell is reported to be planning to invest between \$11mn and \$18.5mn

during 2003 on its Thai fuel retail operations in order to achieve 5% sales growth. The company currently operates a 670-strong network and plans to open 10 new 'mega stations' incorporating coffee shops and supermarkets.

The Philippine Government is expected to sell its 40% stake in the country's biggest refiner, Petron Corporation, in bid to raise funds in the face of a growing budget deficit that is forecast at \$3.93bn for 2003.

China is understood to be considering setting up a \$10bn fund to purchase oil for a strategic reserve that would be funded out of the country's rapidly growing foreign exchange reserves.

Foster Wheeler has been awarded a contract by the New Zealand Refining Company (NZRC) to support the company in producing an engineering, procurement and construction (EPC) sanction package for the New Zealand Future Fuels project. The project, located at Whangarei, North Island, involves modifying New Zealand's sole refinery to produce low-sulphur diesel fuel and low-benzene, low-sulphur and low-aromatics gasoline. The facilities are due to be commissioned in mid-2005.

Africa

Shell Nigeria Gas (SNG) says its gas transmission and distribution projects that began with the incorporation of the company in 1998 will attract foreign direct investment (FDI) in excess of N4bn into Nigeria.

Short of refinery capacity, Nigeria imports half of the 300,000 bld fuel equivalent, and has recently been suffering from its worst fuel crisis in many years, due to only 30% of imported fuel ordered having arrived, reports Stella Zenkovich.

Nairobi-based Kenoil/Kobil is to invest \$10mn this year in fuel retail outlets in Kenya, Uganda, Tanzania, Zambia and Rwanda to expand operations, according to its Managing Director Jacob Segman.

The Egyptian Petroleum Ministry has agreed with Spanish interests to set up a joint venture in Damietta that is to build an LNG plant for exporting gas from new deepwater Red Sea discoveries according to Minister Sameh Fahmy.

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The only way is down

For much of 2002 Iraq was the random variable in the global oil market equation. Whilst the possibility of military action will have a major impact on market trends in the near term, Iraq's huge oil reserves constitute only part of the real market challenge in the next decade. Wood Mackenzie's *Iain Brown* assesses the impact of growth in Middle East production capacity on global oil markets.

In spite of its current pariah status, Iraq remains one of the world's larger oil producers. Its exports are limited politically by the UN and physically by its dilapidated infrastructure, but still it has been exporting close to 2mn b/d. Wood Mackenzie estimates Iraq's total remaining recoverable oil reserves at more than 110bn barrels, in global terms second only to Saudi Arabia. (See Figure 1).

But Iraq is by no means alone in Middle East Opec, in having 'reserves to spare'. In addition Saudi Arabia, Abu Dhabi, Iran, Kuwait and Qatar all have the potential to significantly expand their oil and condensate production capacities and have projects underway to do so.

Beyond Middle East Opec there are

major oil reserves, which will inevitably be brought onstream over the next five years. These include the continuing renaissance in Russian production, the imminent rapid expansion in Caspian output and the strong growth in deepwater production from West and Central Africa.

Many of these prolific, non-Opec provinces are expected to have reached their peak production rates around 2008–2012 and their proven reserves will be significantly depleted. By this same time however, Middle East Opec will still have 'reserves to spare'.

Its overwhelming and steadily increasing share of global reserves will ensure that, as non-Opec resources diminish beyond 2010, Middle East

Opec will assume an increasingly dominant share of global production and a progressively stronger hold on the market (see Figure 2).

The only way (for production) is up?

Any argument over precise Iraqi reserves and most other Middle East Opec figures is effectively academic from a market perspective. Iraq undoubtedly has the resources to achieve huge increases in production over the next two decades and, whilst the oft-quoted target of 6mn b/d in five years is unrealistic, it is achievable within a slightly longer timeframe.

Given the minimal investment in the oil infrastructure of Iraq over the past 10 years, its instantaneous production capacity is now just under 3mn b/d. Conversely, a number of key projects are in preparation that could facilitate a rapid increase in capacity within 18–24 months of large-scale investment becoming available.

A realistic and detailed assessment of the pace of development of Iraq's current reserves base suggests that a capacity as high as 6mn b/d could be achieved within 10–12 years (see Figure 3).

In parallel to the prospective recovery in Iraqi capacity, several of the other major Middle East producing states have plans in implementation which will significantly increase their production outlook.

- Saudi Arabia already has nearly 3mn b/d of oil production capacity shut-in, most of which could be brought onstream within a couple of years.
- Iran has stated its ambitions to increase its capacity from its current 3.7mn b/d to 5mn b/d by 2005. Whilst Wood Mackenzie considers this forecast somewhat optimistic, an increase of at least 500,000 b/d is achievable within a five-year period.
- Abu Dhabi (UAE) is currently pursuing its ambitions of increasing capacity by 25%, to over 3mn b/d by 2007.
- Kuwait suffered a temporary reduction in its capacity in February 2002, when a major fire destroyed a large part of a gathering station on the Raudhatain field. However, with the implementation of its proposed Northern Fields Project (aka Project Kuwait), it plans to increase production capacity to 3mn b/d within a five-to-seven-year period.

The projects listed in Table 1 are all at an advanced planning stage or in the early stages of execution and, although by no

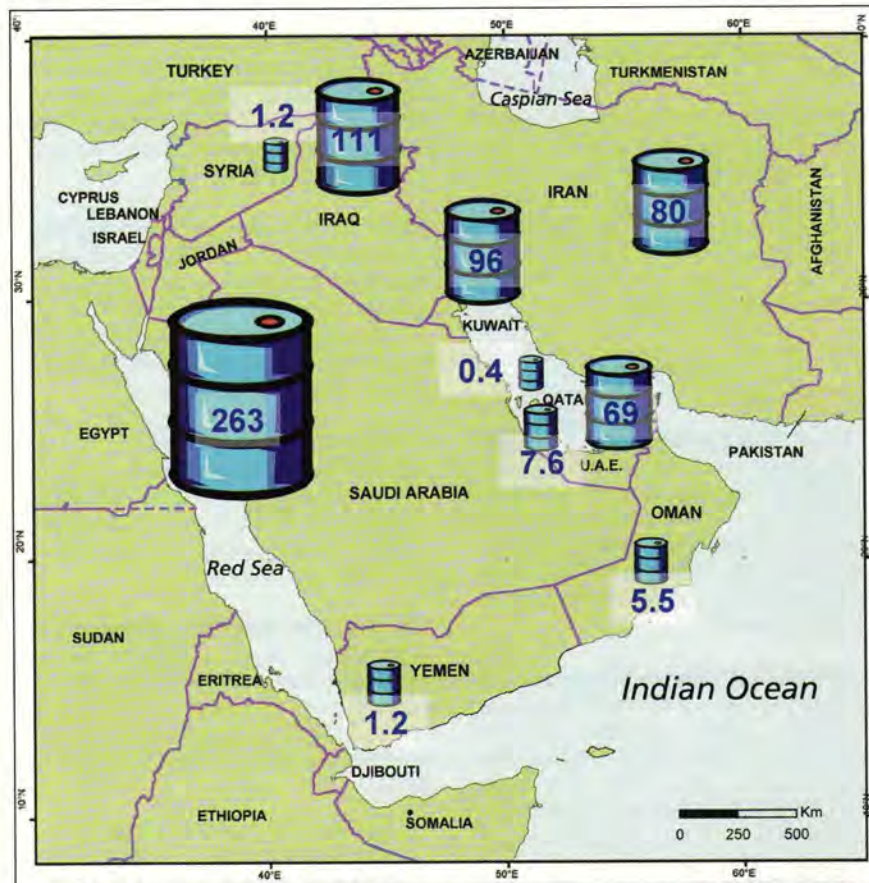


Figure 1: Middle East – remaining oil reserves, bn barrels

Source: Wood Mackenzie

means an exhaustive list, would provide an incremental 3.4mn b/d of Middle East Opec capacity over the next five years. Also within Opec, Nigeria, and to a lesser extent, Algeria have major projects underway which will significantly increase production capacity. Wood Mackenzie expects that Nigeria's capacity will reach 3.6mn b/d by 2007, from 2.2mn b/d in 2002.

This cumulative increase in capacity poses a real threat to Opec in managing the ambitions of its member states against a background of political divisions, which will inevitably be widened following Iraq's full re-admission to the club (see Figure 4).

This prospective internal tension within Opec will be exacerbated by the forecast short- and medium-term growth in non-Opec production. Opec faces the dual threats of reduced Opec share of the global market and increased competition for production quotas within the organisation.

Prospect of over-supply

Looking to the medium term, under most scenarios for the resolution of the current situation in Iraq, the result will be a change to a more cooperative regime, for which maximising oil exports will be critical to fund re-construction. This will present Opec with the dilemma that it will have to face sooner or later. Iraq must be re-established quickly into the system if prices are to be maintained within Opec's \$22-\$28/b target range.

But this accommodation will be very difficult. Over the next few years, Wood Mackenzie estimates that production increases in non-Opec countries will be almost equivalent to the expected growth in world demand, even more so if Russian production goes on rising at the rate of the recent past.

We expect that production from Russia will total around 8.5mn b/d by 2007 (from 7.6mn b/d in 2002), whilst that from Azerbaijan and Kazakhstan could reach 0.85mn and 1.70mn b/d respectively (from 0.31mn b/d and 0.98mn b/d currently). When further supplemented by growth in non-Opec Africa, this proffers the prospect of around 10% growth in non-Opec production in the next five years.

Table 2 outlines one possible future scenario, in which Saudi Arabia is assumed to reduce its production to accommodate the prospective production growth in Iraq and in non-Opec.

This prospect now appears highly probable. Wood Mackenzie believes that restoration of Iraqi production capacity to 3.5mn b/d by 2006 is likely under most scenarios. Whilst sanctions have precluded US companies from any involvement in Iraq, Russian, French and Chinese companies have entered into agreements that should provide up to

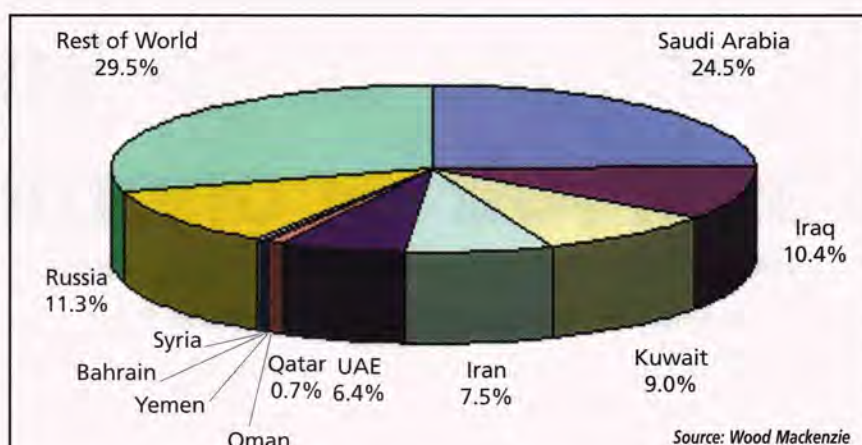


Figure 2: Remaining global oil reserves at 1 January 2003 (Total reserves = 1,072bn barrels)

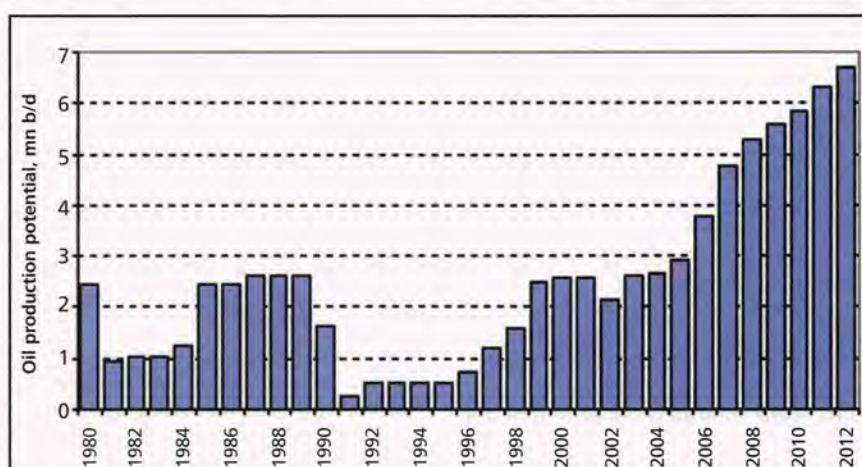


Figure 3: Iraq's oil production and potential, 1980-2012

800,000 b/d of new capacity within six or seven years. These projects are expected to be reviewed to allow some significant level of US-participation and, given the necessity driving the Iraqi work force, key infrastructure reconstruction could be surprisingly rapid.

In such circumstances, if it intends to maintain its role of balancing the market, Opec will have to accept that its gross crude production will increase modestly, at best, between now and 2010.

As always, much will depend on Saudi Arabia finding the delicate balance between its internal politics, domestic budget and the threat posed to the fragile recovery in the world economy, oil demand growth and Opec's long-term market position. But this time, we believe, the restraint is unlikely to be achieved by a Saudi accommodation alone. We expect that for a successful re-admission of an Iraqi quota, all of the other Opec members – including some

continued on p19...

| Country | Project/Prospective project | Potential addition to oil production capacity (b/d) |
|-----------------|-----------------------------------|---|
| Iraq | West Qurna Phase 2 development | 650,000 |
| Iraq | Majnoon field development | 360,000 |
| Iraq | Kirkuk Khurmala Dome development | 100,000 |
| Saudi Arabia | Ghawar Haradh development Phase 2 | 300,000 |
| Saudi Arabia | Qatif field expansion | 500,000 |
| Iran | Current buy-back contracts | 280,000 |
| Iran | Ahwaz Bangestan developments | 350,000 |
| Iran | Azadegan field development | 100,000 |
| Abu Dhabi (UAE) | North East Abu Dhabi project | 110,000 |
| Abu Dhabi (UAE) | ADCO Bu Hasa field expansion | 250,000 |
| Kuwait | Northern Fields project | 400,000 |

Table 1: Selected major oil production projects in Middle East Opec, 2003-2007

Source: Wood Mackenzie

Pressure on to improve reservoir economics

Karl DeMong of Halliburton Energy Services, **Hussein Al-Yami** of Saudi Arabian Oil Company (Saudi Aramco) and **Steven Lambe** of Marathon Oil explain how pressure-isolated multilateral junction systems were successfully used by Saudi Aramco to improve the reservoir economics of a project offshore Saudi Arabia.

Saudi Aramco implemented the use of TAML (Technical Committee for the Advancement of Multi Laterals) Level 5, pressure-isolated junction systems with through tubing access to develop a single reservoir in a slot-limited application in the offshore Arabian Gulf field. Charged with maximising reservoir drainage from the platform, the project team evaluated medium reach horizontal wells along with multilateral legs in the reservoir model. Although all of the wells on the platform were indicated as potential for applying multilateral technology, only the last two were planned due to the expected delivery time for the equipment.

An additional sub-team from the Marjan project team was formed with the following objectives:

- Technically evaluate the drilling and completion equipment on the market for re-accessible drilling junctions.

- Determine the available completion alternatives.
- Evaluate full-cycle operations and costs (drilling, completion, workover and production) in order to evaluate the long-term operating/workover cost of the well.
- Evaluate the applicability of this technology to other areas within Saudi Arabia.

The team then selected wells that would benefit from the multilateral technology. The following operational objectives were developed:

- Accelerate the recovery of the area east of the platform.
- Evaluate multilateral horizontal well performance in the reservoir compared to standard horizontal well performance.
- Reduce the cost per foot of reservoir exposure.
- Reach the maximum reserves in place with each drilling slot.

- Drill and complete the most productive wellbores possible.

Cost savings

In preliminary economic evaluations the potential for 30–70% cost savings on the drilling of a two-leg multilateral well was indicated. However, of more interest to the team were the projected savings of complete platforms and tie-in jackets in the upcoming field development. Utilizing dual multilateral wells in the field development could amount to substantial cost savings.

Figure 1 shows the final configuration of the multilateral wells on the east side of the platform. Since the platform was already built, a single flow line was supplied, and each well needed a single tubing string to surface. To drill the 6 1/8-inch open hole, 7-inch casing needed to be set at the zone. In order to flow each lateral for cleanup independently, and to evaluate the performance of each lateral separately, flow control of each lateral was required independently. In addition, in order to assess the performance of the laterals, through tubing access was desired for production flow meter logging and other types of information gathering.

These requirements fit with TAML Level 4, 5, and 6, but a Level 5 was selected for the following reasons. The TAML 5 junction systems were proven technology and had been run prior to these wells in the Arabian Gulf. A flow wet junction (TAML Level 4) was not desirable due to concerns regarding corrosion and producing pressure differential later in the life of the well. Additionally, the pressure rating of the TAML Level 6 formed junctions currently available is less than that of the Level 5 (in this case the TAML 5 completion is rated to 3,000+ psi). It was therefore decided to run a pressure-isolated, cased and inhibited junction. Also, the 'telescoping effect' or the size reduction through a Level 6 junction can be greater than that of a Level 5 system. Practically, this means that a larger casing size would be required at the junction to achieve a 6 1/8-inch lateral hole size in the zone.

The TAML Level 5 system (TAML 5) was selected for both wells because the system provided a re-enterable, cemented and pressure isolated junction with packer and tubing in each lat-

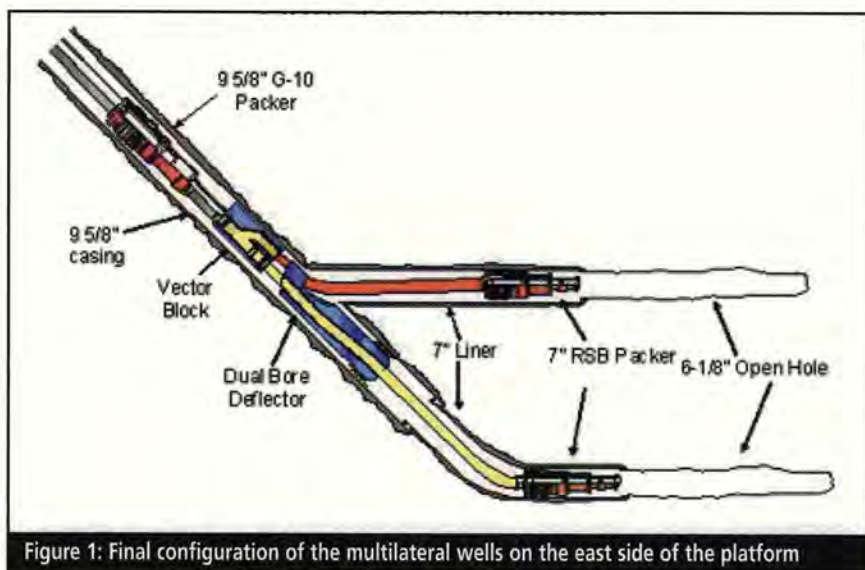


Figure 1: Final configuration of the multilateral wells on the east side of the platform

eral. The multilateral system featured full flow control and through tubing wireline and coil tubing access to each lateral. The system consisted of 9 5/8-inch pre-milled window, latch and lateral liner transition joint while the completion equipment consisted of TAML Level 5 pressure isolated completion. The junction was isolated by means of two 7-inch, torque-locked, retrievable packers below the junction, a dual production whipstock in the junction, a vector block ('Y' block comingling and access tool) and a torque-locked retrievable packer above the junction in the 9 5/8-inch casing. The completion provided segregated production and access to each lateral. The completion schematics of the wells are shown in Figure 2.

And the results...

Detailed production results for this platform were not released. However, all the indications are that production results are being met. The multilateral producers had the highest flowing wellhead pressures, the highest oil rates and the lowest gas/oil ratio.

Cost per foot in the multilateral wells was negatively affected in several ways. The targets on the multilateral wells were further from the platform than those on the horizontal wells. This resulted in greater footage drilled, higher tangent angles and generally more difficult drilling conditions. One of the laterals on Well A was cut short due to a broken torque gauge giving the false impression that the torque was excessive. The delays in the multilateral programme previously stated also had an impact.

Even with these all these factors, the

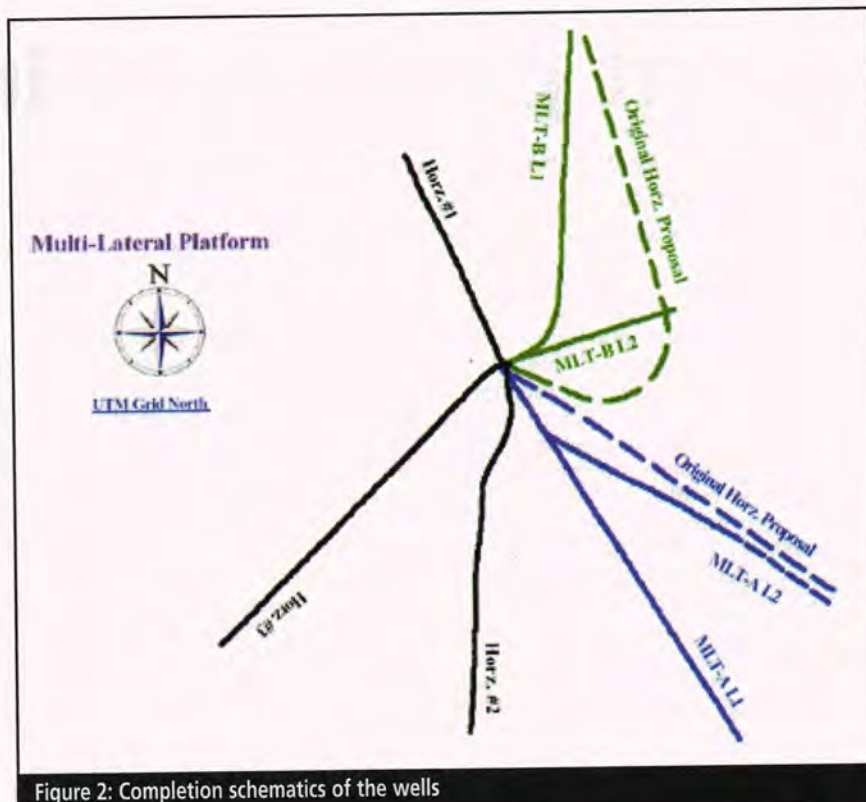


Figure 2: Completion schematics of the wells

cost per foot on the multilaterals was in the same range as the cost per foot of the horizontal wells. However, savings on the slot and tie-in are realized in addition to the drilling cost. These savings are significant in this field, and would be in the order of 50-80%.

The benefits of drilling multilateral wells in slot-limited applications such as offshore platforms are well known. The key to broadening the implementation of this technology is matching actual opportunities with robust, reliable multilateral systems.

All operational objectives were met in the project. Problems, when encountered, were solved and did not recur. Economics for the project were improved, but there are additional improvements to make. The technique is expected to be applicable for use in several other fields in Saudi Arabia.

For those readers wishing to know more technical details of this project, a full copy of a paper by the authors can be found at www.halliburton.com



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Great prospects in Russia

On the second day of IP Week an all-day conference on 'Oil and Gas in the FSU' attracted a standing room only crowd to hear key figures in the industry provide up-to-the-minute information on this most important of oil and gas suppliers. *Chris Skrebowski reports on the three key speakers.*

Yury Shafranik, the Chairman of Soyuzneftegaz and previously Russian Minister of Fuel and Energy, started by saying that investors needed stability and that there were vast new projects to be tackled. There were risks – notably the impact and effect of any conflict in Iraq – which could lead investors to draw back.

In terms of Russian gas production Gazprom accounts for 88% of annual production of around 580–590bn cm. However, in order to increase exports to Western Europe, large investments were needed as the first of the big Siberian fields starts to decline. He anticipated that with appropriate investment production could hold steady at around 600–650bn cm/y out to 2020. However, with additional investment in major projects flows could reach 700bn cm/y.

His view was that take or pay contracts were important and that pressures for European price liberalisation without guarantees to producers were unacceptable to producers such as Russia.

Iraqi potential

Turning to Iraq, he noted that the country could be a major element in energy supplies to Europe. There was considerable potential from the 73 known fields, of which only 15 were currently developed. He estimated recoverable reserves in the 15 developed fields at 6.36bn tonnes (47.7bn barrels), with a further 9.05bn tonnes (67.9bn barrels) in the 58 undeveloped fields, making a total of 115bn barrels. If all the political, social, legal and other complications can be resolved and appropriate investments made, Iraqi production could, at best, reach 13mn b/d, with 10mn b/d his mid-range and 8mn b/d his low estimate.

He then concluded by saying that \$21–\$25/b was a fair long-term price for oil, and that Russian investment conditions were now favourable enough to encourage large-scale investment and increased exports of high value products.

Reserves and exports

Ray Leonard, Vice President for Exploration and New Projects at Yukos, noted that published Russian reserves

were actually smaller than the sum of the audited reserves of the Russian oil majors and are therefore very misleading. In 2002 Yukos undertook a comprehensive study that showed proven Russian oil reserves were between 97bn and 119bn barrels depending on oil price assumptions. By region, the breakdown was West Siberia 67–83bn barrels, Timan-Pechora 12–14bn barrels, Volga Urals 13–16bn barrels, East Siberia 3–4bn barrels and the Russian shelf 2bn barrels.

Continuing the theme of Russia's enormous potential Leonard said that Yukos estimated the ultimate potential at 200–250bn barrels. He also showed the impact of technology on investment by the way in which recent new well flows from Sibneft, at 600 b/d, had been three times the Russian average of 200 b/d, while from Yukos new well flows had steadily increased over the last three years to reach 1,000 b/d in 2002. The Yukos study indicated that Russian oil production would reach a peak of 10–10.5mn b/d, holding this from around 2010 to 2020.

He then turned his attention to export capacity, noting that it could double to 8mn b/d of oil by 2010. The Siberian–Murmansk pipeline being promoted by the oil companies could add 2mn b/d by 2007, while the Angarsk–Dacin line could potentially export 400,000 b/d to China by 2005 and 600,000 b/d by 2009. The Caspian CPC pipeline had added 600,000 b/d in 2002 and could reach 1mn b/d by 2009. Reversal of the Adria pipeline would add 300,000 b/d by 2005. And finally, a pipeline fed by the Sakhalin I and II projects to the port at the south of the island would give 440,000 b/d of export capacity by 2007.

His conclusion was that Russian reserves were much larger than usually reported, there was significant exploration potential and production could reach and maintain 10mn b/d. In addition, significant additional exports would flow to the US and China via new pipelines within five years.

Confirming much of what the previous speaker had said, Yuri Storozhev of Lukoil indicated that Russia could be producing 11.1mn b/d by 2010 and refining 4.3mn b/d, giving an oil export potential of nearly 7mn b/d. The company's esti-

mate of proven reserves was 76bn barrels, with the expectation of this rising to 150bn barrels by 2010. Illustrating all the various new export routes, he raised the question of Transneft's pipeline monopoly and noted the enthusiasm of the producing companies for a new Siberia–Murmansk pipeline. He then went into details of the costs and timings, and variants on the proposal.

In the pipeline

Semya M Vainshtok, Chairman and President of Transneft then addressed the room. He started by noting that Transneft was the world's largest oil transporting company, moving around 330mn tonnes of crude through its pipeline network in the last year. This was due to rise to 397–400mn tonnes in 2003.

Confirming that it was government policy to maintain state control and influence over the industry via control of Transneft he went on to note that increased exports were a priority and they were working to give the companies equal access. He claimed there had been a breakthrough in the last three years, with 1,500 km of newbuild pipeline completed and a rehabilitation spend of \$1bn. The pipeline from Samara to Atyrau had been expanded to give 50mn t/y capacity and the Chechnya bypass had been completed in five rather than 18 months. This, together with other work in the Caspian region, meant that the company could provide transit for Kazakh and Azeri production as a viable alternative to the unbuilt Baku–Ceyhan line.

Noting that route planning was difficult when they had no direct control of field developments, he dismissed complaints from the producing companies about weather-related loading delays at Primorsk and the effective boycotting by Transneft of Ventspils. He stressed that Transneft was flexible and responsive to the oil companies and described the Murmansk proposal as interesting. He went on to state that priority would be given to the Burgas–Alexandropolis line if the companies could provide the oil.

He made particular note of the cost of 'political' pipelines, describing the Baku–Ceyhan line as a 'paper dream'. ●

Plea for ethical business practices

In a very well received presentation during IP Week, John Gibson, the recently appointed CEO of Halliburton Energy Services, tackled the subject of business ethics.

He started his presentation by noting the importance Halliburton gave to the subject with formal policies in place that can be viewed on the company website. He explained there were two possible ways to apply and ultimately enforce business ethics. The first was self regulation, in which the individual or organisation worked to a code of good practice – a code of business ethics. The second was to use the law to regulate and ultimately enforce.

He developed the idea that any individual tends to be obedient to authority, but is constantly confronted with a series of difficult choices:

- The group versus the individual.
- Loyalty versus the truth.
- Long-term versus the short-term.
- Justice versus mercy.

All these areas are readily recognisable, but because there is no 'right' answer any individual, and particularly any manager, has to find a way to make decisions in an acceptable and consistent manner.

Guiding philosophies

Gibson explained that there were effectively three guiding philosophies:

- Utilitarian
- Duty based
- Virtue

The utilitarian analysis looks to the consequences of the decision and modifies the decision-making in response. The duty-based route requires a clear understanding of what is expected and what is involved. The virtue, or value-based, system means decisions are made with a view to meeting community standards or expectations. The expectation is that respect and position will be accorded if decisions are made on this basis.

He concluded by explaining that the choices were not mutually exclusive, nor were the decision-making drivers. This meant that good ethical decision-making would always be difficult and demanding. However, a failure to develop consistent ethical decision-making in business would lead to greater formal regulation and more laws. This was not in the interest of most corporations so it was vital that internally and externally acceptable codes of good practice are developed and applied.

| mn b/d | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Russia supply | 7.6 | 7.9 | 8.1 | 8.3 | 8.4 | 8.5 |
| Non-OpecMiddle East | 2.1 | 2.1 | 1.9 | 2.0 | 2.0 | 2.0 |
| Other Non-Opec supply | 38.4 | 38.9 | 40.1 | 40.9 | 41.3 | 41.8 |
| Middle East Opec | | | | | | |
| Iraq | 2.0 | 2.6 | 2.6 | 2.9 | 3.5 | 4.2 |
| Saudi Arabia | 8.4 | 7.5 | 7.4 | 7.3 | 7.3 | 7.3 |
| Iran | 3.5 | 3.7 | 3.7 | 3.8 | 3.9 | 3.9 |
| Kuwait | 2.0 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| UAE | 2.4 | 2.5 | 2.5 | 2.6 | 2.6 | 2.7 |
| Qatar | 0.8 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 |
| Other Opec | 9.4 | 10.0 | 10.3 | 10.4 | 10.5 | 10.7 |
| Total supply | 76.7 | 78.4 | 79.8 | 81.4 | 82.8 | 84.5 |

Table 2: Forecast global oil supply, Saudi Arabia accommodating restored Iraqi production

Source: Wood Mackenzie

...continued from p15

of Iraq's adversaries of the recent past – will be expected to take some share of the pain.

Even in a case where Iraq is restored as a full member of Opec and the various members accept their share of production constraint as we have suggested, Iraq's desperate reconstruction needs and the inevitable tensions as other members seek to restore parity, are expected to present an ongoing threat to discipline on quotas.

The only way (for prices) is down?

Speculation on short-term events is understandably distracting from more significant medium and long-term considerations. The size and duration of any short-term spike in oil prices does threaten recovery in the fragile global economy, but it is likely that oil prices will be back to 'normal' within six months of the end of any conflict.

The challenge then, we believe, will quickly revert to Opec's ability to manage the forecast expansion of Iraqi supply and to restore equilibrium in the market. This will become increasingly difficult given the expected growth in Russian, Caspian and West/Central African production. If Iraq is to be restored to a quota approaching its previous share of Opec

output (14%, or 3.5mn b/d), it is likely to require an uncharacteristic display of altruism from its fellow members.

If Opec persists with its commitment to maintaining oil prices within its current target price range, it is likely to be consigning itself to a sustained period of exceptional restraint. Such an accommodation will be very difficult to maintain and the almost inevitable outcome will be increased tension within the organisation and a sustained threat to discipline on production quotas.

All of this points to the remainder of the decade being characterised by predominantly downward pressure on oil prices and the prospect of periods when prices will drop below the lower end of the current Opec target range.

But then, in the still longer-term, beyond 2010, Opec is expected to quickly re-establish its predominance. By this time, non-Opec supply growth will generally have slowed and mature regions, such as the North Sea, will be in irreversible decline. As global oil consumption continues to grow, Middle East Opec should begin to assume its inevitable dominance in production and its decisive hold on world oil markets.

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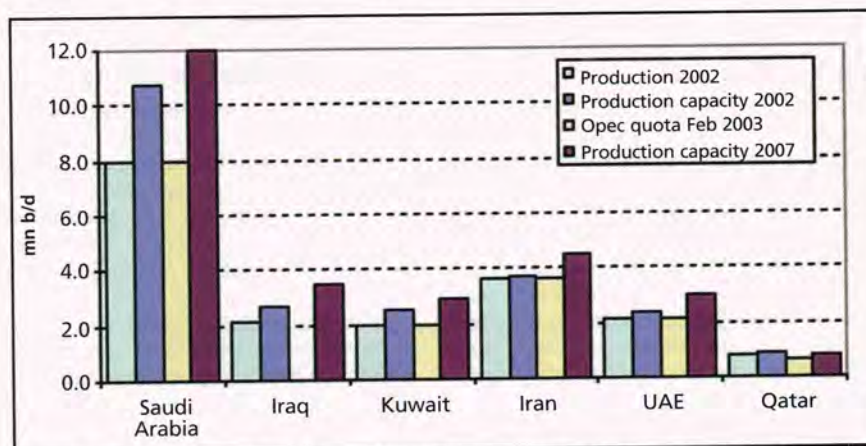


Figure 4: Forecast growth in Opec production capacity, 2002-2007

Source: Wood Mackenzie

Value creation through active portfolio management

Olivier Allen, Investment Strategist from Deloitte & Touche Petroleum Services, reviews the financial challenge that the oil and gas industry is facing and suggests how a modern portfolio approach can help oil and gas executives achieve financial returns by better aligning their strategy and capital allocation decisions with capital market expectations.

Globalisation of the economy and the availability of technology are changing the petroleum industry. Today, company executives face increased competition to attract capital and increase their stakeholders' value. Historic focus on production growth and cost cutting, together with relatively high oil prices, have helped to produce some healthy financial returns in recent years. The current high oil price and the pressure to achieve financial targets is currently shifting focus from production growth to value-based strategies. Systematic and active portfolio management can help companies to increase value by improving investment decisions through the management of portfolio risks.

Before considering either a strategic portfolio review, or growth organically or by acquisition, an oil and gas company needs to recognise whether its next move is likely to create the right balance of financial return for the level of risk. If the return exceeds the compensation required for the level of risk then value will be added. If it is lower then value will be destroyed.

This relationship between risk and financial return is well known to those investors who invest in diversified portfolios to reduce their exposure to individual business risks. Diversification helps to maximise the chance of achieving a required level of financial return in line with an investor's appetite for risk. In the case of an oil and gas company, diversification does not mean holding a large portfolio of assets but rather the right mix of assets. A diversified portfolio should be able to withstand unexpected adverse events such as lower production levels in some assets, exploration failure and environ-

mental hazards, as well as a volatility in oil price that can severely affect a company's financial results.

A critical step in recognising and creating value is to examine the relationship between risk and value from a stakeholder's perspective. To illustrate



Figure 1: Capital asset pricing model

this relationship, a brief review of a fundamental model used in financial economics is needed – the Capital Asset Pricing Model (CAPM) as illustrated in Figure 1.

The financial challenge

Until recently conventional wisdom dictated that production and reserves growth were the key measurement of the success of an oil company's growth and that risk by its nature was costly to the company's stakeholders. It followed from this view that risk reduction would enhance the company's value.

In the late 1960s, CAPM was introduced to the financial community with a message that investors could diversify business or asset specific risks (ie non-correlated to the financial markets). There was no advantage for a company to reduce business risks when investors

could achieve the same results through the management of their own portfolios. Following these developments it became clear that the return required by investors was strongly dependent on the level of market risk to which a company was exposed.

In the CAPM framework, the level of market risk is expressed through a beta factor on the assumption that a company is only financed by equity (see Figure 1). The beta factor measures the correlation between the return on the company's own equity relative to the return achievable from the financial markets. This new focus on market risk caused a re-evaluation as to why firms still displayed a marked aversion to risk, even when such risk can be diversified by investors through their own portfolios.

Under this new paradigm that we are introducing, business risk is costly because it reduces the expected value of future cash flows. This is because business risk enhances incentive conflicts between the company's stakeholders, increases expected costs of financial distress and can increase taxes when the relationship between profits and taxation is non-linear. Today, the industry's new focus on portfolio management derives in part from changes in the theory surrounding portfolio management and its practical application in industry and commerce.

Recent developments in financial economics and portfolio management techniques have indeed had an impact on the oil and gas industry. The message of both is that stakeholder value creation strongly depends on the accurate separation and valuation of market (systematic) and business (non-systematic) risks and the optimum allocation of capital. Modern portfolio management recognises that only systematic risk has a value and that the effect of business risk on portfolio decisions can be explained by the change in the expected costs associated with them. These costs to the stakeholders (known as frictional costs) are generally grouped in three main classes – financial distress, agency and non-linear tax costs. The effect of increasing business risk is to increase the expected value of these frictional costs and thereby destroy value.

One important implication of these theories is that portfolio management

has more to do with the preservation and creation of value than the elimination or reduction of risk. Risk is not something to be eliminated, but a commodity to be created, managed and exchanged.

A new age

From the CAPM model, we know that stakeholders are mainly concerned about market risk. The company, long viewed as a nexus of contracts, may also be viewed as a nexus of risks that may be separated.

Some of the main risks faced by oil and gas companies include commodity price risk, exploration and production risk, casualty risk, foreign exchange risk and political risk. An oil and gas company may choose to bear, transfer, or hedge these risks.

In order to actively manage a portfolio and create value, a company needs to separate and price business and market risks in line with stakeholders' interests (CAPM). Business risks are the risks that can be diversified by holding a portfolio of assets, for example exploration and production risks, and environmental risk. Market risks are those risks outside the control of management and depend on the state of the economy, such as commodity price risks, foreign exchange risk, inflation risk and political risk. (See Figure 2.)

Business risks

We have seen that stakeholders can eliminate business risk through diversification. So, why are oil and gas companies still trying to reduce these risks? One of the reasons is that the

capital-intensive nature of the oil and gas business makes it difficult even for companies with a strong balance sheet to survive a project failure. Large business risks can increase the probability of bankruptcy and the costs (lawyer, liquidator, etc) associated with it to such a level that it becomes valuable to reduce business risks at corporate level.

Business risk reduction also helps to reduce the volatility and increase the predictability of the company's profit stream. This in turn facilitates planning and increases stakeholders' confidence in the management.

The reduction of volatility in company profits creates value by reducing secondary costs (frictional costs) to the stakeholders such as financial distress costs, agency costs, and non-linear taxes. Value is also created by reducing the probability of bankruptcy that impacts on companies' credit ratings.

Like investors, company executives' can create value by reducing business risk through diversification. Taken in isolation, the costly process of portfolio restructuring and diversification (effort and integration costs involved) appears to destroy value, but can create value if the saving in the expected frictional costs exceeds the amount spent on the diversification exercise.

Market risks

Market risks, unlike business risks, cannot be fully eliminated. An oil and gas company can only change the amount of market risk that it wants to take, and this will then define the return that stakeholders expect. For example, management can reduce commodity

price risk through long-term supply contracts or increase it by moving its portfolio towards the upstream part of the energy value chain. Changing the level of market risk in itself does not create value but changes the expected return that the company needs to achieve (see Figure 1).

It must be noted that too much market risk will increase the volatility of profits. This could reduce company value by increasing its expected tax liabilities and by increasing the likelihood of bankruptcy that credit rating agencies monitor. This is the area where commodity price hedging strategies could help create value.

Active portfolio management

Working with colleagues from our Financial Services and oil and gas practices at Deloitte & Touche, we examined various methodologies currently used in oil and gas companies to link investment decisions with stakeholders' interests. A popular corporate management tool is to set a company-wide hurdle rate for projects. Although in doing this the intention of senior management is to increase the return for stakeholders, the result can be counter productive.

For example a business unit could respond to a high hurdle rate by taking on riskier projects with a rate of return that exceeds the hurdle rate. First, the project will add value to the extent that the expected return has increased at a disproportionately higher rate relative to the risk. If not, the project will destroy value. Projects that create value tend to be more elusive than projects that destroy value. Second, a business unit that returns, say, 5% above the risk free rate with minimal associated risk, is clearly adding value for stakeholders. A directive that projects should exceed a hurdle rate of 10% in excess of the risk free rate would penalise this profitable business unit and lead to a loss of shareholder value. This management strategy of setting the hurdle rate at the corporate level will attract projects of a corresponding risk level, which may or not add value.

In order to overcome this fundamental problem, we needed to find a practical way to separate and price both business and market risks, and to quantify the effects of diversification in an oil and gas portfolio in line with capital markets' pricing of risk. We adapted a modern actuarial valuation technique that allows us to separate business and market risks. For example, we can now isolate individual market risks such as oil price, exchange rates and inflation

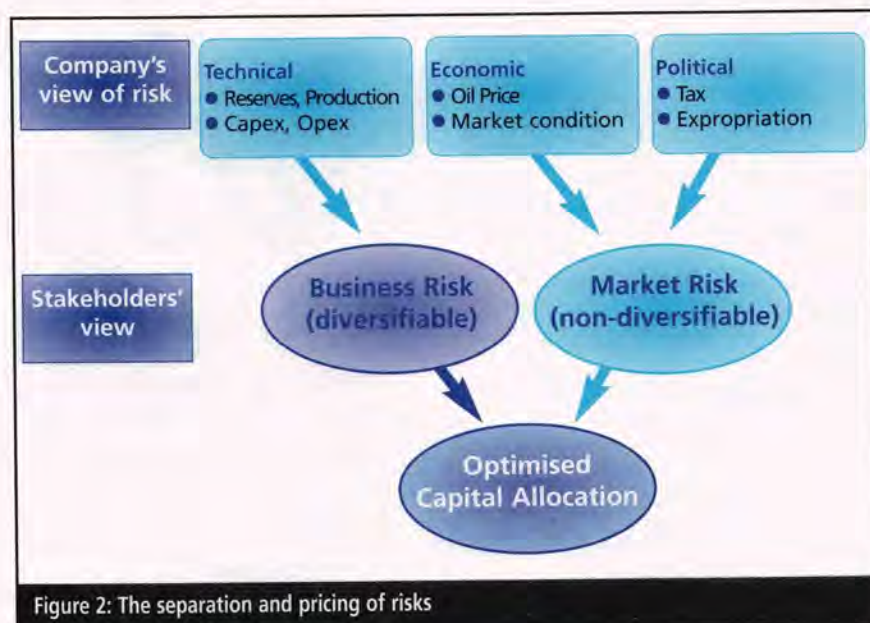


Figure 2: The separation and pricing of risks

and put a market value on them at asset and portfolio level.

The benefits are immediate. The value of the market risk is the value that is important to stakeholders because they can eliminate the business risk through diversification. The cost of risk reduction strategies can be directly compared to the value benefit. This new approach also provides insight into value creating and destroying assets while supporting active portfolio management focused on stakeholder value.

Figure 3 illustrates risk separation and valuation. We have reverse-engineered the cost of capital that a company should have used to reflect the different level of market and business risk of each asset in a portfolio of North Sea producing assets. We then compared the results with a hurdle rate of 7%. It is clear that some assets have been mispriced when using a single hurdle rate and that the allocation of capital was not optimal. Assets are overvalued when the hurdle rate is too low for the level of risk. Assets are undervalued when the hurdle rate is too high. The capital locked into mispriced assets can be released by selling overvalued assets to another company, where assets' cash flow patterns better contribute to the reduction of the

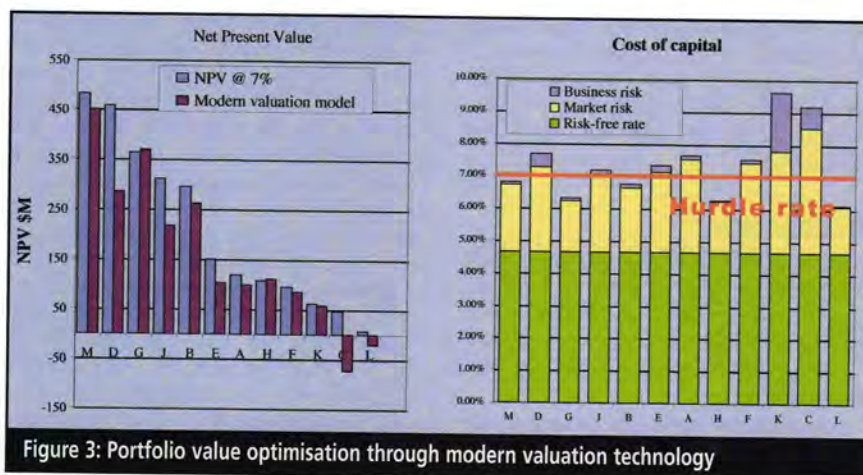


Figure 3: Portfolio value optimisation through modern valuation technology

portfolio's business risk. The difference in risk reduction between two companies' portfolios explains why some assets are more valuable to one company than to another. Ultimately, a more informed investment decision can be made and financial performance can be improved.

Extending our approach it is also possible to price development options and oil price kickers often found in transactions. We can also value and optimise hedging strategies and structure complex transactions while maximising stakeholders' value.

The separation and the valuation of

risk is fundamental to value creation and portfolio management. Short and long-term strategies and their impact upon stakeholders' value can be investigated. Our modern valuation methodology is able to separate market and business risk and quantify diversification effects in oil and gas portfolios. This methodology allows us to help oil and gas companies to structure their portfolios in order to maximise stakeholders' value.

For more information, please contact Olivier Allen at Deloitte & Touche, e: oallen@deloitte.co.uk

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Closing the loop on accurate wetstock monitoring

The outsourcing of fuel monitoring is the best way to satisfy today's stringent safety and environmental requirements on service station operators, claims *Nick Payne*, Director of Mercury Petroleum Systems.

Leaks can be very costly to the forecourt operator, indeed, they can lead to business failure. Not only is product lost and the environment damaged, bad press can result and clean-up can cost anything from £70,000 to £150,000.

Peace of mind

Fuel monitoring is the obvious solution and contacting a monitoring company is the first step to peace of mind – knowing your fuel is being looked after by experts. However, this is only the first step. Just contacting a monitoring company such as Mercury Petroleum Systems is not enough. The fuel retailer also needs to provide data, preferably accurate data! One of the biggest problems companies such as Mercury face is having to spend many hours on the telephone cleaning up data irregularities – such as no delivery input (perhaps the delivery ticket was left in the driver-controlled delivery system), test transfers not being correctly reported, and inaccurate split delivery and dip data.

One-stop-shop

Mercury is a one-stop-shop for peace of mind data capture – your tank is your bank! Along with monitoring services

Mercury supplies a very accurate tank gauge that weighs the fuel, a POS (point of sale) system and a touch-tone phone delivery system. The problems of getting reliable data have been solved by capturing the pump sales and tank dips every hour, getting the ticketed invoice

delivery from the driver or operator, and utilising gauges to measure what has actually been received and the temperature change. We record the ID, time, site, and amount delivered to each tank, and the terminal that it has been drawn from.

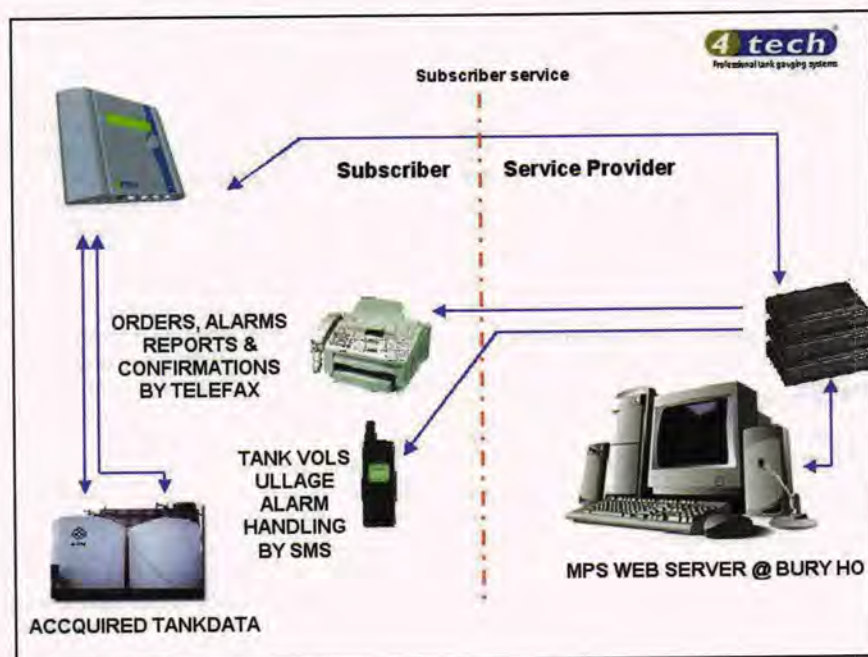
Armed with this technology our trend system can accurately calculate leak loss rate per hour. If the POS fails we are delayed by just one hour as all data is stored on a secure web server and the fuel delivery company schedules the deliveries with our software or their own.

Mercury also polls certain models of Veeder Root and Emco gauges for deliveries over the last three days, temperature change before and after the delivery, volumes, ullages and alarms.

Tankers can be fitted with GPRS phones to enable the driver to dial in and see the ullage or volume of any tank we have polled, in order to facilitate out of hours deliveries. The site still has to supply the safety mechanisms required to satisfy the local Petroleum Officer. Once the driver interrogates a gauge our system sends an email to the relevant person to say when the driver asked for the ullage readings.

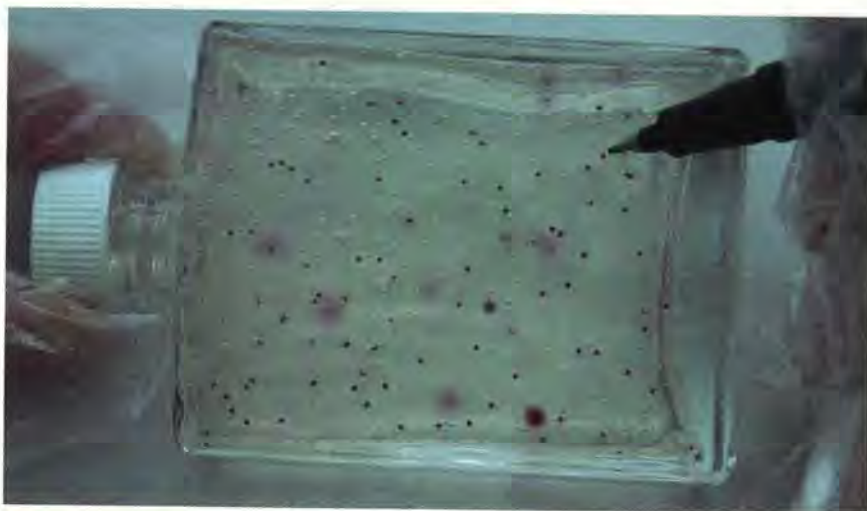
Mercury technology enables us to take away the strain of capturing accurate data by using conventional methods. This then allows us to spot leaks more quickly than most Statistical Inventory Reconciliation systems.

Mercury Petroleum Systems supports and calibrates its own gauges via the telephone line and meter proves the dispensers, closing the loop on accurate wetstock monitoring. Mercury is able to bring peace of mind to forecourt operators who know their fuel is being looked after by experts.



A matter of fact fairy tale

ECHA Microbiology was announced the winner of the IP Innovation Award at the annual IP Awards Dinner held at London's Savoy Hotel on 26 November 2002. Here, **Ted Hill** explains what the award means to his company and outlines the prize-winning project in more detail.



'And the winner of the Institute of Petroleum Innovation Award for 2002 is... ECHA Microbiology for their Smartgel on-site test kit for detecting microbes in fuels and oils.' An enormous and incredulous gasp... mine. Collect the trophy in a daze – lots of congratulations and toasts – wake up with a hangover to match the magnitude of the Award!

But what has it meant for our company and our staff?

First of all, the excitement and pride that has exuded from every member of our small business – it was everybody's award. Also, quite a few broad and satisfied smiles from the Welsh funding agencies that had helped us develop the test kit, as well as from the major fuel suppliers and users who had trialled it, liked it and had sufficient faith in it to use it regularly. Not only use it, but in one case (BP), take on worldwide marketing responsibility for it as a rebranded product, MicrobMonitor.

Prize-winning project

So how could a microbiological test kit costing just a few pounds win such a prestigious award in the petroleum industry? Because microbes are often the unseen enemies that cause fouling, spoilage, equipment malfunction and corrosion in hydraulic and lubricating oils, cutting oils and, most dramatically, in fuels. Hydrocarbons are great things

for microbes to eat – providing far more energy for growth than sugars and fats. And if you want to fight them you've got to find them.

Microbiological tests, such as IP 385/99, used to be complex and mysterious procedures carried out by laboratory based 'egg heads' in white coats. They could churn out mathematical results which often meant little to the client who had sent the sample. Frequently they would qualify the result by pointing out that this was the number of microbes at the time of testing, not at the time of sampling. Some growth, some death, or a little of both might well have occurred whilst the sample was in transit and this would prejudice the validity of the result. An on-site test eliminates this uncertainty.

Complex and mysterious procedures? Not at all. A sample of fuel is measured into a small bottle of thixotropic nutrient gel. The gel is shaken, it liquefies, and the fuel and any microbes in it disperse in the gel. The gel resets and each microbe grows and reproduces and forms a visible red spot – overnight or a little longer (see photo).

Meaningless mathematical results? Not any longer. The result is essentially visual – the number of red spots in the test bottle equals the number of microbes in the sample.

A test conducted by white coated egg heads? Not now. Anyone who can shake a bottle and count can do the test.

In a laboratory? Not necessary. Any corner of an office or a hotel room will do.

So what? Fuels are only sterile at the point of manufacture. They reach the end user after picking up traces of 'dirt' on route – so called background contamination. At any stage during distribution and use, when the conditions are right, a few microbes can start to grow and reproduce. A quantitative on-site test can distinguish between background contamination, the first onset of microbial growth and contamination severe enough to cause operational problems. For many companies very costly operational problems have been the first indication that substantial microbial growth has occurred. The new test can be used to set numerical warning and action limits, and then monitor systems and apply them.

A little growth detected early is easily eliminated with a biocide or by filtration. A lot of growth takes a lot of killing, with impractically high concentrations of biocide applied for a long time and copious sludges of dead microbes. Not a good option. Manual cleaning is the preferred response to heavy contamination, followed by biocide treatment. Both these options are time consuming and costly procedures. Early detection and early action must be the preferred strategy.

The MicrobMonitor test thus makes possible a practical strategy for avoiding operational problems. That is the revolution that the IP Award recognises.

Faith in the product

Does it work? IATA (the International Air Transport Association) thinks so. Its *Guidance Material on Microbiological Contamination in Aircraft Fuel Tanks*, published on 1 November 2002, recommends that all aircraft fuel systems are tested regularly by an on-site test. It quotes warning and action limits, and lays down remedial procedures in response to transgressions. Similar strategies are already being introduced by fuel suppliers.

Tale of inspiration

Winning the IP Award has given ECHA Microbiology worldwide credibility and worldwide acceptance of on-site microbiological monitoring as the preferred strategy for avoiding microbial problems.

And to think that the inspiration for the test kit came from shaking a bottle of tomato sauce. Almost unbelievable. Almost a matter of fact fairy tale! ●



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Rock 'n' roll



The primary separation vessel, heart of the extraction plant at Aurora

Gordon Cope looks at the problems besetting oil sands and heavy oil projects worldwide.

Oil sands are deposits of bitumen (petroleum in the solid or semi-solid state), mixed with unconsolidated sand. Heavy oil is very viscous petroleum, measured in the range of 8–9° API. The oil sands region in Alberta contains 300bn barrels of recoverable crude, out of total reserves in place of 2.5tn barrels (see *Petroleum Review*, February 2003). Venezuela also contains immense deposits, about 289bn barrels of recoverable reserves, which are primarily located in the Orinoco heavy oil belt (see *Petroleum Review*, June 2002).

While the production of oil sands and heavy oil require large capital investments, the risks are low and the rewards – under favourable tax and regulatory conditions – are tangible. Over the last decade, tens of billions of dollars have been invested – primarily in Canada and Venezuela – to exploit these massive reserves.

However, heavy oil and oil sands projects are facing a range of political, environmental and production hurdles that may significantly alter the viability of these resources.

Venezuela heats up

During the 1990s the Venezuelan Government initiated four major heavy

oil joint ventures between the state owned oil company *Petroleos de Venezuela* (PdVSA) and international petroleum firms. (The following are the capacities achieved before the strikes shut in production.)

- The \$2.5bn Petrozuata project between PdVSA and Conoco came onstream in 1998. Current production is 120,000 b/d.
- At Cerro Negro, production has also reached 120,000 b/d since PdVSA and ExxonMobil began pumping heavy crude in 1999.
- The \$4bn Sincor project is jointly owned by TotalFinaElf and PdVSA. It began production in 2000 and is expected to produce 200,000 b/d upon completion of all upgrading facilities.
- Hamaca, consisting of a joint venture between PdVSA and Phillips and ChevronTexaco, began production of 36,000 b/d in 1999. It is expected to reach a peak volume of 190,000 b/d in 2004.

Altogether, the four projects have achieved production of 368,000 b/d in November 2002 – a figure that is expected to rise to 600,000 b/d by 2005.

Beginning in December 2002, however, a countrywide strike crippled the oil

industry and Venezuela's daily production dropped dramatically. Cerro Negro fell to 45,000 b/d and Petrozuata reduced its output to 80,000 b/d. Stocks of heavy oil at the various US Gulf Coast refineries, including Conoco's Lake Charles facility in Louisiana, fell dramatically. In January 2003 there was no production from the four heavy oil Orinoco projects.

Canada chills out

One might be tempted to think that Canada looks much more inviting as an investment locale for heavy oil and oil sands, but one might be surprised.

On the surface, everything looks rosy. Thanks to regulatory changes that allow capital costs to be paid upfront from production, output of synthetic crude from oil sands reached 440,000 b/d by the end of 2002. In addition, heavy oil from oil sands (that has been recovered through augmented methods such as steam assisted gravity drainage, or SAGD; see p29), stands at 300,000 b/d, and conventional heavy oil production has surpassed 553,000 b/d. These three categories now account for 67% of total Canadian crude output of 1.9mn b/d.

In addition:

- Syncrude Canada has plans to increase its production by 40% to 368,000 b/d by 2005. It is three-quarters of the way through its current C\$8bn expansion programme, expected to be completed by 2007.

- Suncor Energy increased its production capacity from 115,000 b/d to 225,000 b/d with the completion of the Millennium mining expansion project.
- Shell expects its Muskeg River mine to enter full production of 155,000 b/d by 2Q2003.

Scratch beneath the surface, however, and a less benign picture emerges. In late 2002 Petro-Canada warned that the planned C\$415mn investment on the proposed Meadow Creek bitumen extraction project in 2003 was at risk. Canadian Natural Resources, with C\$8bn earmarked for the 300,000 b/d Horizon oil sands project (expected to be completed by 2007), said that its plans were also under review.

The primary cause for their hesitation was, in one word, Kyoto. In December 2002 the Canadian Government officially ratified the Kyoto Protocol, which sets targets for greenhouse gas (GHG) emissions at 6% below 1990 levels. One of Ottawa's original options was to tag the upstream producers with the responsibility for emissions from every barrel of oil, regardless of its end use.

The Alberta Government, whose province accounts for the majority of petroleum production in Canada, objected to the economic burden placed upon the energy industry. Murray Smith, Minister of Energy for Alberta, said that Kyoto would 'trigger a migration of capital investment out of Canada'. Countries like Venezuela and Mexico, he noted, were not bound by the Protocol, and would boost their production to displace Canadian energy exports.

The Federal Government has since evolved its position – the carbon dioxide equivalent (CO₂e) burden will also be shared by consumers. Under such circumstances the Kyoto Protocol has a relatively muted effect on the production of heavy oil because, even with SAGD, most GHG emissions can be passed forward. 'The refining is being done in coke upgraders in Minnesota, so that jurisdiction has the responsibility for the CO₂e emissions,' notes Tom Ebbert, Director of Research at Tristone Capital, an investment consultancy based in Calgary. (The US, alas, has declined to ratify the Protocol.)

Oil sands projects, which largely refine the bitumen into synthetic crude at Canadian sites, are not so fortunate. A decade ago the energy required by operators to mine and refine one barrel of synthetic crude amounted to approximately 135 kg of CO₂e. Since then, advances in recovery and processing have reduced that amount to under 100 kg, and it is expected to be in the range of 70 kg by 2010.



Hydrotransport pipeline leads to the aurora primary separation vessel

However, following current trends, oil sands production is also expected to reach approximately 1.7mn b/d by 2010. According to the Canadian Association of Petroleum Producers (CAPP), an industry lobby, if current emission trends hold steady until 2010, Canada's annual CO₂e emissions will be in the range of 810 megatonnes per year, well above the Kyoto target of 570 megatonnes. Natural Resources Canada predicts that new oil sands projects alone will account for about 27 megatonnes of that growth.

Oil sands operators are optimistic that they can reduce emissions further, but, in the end, it is highly likely that they will have to purchase some form of carbon credit. A recent survey by emissions broker Natsource LLC, of New York, showed that market participants expected prices to average \$5/t of CO₂e until 2005, and reach an average of \$11/t by 2010, once the Protocol is initiated.

The Canadian Government has offered to subsidize the cost of carbon credits if they exceed \$15/t, which works out to approximately 30–40 cents/b. Under such circumstances the annual cost of complying with Kyoto for a large oil sands project would be in the \$30mn–\$40mn range. 'If 30 cents per barrel is the level, then that's something that industry can manage,' says Onno DeVries, Manager of Oil Sands for CAPP.

But oil sands projects are long-term in nature, up to 50 years. The concern is that the price of carbon credits may, like the price of oil, fluctuate widely. 'There's no real market for carbon credits yet,' says Ebbert. 'They think it might be around \$10–\$15/t, but what happens when somebody tries to buy 75mn tonnes of it? Everybody knows

that if there's a tight supply of a commodity, then there's no upper limit – \$30? \$100? – nobody knows.'

Gas pains

A second cause for concern in Canada is the rising cost of energy needed to extract heavy oil and oil sands. Unlike Venezuela, where a high geothermal gradient beneath the Orinoco deposits obviates the need for energy-intensive lifting methods, much of the heavy oil deposits in balmy Alberta require some help. The viscosity is commonly reduced either by cyclic injection (in which a centrally located well is injected with natural-gas heated steam, creating a high-temperature front), or SAGD (in which a pair of horizontal wells are drilled, then steam injected into the upper well to heat the bitumen sufficiently to allow it to drain into the lower well; see p29). In most cases some form of electrical pump is needed to lift the oil to the surface.

Industry experts estimate that each barrel of oil produced under these circumstances requires approximately 0.8mn cf of natural gas and 20 kW of electricity. In January 2001 natural gas and electricity costs spiked, doubling the direct lifting costs per barrel of bitumen produced from approximately \$4 to \$8. Since then, electricity and gas prices have moderated back to long-term levels, but the January 2003 natural gas contract recently shot up to a 20-month high of \$5.28/mn cf on Nymex in the face of cold weather forecasts and storage draw-downs.

One way to reduce energy costs is to replace the steam. 'A lot of research is being done on using solvents in a flood-type action, such as injecting benzene



Froth booster pumps at the Aurora project

vapour into the ground, but solvent is very expensive and you need to recover as much as possible,' comments Ebberrn. 'If a large portion gets trapped underground, then it's not economic. So far, there have been no major breakthroughs.'

A second method is to find a less-expensive source of energy. Nexen and OPTI Canada plan to develop a SAGD bitumen extraction project in Long Lake, Alberta, that eliminates the need to purchase natural gas to heat the steam. Using a patented upgrader, the project will convert a portion of the bitumen into a synthetic gas that fuels the SAGD steam-generators. The first phase of production, slated for 2006, would produce 60,000 b/d of 20° API crude.

In the past, oil sands projects operated using techniques that relied heavily on cheap, abundant natural gas. Traditionally, the initial treatment for separating bitumen from sand and clay was to mix the oil sand with water, heat it to 75°C with natural gas, then spin it in a giant centrifuge. In order to reduce the amount of natural gas consumed, Shell Canada has engineered a more energy-efficient production stream into its new Muskeg River mine. It uses a paraffin-froth treatment,

where the oil sand is heated to a mere 35°C and pentane is slowly streamed through to absorb the bitumen.

Not so bad after all?...

Curiously, not all the news is negative:

- Oil sands operators benefit when the cost of electricity rises, because most projects now produce their own electricity and can sell their surplus on the grid as a bonus.
- The North America differential (the discount between heavy oil and regular crude that reflects extra refining costs, etc) has shrunk due to Venezuela's woes. Canadian producers, who might be expecting a seasonal discount of \$10 right now, are currently enjoying a differential of \$4.
- Natural gas hasn't risen as high as the price of oil, which was trading above \$30/b on Nymex in January.

In addition, although oil producers in Venezuela are suffering short-term pain from curtailed production, they may benefit in the longer term. 'The strike adds to the political risk but it won't chase investors away,' says Ebberrn. 'Venezuela wants to raise its oil produc-

tion to 6mn b/d. Right now it's at 2.8mn b/d – they'll need to sweeten the pot to get more foreign investment.'

Problems on the horizon

New problems skulk on the horizon, however. First, the differential is expected to widen as several major heavy oil projects come onstream over the next 12 months. Imperial Oil has a new phase at its Cold Lake project that will add 30,000 b/d and Petro-Canada will add another 30,000 b/d at Fort McKay. Altogether, new projects will amount to a 10% increase on current Canadian production. 'It will have to displace Venezuelan or Saudi Arabian crude, and displacement is a function of price,' says Ebberrn.

Similarly, the large increases in oil sands production may also create downward price pressure. Synthetic crude, which is primarily sold to refineries owned by the various oil sands partners, commands a small premium because of its low sulphur content. 'The latest increases in oil sands production, however, will exceed the capacity of partner-owned refineries to absorb it,' states Ebberrn. 'There's only so much synthetic crude that a refinery can take.'

Finally, scarce labour and other resources have dramatically inflated oil sands construction prices. 'There are too many projects being built at the same time – the last three major projects have had massive cost overruns of 30%–60%,' says Ebberrn. Shell's Athabasca oil sands project (which includes the Muskeg River mine) started at C\$3.5bn and ended up costing C\$5.2bn. 'The internal rates of return were north of 20%, but now they're down to 14%–15%.'

Regardless, many investors remain undeterred. In January TotalFinaElf announced it was investing up to C\$435mn in an oil sands project in Alberta. 'I don't think that's something that concerns us so much,' said spokesman Paul Floren, commenting on the Kyoto Protocol. Indeed, even the prospect of a mere 14% return seemed amenable. 'It's like taking the cream off the milk.'

Likewise, Encana Corporation, which has plans to boost its current heavy oil production from 30,000 b/d to 120,000 b/d over the next four years, takes the current crop of concerns in its stride. 'There are a whole suite of factors to consider, including marketing, production and the [price] differential,' says spokesman Alan Boras. 'You have to continually evaluate all of these over time.'

All photos: Syncrude Canada
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Hot under the collar

Dr Tawfik Nasr*, from the Alberta Research Council, explains how steam assisted gravity drainage (SAGD) technology is aiding the development of oil sands projects.

The capacity of world heavy oil and oil sands has been estimated to be as much as that of the world's total discovered light and medium crude oils in place. And over 90% of the world's heavy oil and oil sands are deposited in Canada and Venezuela (see p26). Up to 90% of Canada's estimated reserves could be recovered by in-situ operations and 10% by surface mining. As the resources available for conventional crude in Canada continue to decline, further development of heavy oil and oil sands recovery technologies is critical to meeting the country's present and future energy requirements.

Most recently, advances made in directional drilling and measuring while drilling (MWD) technologies have facilitated development of new in-situ production technologies such as steam assisted gravity drainage (SAGD) and combined SAGD-solvent processes. These processes have significantly improved well-bore reservoir contact and sweep efficiencies, while reducing production costs.

Promising recovery technologies

Western Canada has large reserves of heavy crude oil and bitumen, most of which cannot be produced by conventional recovery methods. Specialised techniques are required and recent thermal oil recovery technology developments at the Alberta Research Council (ARC) have focused on SAGD and SAGD-solvent processes.

The most promising thermal recovery technology is the SAGD process (see Figure 1), in which two horizontal wells separated by a vertical distance are placed near the bottom of the formation. The top horizontal well is used to inject steam, which rises to form a large steam chamber above the well, while the bottom well is used to collect the produced liquids (formation water, condensate, and oil). The rising steam condenses on the boundary of the chamber, heating and entraining the oil to the production well. The process leads to a high recovery and high oil rate at economic oil-to-steam ratios (OSR).

The Underground Test Facility (UTF-Phase A) at Fort McMurray, Alberta, Canada, was constructed in 1985 by the Alberta Oil Sands Technology and Research Authority (AOSTRA) to test the concept of SAGD. The process was tested from December 1987 to mid-1990. The UTF-Phase A project was the first successful field demonstration of the SAGD process. In addition to proving the concept of SAGD, it also provided operational know-how that is critical to its successful commercial application.

Following the success of the UTF Phase A project, 500-metre long horizontal wells have been used in subsequent phases to further test the commercial viability of the SAGD process. In addition, a number of field pilots are in progress in other heavy oil reservoirs in western Canada (Alberta and Saskatchewan) and around the world. These pilots tested the use of surface accessed horizontal wells and extended SAGD applications to problem reservoirs. These reservoirs often have lower permeabilities, are deeper, have bottom water transition zones, with initial

gas-saturated 'live' oil and top water/gas caps. In Alberta the success of these pilots has led to a number of commercial SAGD projects that are currently underway.

Current developments of the SAGD process at ARC are aimed at improving oil rates, OSR, reducing energy and minimising water disposal requirements. In addition to SAGD, progress has been made in the development of combined steam-solvent injection processes, a novel approach for combining the benefits of steam and solvents in the recovery of heavy oil and bitumen. A newly patented Expanding Solvent-SAGD 'ES-SAGD' process has been successfully field-tested and has resulted in improved oil rates, OSR and lower energy and water requirements as compared to conventional SAGD.

**Dr Tawfik N Nasr is a leader of the thermal gravity oil recovery strategic area in the Heavy Oil and Oil Sands Business Unit at the Alberta Research Council (ARC). His interests include thermal in-situ oil recovery processes, particularly development and implementation of steam assisted gravity drainage (SAGD), steam-solvent processes, horizontal well applications, fluids flow in porous media and heat transfer. He holds five patents in the field of in-situ oil recovery.*

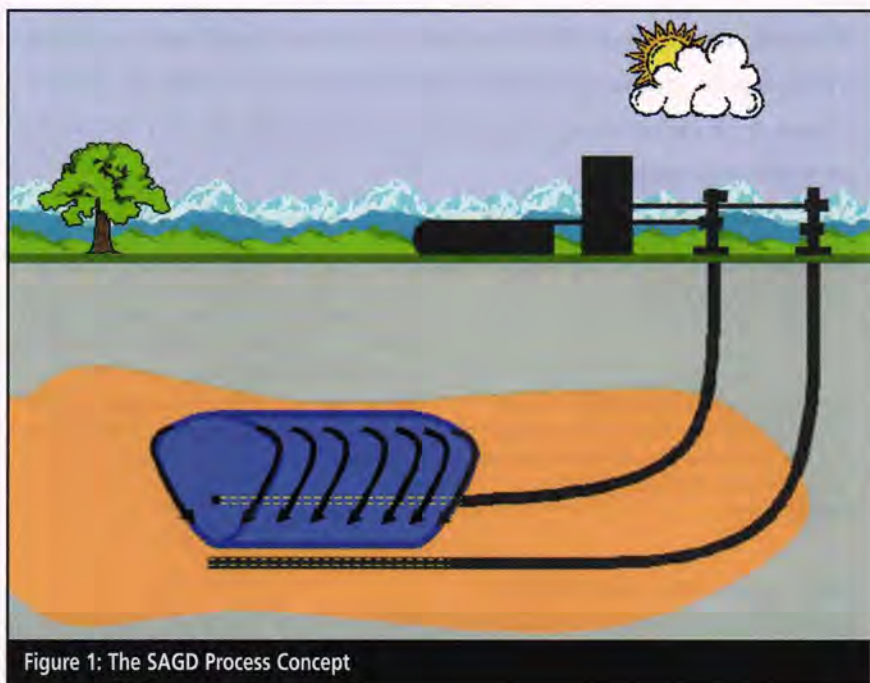
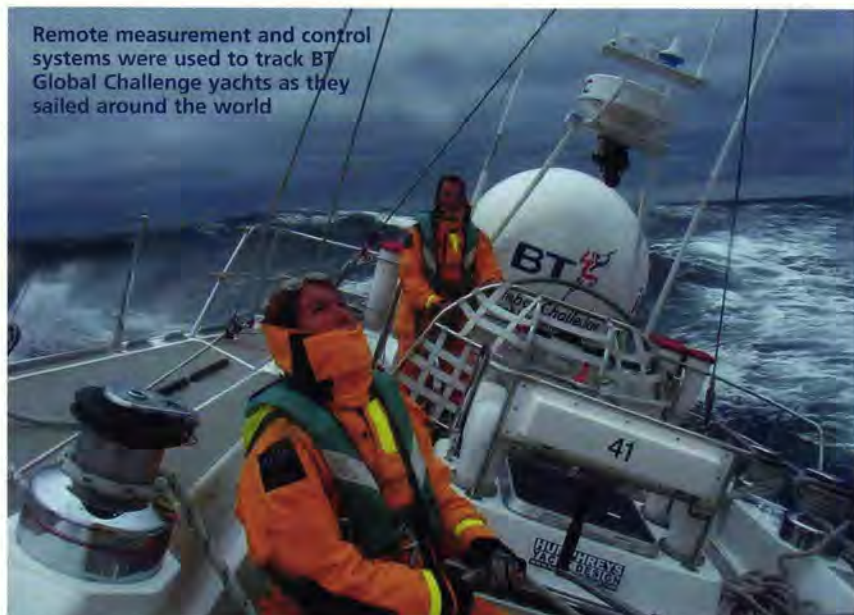


Figure 1: The SAGD Process Concept



Remote measurement and control systems were used to track BT Global Challenge yachts as they sailed around the world

Keeping control of the situation

While the use of remote monitoring systems to monitor onshore and offshore production equipment, pipeline pumping and metering stations, and bulk storage facilities has the potential to deliver both efficiency and safety benefits to the operator, their use to date has been limited by a lack of cost effective, reliable and secure communications. *Gary Hawksworth*, Development Manager, BTexact, and *David Whittingham*, Director, De Flow Ltd, look at how new communication technologies can address these issues and allow the full potential to be gained from remote monitoring systems.

Advantages

Worldwide coverage.

Reliability can be very high if well planned and delays can be overcome by design in the local infrastructure and correct management of applications.

Able to carry voice, video and data.

Disadvantages

Data costs are high if large volumes are transferred. This can be managed with compression technologies and local data processing.

Time delays can cause problems with security systems if not correctly configured.

Table 1: The use of satellite systems to provide global connectivity comes with a number of problems as well as benefits

If cost and risk were not issues, skilled people would be deployed at locations globally to monitor key factors such as production throughput and the need for equipment to be serviced, whilst being alert to safety and environmental hazards. People would be on hand to stop minor performance errors becoming expensive mechanical failures and to ensure that minor environmental problems do not become severe.

By coupling modern instrumentation and local data processing, technology can go some way towards removing the need for local staff, responding in a pre-programmed way to changing process conditions and taking appropriate action when readings exceed set thresholds. But unless staff can communicate with the remote systems to see what's happening and, if necessary, override the automatic response, there remains a need to check the infrastructure regularly to ensure production is not lost and that the integrity of the facility is not compromised.

Location difficulties

While remote monitoring of control systems is relatively straightforward on land in areas where telecommunications networks are readily available, it can be extremely difficult to achieve a reliable connection in remote locations where network access is limited, in harsh climates, or offshore.

Solutions do exist, however, as has been demonstrated by the use of remote measurement and control systems to track BT Global Challenge yachts as they sailed around the world. Building on this experience through our communication cost reduction (CCR) programme in the exploration and production sector, BT is now collaborating with specialist instrumentation and control companies to address remote monitoring and control issues.

An example is the use of satellite systems – an obvious way of providing global connectivity, but one that comes with a number of problems as well as benefits, as highlighted in **Table 1**.

Use of an infrastructure that integrates the measurement and control technologies with a variety of communications technologies can ensure that cost and performance are optimised while avoiding the issues listed in **Table 1**.

Integrated architecture

Figure 2 demonstrates how such an integrated system might operate. The measurement and control devices are located at the remote locations (Zone 1

– wellheads, pipelines, etc). Information from these locations is transferred to a local data centre (Zone 2) using either wireless or fixed line technologies depending upon distance and location.

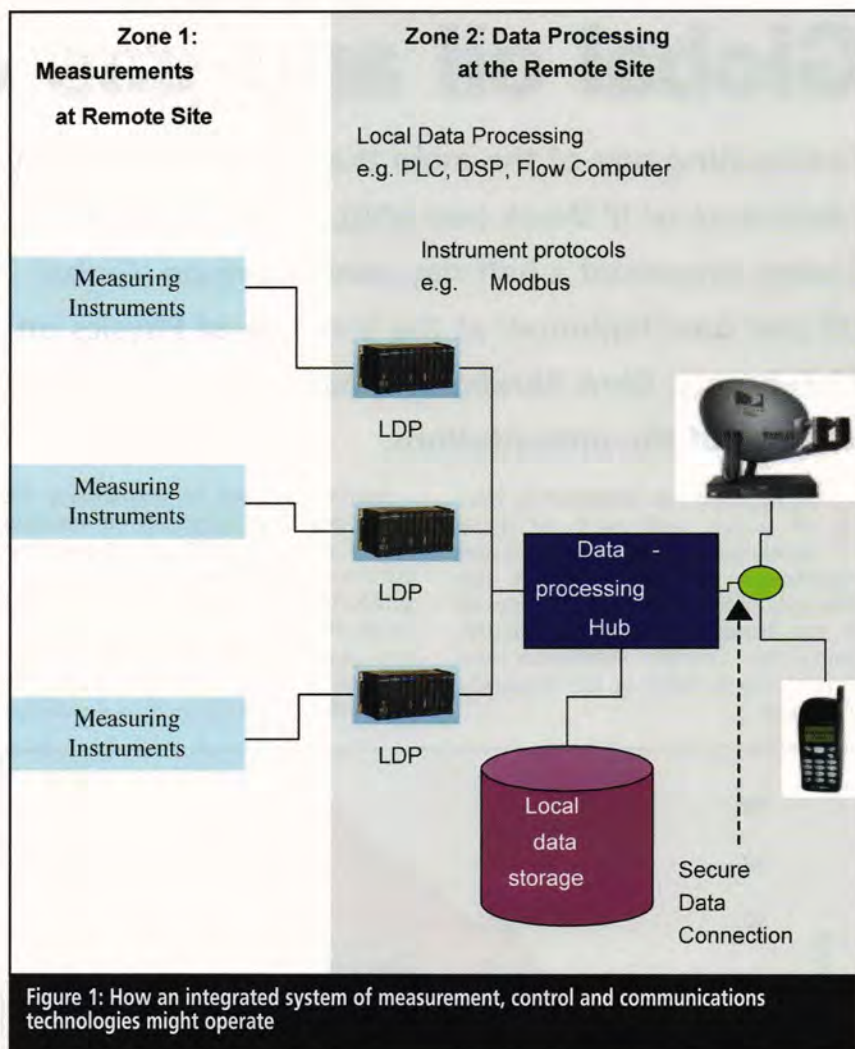
The local data centres play a key role in keeping the maximum amount of information in the area and only transferring key data through to a remote control room via satellite. For example, data can be transferred from several wellheads, miles apart, and allow interaction between sensors, control technologies and actuators to be handled locally. Key information and updates can then be compressed and sent via the satellite or mobile data link and instructions for the programmable controllers returned via the same link. This allows local information systems to operate quickly, whilst keeping satellite time delays and data transfer costs to a minimum.

Sweating the assets

In addition to instrumentation and control, the same infrastructure can be utilised for other tasks such as RF tagging for asset management, and internet and voice communications for remote workers. Together, these allow companies to deliver a high level of corporate governance across the organisation to remote locations by:

- monitoring and controlling systems centrally;
- being able to prove where specific assets are located and when they were deployed; and
- ensuring the latest information, procedures and advice are available to remote workers.

In conclusion, it is evident that the integration of technologies from



measurement, control and communications industries offers the ability to improve the management of remote facilities significantly, through minimisation of downtime, more effective

cost management and rapid response should problems occur. ●

For further information please contact gary.hawksworth@bt.com

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Global oil and gas depletion

Anticipating one of the main themes of the Monday conference of IP Week (see p18), the Institute of Energy organised a half-day conference on 'Global Oil and Gas Depletion' at the Institute of Physics on 13 February. *Chris Skrebowski* outlines the main findings of the presentations.

The meeting was attended by over 90 guests, addressed by three speakers – Roger Bentley of the Department of Cybernetics at the University of Reading, Francis Harper of BP and Professor Paul Stevens of the Centre for Energy, Petroleum and Mineral Law & Policy at the University of Dundee.

Bentley started by explaining his work with the University of Reading group and with ASPO, the Association for the Study of Peak Oil. He showed a production forecast in which oil output peaks at around 2010, and combined oil and gas production around 2015–2020 (Figure 1). The logic that leads to this conclusion is the conventional Hubbert

peak analysis that production will peak when half the original endowment (of recoverable oil) has been depleted. At this point production flows cannot be sustained and production declines.

Using a number of graphs he established that for conventional oil, ie free flowing, peak discovery was in 1965 and, that on the assumption of 1,800 Gb of recoverable oil being discovered by 2050, actual conventional oil production would peak in 2005. He then compared the modelled unconstrained Hubbert peak in 1995 with the actual production profile projected forward to show peak flows around 2010 (Figure 2). He then illustrated his thesis with graphs showing the relationship between discovery and production in various countries.

A graph of UK production by field clearly illustrated the two production peaks – the first caused by the Piper Alpha disaster with the subsequent production decline caused by the retrofitting of additional safety equipment and the second peak in late-1999.

He went on to address a number of oil myths, notably the misleading reserves/production ratio, plus infinite resources, increasing price, will find more oil etc. He then showed that most serious estimates of the original endowment of recoverable oil grouped around 2,000 Gb, with over 900mn barrels already consumed. He developed his theme of misleading data by showing that proved reserves seemed to refer to different things in different countries, in the way that the 'quota wars' of the mid/late 1980s had led to large upward revisions of Opec reserves with limited justification.

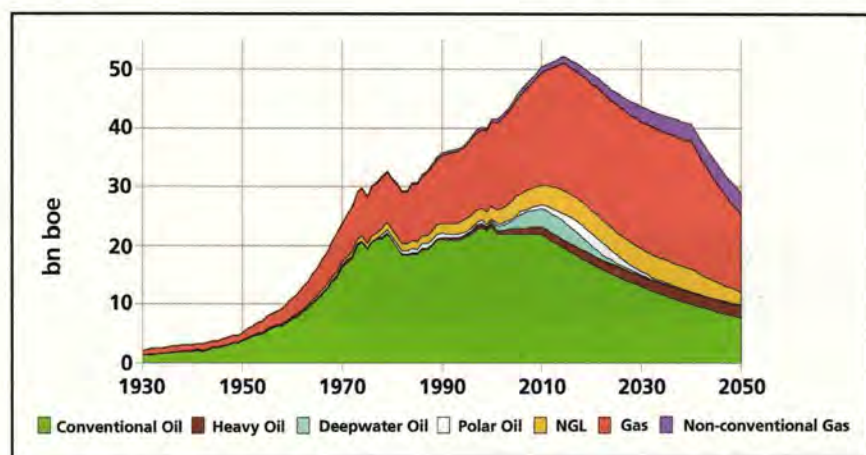


Figure 1: Production forecast – 2002 base case scenario

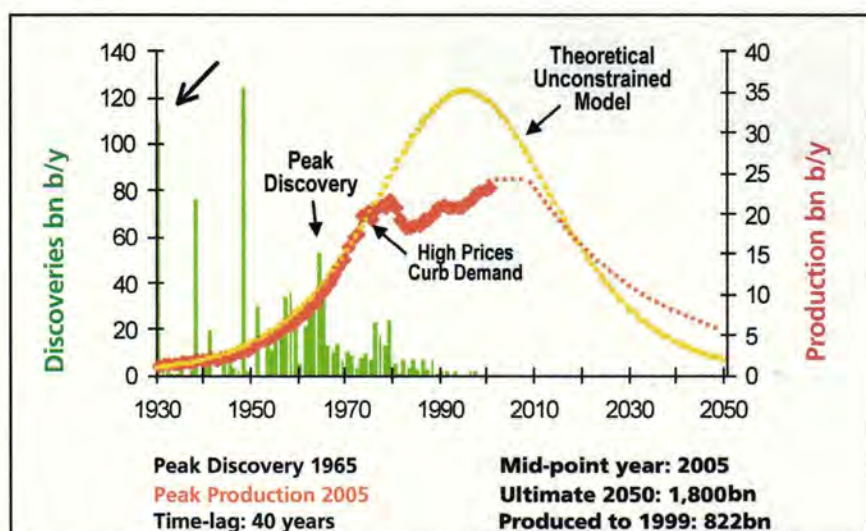


Figure 2: World – conventional oil

Varied viewpoints

His most telling point was when he explained the way that economists and geologists had failed to communicate and how this had been a disaster for the oil depletion debate. According to Bentley, the economists' claim is that geologists don't put price or technology gains in their models, and don't understand the way in which market mechanisms (price) turn resources into reserves.

The geologists, in their turn, say the economists fail to understand reserves reporting, using public data that is predominantly proved reserves (Figure 5), and so are able to make claims such as 'running into oil'. Similarly, they don't understand mid-point peaking, and so produce meaningless comments such as '40 years of oil supplies'. And finally,

because they don't understand the nuances of resources reporting, they claim large technology gains that are really just the product of reserves reporting conventions.

Specifically addressing the economists' arguments, Bentley pointed out that while higher prices encourage exploration, this doesn't necessarily translate into more oil as all discovery plots or creaming curves (wells drilled versus reserves added) reach a point when little or no oil is being added by additional wells.

The argument that price brings in uneconomic fields misses the point that most fields are uneconomic because they are small and so, even if made economic, add little. Most of the oil is in the large fields that are economic down to low oil prices. Increased recovery is real but small, maybe 10%, and all the apparent gains are the result of reserves reporting not technology.

Furthermore, the idea that prices give adequate warning is false – both oil and cod have reduced production costs but price gives no indication of depletion. The only way that price is effective is in the curbing of demand (although oil demand, now that it is concentrated in transport uses, is fairly price inelastic) and in bringing on substitutes. For most oil users, particularly transport, substitutes are uncertain in terms of both availability and price.

Bentley then completed his presentation by showing that realistic reserves growth was actually quite small, the spectacular changes coming from reporting practises and inconsistencies in definitions. His conclusion was that conventional oil supply would peak around 2010–2015, all oil around 2010–2020, oil and gas in 2015–2020 and gas in 2020–2025.

Varying profiles

The next speaker was Francis Harper of BP, who started by suggesting that Bentley's analysis was too rigid and too mechanistic. With a number of graphs and slides he showed that decline rates and production profiles vary greatly. He confirmed that discovery had peaked in the 1960s and fallen steadily into the early 1990s, but had recovered quite strongly in the late 1990s (Figures 3 and 6).

He showed that on the basis of ultimate recoverables of 2,250bn barrels and 2% annual growth maximum flow rates (Hubbert peak) would not occur until 2018. While if growth was 1% this would move out to 2020, and with no growth right out to 2030. If, however, the resource base was larger, even on a 2% growth rate peak flows were significantly delayed. If the resource base is 2,750bn barrels the peak date is around

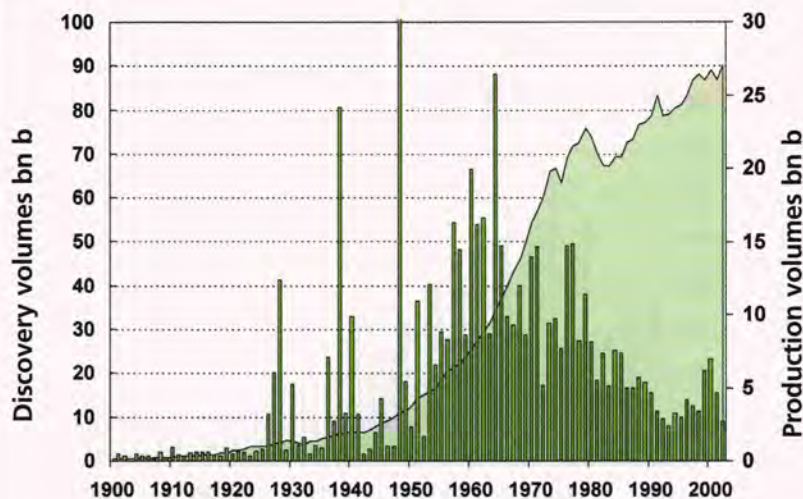


Figure 3: World production and discovery 1900–2002

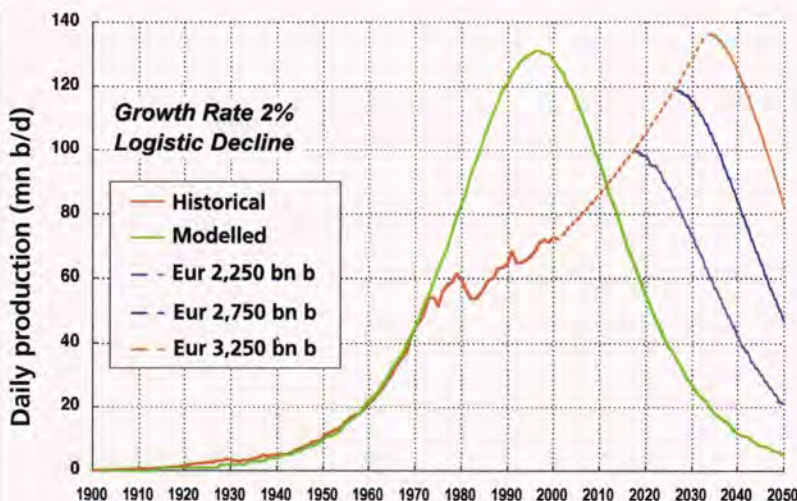


Figure 4: Peak oil – effect of changing resource

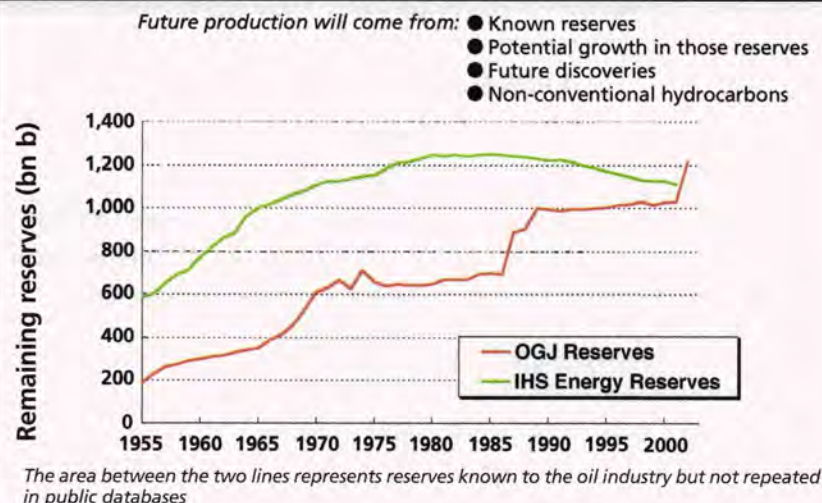


Figure 5: Resource magnitude

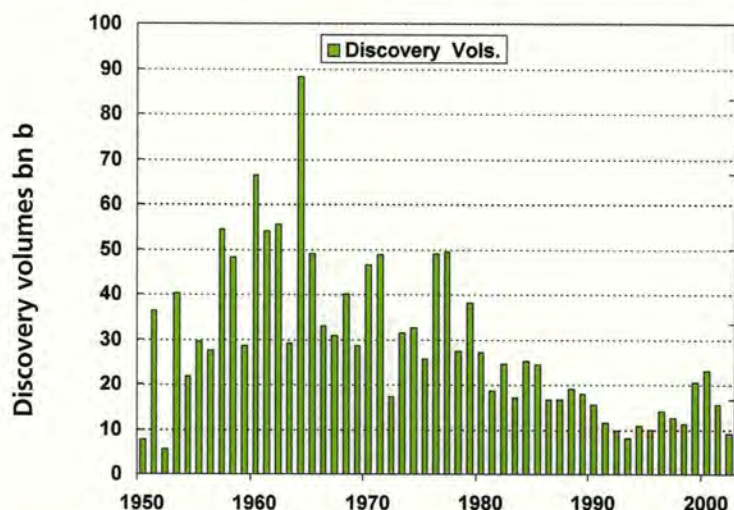


Figure 6: Reserves discovery by year (1950 - to date)

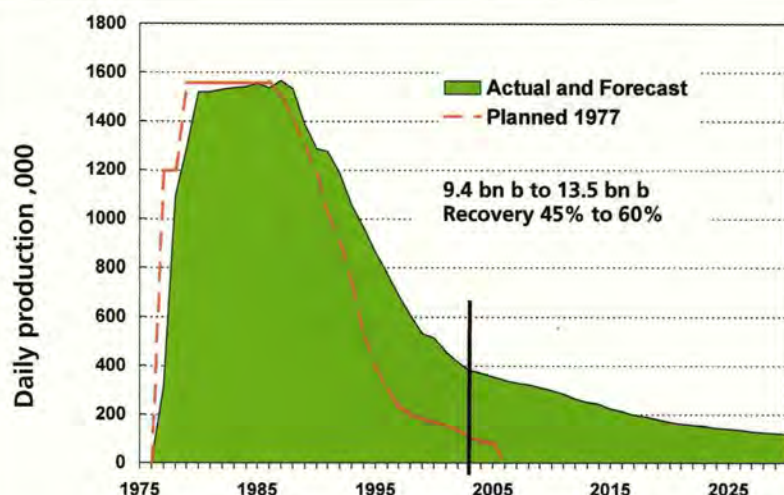


Figure 7: Future reserves: Reserve growth - Prudhoe Bay

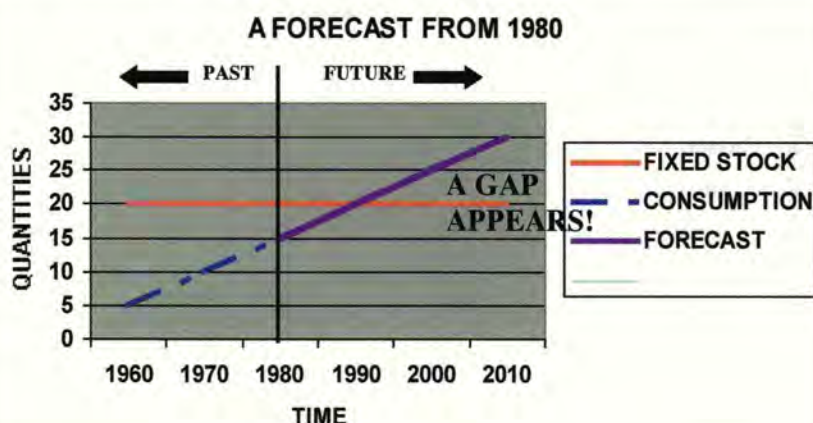


Figure 8: The depletionist methodology reduced to simple gapology

2025 and the peak flow is 120mn b/d. If the resource base is 3,250bn barrels, the peak date is around 2034 and peak flow is just under 140mn b/d (Figure 4).

He went on to show the effects of varying decline rates and to look at the size of the resource, the size of Middle East remaining reserves (around 600bn barrels), the size of recent discovery, and the lack of clear relationship between oil prices, exploration wells drilled and reserves discovered. After posing the question as to whether the recent decline (2001-2002) in discovery was an anomaly or the rise in discovery (1995-2000), he posed two key questions - is the Kashagan discovery unique or are there other super giants to be found? And, if the late 1990s upturn was associated with deepwater discovery, is this a pause or has it run its course?

Recovery rates

Turning to recovery rates, he showed that the global average is currently around 35% - which means if original discovered reserves are 1,950bn barrels then there were 5,500bn barrels originally in place. This, according to Harper, means that a 1% increase in recovery rate equates to an additional 55bn barrels; the potential prize from a 10% increase is 550bn barrels. He then showed that for Prudhoe Bay (Alaska) recoverable reserves had grown from 9.4bn barrels (45% recovery) to 13.5bn barrels (60%) (Figure 7). He then showed graphs that gave BP's oil fields a near 50% growth in reserves after coming onstream, while for all UK oil fields in the North Sea averaged a reserves gain of about 20% in the 20 years after being granted an Annex B. There was, however, a wide spread of reserves changes from those that doubled in size to those that had halved.

Harper illustrated the enormous potential of non-conventionals (heavy oil, bitumen) with a map showing reserves of 1,025bn barrels, of which 420bn barrels was in North America and 320bn barrels in Latin America. His final slide showed the wide variation in pre- and post-peak depletion rates by country.

He summarised his conclusion as:

- We are not facing catastrophe but there are issues to be faced, notably the required investment along with the concentration of production capacity in fewer countries.
- World oil production will probably peak and fall under resource-limited decline, but rapid development of non-conventionals or substitution by other forms of energy (gas, then renewables) could change this.
- Of the main variables controlling a resource-limited peak, resource

magnitude is the main one, but an extra 1tn barrels only defers peak by around 15 years.

- There is a large liquid resource available, but US Geological Survey estimates of reserves growth and yet-to-find are considered optimistic.

'Gapology'

The final speaker was Professor Paul Stevens who started by pointing out that the depletionist methodology basically comes down to what he called 'gapology' – extrapolating demand forward, treating the resource as fixed, and then noting the gap that appears at some future date (Figure 8). He then argued that this methodology provides three areas of error:

- The concept of a fixed stock.
- The expectation of ever rising demand extrapolated from the past.
- Neglect of the feedback loops as the gap approaches.

Addressing the 'fixed stock' concept he showed the way that the marginal cost of production had been falling over recent years, where depletion

would imply rising costs. So, human ingenuity was one antidote to fixed stock depletion. The other antidote was conventional oil versus unconventional. Whereas there were limits to conventional oil resources (even if these could be stretched), the scale of the unconventional was orders of magnitude greater.

Ever rising demand

Addressing the idea of ever rising demand, he pointed out that history and taxation policies altered behaviours. He illustrated this by showing that the countries most impacted by the oil shocks of the 1970s tended to tax energy more and be generally more energy efficient than those economies that had grown rapidly when prices of oil were lower. If this is taken into account, then when prices are higher, the demand growth falls and the gap narrows or disappears.

The widespread use of reserves/production (R/P) ratios is seriously misleading, he stated. There is no way that oil is going to run out on a particular day 40 years from now. Production will run down, price will run up and the

economy and energy supply will adjust.

He noted the unreliability of forecasts by citing the well-known example of the economist Jevons predicting the death of the British economy in the 1860s because the coal was running out. He then showed the way that the wood fuel crisis in the US in the 1860s had been solved by the substitution of coal for wood.

His conclusions were:

- There will be periodic oil shortages and price spikes, but nothing to do with depletion.
- Even if depletion overwhelms human ingenuity in conventional oil production, the feedback loops will cause the problem (ie energy shortage) to be solved some other way.
- Thus the oil will never run out.

Depletion real and imminent

In a lively question and answer session after the presentations, a number of solutions and alternative energies were proposed – but few speakers appeared to doubt that oil depletion was real and relatively imminent. ●



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Following the overwhelmingly positive response from members that voted on the motion to create a single Energy Institute earlier this year, the next stage in the process was to vote on a resolution to submit a joint petition, with the Institute of Energy, to the Privy Council for a Royal Charter to establish the new Institute. This historic vote took place at an EGM on Wednesday 5 March at Deloitte & Touche's offices in the Strand, following a meeting of the IP's governing Council. *Petroleum Review* reports on the creation of the new Institute.

The IP's EGM was chaired by Pierre Jungels, IP President. He commended the merger, pointing out the great opportunities it presented for all interest groups within the IP. He particularly noted the resounding support of the membership in the recent postal ballot where 94% of votes returned had voted in favour. Louise Kingham, the IP's Director General, presented the resolution to the members present and the Chairman then called for a member to propose and then second the resolution prior to calling for the vote itself. The vote was unanimous in favour of proceeding to create the new Institute.

On Thursday 6th March the Institute of Energy held their Special General Meeting where a similar resolution was also voted upon and passed unanimously. On Friday 7th March Louise Kingham sealed the joint petition and

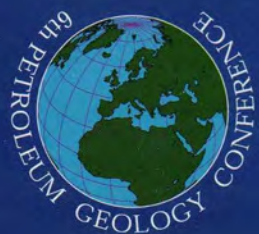
submitted it to the Privy Council for consideration.

Louise Kingham has told IP staff that 'the constitutional process to create the EI is now underway. We will need to work together with our counterparts at the InstE, our trustees and our customers to deliver the new Institute. In what is an unsettling time for you all – I know that those I mention appreciate your professionalism and team work just as I do'.

An Interim Council has been appointed by the Councils of the IP and InstE to oversee merger integration. This body has established a number of working groups led by staff working in partnership with trustees and other members to integrate and develop the key aspects of the EI's operations. It is anticipated that, should all proceed as planned, the Energy Institute will be launched in the autumn. ●



Pierre Jungels, IP President signing the petition with Louise Kingham, IP Director General to be presented to the Privy Council



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Managing a risky business

Large and small companies across all sectors of industry need to keep tight control of the increasing risks to their businesses, be they risks to product, employees or the environment. Legal compliance, company reputation and profit margins are at stake – losing control is expensive. Health, Safety, Environmental and Quality Management Systems (HSEQ) provide essential structures for the control of risks that are critical to the business. However, many companies still perceive management systems as a costly overhead rather than an asset, writes *Colin Hayes*,* Principal Consultant at BMT Cordah.

To date the majority of companies have implemented separate management systems, driven by the need to conform to individual standards such as ISO 9001, ISO 14001 and OHSAS 18001. Increasing alignment of the requirements of the various standards now provides companies with the opportunity to develop integrated systems.

Why integrate?

The oil and gas sector has recognised the advantages of having system frameworks and controls in place, and companies are becoming increasingly aware of the benefits of integrated HSEQ management systems. A sound system that treats all HSEQ risks in the same way can deliver significant operational and cost advantages over separate health, safety, quality and environmental management systems.

For companies with existing 'stand-alone' HSEQ systems, integration is undoubtedly a challenging process. Trying to integrate three established systems, each with its independent history and devoted, proud staff, can often lead to tensions, disagreements and delays. Developing an integrated management system for a new company from scratch would be a whole lot easier. It is, however, widely accepted that there are core processes that are

common to the three systems. Skilful combination of these processes provides the key to successful integration.

Current HSEQ standards

Existing HSEQ standards provide the starting point. So, what standards are currently available? There are three main, internationally accepted standards, although the safety standard is not yet widely used, and many others exist. The main standards are:

- ISO 9001 (in two forms currently, 1994 and 2000) – the Quality Systems Standard
- ISO 14001:1996 – the Environmental Systems Standard
- OHSAS 18001: 1999 – the Safety Systems Standard

Although management systems continue to evolve worldwide, most contain the 'traditional' plan-do-check-review cycle. Within this management system loop there are many common processes, leading to procedures that could be seen as common to all systems. It is noted, with some relief, that more and more standards are dictating fewer and fewer 'documented' procedures. However, many organisations still require the written word in order to achieve uniform application of their own procedures. The role of the integrator must be to use the *common* processes as a basis for developing

common HSEQ procedures, using vocabulary that is *common* to the three standards.

Integrating core and support processes

Common processes can be divided into *core* processes and *support* processes.

So, what would a core process be? Surely this term must be reserved for the main building blocks of any system. I often liken these processes to a jigsaw puzzle. Core processes are the corners and edge pieces you search for first, in order to provide the 'boundary' or 'window' in which you operate and build on. Common core processes include:

- policy statement definition;
- risk identification and evaluation;
- identification of relevant legal and other requirements;
- setting of objectives and targets;
- definition of operational and emergency control procedures;
- definition of non-conformance, corrective and preventative action processes; and
- management review.

The main, common support processes are typically:

- the definition of organisation, structures, roles and responsibilities;
- training, awareness and competence;
- resource allocation and budget;
- internal and external communication;
- documentation generation and also control;
- records control and maintenance;
- audit process;
- management review process; and
- system and operational monitoring and measurement.

The principle of common processes could allow for the integration of management systems to expand even further throughout the business. For example, HSEQ systems have support processes in common with the systems for finance (resource allocation and budget, records, and auditing), personnel (training, awareness and competence, records) or public relations (internal and external communication). In this wider integrated system, the individual departments would have responsibility for assuring the performance of their parts of the system, rather than the HSEQ function.

Identifying risk

Identifying risks is a process that business understands – risks exist to people, the environment, production and equipment. In the past, however, business has lacked the 'joined up thinking' to realise that all risk is the same. It is all corporate risk, which costs the same money and carries the same penalties, and can be controlled in similar ways.

Although there are many ways of assessing risk, a certifier is unlikely to be concerned if you have decided to produce three separate risk registers rather than one combined HSEQ register, so long as you have complied with the requirements of the standards. As there are a great number of variables to be assessed, the key to success is to ensure that the risk evaluation process is conducted by a team, including the risk owners (local operators and management), and HSEQ professionals. The risk evaluation must be relevant to the business and must identify where improvement (risk reduction) is required to deliver real benefits to the business.

Checking and corrective action

The 'checking and corrective action' element of an integrated system could almost certainly bring the historical stand-alone functions of the three systems into conflict. In order to audit certain issues or themes, the auditors need to have the specific skills to do so. For example, personnel from the safety department will be used for specific H&S audits. This practice will continue for some time to come, at least, until integrated cross-training of staff has had time to work through the organisation.

However, the very premise on which integration is built is that management systems are basically the same. It follows, therefore, that a management system audit remains a management system audit, regardless of the type of standard being followed. This is the primary and most significant efficiency in the push for integration. I personally have only become a registered auditor with one professional organisation, namely IEMA (the Institute of Environmental Management and Assessment). Despite that organisation being an environmental one, I record all my environmental, safety and quality audits on the same log sheet. It is the audit skills that are important, allied to the understanding of management systems, rather than from which 'stable' you belong, to use a horseracing metaphor. Trained management system auditors within an organisation can be tasked to audit any part of an integrated system, which benefits the



Figure 1: HSEQ risks might not always be immediately apparent

organisation by providing a larger, more diverse, pool of experience to utilise. It also provides opportunities for lateral learning and the spread of best practice.

Conflicts may arise with historical differences in the application and interpretation of checking and corrective action for the three types of standard. During integration it is essential that non-conformance systems can be used for all disciplines. Even minor detail, such as the name of a 'field' in a tracking database, must be HSEQ compatible and entries must be able to be 'sorted' by discipline because of the important requirement to analyse performance for the individual H, S, E and Q disciplines for internal as well as external reporting (which includes statutory reporting) and management review.

Independent or integrated certification

Preparation for certification of an integrated management system follows similar steps as for stand-alone systems. However, the availability of truly integrated standards is a point for further discussion. You should confirm that your chosen certifier is accredited to certify to an integrated standard.

So, do you certify to one single standard or three separate standards? To gain financial benefits from integration we must push for the use of the 'super HSEQ standard'. Although a company being certified could argue that common core and support processes should lead to a two-thirds reduction in auditing time, and therefore costs, over stand-alone systems, the number of

days a certification body may take to certify and monitor your certificate over time may not actually reduce significantly. Nevertheless, there will be savings due to the reduced number of visits and the travel and subsistence expenses.

The certifying bodies must ensure they are prepared for the potential growth in this area. They need to ensure audit staff are converted to the integrated standards or at least they are multi-disciplined. Those that do should have a clear cost advantage.

The way forward

Integration is without a doubt the way forward. It is not easy to achieve and the path to success is never going to be smooth, especially when starting the journey with three stand-alone systems. Commitment, careful planning, communication and clear direction are the fundamental requirements, with a heavy sprinkling of enthusiasm, optimism and diplomacy.

Remember – you will get there in the end. You have to!

**Colin Hayes is a Principal Consultant with BMT Cordah Limited. He leads the company's management systems and audit team which is based in Aberdeen, Scotland. He will be delivering a three-day training course on Integrated HSEQ Management Systems in association with the Institute of Petroleum in London from 14–16 May 2003. Contact Nick Wilkinson, IP Training, Institute of Petroleum, for details on T: +44 (0)20 7467 7151; F: +44 (0)20 7255 1472, e: nwilkinson@petroleum.co.uk or visit www.petroleum.co.uk*

IHS Energy – an expanding service to the industry

Chris Skrebowski, Editor, Petroleum Review, recently interviewed a number of top IHS personnel to learn about the development of the company and its ambitions for the future.

Mike McCrory, President and CEO of IHS Energy, started by explaining the way in which the company had been formed by the progressive amalgamation of a series of data vendors in the US and Canada, and of Petroconsultants in Europe (see tinted box). He noted that amalgamation mergers and takeovers were very much the recent history of oil service companies and recalled that a listing of such companies two decades ago by J S Herold contained 86 companies – by 2002 the same listing had reduced to just six companies.

For IHS Energy the company had started with PI (Petroleum Information), which was one of the first to offer digital products to the industry. Throughout the 1990s a series of mergers and acquisitions culminated with the incorporation of QC Data's Petroleum Data Services Division and its AccuMap Enerdata Division in 2000. This was the last of seven companies and, according to McCrory, the easiest fit. Initially, he explained, the component companies making up IHS Energy were run more or less as individual companies as part of an overall portfolio company. But, the continuing erosion of margins as the key oil company customers merged, meant that data suppliers had no option but to fully merge and improve their data offering via economies of scale. Today, IHS Energy is operated as a single, legally consolidated entity, ultimately owned by TBG out of the Netherlands, whose involvement dates back to 1928.

Expanded operations

At present IHS Energy employs 1,150 people, fairly evenly spread around the world. However, within three years it is expected to have expanded this to 1,600 people.

The company had recently undertaken an in-depth survey of its customers in order to establish their perceptions of IHS Energy and their use of its products. The primary products are a series of databases

that allow users to drill down and find out all the data on concessions, drilling, well results, field development, production, production profiles, etc. Increasingly the databases are web-accessed from users' terminals, with printed products being rapidly phased out.

The result of the customer survey was, according to McCrory, that half its customers used IHS Energy databases every working day while virtually all used them at least once a week. The company's business model was based on subscriptions to its services. Although many of the older generation knew the company under its old names – PI, Petroconsultants, etc – IHS Energy was now being run as a single, legally consolidated entity. The whole offering was being rebranded as IHS Energy and was seeking to derive maximum leverage from its assets. The company had 300 data gatherers based around the world, forming the bedrock of a company that derives its major income from its data content. The development and sale of its browse and query software was the second most important source of income, with consultancy services being developed as the third income stream.

IHS Energy has 23 technical teams operating globally, working closely with oil companies and other users to bundle desktops and data access, and developing linkages to make the data work for users. McCrory noted that the IHS databases are becoming increasingly important as repositories of industry knowledge at a time when companies are losing knowledge as staff exit with mergers and downsizings.

Consulting leverage

The company's move to leverage consulting was a response to staff-short companies needing answers to questions rather than access to data, according to Charles Lucas-Clements, Practise Director-Strategic Consulting. It has a number of highly professional

Growing the business

IHS Energy Group has been formed from the amalgamation of a series of companies, in 1998:

- Petroleum Information/Dwights
- Petroconsultants
- PI (ERICO)
- MAI Consultants
- IEDS

In 2000, the Group acquired:

- QC Data's Petroleum Data Services
- QC Data's AccuMap Enerdata Division

consultants who speak 40 languages between them. However, consultancy is an activity with a high cost-base. This, he explained, means that effort has to go into identifying the areas where the benefits to the client are largest in relation to the likely cost.

Following this logic IHS's latest innovation is its 'health of well' data. This involves the collection of well data, in real time, via the web. As an example of how useful and powerful such data can be he cited a project to collect online data from 300 wells at a cost to the client of around \$100,000. The client having made some process changes in the light of the data gathered and its interpretation was able to secure benefits amounting to \$900,000. This was an area that had already seen a significant increase in interest and investment over the last three years and one that was likely to develop further.

Importance of Internet

The Internet is becoming increasingly important as both a means of gathering and disseminating data according to McCrory, with the company's GEPS (Global Exploration and Production Service) now moving to web deployment. The challenge, he explained, is to grow the offering while balancing the demands and opportunities of the core areas of business against the costs and demands of the frontier areas.

Continuing the theme of contractors making up for the lack of manpower and expertise in the oil companies, Robert Winsloe, Executive Vice President Marketing, Sales and Consultancy, noted that IHS Energy was doing increasing amounts of consulting and training in data

use and interpretation for companies. Increasingly they were also supplying people to work on projects. Another area of interest had been data integration work following company mergers. Reductions in space as well as manpower meant there was now increasing interest in getting companies such as IHS Energy to store physical data assets, something the company did under its Datalogic banner.

McCrory indicated there was some interest from governments and government agencies in the collection and dissemination of data about the oil and gas industry. This, however, was a difficult area as there was no regulatory push and attitudes varied from quite open to possessive and secretive.

Asked about competitors to IHS Energy, he explained that this varied from region to region. In the US there were a limited number of specific providers – PennWell and DataLogic being examples. In Canada the market was very open, with a number of small providers in different sectors. On a worldwide basis the only two competitors he identified were Wood Mackenzie and Deloitte and Touche.

He concluded by explaining that IHS Energy had built its current dominant position on the depth and extent of its databases, their accuracy and the global spread of their data gathering and the expertise of the staff. He was pleased to be able to say that IHS Energy was one of the few companies in the oil and gas industry looking forward to expanding the number of people it employed. ●

Visit www.ihsenergy.com for further information.

Candidates for most significant find of 2002 are (no specific order)

FRONTIER NORTH AMERICA

Gulf of Mexico

Alaminos Canyon 857 1 and 903 1 – These two finds represent the first discoveries made in the very deep waters of the Perdido Fold Belt, a new production area in the Gulf of Mexico.

LATIN AMERICA

Mexico

Lankahuasa 1 – Very exciting find as it is the first in a series of many natural gas prospects high-graded for drilling in shallow waters off Veracruz and Tamaulipas states. The area is a vast, relatively unexplored portion of the continental shelf stretching around 500 km from the maritime boundary with the USA to the south-western portion of the Bay of Campeche.

EUROPE

Ireland

12/2-1 (Dooish) – Although yet to reach commitment depth, this deepwater well penetrated a substantial hydrocarbon column in a tilted fault block and demonstrated for the first time the presence of a working hydrocarbon system in the Rockall Trough.

Italy

Panda 1 – Gross pay interval of 300m with gas reserves speculated as being as high as 1 Tcf. The results of this well point to a potentially new trend in the Gela Foredeep of the Sicilian Channel.

CIS

Russia

Chugoryakhinskaya 1 Located off the coast of West Siberia this is one of two Russian finds located in the frigid northern waters, activity that marked a significant shift in exploring the offshore.

SAHARAN AFRICA

Egypt

El King 1 – company's fourth deepwater find in the Nile Delta of 2002 but significant in that it is the first deepwater Miocene oil discovery in the area, confirming speculation by the industry that such a hydrocarbon system is present and invigorating the play's deepwater potential.

SUB-SAHARAN AFRICA

Angola

Plutao 1 – the second well on Block 31, and the fourth overall, that finally confirmed the likely potential of the ultra-deepwater off Angola as this was the first to test oil at potentially commercial rates.

MIDDLE EAST

Yemen

Auqban 1 – the second in a four-well program that in addition to testing oil, may have encountered the back edge of a significant reef running east in the direction of the Qarn/Qaymah gas/condensate discovery.

2002 Discoveries & Highlights

06 January 2003

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Petroleum review

Upcoming Features

- | | |
|------|---|
| May | <ul style="list-style-type: none"> ● Pipeline survey ● Alternative fuels ● Oil and gas developments in Africa |
| June | <ul style="list-style-type: none"> ● Oil and gas trading: recent developments ● Latest drilling technology ● Current industry research/publications ● Oil and gas developments in the Caribbean and Latin America |
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M c M I L L A N
S C O T T



Wincanton sets sights on the road ahead

Following the recent merger of two of the largest petroleum delivery companies – Wincanton and P&O Trans European – **Gordon Scott** (below), Managing Director of the new Wincanton, answers questions about the new company and its plans for the future.

Q: When did the acquisition of P&O Trans European go through? Can you explain where the merger process has now got to and the next steps?

A: The acquisition was completed on 31 December 2002 and the process of integrating the businesses is now in progress.

Q: One of the stated objectives of the acquisition was for Wincanton to gain European interests. Can you explain what in relation to the oil industry was acquired in Europe and how you plan to develop the European side of the new business as far as the oil industry is concerned?

A: Before the acquisition Wincanton's larger customers indicated that a presence in mainland Europe would be viewed as a positive step for the partnership. Although the activities of the combined business in the petroleum sector are mainly in the UK, we are reviewing and evaluating opportunities across the geographical spread of the company.

Q: Will the new company trade under the Wincanton name or will you continue to use the P&O Trans European name or a completely new branding?

A: The name of P&O Trans European no

longer exists and all trading is now under the Wincanton name.

Q: In terms of oil products deliveries how big is the combined fleet? Do you plan to expand it? Who are your direct rivals?

A: The combined fleet is in excess of 730 vehicles on petroleum service. Clearly we would like to win additional business, which should expand the fleet, but we are also concentrating on keeping our existing customer base happy with our current service. Our direct rivals in petroleum distribution are Tankfreight and Hoyer.

Q: Deliveries of dry goods for forecourt shops is becoming increasingly important. What is your role in this area? How do you see it developing? And who are your direct rivals?

A: We do not currently have any direct business delivering dry goods to forecourts, but you are right that it is becoming a greater part of the total supply chain. We are in discussion with a number of our clients about this activity.

Q: Do any oil companies still own and operate delivery tankers in the UK? Is this situation changing and, if so, how?

A: I'm not aware of any of the majors having in-house fleets. All the large

players have contracted out so that they can concentrate on their core competency. I do not see this changing, but who knows?

Q: What is the situation in terms of oil company operation of delivery tanker fleets? What are the opportunities and what are your plans?

A: Oil companies have a mix in terms of asset control, with a number retaining the assets under their control and contracting out the driver. Others look to outsource all of their assets and transfer totally to the third-party provider.

Q: In terms of logistics for the oil industry do you currently or do you plan, to operate in areas other than road tanker deliveries?

A: We are always exploring different avenues with our customer base and through regular reviews we have an opportunity to look at all levels of their business.





This year's annual meeting of the Association for Science Education (ASE) was held at Birmingham University from 3–5 January. Gill Haben, IP Education and Training Manager reports.

ASE is the *must attend* event for UK science teachers. Reflecting the importance of the show, the Institute of Petroleum (IP) was once again very much present at the exhibition (see photo). In addition to marketing our educational/career resources, a key aim was to canvass the opinions of the teaching profession about the usefulness of the material and their requirements for the future.

Thousands of teachers poured through the doors over the three days and it felt as though all of them stopped off at the IP stand! The main attraction was the virtual tour of ExxonMobil's Fawley Refinery – launched at the show using a plasma screen kindly provided by ExxonMobil. Delegates were not only invited to take a tour of the refinery online, but also to play the interactive games on *Discover Petroleum* (DP) – the first module of *The Hydrocarbon Trail* (HCT) that is being developed by the IP (see *Petroleum Review*, October 2002).

There was huge interest in both the virtual tour of Fawley and DP, and it was quite clear that there is a real demand for the IP to provide the full supply chain of virtual visits into the industry and further modules of HCT. The Lord and Lady Major of Birmingham even came by and stopped to play!

Feedback

We received much positive feedback from delegates visiting the IP stand. One particular head teacher explained how 'terrific' it was that he and his pupils could visit the Fawley Refinery electronically as, although lessons incorporated the local industry in the area, they had never been on the site itself. Indeed, we had similar feedback when we first pro-

duced *Inside an Industry* – Coryton Oil Refinery as a booklet in 1999. However, we were told that having the interactive visit to Fawley online worked on many more levels and was a great deal of fun for pupils and teachers alike.

'Fun' was part of our remit when building *Discover Petroleum* and 'HC' as a brand image – and it seems to have worked extremely well. For those of you who don't know, HC (hydrocarbon) is the little green character that guides you around the DP site (see left).

Once again the teachers reinforced our understanding that while there is a plethora of industry information available, little is readily usable for their busy schedules. I am happy to report, however, that the IP's resources fall into the 'extremely useful' category.

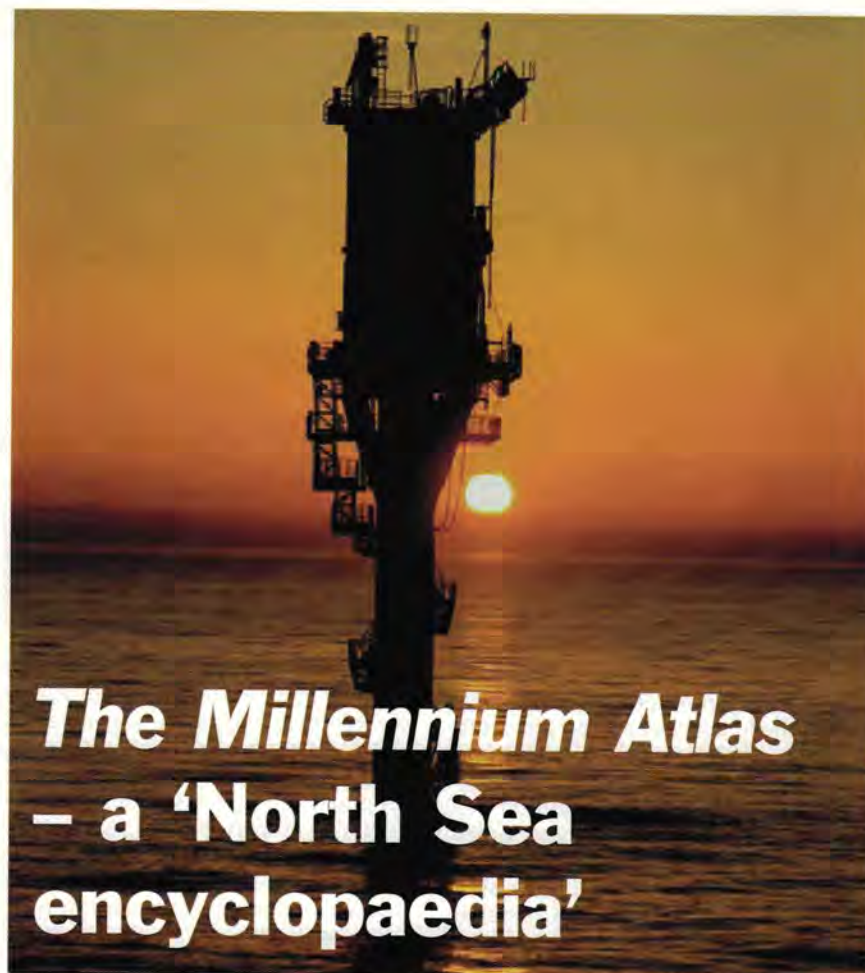
It is very gratifying to know that we have built a reputation and now a well-recognised brand for fit-for-purpose educational materials. Many delegates said that they were using both our publications together with our website (www.petroleum.co.uk/discover) as part of their lesson programmes. *Discover Petroleum* goes from strength to strength and we now plan to produce more modules and virtual visits over the forthcoming months.

Keep in touch

Next year's ASE event will be held at Reading University. In the meantime, please get in touch with the IP Education and Training Department if you would like to comment on anything reported here or if there is anything else you would like us to know about in relation to our educational/careers programme.

Contact me on: T: +44 (0)20 7467 7135 or e: ghaben@petroleum.co.uk





One statistic above all others stands out from the plethora of facts and assumptions in the newly published *Millennium Atlas: Petroleum Geology of the Central and Northern North Sea* – it is that 500,000 person years of effort have so far been expended in an attempt to understand the petroleum geology of the North Sea and to produce its hydrocarbons as efficiently and safely as possible, writes Ray Dafter.*

To be fair, the figure can only be an educated estimate. But it helps to explain the richness of information in this weighty tome. The Atlas**, the work of more than 100 authors, is the result of the combined effort of the Geological Society of London, the Norwegian Petroleum Society and the Geological Survey of Denmark and Greenland.

It is a book that tracks progress, even when it does so inadvertently. The Atlas took six years and an estimated cost of £3mn to put together. Its publication has only been made possible by donations from many oil companies with North Sea interests, their logos proudly displayed on a prefix page. However, a significant number of these companies no longer exist as stand-alone entities – companies like Amoco, Arco, Conoco, Elf, Enterprise Oil, Fina, Lasmo, Phillips Petroleum, Saga Petroleum and Texaco have either merged or have been absorbed by other groups.

Geological study...

As one would expect, much of the book concentrates on the geological influence on the present-day industry. It traces plate tectonics from the earliest of time up to more recent marine deposition, faulting, tilting, salt flowage and the countless other factors that have given rise to petroleum accumulations deep beneath the seabed of the North Sea.

Seven hydrocarbon 'plays' are identified and analysed in this study – pre-Triassic, Triassic, Lower and Middle Jurassic, Upper Jurassic, Upper Cretaceous as well as Danian (chalk), Paleocene and post-Paleocene. By far the most important oil play is seen to be the Lower and Middle Jurassic where total discovered reserves/resources represent around 40% of the total discovered reserves in the central and northern

North Sea. (The southern North Sea gas basin has been omitted from this study).

... and so much more

But the Atlas is much more than a geological study. It is more an encyclopaedia of the North Sea oil and gas industry, providing information on all commercial developments as well as an overview of the technological developments in exploration, development and production.

The study shows that that the North Sea may be a mature oil and gas province, but it is far from being a spent force. At the turn of the Millennium some 8,000 exploration, appraisal and development wells had been drilled in the UK, Norwegian and Danish sectors of the North Sea covered by the Atlas. Gross oil and gas revenues have so far totalled more than \$1,500bn. Exploration and production activities have generated over 50,000 jobs offshore and 300,000 jobs onshore in the UK, Norway and Denmark. Known recoverable petroleum reserves and resources are estimated to be 78,650mn boe (60% oil, 33.6% natural gas and 6.4% natural gas liquids and condensate). Of this total 34,000mn boe have been produced, indicating that there is far more oil and gas to produce than has been extracted so far.

Industry ingenuity

The Atlas points to the ingenuity shown by companies in exploiting these hydrocarbons in such harsh conditions. History shows us that many of the innovative ideas and techniques come from new entrepreneurial companies, some of which will grow to take the place of those names that are gradually disappearing from memory – just like the Devonian-period fossilised fish depicted in this impressive book! ●

* Ray Dafter is an oil industry journalist and author, covering the development of the North Sea from the early 1970s. Formerly Energy Editor of the Financial Times, he was for nine years Director of Corporate Affairs with Enterprise Oil. Ray is the author of six books and has also written extensively in newspapers and periodicals around the world.

** The Millennium Atlas; Petroleum Geology of the Central and Northern North Sea is published by the Millennium Atlas Company and is available from: Geological Society Publishing House, Unit 7 Brassmill Enterprise Centre, Brassmill Lane, Bath, Somerset BA1 3JN, UK, or e: sales@geolsoc.org.uk The cost is £199 per book. A CD version of the Millennium Atlas is also available at a cost of £49 if bought with the book.

Photo: The Kraka field; this unmanned platform lies at the location of the first oil discovery in the entire North Sea

Quantitative Methods in Reservoir Engineering*

Wilson C Chin (Elsevier Science, Linacre House, Jordan Hill, Oxford OX2 8DP, UK. T: +44 (0)1865 310366; F: +44 (0)1865 310043; www.elsevier.com) ISBN 0750675683. 480 pages. Price (hardback): £60.

This publication is designed to act as a valuable tool for predicting reservoir flow in the most efficient and profitable manner possible, using quantitative methods rather than anecdotal and outdated methods. A revision of two earlier publications – *Modern Reservoir Flow and Well Transient Analysis and Formation Invasion* – the book integrates rigorous mathematical methods for simulating and predicting reservoir flow both near and away from the well.

Geomechanics in Reservoir Simulation

Edited by Pascal Longuemare (Editions Technip, 27, rue Ginoux, 75737 Paris, Cedex 15, France. T: +33 1 45 78 33 80; F: +33 1 45 75 37 11; e: info@editionstechnip.com) ISBN 2710808331. 200 pages. Price: \$70; £70.

Geomechanics plays a significant role in problems such as wellbore stability, hydraulic fracturing and subsidence. In recent years there has been growing awareness of the importance of the link between fluid flow and geomechanics in the management of stress-sensitive reservoirs. Geomechanical processes in and around a reservoir caused by depletion, cold-water injection or steam injection can have a significant impact on productivity and recovery. Prediction of stress evolution is essential for proper reservoir management. This book provides a representative view of the IFP's December 2001 'Geomechanics in Reservoir Simulation' conference, including an aggregation of data from field cases, a grasp of complex physical phenomena and advances in numerical methods that offer the means for understanding the geomechanical behaviour of reservoirs in challenging environments.

International Maritime and Commercial Law Yearbook 2002

Professor Francis D Rose (Informa Professional, Informa House, 30–32 Mortimer Street, London W1W 7RE, UK. T: +44 (0)20 7017 5179; F: +44 (0)20 7017 5221; www.informa.com) ISBN 1843111918. 140 pages. Price: £95.

This yearbook provides a summary of developments in key areas of maritime and commercial law, areas that are developing so quickly that it is vital to stay up to date with changes and to understand their implications. It is an essential reference source for legal professionals, industry practitioners, students and academics alike.

Gas Turbine Engineering Handbook*

Meherwan P Boyce (Elsevier Science, Linacre House, Jordan Hill, Oxford OX2 8DP, UK. T: +44 (0)1865 310366; F: +44 (0)1865 310043; www.elsevier.com) ISBN 0884157326. 798 pages. Price (hardback): £90.

This publication covers every aspect of design, installation, operation and maintenance of gas turbines. Presenting data and suggestions for obtaining optimum performance, it serves as a desk reference for both students and professionals. Now in its second edition, the book not only updates technology, which has seen a great leap forward in the 1990s, but also includes answers to concerns about emissions, efficiency, mechanical standards and codes, new materials and coatings.

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- *Terrorism and oil.* Neal Adams. PennWell, Tulsa, Oklahoma, US, 2003. ISBN 0878148639.
- *Transporting Britain's energy 2002: Development of investment scenario.* Transco, Hinckley, UK, 2002.
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Membership News

NEW MEMBERS

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Mr R Bare, Texaco Petroleum Suppliers
Mr P J Barr, ANZ Investment Bank
Mr L Bolander, Fluor Corporation
Dr M Butler, Thani Group
Mr G Catalano, Woodside Energy (UK)
Mr R Crist, Elk Petroleum LLC
Mr H Davey, Herbert Smith
Mr G Dean, Centrica
Mr J Desfontaines, IEDS
Mr E Di Lella, ENI Atriplex
Mr D Duma, Texaco Petroleum Suppliers
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Mr E Gourevitch, Virage Consulting
Mr M J Green, Liquip UK Pty
Mr M R Hayes, BG Group
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Mr P A Wait, Virgin Atlantic Airways
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Mr M Webster, Aberdeen
Mr G Wildgoose, Nexant
Mr R Wiltshire, Global Technology Forum
Ms A Wisdom, SolArc
Mr D Wyatt, Elk Petroleum LLC
Mr I Yaniv, Alon
Mr L Youdeowei, Nigeria

STUDENTS

Mr O Adewale, Aberdeen
Mr W Almashri Otman, University of Aberdeen
Mr T P Bushell, London

STUDENTS CONTINUED

Mr Y N Kue, Aberdeen
Mr M E Ogundu, Aberdeen
Mr A Rakhmetov, London
Mr G Smith, Fife

STUDENT PRIZEWINNER

Ms C Grelaud, Sultan Qaboos University

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Representative: Mary Jackson

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Branch Activities

LONDON

Contact: Ian K Robinson, T: +44 (0)1932 783774

22 Apr: 18.00: *Contaminated Land and the Future of Biosensors*, by Geoff Card, Card Geotechnics, Ed Bell, Crown Bio Systems and Pam Phillips

Discussion Group

ENERGY, ECONOMICS, ENVIRONMENT

**The e-Field
Wise Decisions in Real Time:
From Reservoirs to Markets**

Tuesday 17 June 17.00 for 17.30 – 19.00
Institute of Petroleum, 61 New Cavendish Street,
London W1G 7AR Refreshments provided

Speaker: Wolfgang Schollnberger, Technology
Vice President, BP plc

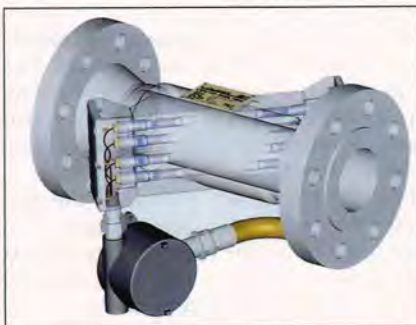
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OIML-approved ultrasonic flow meter

Caldon reports that its LEFM multi-path ultrasonic transit time flowmeter – developed for custody transfer applications in the petroleum industry – has been granted OIML R117 certification for its LEFM 240C model.

Using a full bore spool piece, the LEFM 240C has four chordal paths for accurate and stable flow measurement. It is currently available for lines sizes from 4-inches to 36-inches. The meter is also bi-directional and presents no obstruction or venturi pressure drop in the flow-line, states the company. Automatic speed of sound monitoring is reported to ensure that performance is maintained independent of fluid temperature variations as well as viscosity or density changes in the oil product being monitored. 'Information on these parameters can be used for monitoring changes to the product in the line, and for interface monitoring in multi-product lines,' comments Caldon.

Further testing of Caldon multi-



path fiscal metering systems is ongoing at NEL, where a collaborative user group project sponsored by Amerada Hess, ChevronTexaco and TotalFinaElf, among others, is evaluating the meter for future fiscal measurement applications.

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Large bore, severe service isolation valve



Anderson Greenwood has developed a large bore, severe service valve claimed to offer all the benefits of a metal seated gate valve but configured as a conical seated plug valve, which means that it is less susceptible to blockage from challenging process media and is fully roddable.

The valve is designed to act as the primary isolator for instruments and instrument lines. Due to its multifunctional properties, such as its capacity for extremely high pressures and temperatures, the valve eliminates the need for first isolation cryogenic valves or high temperature steam valves, states the manufacturer. Furthermore, its straight-through flow design is reported to make the durable valve far less susceptible to the erosive effects of steam than conventional alternatives.

The valve is claimed to retain the ability to reseal even in dirty or sandy service, making it ideally suited for applications such as the processing of oil shale or tar sand. It is capable of handling temperatures from -100°C to +550°C and pressures up to 6,000 psig, and is available with a 10 mm or 16mm through bore, as either a single isolation valve or double block and bleed valve.

T: +44 (0)161 494 3304
F: +44 (0)161 494 5672

Mini ball valve boosts temp range

Parker Instrumentation has launched a 12-mm/1/2-inch ball valve for fluid instrumentation applications, whose patented one-piece seat and packing component is reported to allow the

valve to operate over an exceptionally wide temperature range.

The moulded one-piece seat/packing component eliminates dead space between the valve and the inlet/outlet connections that can trap particles or build up deposits as well as act as a potential leak path. This feature also sidesteps the expansion and contraction issues associated with the use of individual seat and packing components, allowing Parker to specify the valve for operation over an extended temperature range. As standard, the MB8 model, for example, operates over -54°C to +149°C. Unlike some other mini ball valves the packing nut may also be adjusted without special tools.

In addition, the valve's miniature design and integral compression tubing connections are claimed to cut weight and space compared with conventional products.

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If you would like your new product releases to be considered for our *Technology News* pages, please send the relevant information and pictures to:

Kim Jackson, Associate Editor, *Petroleum Review*,
61 New Cavendish Street, London W1G 7AR, UK
or e: petrev@petroleum.co.uk

MOVES

People

ChevronTexaco has appointed **Randy Curry** as President, Chevron Texaco Natural Gas (CTNG), the company's new US wholesale natural gas marketing unit. Curry will report to **Ray Wilcox**, Vice-President of ChevronTexaco and President of ChevronTexaco North America Exploration & Production. After joining the company in 1988, Curry has held a variety of positions in the industry, including Vice-President, Marketing, Texaco Natural Gas (TNGI) and Senior Vice-President, Pipeline and Plant Group (TNGI). Most recently, he held the position of President, Bridgeline Holdings, a ChevronTexaco joint venture natural gas pipeline and marketing company. The company has also announced the following appointments within CTNG: **Don Haley**, Vice-President Trading; **Steve Wilson**, Vice-President Marketing; **Charlie Mertz**, Director Supply Fuels Management. All three will report to Randy Curry.

Apache has announced that **Janine J McArdle** has been appointed Vice President, Oil & Gas Marketing and **Michael J Benson** has been promoted to Vice-President, Security. McArdle will direct Apache's worldwide crude oil and natural gas activities. Prior to joining Apache, she served as Managing Director for Aquila Europe Ltd. Benson joined Apache in 1996 as Director of Security after eight years as an international security consultant advising large corporations and high-profile individuals. He served in the UK's Police Force for 14 years.

Former Head of Lukoil-Neftokhim Burgas, **Vladimir Rakitsky** will succeed Vice-President **Vladislav Bazhenov** as Head of Oil Refining and Petrochemicals. Bazhenov retired in February this year. **Igor Kuzmin** has been appointed Executive Director of Lukoil-Neftokhim Burgas. Prior to this Kuzmin held the post of First Deputy to the General Director of OAO Lukoil Permnefteorgsintez. Lukoil Vice President **Vagit Sharifov** has been appointed Head of Internal Audit created in 2002. Prior to this, Sharifov was Head of Oil Product Distribution. In January 2003, **Vera Zhuravleva** has been appointed Head of Distribution Operations of OAO Lukoil.

Shell Canada has announced that President and CEO, **Tim W Faithfull**, will retire in July 2003 after more than 36 years' service with the company. Faithfull joined Shell in the UK in 1967 and took over leadership of the Canadian company in April 1999. In 1996, he was appointed Chairman and Chief Executive of the Shell companies in Singapore. **Linda Cook**, currently Chief Executive of the Group's Gas and Power division in London, will succeed Faithfull as President and CEO of Shell Canada in July this year. Cook joined Shell in Houston in 1980 and has held a range of positions in the Exploration & Production division of Shell in the US as well as Shell International in the Netherlands. The company has also announced that **Malcolm Brinded**, a Managing Director of the

Group, will replace Cook as CEO of the Gas and Power division with effect from 1 July 2003.

Charles F Bolden has been elected to the Board of Directors for Marathon Oil. The appointment took effect from 15 February. Bolden recently retired as a Major General from the US Marine Corps and is currently President and CEO of American Puretex Water Corporation and Puretex Water Works.

Following the acquisition of P&O TransEuropean in December 2002, supply chain solutions company Wincanton has announced the creation of two business units. **Graeme McFaull** will take responsibility for the UK & Ireland, whilst **Peter Brown** will be managing operations in mainland Europe.

The gas detector manufacturer Crowcon has appointed a specialist manager **Andy Avenell** for its fixed gas safety products. Avenell joined the company in 1998 as a service engineer, he became a technical support engineer and then Senior Project Engineer in the Special Projects department, where he designed custom-built gas safety installations.



British Standards Institute (BSI) has appointed **Chris Fenton** as Managing Director of BSI Inspectorate Rest of World, covering Europe, Africa and Asia. Fenton will be working alongside **Neil Hopkins**, President BSI Inspectorate Americas.

Andrew Swiger has been recently appointed Chairman and Production Director of ExxonMobil International, succeeding **Ansel Condray** who retired end-2002. Swiger is also Chairman, Esso Petroleum, Esso Exploration & Production UK, and Mobil North Sea. He also oversees the company's oil and gas production operations in Europe. Prior to this appointment, Swiger was Vice-President, Africa, ExxonMobil and was responsible for oil and gas production operations in Africa. He joined Mobil in 1978.



NEXT MONTH'S FEATURES...

The May 2003 issue of *Petroleum Review* will feature a round-up of recent developments in the African exploration and production arena, as well as a review of the Chinese gas sector. Other articles include a closer look at the application of Enventure Global Technology's Solid Expandable Tubular (SET™) technology in a mono-diameter well and analysis of the offshore renewable energy sector by Douglas-Westwood. Looking downstream, there will be a review of the recent International Forecourt & Fuel Equipment show, including highlights of the IP Seminar on 'IP Learnings for Forecourt Operations', and a report on the relationship between auto-fuel cetane number and cetane index.



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8 - 11 April, 2003

Course Venue:
London, UK

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Non-Member:
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Overview of the Natural Gas Industry

This **four-day course** will provide participants with an overview of the economic and contractual aspects of the natural gas industry. The peculiar features of natural gas will be highlighted in order to explain the economic differences between a crude oil chain and a natural gas chain. Gas chains can become very complex and a broad range of crucial economic, marketing, and legal issues of the gas industry will be examined. Discussions will cover a number of questions, including problems of gas projects' structuring, upstream sales' contracts, take-or-pay issues, and gas markets' liberalisation.



Custody Transfer of Crude Oil - Trading and Loss Control Issues

This **two-day course** covers the principles of custody transfer, the units of measurement and the terminology used.

Participants will become aware of the need to minimise the uncertainties during the various measurements that are crucial in performing a custody transfer. They will also learn the acceptable limits within which measurements may differ and what can cause excessive differences and their effect on the final outcome.



SGS

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28 - 29 April, 2003

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Price Risk Management in Energy Trading

This **four-day course** provides delegates with a thorough understanding of how markets operate and the range of contracts, tools and techniques available to manage and take advantage of price and margin volatility in the oil, gas and electricity markets.

Practical skills are developed and reinforced through world-class business trading simulations and syndicate exercises of increasing difficulty and intensity.



Liquefied Natural Gas - The Commercial Imperatives

This **five-day course** draws on the extensive commercial expertise of the Gas Strategies LNG team. The special features of the LNG business are investigated, beginning with the upstream aspects of the business. Delegates will also learn about the complex aspects of financing LNG chains and explore the physical and commercial arrangements necessary to put an LNG project in place. The case study is partly drawn from the real-life history of the North West Shelf Project in Australia and partly set in the fictional Gazania region.

Alphatania

Course Dates:
11 - 16 May, 2003

Course Venue:
Birmingham, UK



BMTI
BMT Cordah Limited

Course Dates:
14 - 16 May, 2003

Course Venue:
London, UK

IP Member:
£1400.00 (£1645.00 inc VAT)

Non-Member:
£1600.00 (£1880.00 inc VAT)

Integrated HSEQ Management Systems for the Energy Industry – An Efficient and Practical Approach

The energy industry needs to keep a tight control of the increasing risks to the business. A sound structure can deliver practical control and has operational and cost advantages over separate health and safety, environmental and quality management systems. This new, **three-day course** is designed to help oil and gas sector companies by giving delegates sound practical training in the concept, design, development, implementation, maintenance and formal methods of checking fully integrated HSEQ management systems. The course will also benefit those who are looking for greater efficiencies in running partially-integrated or standalone systems.



Fundamentals of Petroleum Refining Processes

This **four-day course** examines the composition, main characteristics and new trends of petroleum products, examining the roles of the different refining units and their process characteristics.

Participants will gain an understanding of the main manufacturing schemes encountered in the oil refining field and look at the overall economic context of this industry.



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INDUSTRIE

Course Dates:
20 - 23 May, 2003

Course Venue:
London, UK

IP Member:
£1900.00 (£2232.50 inc VAT)

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For more information, see enclosed inserts or contact Nick Wilkinson at IP Training
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