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MAY 2003

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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
		b/d	= barrels/day
t/y	= tonnes/year	t/d	= tonnes/day

No single letter abbreviations are used. Abbreviations go together eg. 100mn cf/y = 100 million cubic feet per year.

Front cover: One of the latest African success stories has been the series of oil discoveries in the block 404 area in Algeria. The first of these to move into production is Anadarko's Hassi Berkine field. Pictured is the central production facility for the field (see p34).

Photo: **Anadarko**

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ROUNDUP From the Editor

Don't expect rapid return of Iraqi oil

The effective ending of the war in Iraq is greatly to be welcomed, particularly as unconventional weapons were not used and casualties were light. However, hopes of an early resumption in Iraqi supplies looks more problematic even though the limited damage is not a significant problem and the last of the fired wells will probably be extinguished by the time *Petroleum Review* is published. The real problem is the complexities of ownership and who has the rights or abilities to initiate investments or to recommence production.

A vast lawyer's benefit is rapidly emerging. Lukoil is offering to sue anyone who lifts oil from its West Qurna field while TotalFinaElf is now loudly declaiming that it never signed any contract with Iraq. The other contract holders are unclear as to whether they wish to pursue their claims, while the UN claims that it has sole jurisdiction over Iraqi oil via the oil-for-food programe – a programme that can only be altered by the Security Council, which includes France, Russia, China and Syria, all of whom are more or less hostile to US and UK hopes of restarting production.

As a counter move the US has just called for the full lifting of all sanctions on Iraq, which would allow unrestricted oil production to recommence. However, for this to happen, either there would have to be a general political recognition of a new Iraqi administration or a recognition of the rights of the occupying powers to export oil. The normal recognition route is via the UN.

We can only conclude it will be some time before legal Iraqi oil exports recommence, there will be enormous political wrangling and some lawyers are going to get very rich.

Opec in the vice?

The international oil industry has always been ambivalent about Opec – with opinions ranging from it being an outrageous cartel, via it being irrelevant, to it being a rather good thing. The explanation of the latter is that Opec is a useful whipping boy, which ensures oil company production is more profitable than it might otherwise be because oil company production can be kept flat out while Opec absorbs all the seasonality of demand.

The political right, and particularly the political right in the US, has no doubts – Opec is a thoroughly bad thing, a restrictive cartel and the world would be a better place if it was broken. Those who think this way in the US have been pretty clear that now is the ideal time to break Opec, revive the world economy, reduce gasoline prices and elect Mr Bush in 2004.

This column has noted before that Opec power is actually about having spare capacity that can be held off the market. On this measure Opec, by late March, was without power as the only useable production capacity not flat out was in Iraq (war), Nigeria (political dispute) and Venezuela (recovering from political dispute). By mid-April Venezuela was claiming to be producing 3.2mn b/d while Nigeria had restored most of the cut-backs.

According to the International Energy Agency's (IEA) latest figures crude stocks are low, some six days below year earlier levels at the end of February. However, it records a 600,000 b/d stockbuild in the first quarter because Opec production of 30mn b/d (crude + NGLs + unconventionals) met a call on Opec (demand) of 29.4mn b/d. The IEA sees the call on Opec of 27.4mn b/d in the second quarter, 27.3mn b/d in the third quarter, and 28.3mn b/d in the fourth. If Opec doesn't wish to see prices falling it will have to reduce production by 2–3mn b/d while Iraq is out of the market, and by 4–5mn b/d once it comes back in. Opec's meeting on 24 April will be critical.

North Sea repentance

A year ago the UK Chancellor raised North Sea tax, bringing down the ire of the oil companies and UKOOA on his head. This year he has recognised the threat to future North Sea developments and, having already removed royalties from 1 January 2003, has now decided to remove PRT from tariffing business (see p10). According to UKOOA this could unlock 500–700mn boe of currently uneconomic North Sea discoveries and unleash $3–4bn of new investments.

The Budget also maintained the government's 'green' credentials, with small but useful fuel duty incentives. This year's increase in motor fuel duties of 1.28 p/l (5.8 p/gallon) has been postponed until the 10 October. Presumably the UK Chancellor is banking on Opec disunity and lower oil prices.

Chris Skrebowski

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

e world

The UK Department of Trade and Industry is developing a new oil and gas database for the onshore sector that should be ready in time for this month's 11th licensing round and will be a valuable addition to the existing seismic and well data release systems. The new data available will include technical sections of licence applications for the 1st to 6th onshore licensing rounds, together with technical licence reports more than six years old. Plans are to update the site regularly with licence applications from later rounds and with reports that are more than five years old. A demonstration of the system is available at **www.mosaicis.com/onshore** A link will be available from the DTI site **www.og.dti.gov.uk** once the database is launched.

Sibneft has launched a new version of its website in both English – **www.sibneft.com** – and Russian – **www.sibneft.ru** The new site retains the look and feel of its predecessor, while presenting updated information and adding several new functions designed to improve corporate transparency. The site includes an expanded 'Investor Centre', with a special section for financial analysts and new areas for posting shareholder meeting materials, regulatory filings and a variety of other documents. Another addition is the 'Careers at Sibneft' section.

Bollfilter UK has launched an expanded website designed to provide users and specifiers of automatic filtration systems with a wealth of product, technical and application advice. The **www.bollfilteruk.co.uk** site features the main products in the Bollfilter automatic range, as well as information about manual filters.

Global Pacific & Partners has completed its new report on *National Oil Companies (Strategies, Competitors, Governments)* covering over 100 state-owned players worldwide. For information, e: **duncan@glopac.com**

Senior executives of the Royal Dutch/Shell Group of Companies recently delivered a presentation to investors and analysts in London, about the Group's strategy for two of its main businesses – Exploration and Production and Gas & Power. Plans include the delivery of pre-tax performance improvements of between $500mn and $800mn over the next four years through the global reorganisation of the EP business and the investment of some $8bn to $9bn per annum in the two businesses. A copy of the full report can be found at **www.shell.com**

In Brief

UK

***The UK and Norwegian Energy** Ministers are understood to be in negotiations over a treaty that would provide the UK with access to secure gas supplies from the Ormen Lange field in the Norwegian sector of the North Sea for decades. The UK is forecast to become a net gas importer by 2006 and by 2020 some 70% of the country's electricity is expected to be generated from gas.*

***Baker Hughes and the Expro Group** have created a new joint venture – QuantX Wellbore Instrumentation – that will further develop and market the permanent monitoring technologies of both companies to the global oil and gas industry.*

***Apache Corporation has closed on the** UK North Sea Forties field portion of its $1.3bn acquisition of producing assets from BP. Apache paid approximately $630mn for the Forties field. Apache closed on the Gulf of Mexico portion of the transaction in mid-March.*

***Paladin Resources, the oil junior created** by the former Clyde Petroleum management team, is aiming to 'scavenge' as much as 100,000 b/d of oil from mature North Sea oil fields within the next five years as industry giants sell down their interests.*

Europe

***A Letter of Intent worth some** NKr700mn has been signed by Statoil and Transocean for drilling and completion work on the Snøhvit field in the Barents Sea.*

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

Shallow-water focus in new Gulf of Mexico round

Despite current and forecast high price levels for oil and natural gas, the US Minerals Management Service's 19 March auction of offshore blocks in the central region of the Gulf of Mexico was low-key, with 74 companies offering $315.5mn in high bids for 561 blocks off the coasts of Alabama, Louisiana and Mississippi. High bids in the March 2002 auction for central region blocks totalled $363.2mn, reports *Judith Gurney*.

The focus of bidding varied slightly from that of recent auctions, with 67% of the bids for blocks in shallow waters with depths of less than 200 metres and 25.5% for blocks in water depths greater than 800 metres. The average over the last few years has been 60% and 30%, respectively.

Fewer bids for deepwater blocks doesn't necessarily indicate flagging interest in the deepwater potential, however. Most traditional deepwater players acquired substantial folios of deepwater blocks in earlier auctions and they must drill these soon or surrender their leases. In addition, these companies are currently committing large investments to the development of their deepwater discoveries.

Blocks in shallow waters, which hold little promise of undiscovered oil, are believed to contain ample, but deep, gas reserves. The MMS is currently offering royalty relief for gas production from depths of 15,000 ft or more below sea level, and has recently announced its intention to broaden this relief.

Kerr-McGee, for several years top bidder in Gulf western region auctions, led this central region auction in terms of total bids made, total amounts offered and apparently successful high bids (the MMS will issue is final acceptance of high bids later this spring). With the exception of Chevron and Unocal, the most active bidders were independents, including Murphy, Hunt Oil, Dominion, Newfield, Spinnaker, Magnum Hunter and BHP Billiton. Hunt, in conjunction with Cheyenne International and Energy Partners, made the highest bid of $8.2mn for a shallow water block in South Marsh Island. All of the highest bids, except for one by Unocal and another by Chevron, were for shallow-water blocks.

Reorganisation for Rosenberg yard

Aker Kvaerner is planning to reorganise the Kvaerner Rosenberg yard in Stavanger and to refocus its operations towards new markets. The company hopes to find new owners for Rosenberg within the next three years. The yard currently employs 720 staff.

Refocusing Rosenberg towards new types of work has already been under way for some time. The yard has recently won several such contracts, including modifications to and maintenance of drilling rigs and other vessels. It recently secured an upgrading and maintenance contract for the Njord B storage tanker that is due to arrive at Rosenberg this month.

Two major offshore deliveries were slated in April 2003 – the utility and living quarters module for the Grane platform, and the gas injection module for Oseberg C. In addition, the yard will prepare the Grane installation for production start by October and deliver a module for Sleipner West in February 2004. Once these projects have completed, Rosenberg will have no traditional new fabrication assignments for the offshore market.

Nigeria/Sao Tome & Principe dispute resolved

Nigeria and Sao Tome & Principe have resolved their dispute over the sharing of oil resources in the Gulf of Guinea, reports *Stella Zenkovich*.

Under their original treaty, Nigeria was to have full rights over block 246, the 'jewel' of the Joint Development Authority, and a 60:40 advantage in sharing revenue from elsewhere, in return for which ST&P was to receive 10,000 b/d of oil and 250 scholarships.

Oil block allocation last October was, however, suspended by the newly-elected President Frederico de Menezes. Now, under the revised treaty, revenue from *all* blocks will be shared 60:40. The allocation of blocks is to start this month.

NEWS Upstream

Offshore shows good growth prospects

There is potential for a major growth in offshore oil and gas activity over the next five years, with oil and gas reserves presently under consideration for development totalling three times those brought onstream over the past five years. However, despite the probability that not all these fields will come onstream in the period, many sectors could see a growth of capital expenditure of between 40% and 100%.

These are among the findings in *Global Offshore Prospects*, a new quarterly study of the offshore oil and gas industry by energy analyst Douglas-Westwood and industry data specialist Infield Systems. Some 835 fields have entered production over the past five years, with a further 1,276 prospects identified for the next five-year period. In total, these future fields could be expected to yield 79bn barrels of liquids and 86bn boe of gas over their field lives.

However, Dr Knight, Infield Systems Data Manager, cautioned: 'In our experience unforeseen delays such as mergers, oil and gas price variations, political changes, etc, tend to put a certain number of projects each year on hold. These tend to roll over from year to year until the optimum economic conditions for their development can be reached.' That said, the study predicts that progress will be made on between 60% and 70% of the projects in the five-year timeframe.

New AUV alliance

Fugro of the Netherlands and US companies Boeing and Oceaneering International have formed an alliance to provide worldwide deepwater AUV (autonomous underwater vehicle) survey services to the oil and gas industry.

The partners also report that their recently developed *Echo Ranger* deepwater surveying AUV has entered service in the Gulf of Mexico.

In contrast to a traditional towed survey system that requires the use of a long umbilical cable to transmit information back to a tow-vessel, *Echo Ranger* is reported to internally store data from survey sensors for download upon vehicle recovery.

In addition, for real-time data observation and quality control, the AUV can also transmit survey data back to the mother ship through the water column via an onboard acoustic modem.

Seymour onstream

The 22/5b-A12z well in the North Sea Seymour field has come onstream ahead of schedule and under budget, reports operator BG (57%). During earlier tests the gas condensate well flowed at a maximum rate of 44mn cf/d. Field partners are TotalFinaElf (25%) and Centrica Resources (18%).

As well as developing new reserves from the southwest area of the Seymour field, the A-12z well will also extend the period over which the Armada platform processing capacity remains fully utilised. Processed Seymour gas and condensate will be shipped to market through the CATS gas pipeline and the Everest and Forties liquids pipelines.

Subsea pipeline award

Halliburton's Energy Services Group reports that its Pipeline and Process Services division has been awarded the 2003 Subsea Pipeline Technology Award by the Pipeline Industries Guild for the development and application of its new Hal-AT™ acoustic telemetry system. Hal-AT™ is a real-time, remote subsea system that allows for more accurate predictions of pig location. This is done by using the pressure monitoring function at the launch point, or the pig tracking/signalling function further along the pipeline. The system can also be of benefit during pre-commissioning/hydrotesting activities by allowing the support vessel to move off-station and continue its work elsewhere while still monitoring the pressure trend within the pipeline under test. It uses an acoustic transponder as the link between a subsea location and a vessel-based monitoring station. The transponder can be deployed in water depths of up to 2,000 metres.

The system has two main benefits. First, by accurately monitoring pipeline pressure during pigging runs it removes the uncertainty factor relating to pig location and negates the industry-wide practice of pumping overfills for pipelines and flowlines in deepwater environments. This reduces the quantity of chemicals required during a project and reduces potential environmental impact. Second, it can reduce vessel time by eliminating 'best guess' estimates. These combined benefits can lead to an overall reduction in project costs for a client, states Halliburton.

The most recent application of the system was in early 2002 during the pre-commissioning activities of two infield flowlines for a deepwater project in the Gulf of Mexico.

In Brief

***Rig utilisation in the North Sea** jumped to 71.1% in March 2003, up from 65.8% in February, according to data compiled by Platts.*

***Capacity at the Kårstø gas processing** complex in Norway is to be expanded by more than 40% above the present level of 61mn cm to 88mn cm by 2005. The Gassled partnership that owns the facility plans to invest NKr5.74bn to accept and process gas from Statoil's Kristin development and other Norwegian Sea fields. Work on the expansion project is due to complete by 1 October 2005.*

***Norway's 2002 North Sea licensing** round has resulted in operatorships being offered to Norsk Hydro, ExxonMobil, DONG, Statoil, Norsk Agip, DNO, Petora and RWE Dea. Eight companies have been offered participation in licences – Paladin, Statoil, RWE Dea, Norsk Hydro, Norsk Agip, OER, DNO and ExxonMobil.*

***Aker Kvaerner has won Norsk Hydro's** contract for engineering and design of the onshore processing plant at Aukra, Norway, that will handle gas from the Ormen Lange field on the Norwegian shelf.*

***Foaming agents are to be tried out by** Statoil on its Statfjørd field in the North Sea in a bid to improve oil recovery.*

North America

***Anadarko Petroleum has made a natural** gas discovery at its Jubilee prospect in the eastern Gulf of Mexico. Field size has been put at between 40mn and 50mn boe.*

***Suncor is understood to be planning to** spend $3bn on expanding production capacity at its oil sands facilities in North America, including the future development of the Firebag oil sands project. The company is targeting 330,000 b/d by late 2007 and over 0.5mn b/d by 2010–2012.*

***IHS Energy has released AS$ET 3.1, a** major new version of its E&P portfolio management tool. The application's combination of ring-fencing, Monte Carlo modeling techniques and a built-in, field-development planning tool is reported to allow evaluation of economic criteria to provide an accurate portfolio analysis.*

In Brief

***The Athabasca oil sands project has** achieved another major milestone with start-up and first production of synthetic crude oil at the Scotford upgrader, which is located near Fort Saskatchewan, Alberta, Canada.*

Middle East

***The Pentagon contract given without** competition to Kellogg Brown & Root, a Halliburton subsidiary, to fight oil well fires in Iraq is worth as much as $7bn over two years, according to a letter from the Army Corps of Engineers says a report in the New York Times. The contract also allows KBR to earn as much as 7% profit, which could amount to $490mn.*

***A senior UN official is reported to have** stated that the US will have to go back to the UN Security Council for approval to exploit Iraqi oil revenues for reconstruction or to award contracts to modernise the country's oil sector. Iraq's oil is currently sold under the UN food-for-oil programme, controlled by the UN Security Council, who is the only body that can change how the oil is sold and what the money is used for.*

***It has been reported that Kuwait** plans to invest $2bn in oil development projects over the next year to ramp up capacity to 4mn b/d. Maximum capacity is now 2.4mn b/d. The 2003–2004 investment plans cover 163 capital projects.*

***Lukoil has warned that there should be** no attempt to take over its West Qurna field in Iraq, saying it would sue for $20bn and arrest tankers carrying crude if any outsider tried to take a lead role on the project.* The Guardian *reports that lawyers at Norton Rose in London have already been hired by oil companies to look in to the issue of oil fields in Iraq and warn there could be a blizzard of claims.*

***An oil saturated geological strata dis**covered northeast of Tel Aviv, Israel, could produce 75mn barrels of oil, say geologists for Givot Olam Oil. Meged-4 at Kfar Saba has a depth of 4,880 meters and oil mixtures were discovered in initial electric logs. Earlier tests on other sections of the layer showed signs of oil and gas, writes* Joel Ceausu.

***Saudi Arabian oil revenues are forecast** to hit $60bn this year compared with a budget forecast of $48.6mn, according to the National Commercial Bank.*

NEWS Upstream

UKCS oil and gas production

According to the latest (March) Royal Bank of Scotland *Oil and Gas Index*, UK oil production of 2,133,139 b/d in January 2003 was down 4.4% on the previous month and 6% on the year. Gas output rose slightly to 12,200mn cf/d, up from 12,175mn cf/d in December 2002.

'Oil markets reacted quickly on the start of conflict in Iraq, with prices falling by 25% in little over a week, removing much of the premium that has existed in the crude price for the past 12 months,' commented Senior Economist Tony Wood. 'However, uncertainty remains and oil markets will continue to be volatile over the coming weeks, with markets reacting to events as they unfold. Prices remain above the level required to justify investment in the North Sea despite the fall.'

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
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	10,611	27.60
Nov	2,165,277	11,276	24.20
Dec	2,230,434	12,175	28.30
Jan 2003	2,133,139	12,200	31.20

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

ChevronTexaco sells PNG interests

ChevronTexaco has announced plans to sell its interests and resign operatorship of its Papua New Guinea (PNG) joint ventures as part of the company's drive 'to focus on assets more aligned with strategic growth objectives'.

The offer for sale will include all its oil and gas production interests in the Kutubu (19.4%), Moran (8.7%), Gobe Main (19.4%) and South East Gobe (9.4%) oil fields in PNG's Southern Highlands Province, which currently produce around 53,000 b/d of oil, as well as an exploration licence and two petroleum retention licences.

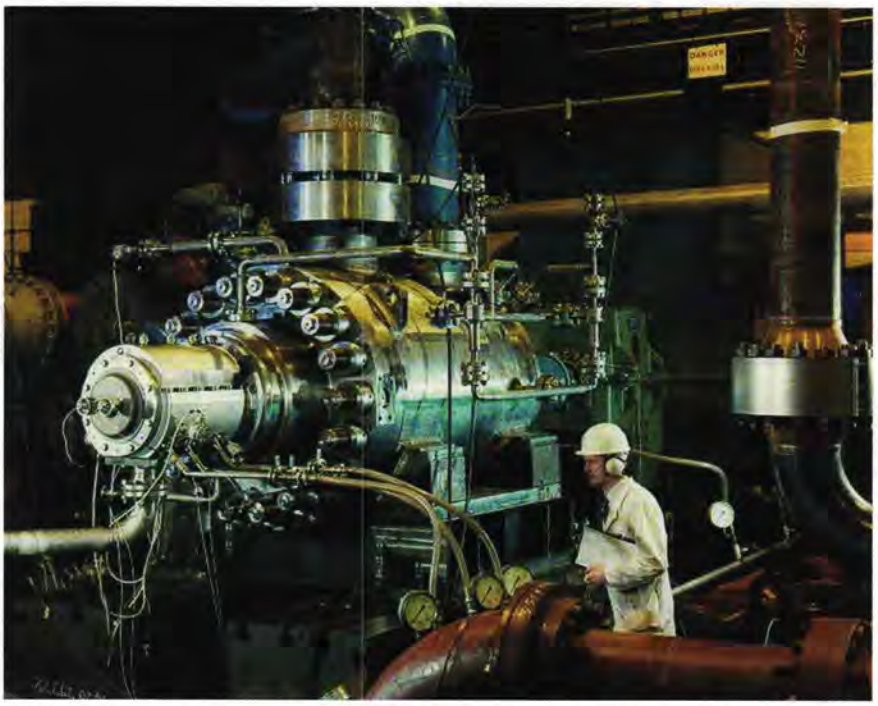
Asphaltene control in the pipeline

JD Horizons of Prestbury in Cheshire has recently launched a new range of high performance additives for asphaltene deposition control in oil industry applications. Based on technology licensed from BP on behalf of the DART (Downhole Asphaltene Remediation Technology) industry joint venture, the FlowSolve™ range of products has been developed to eliminate asphaltene deposition in crude oil production operations.

FlowSolve initially comprises six products based on a proprietary polymer chemistry, developed for both downhole and topside applications applied by continuous injection or squeeze deployment methods. The FlowSolve 100 Series products also offer low environmental impact, high thermal stability well in excess of reservoir temperature, and ultra-low viscosity at seabed temperatures required for subsea umbilical deployment.

NEWS Upstream

Injection water pump first for Sulzer



Sulzer Pumps has been selected to supply four seawater injection pumps that are claimed will be the largest built to date. The pumps, to be supplied to the Azerbaijan International Operating Company (AIOC) for installation on its compression and water injection platform for the Azeri Development Project in the Azeri sector of the Caspian Sea, are each rated at 26 MW absorbed power. The company reports that this is some 50% greater power than the previous record.

A 'low flow' pump cartridge fully interchangeable with the mains pumps will also be supplied to meet the early phase injection requirements. Delivery is scheduled for April to July 2004.

Al Khaleej project development approved

The State of Qatar, Qatar Petroleum and ExxonMobil have announced the launch of phase one of the Al Khaleej Gas (AKG) project. The project will produce gas from Qatar's North field, recover associated condensate and natual gas liquids for sale, and market 1.75bn cf/d of pipeline gas for domestic and export customers.

AKG will be developed in phases to meet gas sales commitments. Phase one will supply 750mn cf/d to the Oryx gas-to-liquids plant, the Ras Laffan power plant and other domestic industrial users. First gas is slated for 4Q2005.

Ekofisk expansion plans given green light

TotalFinaElf (39.9%) and partners ConocoPhillips (operator, 35.11%), Agip (12.39%), Norsk Hydro (6.65%), Petoro (5%) and Statoil (0.95%) have approved the Ekofisk Area Growth Plan for further development on the PL018 license in the Norwegian North Sea. The project aims to boost the recovery of oil and gas in place and increase the field's processing capacity. Drilling will start in 2004 on three of the 25 wells scheduled under the plan. First production is slated for 2005. The additional volume of reserves to be accessed and produced is put at 142mn barrels.

Operator ConocoPhillips Norway has awarded the NKr1.75bn engineering, procurement and construction contract for the new Ekofisk 2/4 M platform to Aker Kvaerner. The company is to deliver topsides and jacket for the process and wellhead platform, as well as a long bridge with tripod that will connect to the existing Ekofisk installations.

The jacket and tripod will be fabricated by the Aker Verdal yard, while the Kvaerner Egersund yard will build the topsides and bridge.

In Brief

***Iraq could resume exports within three** months from its vast southern oil fields once $1bn in repairs is made to neglected facilities, the commander of UK forces in the Gulf has said.*

***Shell, BP, Edison, OMV, Eni and** TotalFinaElf are reported to have placed bids on the Bushehr, Iran Mehr, Dir, Hamoun, Alvand, Forouz, Towsan and Lark onshore oil and gas blocks in the Persian Gulf.*

Russia & Central Asia

***Production of oil and gas condensate** in Kazakhstan amounted to 12.39mn tonnes in January–March 2003, which was 13% more than in the same period last year, reports the Caspian News Agency. This included 1.53mn tonnes of gas condensate (up 31% year-on-year).*

***Azeri state oil company Socar has** agreed to sell its 20% stake in the Yalama project to LukArco, in which Lukoil holds a 54% interest. The deal will increase LukArco's total interest in the Caspian Sea project to 80%.*

***Russia's State Authorising Body has** given its approval to the development plan and budget submitted for the Sakhalin 1 oil and gas project off Russia's Far East Pacific coast. Sakhalin 1 contains recoverable reserves of approximately 2.3bn barrels of oil and 600tn cf of natural gas.*

***Yukos is reported to be targeting a** 6.5% reduction in lifting costs in 2003 to $1.74/b, compared with $1.86/b in 2002.*

***BP is set to invest $220mn between** now and 2006 in BP-Rosneft's Sakhalin 4 and 5 joint exploration and development projects. Rosneft's President, Sergei Bogdanchikov, said that the expenditure will be approximately $20mn this year, increasing to about $100mn with the commencement of the exploratory drilling programme.*

***Russia will increase oil exports in** 2Q2003 by 1.3mn tonnes to 30.5mn tonnes according to Deputy Prime Minister Viktor Khristenko.*

***AIOC – the Azerbaijan International** Operating Company – has reported that production from the Chirag field offshore Azerbaijan has increased during the first two months of 2003 by 5% over last year.*

In Brief

Kerr-McGee has completed the sale of its interests in Kazakhstan to Sheli for $165mn. The Kazakhstan assets included a 50% interest in the Arman field and 100% interest in the Mertvyi Kultuk exploratory area, as well as a 1.75% working interest in the Caspian Pipeline Consortium.

Prime Tass has reported Russian Economy Ministry figures for medium-term oil output that suggest an increase in output of 2.2% in 2004 and 7.2% in 2005.

Gazprom has announced that its reserve replacement ratio was almost 100% in 2002, which is the first time since 1993 that it has achieved such a high figure, reports UFG. Under a Russian standards-based reserve audit, Gazprom added 514bn cm last year, versus output of 522bn cm. It is not clear, however, whether the added reserves have come from exploration and development or are simply the result of the reacquisition of Purgaz, Vostokgazprom and Zapsibgazprom in 2002, comments the analyst. Gazprom is also reported to have signed an agreement with DeGolyer and MacNaughton for the latter to carry out a reserves audit to international standards.

Lukoil is to acquire oil assets of the Urals Group in the Republic of Komi, including a 50.8% interest in Tebukneft, 59.8% in Ukhtaneft and 58.3% in RKM Oil, for an undisclosed sum. Gross proven and probable oil and gas reserves for the three companies are put at 48.1mn tonnes of oil and 4.1bn cm of gas, with a further 13.7mn tonnes and 0.7bn cm of possible reserves.

Gazprom and Lukoil are reported to have agreed to set up a 50:50 joint venture to develop the Central block in the Caspian Sea, with reserves put at 3.6bn boe.

Fluor Corporation's PFD UK joint venture has recently been reconfirmed by Tengizchevroil (TCO) as the contractor for engineering, procurement and construction management (EPCM) services for the restarted second generation and sour gas injection projects at the Tengiz and Korolev fields in Kazakhstan. Partnered with Parsons E&C, the PFD joint venture will manage execution of the projects that aim to increase oil production at Tengiz by 10mn t/y (200,000 b/d) and will increase gas, LPG and sulphur sales products by a commensurate amount. A new 120-km pipeline is to be constructed to transport additional gas into the existing export pipeline system.

Asia-Pacific

OMV has tested a production well in the Sawan gas field at a record rate of 101mn cf/d, claimed to be the highest rate ever achieved in a Pakistani gas field.*

BP and PetroVietnam are in the final stages of negotiations over development of Vietnam's block 05-2 in the offshore Nam Con Son Basin. BP has indicated it is ready to invest an additional $650mn in bringing the block's gas reserves onstream.

Oil and Natural Gas Corporation says it has discovered oil reserves west of the Vasai gas field offshore the Mumbai coast. The Vasai West field estimated to contain 240mn barrels of in-place oil plus oil-equivalent gas.*

Reliance Industries is understood to have made a fourth gas discovery, Dhirubhai-4, in India's KG-D6 block. In-place reserves are put at 1.7tn cf of gas. Gas reserves for the three earlier finds are put at between 7tn and 8tn cf.

Unocal is investing a further $300mn in Thailand during 2003 to explore and develop the country's oil and gas industry – some 140 development and delineation wells will be drilled this year.

Korea National Oil Corporation has made a large gas discovery in the Nam Con Son Basin's block 11-2 in the South China Sea offshore Vietnam.

ConocoPhillips has announced the successful test of the Suban-8 delineation well on the southwest flank of the Suban gas field, which is located on the Corridor PSC of South Sumatra, Indonesia.

The Korea National Oil Corporation (KNOC) has discovered an additional 50bn cf of gas reserves in the Donghae-1 field – the nation's first offshore gas field in the Sea of Japan. The field was originally discovered in March 2002, with reserves put at 200bn cf of gas, equivalent to 4mn tonnes of LNG. First production is expected in December 2003.

An ExxonMobil-led consortium is reported to have confirmed the Jansz discovery offshore Western Australia's north coast as the nation's largest ever gas find, with reserves put at 20tn cf.*

Latin America

Conoco Venezuela and partners have received approval from the Venezuelan Government for the $480mn Phase 1 development of the Corocoro oil field in Venezuela's Gulf of Paria West area. Initial production of 55,000 b/d of oil is expected by 2H2005.*

Venezuela plans to pump oil at close to maximum capacity this year in an effort to recover losses from a devastating two-month strike. PdVSA say it plans to produce about 3.1mn b/d until December.*

Venezuela has discovered a new oil field with reserves of over 350mn barrels of light crude oil. Preliminary drilling on the Chaguaramal oil field in the eastern state of Monagas also revealed deposits of 870bn cf of gas.

Africa

TotalFinaElf and Sonangol have announced two new oil discoveries in Angola's deep offshore block 17, taking the total for the block to 15. The Acacia-1 well tested 13,712 b/d of oil, while the Hortensia-1 well tested 5,092 b/d. Both finds are located near the Perpetua discovery made in 2000, opening the possibility of their joint development, together with the Zinia field discovered in December 2002.

Sonatrach and Anadarko are reported to have discovered oil in block 404 of Algeria's Berkine Basin. The SFSW-1 well tested 2,689 b/d of 47° API gravity oil and 4.72mn cf/d of gas.

First Calgary Petroleums reports that its discovery well MLE-2 on the Ledjmet block (405b) in Algeria has tested 44,330 boe/d, comprising 189mn cf/d of gas and 12,874 b/d of condensate. Appraisal drilling is planned in May 2003.

Petro-Canada has commenced production on its En Naga North field onshore Libya in block NC-177 in the Sirte Basin. The company said first oil from the field is flowing at an initial rate of approximately 6,800 b/d, but is expected to ramp up once the field is in full production.

Libya will be licensing some 30 blocks for exploration by major international oil companies between March and the end of June 2003.

MANY OF THE MONTH'S UPSTREAM NEWS STORIES NOT INCLUDED ABOVE CAN BE FOUND ON THE NEWS IN BRIEF SERVICE @ www.petroleum.co.uk

UK energy trend reports

The UK Department of Trade and Industry has published its latest *Energy Trends* and *Quarterly Energy Prices* bulletins.* The figures show that energy consumption has increased by 6.5% between 1990 and 2002, compared with a GDP increase of 30.5% over the same period. Energy consumption did not change at the same rate as GDP due to improvements in energy efficiency, fuel switching, a decline in the relative importance of energy intensive industries, and because demand for space heating did not increase in line with output.

Indigenous production of primary fuels was 272.6mn tonnes of oil equivalent in 2002, 1.8% lower than in 2001. On a seasonally adjusted and temperature corrected basis total inland consumption on a primary fuel input basis was 236.8mn tonnes of oil equivalent in the year 2002, 1.2% lower than in 2001.

Between 2001 and 2002 coal and other solid fuel consumption decreased by 8.4%, oil consumption rose by 0.1%, gas consumption rose by 1.3% and primary electricity consumption decreased by 2.6%.

Looking at production, total indigenous UK production of crude oil and NGLs decreased by 0.6% in 2002 compared with 2001, mostly due to the general decline in production from older established fields. Total indigenous UK production of natural gas in 2002 was 2.6% lower than in 2001, the second consecutive year that gas production has fallen. Compared with 2001, exports of natural gas in 2002 increased by 9% while imports have nearly doubled. This reflects the commissioning of the Vesterled pipeline in the 4Q2001 which allows additional supplies of gas from the Norwegian sector of the North Sea. Demand for gas in 2001 as a whole was 0.2% lower than in 2000. Coal production (including an estimate for slurry) of 30.0mn tonnes was 6.0% down on 2001.

Refinery throughput in 2002 was 0.4% higher than in 2001. Imports of oil products in 2002 were 18.2% lower due to a significant increase in imports in 2001 to compensate for lost production while refineries were shutdown for conversion to produce ULSP (ultra low sulphur petrol). Consequently, net exports of oil and oil products were 5.8% higher than in 2001 at 36.7mn tonnes.

Motor spirit deliveries fell by 4.6% whilst diesel fuel increased by 7.4%. These figures reflect a general move away from petrol-engined vehicles to diesel-engined vehicles. Together, petrol and diesel consumption was 0.7% higher than in 2001.

Looking at fuel prices, in mid-March 2003 a litre of unleaded petrol was on average 78.7 pence, an increase of 7.2 p/l compared to a year ago. Diesel was, on average, 81.3 p/l, 6.5 p/l higher than a year ago. Lead replacement petrol (LRP) cost, on average, 81.4 p/l in mid-March 2003. Compared to a year ago this represents an increase of 5.3 p/l. Crude oil prices have risen sharply in recent months, contributing to the recent increases in petrol and diesel prices. Crude oil prices are almost 30% higher than a year ago, due mainly to the political situations in the Middle East and Venezuela.

**The* Energy Trends *and the* Quarterly Energy Prices *bulletins are available in hard copy from the DTI on subscription, priced £35/y, and on the Internet at* www.dti.gov.uk/energy/inform/energy_stats_overview/index.shtml

UK on track to meet Kyoto targets

The UK is still on track to meet its Kyoto targets to cut greenhouse gases and its domestic goal of reducing carbon dioxide (CO_2), according to the latest figures from the UK Government. Greenhouse gas emissions fell by 3.5% in 2002, a reduction in line with the trend needed to ensure the UK meets its target of reducing such gases to 12.5% below 1990 levels by 2012.

CO_2 emissions fell by 9% from 1990–2001, keeping the domestic Climate Change Programme goal of reducing CO_2 to 20% below 1990 levels by 2010 firmly on the agenda. The CO_2 drop came at the same time as a 30% growth in GDP, proving that economic growth does not have to be at the expense of a cleaner environment, stated Energy Minister Brian Wilson.

The figures also suggest the proportion of UK electricity generation accounted for by all renewables in 2002 was around 3%, up from 2.6% in 2001.

Want to know the latest rig count from Baker Hughes? Visit the IP website home page @ www.petroleum.co.uk

In Brief

UK

***RGIT Montrose, a leading provider of** training and consultancy services for the energy sector, has changed hands in a £10mn management buy-out backed by venture capitalist 3i and the Bank of Scotland.*

***GE Wind Energy has expanded its** family of wind turbines with the introduction of the 2.x Series. The new addition has three different power classes and rotor diameters, and has been designed for onshore locations with high or low winds. The company also recently introduced a 3.6 MW unit, claimed to be the first wind turbine over 3 MW expressly designed for offshore applications to produce commercial power.*

***Tullow Oil has posted a 2002 turnover of** £112.6mn and pre-tax profit of £22.5mn.*

***Premier Oil has delayed its $670mn** restructuring plan, including its withdrawal from controversial activities in Burma, as partners finalise details.*

***Shell is reported to be planning to shed** up to 4,300 global oil exploration jobs over the next four years in a move to cut costs by up to $800mn/y and boost profits that slumped 23% last year.*

***Independent oil and gas producer** Dana Petroleum has announced a 22% increase in profits, at £6.8mn on a 45% increase in turnover.**

***Paladin Resources has posted a 2002** turnover of £170.2mn, up 63% from the same period a year ago. Profit after tax rose 87% to £20.1mn. The company also reported that it plans to increase production and reserves to 100,000 boe/d and 250mn boe respectively in five years.*

Europe

***Repsol-YPF is to attempt to extract up** to 37,000 tonnes of fuel oil from the sunken tanker* Prestige *in a three-step approach that has never been tried before.*

***Turkey and Greece have signed a** binding agreement to build a 285-km gas pipeline connecting Kasracabey, near Bursa, in Turkey, with Komotini in northern Greece, reports* Stella Zenkovich. *The pipeline is expected to carry 500mn cm/y of gas.*

In Brief

North America

***Despite high prices, US natural gas** demand is forecast to increase by 2.7% in 2003 to reach 22.5tn cf, according to the United States Energy Information Administration. Gas demand is also forecast to reach 23.05tn cf in 2004.*

***Higher oil and gas prices have** enabled ConocoPhillips to lower its debt balance by $1.5bn in 1Q2003.*

***Marathon Oil intends selling its assets** in Western Canada in a move that would enable it to exceed its goal of raising $400mn from asset sales and to pay down debt.*

***Weatherford International has exercised** its option to assume control of e2Tech from Shell Technology Ventures. The deal will provide Weatherford with access to a range of expandable tubular technology.*

Middle East

***A former Chief Executive of the Shell** Oil Company – Philip J Carroll – appears to be the leading contender to oversee Iraqi oil production after the fall of Saddam Hussein, reports the* Houston Chronicle. *After leaving Shell, Carroll ran the Fluor Corporation, retiring in 2002.*

Russia & Central Asia

***Gazprom's Gazexport subsidiary will** buy 5bn–6bn cm of gas from Turkmenneftegaz in 2004.**

***Lukoil is planning to continue its consolidation**, reports UFG, aiming to conclude its negotiations with Russian company Rosneft to increase its stake in Archangelskgeolgodobycha (AGD) to 99%. AGD has proven reserves of 1.2bn barrels**

***Transneft increased its crude export** shipments by 6.5% year-on-year in 1Q2003, although this is still a slower increase than that seen in Russian crude output, which rose 11% in the period, says UFG.*

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NEWS Industry

African developments in the pipeline

Funds are being assembled for the building of the $3.7bn, 1,070-km Chad–Cameroon pipeline project, the single largest private sector investment in sub-Saharan Africa, writes *Stella Zenkovich*. The IFC is providing a $100mn loan and has mobilised a further $100mn in commercial lending. The World Bank and the IBRD are lending Chad $395mn and Cameroon $53.4mn.

Other African developments include:

- Malawi President Bakili Muluzi is seeking support for the building of a pipeline from Nacala, in northern Mozambique, to Lilongwe, the capital, within the framework of the Nacala Development Corridor, to lower the transport cost of fuel for his landlocked country. Fuel is currently delivered by road tankers from South African ports. Nacala is the nearest port for Malawi.
- Having agreed to buy half of Union Fenosa's gas assets for €440mn, Eni of Italy has been signalling reduced interest in Egyptian gas from Edison. However, Shell Egypt Chairman Andrew Vaughan, whose company has so far invested $350mn in seismic surveys and drilling in Egypt and is one of the country's biggest gas producers in the Western Desert, sees ample room for further investment in gas exploration and distribution.
- Algerian Oil Minister Chakib Khalil expects his country's 100,000 b/d spare capacity to double in the second quarter due to the seasonal 2mn b/d fall in global oil demand.

Russia gas agreement

Lukoil and Gazprom have signed a cooperation agreement for gas supplies from the Nakhodkinskoye field of the Bolshekhetskay Depression in the Yamalo-Nenets Autonomous District. Lukoil will sell to Gazprom up to 0.75bn cm of gas in 4Q2005, and up to 8bn cm in 2006. Gazprom has committed to pay for gas and its transport via the Russian Unified gas supply system.

The agreement is in addition to the two companies' general strategic partnership for 2002–2005, under which Lukoil and Gazprom will jointly implement E&P projects in the Yamalo-Nenets Autonomous District, the Nenets Autonomous District and the Russian sector of the Caspian Sea.

Canadian gas pipeline

Alaskan legislators, together with ConocoPhillips and BP, are understood to have requested that Congress underwrite part of the $20bn cost of building a 3,600-mile pipeline linking Alaska's North Slope with the US Midwest. The pipeline could deliver up to 4.5bn cf/d of gas, equivalent to some 8% of current US gas production, after completion. The participants in the project want Congress to approve a package of tax incentives that limit the financial risk of the venture.

The Canadian Government is also understood to be close to getting approval from the last of the First Nations group that would allow the pipeline to go ahead.

Wind energy 'crucial' to UK future

Fleets of wind turbines located miles off the UK coastline will make a crucial contribution to the nation's energy future, UK Energy Minister Brian Wilson recently stated. Speaking at the British Wind Energy Association's Offshore Wind 2003 conference, he underlined the government's backing for such projects, with the announcement of £42mn in capital grants.

Some £4mn will go to National Wind Power for the Rhyl Flats project in North Wales, £10mn to Warwick Offshore Wind for the Barrow project offshore Cumbria, £10mn to GREP UK Marine for the Kentish Flats project in North Kent, and £18mn to Offshore Energy Resources and Solway Offshore for the Robin Rigg project in the Solway Firth. These projects are among seven sites to have been awarded planning consent from the 19 identified for offshore development by the Crown Estate. Together the projects will create more than 500 wind turbines, generating 1,500 MW of electricity – or 1.5% of the UK's energy needs.

However, Wilson warned that there were 'major obstacles' to be addressed if the UK was to grasp the benefits of renewables. One of the most significant of these is transmission, with Britain needing to be 're-wired' to adapt to the age of alternative energies. 'Infrastructure is all,' he said. 'There is no point in generating power unless we can ensure that it is capable of being carried to the markets that require it. The regulatory system must help our aspirations for renewable energy and not place obstacles in its way.'

UK 2003 Budget unveils upstream and downstream tax changes

In his latest Budget, the UK Chancellor of the Exchequer stated that, following the abolishing of Royalty Payments from the North Sea at the start of 2003, 'from 1 January next year and for all contracts completed from today we will abolish Petroleum Revenue Tax on new tariffing business in the North Sea.' Fields developed pre-1993 are currently liable for PRT, at a rate of 50%, on tariffs received for the use of their associated pipelines and platforms from third-party business.

Reacting to the news, UKOOA (the UK Offshore Operators Association) said: 'Abolishing PRT on new tariff business could, by encouraging lower tariffs, potentially unlock a further 500mn–700mn boe from the development of currently uneconomic North Sea discoveries, representing new capital investment in the region of $3bn–$4bn.'

Wood Mackenzie's probable developments portfolio represents those fields that it expects to commence production in the next four years and are economic under the pre-budget regime. The analyst estimates that the Net Present Value (NPV) of government take will decrease by some £200mn as result of the change in the treatment of tariffs from these fields, assuming a resulting decrease in tariffs. This, it reports, compares to a total NPV of government take of more than £35bn from currently commercial fields in the UK.

'The Treasury will be hoping that the further revenues from the additional fields which now prove to be economic as a result of the change will offset this loss,' comments Wood Mackenzie.

'This positive incremental change in the fiscal terms is in contrast to last year's significant tax increase. The effective increase in Corporation Tax from 30% to 40% re-allocated an estimate £5.1bn in NPV from companies to the Treasury. The subsequent abolition of Royalty is estimated to have returned some £790mn of this value to the companies.'

Furthermore, by providing the relief on future tariffs the Treasury is thought to be relying on infrastructure owners to pass on this benefit in the form of lower tariffs to potential new field developments.

'As tariffs are negotiated on a case by case basis, it will be difficult for the Treasury to conclude that this actually occurs', comments Wood Mackenzie. 'However, additional throughput is in the interest of the infrastructure owners as it provides additional revenue. These additional volumes will become increasingly important to the pipeline owners as production from the UK declines and significant capacity becomes available in the majority of pipelines.'

Turning his attention to fuel duties, the UK Chancellor also reported that: 'Owing to the recent high and volatile level of oil prices as a result of military conflict in Iraq, I have decided to defer the 1.28 p/l annual revalorisation of fuel duties until six months from now – 1 October – and will legislate to this effect. And, if the current international uncertainties and volatility remain, I will not proceed with the change at all.'

To encourage the development of the least polluting cars the Chancellor also unveiled a new lower carbon dioxide VED band from 1 May 2003 for the most environmentally-friendly cars.

Alongside the standard revalorisation and an increase in the VED rate for cars and vans by £5, this increases the VED differential between the least and the most polluting cars to £110 per annum.

He also announced a new duty differential for sulphur-free fuels from 1 September 2004, of 0.5 p/l relative to the rates for ultra-low sulphur fuels, to encourage the early introduction and take up of these fuels. Under EU agreements, sulphur-free fuels must replace conventional road fuels by 2009.

The new duty is designed to facilitate this process, and will help to offset the extra costs of production of these more environmentally friendly fuels, reported the Chancellor.

A sulphur-free fuel has a sulphur content not exceeding 10 ppm. Such fuels give immediate greenhouse gas emissions improvements in existing cars, because they enable catalytic converters to function more effectively. They also offer greater long-term reductions in carbon dioxide emissions when used with new engine technologies.

In the short- to medium-term, however, because of additional refining requirements, sulphur-free fuels need more energy to produce than ultra-low sulphur fuels, resulting in higher carbon dioxide emissions from oil refineries removing the sulphur. The government reports that it has chosen the date of introduction carefully to ensure that environmental benefits overall are maximised.

An increase in the duties for rebated gas oil (red diesel) and fuel oil – which have higher levels of sulphur than road fuels – by 1 p/l above revalorisation, from Budget Day, was also announced.

The Chancellor also announced a new duty incentive for bioethanol used as a road fuel, set at 20 p/l below the prevailing rate for sulphur-free petrol, from 1 January 2005.

However, while the duty incentive was seen as a clear signal of the government's intention to encourage both the production and introduction of bioethanol, some industry observers commented that the level may not be enough to stimulate large-scale ethanol production.

Furthermore, it is anticipated that without additional incentives for biofuels, the UK could struggle to meet EU environmental targets for 2005. Blended biofuel supplier Greenergy suggests that the government link the new rate of duty for bioethanol to production methods with assured carbon benefits.

The existing 20 p/l fuel duty incentive on biodiesel is to remain stationary. Greenergy had been leading the call for an increase in the duty to 25 p/l, linked to biodiesel blended with conventional ultra-low sulphur diesel, in the hope that such an increase would drive investment in UK-based production facilities, encourage the UK farming community's diversification into energy crops, help meet government objectives to migrate towards a low carbon emission strategy, and establish quality standards essential to a durable and credible sector through the use of blended biodiesels to smooth out quality variances in pure biodiesel.

Remaining positive however, Andrew Owens, Chief Executive said: 'We do not believe that because the government did not take this step in Budget 2003 this means that they will not take it in the future, and we will continue discussions with them.'

In Brief

UK

InterContinentalExchange (ICE) has *launched ICEBlock™ – claimed to be the energy industry's first electronic broker 'give-up' facility in conjunction with the London Clearing House (LCH). Broker give-ups are trades that are originated by voice brokers and submitted to a clearing house for confirmation and registration.*

UK gas and power grid operator *National Grid Transco has secured permission from Medway Council to build a LNG import terminal at the Isle of Grain in Kent, where Transco's ring-fenced LNG storage business has a facility. The company expects the plant to be receiving first gas in 1Q2005.*

Shell UK is to invest £75mn at its *Stanlow refinery in Ellesmere Port, Cheshire, to produce environmentally-friendly sulphur-free fuels.*

Rural garages around the UK are *being urged by Energy Minister Brian Wilson to get their mechanics accredited as approved installers of LPG equipment on vehicles. For further information on the Boost LPG initiative, visit* **www.boostlpg.aeat.com***

Europe

The European Commission is threat- *ening Italy with legal action at the European Court of Justice, claiming it has failed to force the Naples municipal authorities to put its city gas supply contract renewal out to open tender, reports* Keith Nuthall.

Brussels has approved a 7.46mn *grant for the construction of an aviation fuel pipeline to the new Athens International Airport, bypassing the need to use 120 supply trucks, writes* Keith Nuthall.

Under an agreement with Shell, *TotalFinaElf is planning to swap 133 Shell-DEA fuel retail outlets in Germany for seven motorway service stations in France, its 33 service stations in the Czech Republic and its 70 service stations in Hungary.**

Gazprom is understood to be in talks *with Wintershall of Germany to jointly buy a 27% stake in Verbundnetz Gas (VNG) that controls the East German retail gas market. The interest has been put up for sale by E.On and Ruhrgas.*

'Make or break' for Europe's power sectors

Fitch Ratings, the international rating agency, has said that 2003 will be 'a make or break' year for the strategies of the European power sector, as many companies face tough decisions over further investment or consolidation.

'At 35%, the proportion of European power companies either on Rating Watch Negative or with a Negative Outlook has reached an historic high,' reported Isaac Xenitides, the head of Fitch's European Energy Team. 'However, this is still better than the global picture for the power and gas industry where the number of companies with Negative Outlook outnumbers those with a positive perspective by a factor of 7:1.'

Richard Hunter, Managing Director of Fitch's Global Power group in New York, said: 'With over €20bn of European utility refinancing coming to the market this year the big question is whether companies continue down the path of expansion and add to this debt, or take the opportunity to consolidate. Early signs this year are more encouraging than they have been for a while, but we're still waiting for delivery on the revised strategies.'

Call to EC on compulsory oil stocks

In its consultation response to the UK Government, UKPIA, the trade association representing the main oil refining and marketing companies in the UK, is asking that the EU Commission re-think proposals for a further directive governing compulsory stocking of petroleum products.

At present the UK, as a net exporter of crude oil, is not required to hold any stocks of petroleum products under International Energy Agency (IEA) rules. However, under existing EU arrangements, the UK is, nevertheless, required to hold substantial contingency stocks of various petroleum products such as petrol, diesel and heating oil. These stocks held by, and at the expense of, UK refiners currently amount to 67 ½ days of UK inland consumption.

Under recently published proposals from the European Commission the amount required to be held by the UK would be significantly increased. The draft EU Regulation also envisages the EU having overall control of the stocks and using them in times of crisis to influence the market in oil and oil products.

UKPIA Director General Macolm Webb commented that the proposals appear to be a 'solution in search of a problem'. The Association estimates the start-up costs at a minimum of £900mn, plus significant maintenance costs each year thereafter.

A copy of the full UKPIA response to the consultation can be found at **www.ukpia.com** under the heading 'Publications'.

EBRD developments in the pipeline

The EBRD is also planning to lend 50mn to Russia's PetroAlliance, to expand services through the acquisition of hydrofracturing, sidetracking and directional drilling equipment, plus staff training, reports *Keith Nuthall*. The bank is also lending Polish petrochemicals firm PKN Orlen and joint venture partner Basell some 85mn to help finance a plastics plant at Plock, Poland.

It is also talking closely to concerned environmental groups before agreeing to release $300mn to build the planned key Baku–Tbilisi–Ceyhan oil and gas pipeline from the Caspian to Turkey's Mediterranean coast. Concerns include construction soil erosion and oil spills.

At the same time, the EU has been firming its security of oil supplies to deal with Iraq war threats. The European Commission has for a second time convened the EU's Oil Supply Group to assess Europe's stocks in case of shortages. It has also released a paper calling for 'intensified dialogue with producer countries' to improve price mechanisms and supply arrangements.

Other EU oil industry news includes:

- The European Parliament has amended a directive promoting biofuel use by insisting that those made from vegetable oils are listed amongst the fuels that attract tax breaks and other financial benefits.
- The European Court of Justice (ECJ) has rejected an appeal by France's Pétrolessence against the European Commission's blocking of its purchase of motorway petrol stations sold by TotalFinaElf to secure merger approval.

NEWS Downstream

Demand forecasting to save money

Cap Gemini Ernst & Young, together with SAS, has launched a new demand forecasting system for energy companies that is claimed could save organisations millions of euros. Nigel Lewis, Trading and Risk Management Consultant, comments: 'EDMOES [energy demand management organisation and exploitation system] gives energy companies a competitive advantage in the deregulated environment. In competitive markets there is very little room for error when forecasting energy demand. EDMOES reduces this margin of error, thanks to new levels of forecasting accuracy, and allows our clients to reduce the costs associated with energy balancing, pricing, customer acquisition and retention, and trading.'

The system is also reported to be adaptable to variables such as changing customer behaviour and enables companies to produce forecasts for any period (daily, hourly or 15-minute forecasts), any segmentation of customers, or any forecast horizon.

According to research, a leading electricity company could save up to £10mn/y by improved forecasting activity alone.

OMV in fuel retail deal

OMV has acquired 141 service stations in Austria, Czech Republic, Slovakia and Bulgaria from the Austrian company Avanti for an undisclosed sum. Some 109 of the acquired sites are in Austria, boosting OMV's Austrian network to 626 outlets and increasing its market share to 24%, just 1% below the market leader.

In the Czech Republic, the deal increases OMV's network by 11 to 138, boosting market share to 11%. In Slovakia the network will grow by 20 outlets to 101 sites; the market share will rise to 18%. Only one site is added in Bulgaria, bringing the total number to 65 and market share to about 10%.

OMV's total retail network in Central and Eastern Europe now numbers 1,756 outlets.

Call to diversify

In a press release launching its new report entitled *Australia's Polluting Power: Coal-fired Electricity and its Impact on Global Warming*, WWF Australia has said that 'a small group of coal-fired power stations is Australia's largest source of global warming, pumping out 170mn tonnes of carbon dioxide every year'. The report reveals that electricity generation produces one-third of Australia's greenhouse emissions and that 97% of these emissions are produced by 24 coal-fired power stations.

WWF Australia is calling for Australia to diversify its electricity supply by 'increasing the use of renewable energy and super-efficient gas', and for governments to introduce stronger energy saving regulations.

Service station plans

Interoil, a joint venture of Austro-Slovenian fuel retailer OMV-Istrabenz and Kopex-Sarajlic of Sarajevo, is aiming for a 20% share of the fuel retail market in Bosnia-Herzegovina within five years, writes *Stella Zenkovich*. The venture plans to initially operate nine sites, adding a further 50 to 80 outlets over the next five years.

Slovenian oil trader Petrol currently operates 25 service stations in Bosnia-Herzegovina, a number it is intending to increase to 30 by the end of 2003. Meanwhile, Petrol Belgrade, a local subsidiary of the Slovenian oil trader, is planning to have 100 filling stations in operation in Serbia by the end of the year, where it says the conditions are highly favourable for investment. The company reports that it has already made strong contacts with several local oil traders seeking back-up. Petrol plans to be operating 500 filling stations in the country by 2010.

Taiwan LNG terminal

TaLNG Company – a 50:50 joint venture between Shell Gas and Asia Cement Corporation – has submitted a bid in response to Taiwan Power Company's (TPC) tender for the supply of natural gas to the TaTan power station in northern Taiwan.

If the tender is successful, TaLNG proposes the construction of a new LNG receiving terminal in northern Taiwan and will supply up to 1.7mn t/y of regasified LNG to Taipower over a 25-year period from 2008. The LNG will be sourced from gas fields that are currently being developed offshore Russia's Sakhalin Island by Sakhalin Energy Investment.

In Brief

Eastern Europe

***Slovnaft, in which MOL has increased** its holding from 36.2% to 67.8%, is being used by the Hungarian oil company as the bidding and acquisition vehicle for a 63% stake in Czech refinery, fuel retail and petrochemical group Unipetrol, reports* Stella Zenkovich. *Slovnaft has an established presence in the Eastern Moravian sector of the Czech market.*

North America

***To improve air quality, the City of Los** Angeles has unveiled a new power plant that runs on fuel-cell technology, reports* Philip Fine.

***A Massachusetts Institute of Technology** study has concluded that hydrogen powered cars will not perform better than hybrid diesel-electric vehicles regarding energy use and greenhouse gas emissions until after 2020, reports* Keith Nuthall.*

***The US EIA (US Energy Information** Administration) is reported to have stated that gas storage levels are a record lows, with surplus capacity currently only 10% of 2003's projected 51.4bn cf/d average production rate.**

***The Houston refiner Frontier Oil** Corporation has agreed to acquire Dallas rival Holly Corporation for $449.2mn in cash and stock.*

***Enron, the bankrupt US energy group,** said it would hold on to its three North American pipelines for its creditors rather than sell them, and said it might pursue the same strategy for certain Latin American energy assets.*

Middle East

***Three Abu Dhabi National Oil Corp** subsidiaries – Abu Dhabi Gas Liquefaction Company (Adgas), Abu Dhabi Marine Operations Company and Adnoc Distribution – are jointly developing a project on Das Island to replace gasoline with compressed natural gas (CNG) in vehicles by 2004 and to introduce CNG in Abu Dhabi City.*

***Qatar has embarked on what is** claimed to be the Middle East's first GTL venture. The plant will initially include two trains producing 33,000*

In Brief

*b/d of liquids, comprising 24,000 b/d of diesel, 8,000 barrels of naphtha and 1,000 barrels of LPG.**

Russia & Central Asia

***Surgutneftegaz is planning to sign** an agreement with the Leningrad region to construct a new refinery in Primorsk with a capacity of 120,000 to 140,000 b/d, reports UFG.*

Asia-Pacific

***Mobil has announced it will close its** Port Stanvac oil refinery in Adelaide within months.*

***Standards Australia is to take over** responsibility for the development and maintenance of gas technical standards in Australia from 1 July 2003. The Australian Gas Association currently undertakes this role.*

***The North West Shelf LNG Sellers** have signed a sales and purchase agreement with Tokyo Electric Power for the supply of 125,000 cm of LNG on 25 March 2003.*

***Petronas has signed two separate** sale and purchase agreements valued at more than $20bn with Tokyo Electric Power and Tokyo Gas to supply LNG to Japanese firms.*

MANY MORE OF THE MONTH'S DOWNSTREAM NEWS STORIES NOT INCLUDED ABOVE CAN BE FOUND ON THE NEWS IN BRIEF SERVICE @ www.petroleum.co.uk

NEWS Downstream

Competition in the European electricity sector

The competitive intensity within European electricity markets still varies significantly from one country to another according to the level of market openness, extent of cross-border trading and the size of the largest generators, according to a new report from Cap Gemini Ernst & Young. The latest edition of the *European Energy Markets Deregulation Observatory* shows that in some regions – such as the UK and Germany – the main players have not more than 25% market share, while in others, such as France and Belgium, the former monopolies still retain market shares above 90%.

The report shows that cross-border trading is not yet sufficient to create a single European market, with continuing differences in wholesale prices between neighbouring countries (eg Germany and France). Current interconnections were primarily designed to provide cross-border support for system security and reliability. Progress has been made in developing cross-border capacity auctions to allow greater trading access to the interconnectors. However, as the report explains, there are four different types of auction being used and, for the most part, these still tend to favour the pre-existing long-term contracts. European organisations such as ETSO and EFET are trying to develop a more harmonised approach that could encourage a significant increase in trading between national markets and also make clear where expansion of the interconnector capacities would be commercially viable.

A full summary of the report can be found at **www.cgey.com/energy**

Investment needed in Russian pipelines

Pipeline transport in Russia should be state-controlled, stated Prime Minister Mikhail Kasyanov when commenting on the oil majors' intentions of investing capital in the construction of export pipelines, writes *Stella Zenkovich.*

He also emphasised the need to enforce legally binding equal access to pipelines, but added that meeting all export wishes of oil companies would be wrong, because the development and tapping of resources should be subject to a national energy strategy formulated by the government – an idea that appears to negate the concept of equal access.

He further confirmed his authoritarian beliefs by intimating that the government should spread oil and gas exports to a wider range of countries to reduce Russian dependence on world market trends. Russian oil pipelines require some $130mn of investment each year to remain in working order according to the Ministry of Economic Development and Trade. It claims that 70% of the country's oil pipeline system has deteriorated with some 70% of pipeline storage tanks in use for over 20 years. In addition, some 34% of pipelines have been in use for 30 years, with only 7% of the pipeline network less than ten years old.

Neglected investment is a major problem, the Ministry has stated, now that the government is planning to increase oil extraction to 574mn tonnes by 2010. It is also planned to expand existing pipelines and create new pipelines, in particular in the Northern Baltic, Eastern Siberian regions and in the Russian Far East.

UK Deliveries into Consumption (tonnes)

Products	†Feb 2002	†Feb 2003	†Jan–Feb 2002	†Jan–Feb 2003	% Change
Naphtha/LDF	117,754	239,848	188,129	440,060	134
ATF – Kerosene	648,506	708,294	1,389,633	1,642,866	18
Petrol	–	–	–	–	–
of which unleaded	1,581,681	1,508,186	3,206,147	2,985,697	–7
of which Super unleaded	41,563	64,538	82,771	138,172	67
ULSP (ultra low sulfur petrol)	1,540,118	1,443,648	3,123,376	2,847,525	–9
Lead Replacement Petrol (LRP)	39,622	18,246	88,675	37,948	–57
Burning Oil	404,338	513,377	819,289	712,474	–13
Automotive Diesel	1,375,313	1,337,185	2,725,286	2,600,263	–5
Gas/Diesel Oil	499,047	531,491	1,087,198	1,068,427	–2
Fuel Oil	177,304	168,330	389,749	437,276	12
Lubricating Oil	79,976	68,635	154,574	138,87	–10
Other Products	632,251	600,972	1,232,556	1,516,984	23
Total above	5,555,792	5,694,564	11,281,236	11,580,860	3
Refinery Consumption	479,835	387,553	889,951	792,859	–11
Total all products	6,035,627	6,082,117	12,171,187	12,373,719	2

† Revised with adjustments

All figures provided by the UK Department of Trade and Industry (DTI)

Pipelines under pressure

Photo: Anadarko

While high energy prices have filled out the petroleum sector's coffers in recent years, the general outlook for the sector is not optimistic. Flat worldwide consumption, fear of recession, war, and disruption of supplies have led the industry to closely examine capital expenditures and the world's pipeline network – the backbone of energy transportation – is feeling the pinch. *Gordon Cope* looks at some of the major pipeline projects (both under construction and proposed) and the impact that changing factors are having on their viability.

There are two competing projects vying to bring natural gas south from the Arctic Circle, a region that is a major focus of Anadarko's frontier exploration efforts.

After many years of international intrigue, the construction of the Baku–Tbilisi–Ceyhan (BTC) pipeline is expected to get under way in 2Q2003. At 1,760 km in length and with a capacity of 1.2mn b/d, the $2.95bn pipeline is neither the largest nor the most expensive transportation facility in the world – but it certainly is one of the most controversial. Western concerns meant that routes running through Iran and Russia were downplayed in favour of a meandering circuit through Azerbaijan, Georgia and Turkey, to the Mediterranean outlet of Ceyhan. 'There are a number of factors to consider,' said BP spokesman Tony Odone when asked about route selection. 'You try to get the shortest line, then look at the geological, topographical, political and environmental factors. You want to reduce the risks of all those elements. That was done through extensive consultation with all three countries.'

Turkish delight

The purpose of the pipeline is to help unlock the export potential of the rich petroleum deposits within the Caspian Basin. The BP-operated Azeri-Chirag-Gunashli (ACG) field is said to hold 5.4bn barrels of recoverable crude. It currently produces 140,000 b/d and is expected to ramp up production to 1mn b/d to coincide with the completion of the BTC pipeline early in 2005. Longer-range projections see production from the 7bn barrel Kashagan field, in Kazakhstan's sector of the Caspian, dominating shipments after 2015.

Mark McCafferty, an energy consultant,* has been analysing the economics of the pipeline. 'In Baku, I talked to the project team, and if they adjust the tariff to $3–$3.5/b it's viable. Some 400,000 b/d by barge from Kazakhstan improves the viability even more.' He estimates that total lifting, operational and transportation costs to Ceyhan work out to a competitive $7/b range.

Security remains a wild card, however. Armenia, which has been involved in violent conflict with Azerbaijan over the disposition of the Nagorno-Karabakh enclave, was recently cited as a potential source of disaffection toward the project after an attack against the existing Baku–Supsa oil pipeline in Georgia. Both Georgia and Azerbaijan have set up special security forces to protect the project. BP, the largest shareholder in the multinational consortium responsible for BTC, notes that the pipeline will be buried throughout its length to a depth of at least one

metre, hopefully in something that is Armenian proof. 'They've factored in the risks and built a system to detect and shut down the pipeline if there's a breach,' says McCafferty. 'ACG is going full steam ahead. Really, there's no other solution [for transportation to market] than BTC.'

Always the bridesmaid

If ever there was a project that should be moving ahead, then the Arctic pipeline is it. Proven reserves, gung-ho government backing and strong commodity prices all point to the imminent breaking of gas.

And, yet, the Energy Information Administration (EIA), in its 2003 long-range outlook for the North American gas market, doesn't foresee any Arctic gas until 2016. Why the delay?

There are two main competing projects vying to bring natural gas south from the Arctic Circle. The Mackenzie Valley pipeline proposes to connect 5.8tn cf of proven reserves in the Mackenzie Delta to the existing North American natural gas network through a 1,300-km pipe running south to Alberta. The $3bn project is currently the subject of a formal feasibility study by the four main producers – Imperial Oil, Shell Canada, ConocoPhillips and ExxonMobil. Indigenous groups, which successfully opposed the development in the 1970s, are now supporting the 1.2bn cf/d line.

The Alaska Highway pipeline is designed to connect 34tn cf of stranded gas reserves in Prudhoe Bay to markets in Canada and the lower 48 states by following a 2,800-km path south through Alaska, the Yukon Territory and British Columbia. The cost of the 4.3bn cf/d line is estimated in the $20bn range. In addition to being enthusiastically supported by the Alaskan Government, the US Senate has also introduced a bill offering producers a tax credit to gas selling at less than $3.25/mn cf (although the credits must be paid back if gas prices surpass $4.80/mn cf).

An additional 5bn cf/d would have no difficulty finding a home in the North American market. The EIA estimates that US gas demand, currently in the range of 22tn cf/y (60bn cf/d), may rise to 35tn cf/y (96bn cf/d) by 2025. The oil sand projects in northern Alberta alone are expected to consume 1bn cf/d.

The energy transportation sector in North America, however, is currently in a slump. In addition to the meltdown of Enron and the natural gas price fixing scandal in California, a stagnant North American economy and government regulatory intervention have created a cautious investment environment. As Fred Fowler, President of Duke Energy Corporation, recently pointed out in an open letter to the industry, the dozen or so major players in the pipeline sector have lost almost $240bn in market capitalisation since mid-2001.

Still, hope springs eternal. 'We will see the Mackenzie Delta project go ahead,' says consultant Scott Mitchell. 'The companies involved are excited with getting on with it, and the indigenous communities are looking to go forward with it. We are suggesting an initial throughput of gas in 2009. By 2011, they should have a throughput of 1bn cf/d.'

As for the Alaska Highway project, the producers – ExxonMobil, BP and ConocoPhillips – envision a lively negotiating process to nail down royalty and tax guarantees, permitting legislation and binding dispute arbitration before any pipe hits the permafrost. 'We envision a five- to seven-year process of engineering, permitting and construction before the first gas flows,' states ExxonMobil spokesman Bob Davis.

Murmansk proposals

High oil prices have invigorated the Russian petroleum industry in a manner unthinkable only a few years ago. The International Energy Agency (IEA) notes that, at 7.8mn b/d, it is now the world's second largest oil producer, and exports some 4.5mn b/d of crude. According to Tyumen Oil Company (TNK), Russia's fourth largest oil producer (which recently entered into an agreement with BP to create a giant new Russian oil company), exports are expected to increase to 5.5mn b/d by 2010.

The major problem is getting the black stuff out of Russia. 'The domestic market price is depressed [sometimes to as little as $5/b], because they've got a real export constraint problem,' says consultant Colin Lothian. 'They are desperate for exports.'

The primary constraint is a lack of a year-round, deepwater port capable of handling large shipments. In 2002, Yukos began shipping oil from the port of Novorossiysk on the Black Sea to the US market. Tough new rules imposed by Turkey to reduce tanker traffic through the Bosphorus Strait have strangled that route, however. Hence, in December, Yukos, along with privatised Russian oil companies Lukoil, TNK and Sibneft, announced preliminary plans to link Russia's existing network to the Arctic port of Murmansk. Located approximately 1,700 km due north of Moscow on the Barents Sea, Murmansk is already a loading point for oil bound for north-western Europe. Two proposed routes, 2,500 km and 3,600 km in length, would deliver up to 1.6mn b/d to the ice-free Arctic port, allowing for the development of Russia's first facility capable of handling supertanker volumes of 2mn barrels.

Because the $3.4bn–$4.5bn project would be the first privately-built and operated major pipeline in Russia, politics plays a significant role. Transneft, Russia's government-owned oil transportation company, has proposed its own export plan. It favours the creation of a crude pipeline from Angarsk, near Lake Baykal, to China's petroleum terminal in Daqing and a spur to the ice-free port of Nakhodka (located on the Sea of Japan 50 km east of Vladivostok), to service the Asian market. The company cites better transportation economics and the opportunity to develop oil reserves in Eastern Siberia and the Russian Far East.

However, the Kremlin recently threw ice-cold water on the Murmansk initiative when Prime Minister Kasyanov stated a preference for government control of the transportation system. Further manoeuvering is likely to delay the project's proposed 2007 completion date. In the end, a fast-track expansion of the existing Baltic pipeline system (BPS) already in the works may do an end run around the political wrangling. 'It makes more economic sense to expand BPS before initiating large-scale pipeline work,' notes Lothian.

Gulf of Mexico salvation

The Gulf of Mexico has been a stalwart of American gas production for decades, but the region's shallow-water offshore fields have been in serious decline since 1996 (when output peaked at 13bn cf/d) to approximately 10bn cf/d today.

Deepwater discoveries have been seen as a source of salvation. In a crescent situated approximately 200 km south of the Mississippi Delta, a string of fields – including Thunder Horse, Mad Dog and Atlantis – are expected to produce up to 1mn b/d of oil and 5bn cf/d of gas, primarily through the Mardi Gras and Canyon Express deepwater pipeline transportation systems. 'The problem is the fields are much more oil-prone and less gas-prone than expected,' says consultant Mark Tuckwood. 'We see the deepwater gas peaking at around 5.3bn cf/d in 2004, then declining pretty quickly after that, to around 3bn cf/d in 2012.'

Not all hope is lost for the shelf, however. Recent exploratory wells have discovered significant gas below 15,000 ft, and the Interior Department's Minerals Management Service (MMS) estimates that as much as 20tn cf may lie undiscovered at great depths. 'It's a play that

Photo: Transco

Although the UK has been able to import gas since 1998 through a line interconnecting with the European network, new import facilities will be needed to meet the expected shortfall.

still has to be proved,' says Tuckwood. 'And the cost of drilling into deeper horizons makes the economics of the play quite different.'

Sakhalin 'hot potato'

On the very eastern edge of Russia, just north of Japan, lie the snow-shrouded Sakhalin Islands. There are two main production sharing agreement (PSA) projects in the archipelago – Sakhalin-1, headed by ExxonMobil and partners, and Sakhalin-2, with a consortium led by Shell. Drilling over the last decade has firmed up reserves of 2.3bn barrels of oil and 17tn cf of gas. Both projects are expected to yield up to 400,000 b/d and significant natural gas production. At Sakhalin-2, Shell has announced plans to build a 4.8mn t/y LNG plant to export gas. ExxonMobil, however, would prefer to pipe the gas to Japan. The 1,400-km line would follow a Pacific Ocean route to a northern port. 'It's a hot potato, because the Sakhalin regional government is very supportive of the (LNG) project, but the governor is opposed to piping the gas to Japan,' says Lothian.

The pipeline project is further complicated by long-standing territorial disputes between Russia and Japan, an earthquake prone route and a Japanese gas distribution system that is not designed to handle large pipelines. On the other hand, says Lothian, 'the LNG plant has no firm sales yet'. The outcome of the pipeline may be resolved in the future when ExxonMobil and ChevronTexaco explore new leases in the region. 'There are two massive structures that could hold as much as 40–60tn cf of gas,' comments Lothian.

Latin American demand falls short

The 3,150-km Bolivia–Brazil pipeline – once vaunted as a prime example of Latin American cooperation in exploiting indigenous energy reserves – has come a bit of a cropper. The line, which has a capacity of 30mn cm/d, is currently running at 24mn cm/d. 'Demand in Brazil is much less than projected,' says consultant Matthew Shaw. 'The economy has not been doing so well and the devaluation of the currency has made the gas very expensive. Also, there was a drought a few years ago and hydroelectricity had to be rationed. When they finally took the rationing off, demand for energy didn't rebound as much as they thought.'

Brazil, it seems, is slightly less than enthusiastic about paying Bolivian producers for US$-denominated gas it doesn't want, and has asked to renegotiate the terms, placing a question mark over the economic viability of such projects in the future. Although some profitable opportunities still exist in Latin America (such as gas pipelines from Argentina to Chile), an oil industry strike in Venezuela, the economic meltdown in Argentina and the election of a left-wing government in Brazil have done little to encourage investors. 'You have to admit, South America is not exactly flavour of the month,' says Shaw.

One bright spot is Camisea. The condensate-rich gas field, which sat idle since Shell's discovery in the Peruvian hinterland in the early 1980s, is now finally being exploited. A 32-inch, 710-km pipeline is under construction, connecting the 11tn cf gas field to Lima by 2004.

The project, led by Pluspetrol, is primarily geared to tap the abundant condensate in the field, but the 1.2bn cf/d line to Lima is being built with an eye to LNG export. 'But it's expensive when you compare it to other Pacific Rim LNG projects in Sakhalin and Indonesia,' notes Shaw. 'Peru and Bolivia need to get together and build one.' Even then, the deal would involve Bolivia producing, Peru liquefying, Mexico re-gassifying and the US consuming. 'Any LNG scheme that involves four countries is pretty fraught,' says Shaw.

UK in decline

The UK currently produces approximately 10bn cf/d of natural gas, but drilling within the UK sector of the North Sea is not keeping apace with natural decline in field output. 'The UK is expected to be a net importer of gas by 2005,' says consultant Rhodri Thomas.

Although the UK has been able to import gas since 1998 through a line interconnecting with the European network, new import facilities will be needed to meet the expected shortfall. Several alternatives are being touted, but the Ormen Lange field in Norway, with in excess of 12tn cf of proven reserves, is seen as a strong candidate to supply future needs. A 1,100-km undersea gas line tying into the UK grid is projected to cost £1.2bn. A potential barrier to the plan is the unitised nature of transportation in the Norwegian sector, making the sorting out of who-pays-for-what among the various producers somewhat problematical. Regardless, industry experts feel that a decision in principle must be made soon in order to forestall a supply squeeze. 'The pipeline would take two to three years to build,' comments Thomas. 'It's getting to the critical stage.'

**Wood Mackenzie operates an extensive energy consultancy in Edinburgh* (www.woodmac.com/encon.htm). *All consultants mentioned in this article are members of that office. The author is indebted for their expert help.*

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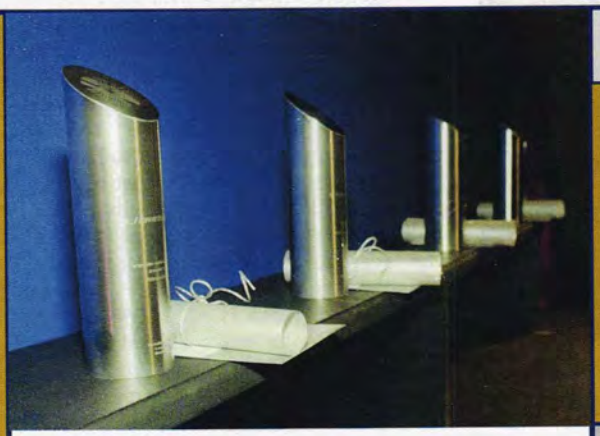

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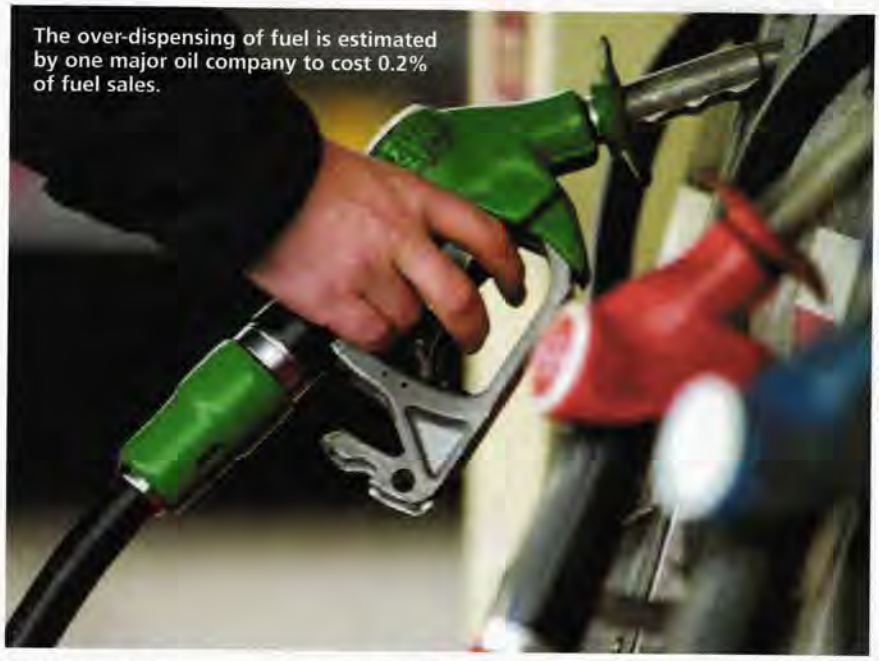

The over-dispensing of fuel is estimated by one major oil company to cost 0.2% of fuel sales.

Web-enabled service stations cutting costs

eGasStation has developed an advanced e-business solution for the retail fuel industry that it claims will help significantly reduce operating costs. At the heart of the solution is new technology that allows legacy devices such as fuel dispensers, point-of-sale systems and tank gauges to be seamlessly integrated to provide a powerful new remote management tool. *Martin McTague*, Managing Director, reports.

The initial value proposition prepared for a major fuel retail company has indicated a payback after installing eGasStation's new remote management tool in less than six months. The cost analysis showed that the investment that was required to 'web enable' site operations will be paid for by significant cost savings from:

- the reduction of losses from over dispensing;
- reducing fuel restocking costs;
- automating many of the current manual operations;
- the focusing of maintenance through remote diagnosis; and
- reducing the risk of brand damage and expensive clean-up operations when underground tanks or pipes leak.

In addition to the fuel management benefits, improved profitability can be achieved by remote management of car washes, refrigeration units, HVAC systems, dry stock, security and new revenue generating services such as in-car services, improved CRM (customer relationship management) and dynamic fuel pricing.

This new infrastructure will also allow low-cost upgrades to point-of-sale (POS) systems and tank gauge equipment, and serve as a foundation for new revenue opportunities.

Industry overview

Industry analysts forecast that the most successful fuel retailers will be those who anticipate, adapt to and manage change. Many major oil companies anticipate significant cost savings from e-business – but until now this has not been used to prevent unreconciled fuel losses that typically amount to 0.5% of fuel dispensed.

However, regulation will continue to increase, especially for environmental, competition and employment issues, and this will put more pressure on margins. This, in turn, will encourage operators to implement the remote management of many retail fuel activities in order to reduce the cost of operations and improve profitability.

Most of the 25-odd devices found at an average petrol station are not e-enabled and communicate via serial connection (there is no TCP/IP or networking). Major leaks of fuel from an underground tank or pipeline system can cost up to €3mn to clean up, while the cost of the negative publicity subsequently associated with the brand is impossible to measure.

Many of the back office systems (BOS) are expensive to maintain and difficult to upgrade. They typically use sales data from the POS systems and stock data from automatic tank gauges (ATG) to provide basic fuel management systems that are usually either inaccurate and/or prone to false alarms.

For the larger oil companies the site-based BOS is often linked via a conventional analogue modem to the head office-based back office and enterprise systems such as ERP. This connection can be one of many different phone lines for voice/fax and data communications. Broadband connectivity is rare, but ISDN lines are found in some sites.

Robust remote management

A major challenge facing the fuel retail sector is how to provide better control over the millions of devices in service stations without incurring the cost of a large-scale update and replacement programme. Central to the eGasStation solution is the design of the data acquisition platform known as the Java Automated Controller (JAC) that can acquire, store and analyse from a wide range of legacy devices and reliably transport data to an off-site server for further analytical processing.

The main value proposition for this technology is significant operational savings gained from off-site fuel management. Sophisticated statistical analysis of every fuel movement provides four major benefits:

- It allows the retailer to effectively manage environmental risks using remote data analysis systems. These systems are far more sensitive than conventional wetstock reconciliation and can quickly detect very small leaks and allow enough time to respond before they can cause significant damage to the environment or danger to people/property. Most conventional fuel management systems are handicapped by poor quality, incomplete or uncoordinated data collection techniques that were designed for financial management systems. eGasStation take responsibility for data collection and provides significant insurance cover against errors or omissions.
- The increased sensitivity of this system allows retailers to remotely identify over-dispensing pumps and cost-effectively manage their recalibration. The over-dispensing of fuel is estimated by one major oil company to cost 0.2% of fuel sales. Many in the industry believe this is a very conservative figure and claim that if high volume dispensers are targeted then the benefit accrued would be much higher.
- Providing automatic tank replenishment and remote monitoring of tank contents via a secure website will improve the efficiency of the distribution system by peak demand lopping and more accurate forecasting.
- Fuel movement data is used to track fuel flowing from tanks to customer's car. From this model of the storage and dispensing system, real time data can be used to diagnose faults in legacy equipment and provide precisely targeted maintenance.

Other benefits include the elimination of false alarms that can be common with automated tank gauge systems, avoiding expensive upgrades to tank gauge systems and POS by centralising data analysis, and enabling site management to focus on retail responsibilities rather than training them to interpret inaccurate wetstock data.

Any fuel system problems are handled using an agreed escalation and maintenance resolution process that can be used to automatically direct authorised maintenance contractors.

Car wash management

One example of where the technology can be applied is at the forecourt car wash. Several benefits are derived through interfacing with the car wash controller and the POS, including:

- The ability to migrate to a maintenance contract based on wash cycles and not on time cycles.
- The immediate notification of field engineers and support contractors as soon as a system is not operating properly or when the car wash shuts down (reduces downtime and improves repair scheduling efficiency).
- Increasing sales through 'happy hour' pricing and improved trend analysis.
- The ability to track real downtime versus what is reported by site management and maintenance contractors (improve trend analysis and validate performance).
- The ability to send a diagnosis reference with the maintenance request instead of just a generic call (improves repair scheduling efficiency and reduces downtime).

Several benefits are derived through interfacing with the car wash controller and the point-of-sale

Value added services

A web-enabled service station will be the key access point for the provision of a raft of new value-added services. Once this infrastructure is in place fuel retailers will be in a position to take advantage of several new applications, including:

- Energy management – provide sensors (HVAC, Refrigerators, etc.) to alert air conditioning/heating temperature; lighting failures (signage); cooler temperature; and compressor cycling.
- Dry stock management.
- Dynamic fuel pricing.
- Category management and streamlined evaluation of sales data (fuel and SKU items).
- Voice-over IP (VOIP) technologies to consolidate telephone lines.
- Remote software maintenance and distribution.
- Security surveillance systems.
- Wireless technologies to help facilitate the speed and ease of deployment and reduce costs associated with physical networks.

Future applications

Developers are currently working on new Internet-based services for service station owners and their customers. These applications are exploiting the spread of in-car computing and navigation systems, which are migrating from luxury-class vehicles to the mass market. For a relatively small additional cost, car manufacturers will be able to integrate web access into their vehicles, thus offering attractive services to their customers and adding to their own bottom line.

Fuel retailers have a golden opportunity to capitalise on this emerging trend by incorporating compatible services at the pump dispenser and in-store functions such as POS and kiosk. Services could include:

- Video and music download to the automobile and/or digital radio.
- GPS based mapping services.
- Local advertisers can be allowed (for a fee) to target the customers with market messages while they are waiting to fill their tanks.
- Smart chip (credit card, ring, key chain) integration to offer new payment and CRM opportunities.
- Real-time price auction services for Intelligent Network Vehicles and PDA devices.
- Car synchronisation applications that send alerts to e-mail and PDA devices to warn of maintenance/repair offers.

In short, the adoption of this technology to web-enable the forecourt will help fuel retailers reduce the cost of operation, improve profitability and offer new revenue opportunities. ●

Focus on the forecourt

Over 100 major companies exhibited at this year's International Forecourt & Fuel Equipment Exhibition (IFFE*), promoting fuel dispensing equipment, car washes, vapour recovery equipment, air and water delivery systems, electronic data systems, tank measurement devices and security systems. *Kim Jackson* reviews some of the new products on offer, as well as highlights from the IP's half-day technical seminar organised in association with Catalist.

LPG was very much centre stage at the show, with exhibitors such as BP LPG UK, Premier Autogas, Flogas, Pumptronics, OPW and Gilbarco-Veeder Root all keen to demonstrate their commitment to an alternative fuel that is moving to the mainstream as market accessibility improves.

Pumptronics, for example, was exhibiting a range of dispensers that illustrated the 50-plus design options that can be mixed and matched. New products included a dual fuel pump serving unleaded and LPG from the same dispensing point. According to the company: 'This has lots of advantages as drivers don't have to fill up with conventional fuel at one dispenser, then move their car to an LPG pump, and cashiers aren't confused about whether people are driving off without paying.'

Gilbarco-Veeder Root was also launching its first dual fuel dispenser – the Euroline GM LPG Combi Dispenser – at the show, in addition to promoting PassPort Europe, a fully touch-screen operation forecourt controller solution; the SK700, a new multi-product dispenser with flexible configurations; and DIS-500, its latest fully configurable DCD (driver controlled deliveries) unit. Meanwhile, Flogas UK was holding refuelling demonstrations to show forecourt operators how easy it is to fill a dual fuel vehicle. Technical experts were on hand to answer visitors' questions about LPG installation design, costs and other issues.

With over 600 forecourt sites now selling LPG across the UK (see *Petroleum Review*'s *Retail Marketing Supplement (RMS)*, March 2003), BP LPG UK was keen to promote the service it provides to non-BP sites. The company is currently rolling out autogas to new and renovated BP forecourts across the country. It also provides the fuel to independent retailers.

Wetstock management

Looking at the issue of wetstock management, Mercury Petroleum Systems unveiled its 4Tech tank gauge that weighs petrol so that its accuracy is unaffected by temperature. The company also offers a complete 'closing the loop' solution for wetstock management that includes a point of sale terminal, tank gauge and remote monitoring, with data updated every hour via phone line (see *Petroleum Review*, April 2003).

Together with companies such as OPW and Fairbanks Environmental, Mercury was keen to stress the financial

as well as the environmental benefits of improving leak detection.

At the car wash

Show visitors were also able to see the latest vehicle washing systems – from high-speed conveyor operations down to jet washes, vacuuming and air towers – as well as equipment servicing and a full range of chemicals used in wash systems. Exhibitors included Ryko, launching its new Excel rollover car wash that features a queue detection system that can speed up the wash when customers are waiting.

Meanwhile, Wilcomatic was promoting its new 'aesthetically appealing' jet wash; a fragrant vacuum with liquid containers that bubble to attract customers; a touchless, high-speed wash that uses sonar to position the vehicle; and US soft cloth technology that does not damage the softer paint finishes on premium cars.

It's a dog's life

Of the more unusual exhibits at the show were the self-service dog wash booths on offer from the two companies Pet Clin UK and Dogwash. Having proved extremely popular in Spain, the concept is now being promoted in the UK and elsewhere in Europe.

Other exhibitors included Lebury Welding & Engineering, promoting its SuperVault MH above ground petrol storage tank (see *RMS* 2003) and Gulf, which was launching its new range of technologically advanced lubricants, available in easy pour one- and four-litre packs.

Meggitt Petroleum Systems presented its site controllers that allow integration of forecourt peripherals, outdoor payment systems to cut queues and provide 24-hour fuel sales, multimedia pump heads that combine the calculator of the pump and the outdoor payment terminal into a single touchscreen, and back office software for forecourt management information.

Meanwhile, Pumpwatch unveiled its Measures Packs, featuring one, two, three or four of the latest Mk2 version of its CFX99 Series volumetric measures suspended from a single two-wheel trolley. The measures have a lightweight carbon composite construction that is claimed to allow for full flow-rate filling through a screw-on funnel on top, and bottom discharging through a ball-valve and discharge hose. The company reports that with two four-measure Multi Measures Packs two operatives can conduct four tests of retail pump dispensing accuracy on each of 36 nozzles in three hours.

The Platform

A number of free seminars were held at the 'The Platform' seminar theatre, including presentations on security, wetstock management, alternative fuels and environmental issues. It was also the venue for the launch of Garage Watch's 'Happy 2 Help' initiative aimed at providing attended service to help disabled and elderly customers.

Particularly popular was the Question Time Session on Day Two of the show, where Chairwoman Merril Boulton, Editor, *Forecourt Trader*, was joined by Fuelforce Chairman Rikki Hunt, Garage Watch CEO Mark Bradshaw, PRA Director Ray Holloway, Margram Chairman David Davis, Murco Marketing Director Breff Kelly and Patrick Hudson, Dealer Business Manager, Jet. Topics debated included the issue of two-tier pricing – something that the panelists felt was, in all likelihood, here to stay as dealers struggled to maintain their profitability and viability in the face of supermarket competition. Ray Holloway, however, suggested that the removal of prices from the pole sign may go some way to stamping out the problem, an issue he discussed in his contribution to this year's *Retail Marketing Survey*.

On the issue of alternative fuels, most of the panelists seemed to feel that LPG was the most promising fuel of the future as there were still issues of infrastructure development and vehicle warranty problems associated with the use of biodiesel [not biodiesel blends].

However, a note of caution was voiced regarding tax breaks on LPG (and other alternatives), pointing out that unless retailers and motorists were convinced as to the longevity of the tax differential compared to conventional fuels, many operators may choose not to invest in what could turn out to be a short-term market.

Other topics hotly debated included the value of promotion programmes and the work of the recently established Oil Industry Forum.

A matter of convenience

The Convenience Retailing Show was held alongside IFFE, bringing together the latest products and services for the convenience market as well as offering useful tips and advice on maximising profits and improving store layout via its 'Virtual C-Store' stand. A dedicated 'Shop Zone' was unveiled at the show for the first time, promoting in-store products such as antifreeze, oil and car care accessories, as well as showing new ideas for effective ranging and marketing.

Exhibitors included Canadian manufacturer Flex-O, that was launching its successful North American products into the UK market. The company makes additives and oil stabilisers for petrol and diesel vehicles, and was busy giving away free packets of its engine cleaning additive in tablet form that is claimed to reduce fumes by 40% while improving fuel consumption and protecting the engine. UK Managing Director Dragana Baker explained to *Petroleum Review* that: 'This is the first additive that is not a liquid. It's much easier for drivers to use because they don't have to bother about measuring exact quantities. As long as they have 10 litres of petrol in the tank they just drop a tablet in and it dissolves within a couple of minutes.'

IP forecourt seminar

As part of the Forecourt and Fuel Equipment Show, the Institute of Petroleum, in association with Catalist, presented a free, half-day seminar on key technical, environmental, and the health and safety issues affecting forecourt design and operations. Introducing the seminar and its speakers, Catalist Managing Director Nigel Lang emphasised the importance of good quality data and provided a summary of the European retail petroleum market based on Catalist's surveys of all service stations.

Thermite sparking was the first topic of discussion, Alec O'Beirne of PTF Training outlining the events of an incident at a forecourt in Shipley in which vapour that had accumulated within a direct fill point chamber ignited during a road tanker delivery of petrol in 1999. The fire was subsequently extinguished by the tanker driver who promptly replaced the fill point chamber lid (see *Petroleum Review*, July 2002). O'Beirne went on to detail the subsequent Health & Safety Laboratory investigation, which concluded that thermite sparking had acted as the ignition source – produced from either a light impact of one of the aluminium hose-end couplings with some rusty steel, or the rusty steel bands on the hose end, smeared with some aluminium, striking a hard surface such as a kerbstone.

Although believed to be a very rare type of incident, a number of immediate and long-term actions were identified to prevent recurrence elsewhere. Short-term actions included a briefing note (available as a free download from the IP at **www.petroleum.co.uk**), adding thermite spark risks to training programmes and improving general housekeeping by keeping rust on the forecourt to a minimum. Looking longer term, it was proposed to seek modified hose couplings, redesign hose blanking plugs, use non-metallic gratings and manholes, relocate drain gulleys away from where hoses will be in use, fit restraints to fill pipe caps, and ensure correct design and maintenance of fill pipes.

Cathodic protection

Martin McTague, Managing Director of EcoTech (UST), went on to discuss cathodic protection of underground storage tanks at service stations. He explained that the advice provided in the DEFRA Code of Practice could be viewed as somewhat confusing to forecourt operators. While it indicates that 'coatings should not be relied upon as the sole means of preventing corrosion', with leak detection systems and, 'where appropriate', cathodic protection suggested as additional mechanisms, it does not provide much additional guidance on such systems or their application.

He went on to explain the mechanisms of corrosion and cathodic protection systems, and outlined the IP's recently published guidance on the external cathodic protection of underground steel storage tanks and steel pipework at service stations.

Electrical testing

Delegates also heard from John Dallimore of John Dallimore & Partners about the need to test electrical installations at forecourts, as required by the UK Electricity at Work Regulations.

He went on to explain the guidance offered in the IP/APEA 'Blue Book', which sets out six programmes for inspection and testing at both new and refurbished filling stations, as well as existing fuel retail sites, the selected programme determined by the status of the installation.

He closed by emphasising the importance of training for fuel retailers and electrical contractors involved in electrical installation inspection and its reporting, to ensure that this important safety requirement was adequately met.

It's a bug's life

Ian Smith, Director, First Environment, addressed the issue of *Legionella* in recycling car wash systems, presenting the results of a recently completed study commissioned by the IP. He explained that *Legionella* was a bacteria, common in nature, that readily colonised engineered water systems,

with the potential to lead to Legionnaires' Disease and Pontiac Fever. Factors favouring its growth were a temperature range of between 20°C and 45°C, the presence of iron and other nutrients as a food source, deposits and low flow areas of systems such as car wash interceptors, and the presence of a biofilm.

The study assessed 16 car wash units around the UK, with three sampling and inspection visits to each over the summer and early autumn. It found that water temperatures at the sites were commonly between 12°C and 22°C, putting them below the favoured range for the development of *Legionella*, water chemistry was generally stable and biocide levels were usually low or not present. *Legionella* was detected at three of the 16 sites, with bacteria levels varying widely, although the only significant count was for an off-line unit that was being refurbished and had been decommissioned for some two to three weeks prior to testing.

The overall assessment of risk was believed to be low, although increased where units remained static. It was further reported that the IP is currently putting together appropriate guidance based on the results of the study, due to be released later this year.

Sensitive sites

Robbie Dow of Arcadis Geraghty & Miller International closed the well-attended seminar with a presentation on the GIS mapping of environmentally sensitive sites. The company had been asked by the IP to assess more than 13,000 fuel retail outlets in the UK during 2002 and to develop a database that detailed the potential groundwater and ecological sensitivity of each individual site. The database developed sets potential risks in context and will provide a basis for the management of such risks. It will enable fuel retailers to ensure that operating procedures and installations are designed in relation to site sensitivities, allowing them to prioritise sites for investigation and/or implement risk reduction measures.

The study concluded that 25% of the 13,141 sites identified were sited on a major aquifer, 19% had high groundwater vulnerability as they were situated on highly permeable soil. Some 2.7% were close to sensitive abstraction or in a Source Protection Zone 1 (SPZ1), 1.6% were located less than 100 metres from a Site of Specific Scientific Interest (SSSI), and 1.1% were classed as high vulnerability and located close to sensitive abstration/SPZ1.

** The IFFE was held at the Birmingham NEC on 4–6 March.*

Going from strength to strength

Petrotechnics was announced the winner of the IP Information Technology Award* at the annual IP Awards Dinner held at London's Savoy Hotel on 26 November 2002. *Phil Murray*, Managing Director, reports on the company's progress since then.

We've been honoured with our fair share of awards in the past, but to win the IP Information Technology Award was especially gratifying – the recognition from industry peers making this prestigious award particularly special. Since receiving the award, the company has continued to grow at an impressive rate despite the general slowdown in the technology sector. The demand for our software and services confirms that technology solutions are still being sought in the oil and gas industry, but only where they clearly add significant value to the business.

The company has grown from 26 to 40 employees since its foundation, and seen turnover double in the past year. We have been mainly adding to our consultancy division and to our software development team, but we're looking to recruit more staff in every area of the business in the coming year.

Safe system of work

Petrotechnics won the IP Information Technology Award for Sentinel Pro, which has become the market leading integrated safe system of work package in the upstream oil and gas market since its release.

By combining permit to work, task risk assessment and isolations into an integrated process supported by a single piece of software our clients have been able to make significant gains in safety performance and cost reduction. Many clients are using Sentinel Pro as an effective tool to standardise safety process management and reinforce excellent safety behaviours across disparate workforces, regions and cultures.

And there's more...

There's far more to Petrotechnics than Sentinel Pro. Praxima, the company's service division has grown quickly since its inception in April, and is undertaking a number of safety training and safety culture improvement contracts and developing web-based tools for a variety of oil majors.

In the past few months, we have also signed contracts with ExxonMobil, Agip KCO and DNO, as well as a major defense contractor. We are expecting to announce a further series of significant engagements over the next few months.

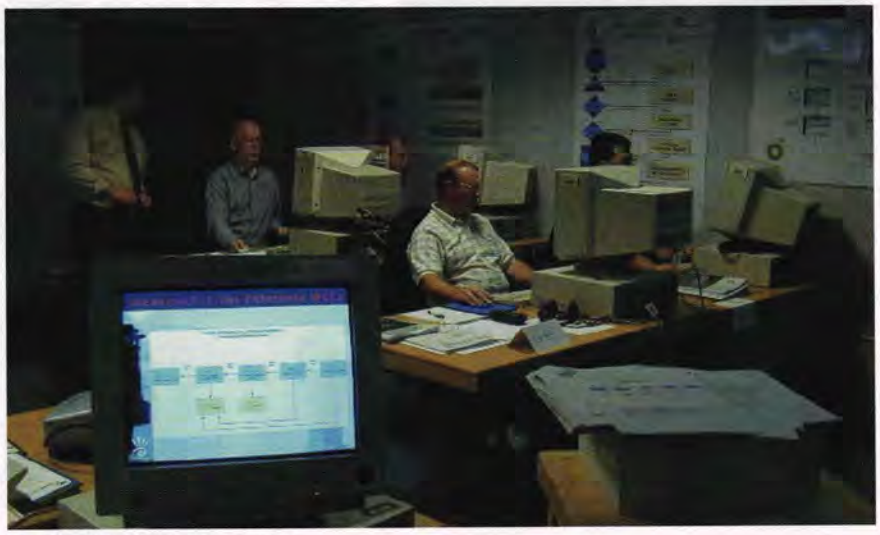
Looking to the future

So, what is next for Petrotechnics? Continued expansion with turnover set to double, our aim is to be the 'company of choice' for HSE management systems and services in the international energy sector.

We are also in discussions with a number of companies in the downstream and petrochemical markets, and we're starting to see interest from nuclear facilities, oil sands and mining.

* *Sponsored by* Oil and Gas Journal. *Please also note that the Innovation Award covered in the April 2003 issue was sponsored by ExxonMobil.*

If you are interested in taking part in IP Awards 2004, visit the Awards website at www.ipawards.com *for further details. The entry deadline is 1 July 2003.*



Sentinel Pro training session

Sentinel Pro in use

Full speed ahead...

With the formal approvals received from the members and Councils of the IP and Institute of Energy (InstE), merger work has now started accelerating as we approach the Summer and the forming of the Energy Institute as a legal entity.

As part of this process we reported in April's *Petroleum Review* that an Interim Council had been established by the Trustees of the IP and InstE, with delegated authorities to oversee merger integration with a focus on developing the structure and operations of the Energy Institute.

The Interim Council of the Energy Institute met for the first time at the offices of the Institute of Petroleum on 28 March 2003. The make up of the Council is evenly split between Trustees of the IP and InstE, with seven members having been elected by their respective Councils, plus the Presidents of the IP and InstE. The DG and CEO of the IP and InstE also sit on the Interim Council, but as non-voting members.

The membership of the Interim Council is as follows:

Institute of Petroleum

- Pierre Jungels CBE CEng FInstPet, President
- David Codd MInstPet, Council Member
- Brian Hamilton FInstPet, Vice President, Scientific and Technical Advisory
- *Committee Chair*: Charles Henderson CB FInstPet, Immediate Past President
- Anthony Levy FInstPet, Vice President, Information Services Committee Chair
- Terry Moore CBE FInstPet, Council Member
- John Mumford OBE FInstPet, Council Member
- Peter Newman FInstPet, Honorary Treasurer
- Louise Kingham MInstPet, MInstE, Director General (non-voting member)

Institute of Energy

- John Blackhall CEng FInstE, President
- Chris Boocock CEng MInstE, Membership Committee Chair
- Brian Chamberlain CEng FInstE, Past President
- Martin Fry FInstE, President Elect, Education and Training Committee
- Tal Golesworthy CEng MInstE, Event Advisory Committee Chair
- Matthew Leach CEng MInstE, Education and Training Committee
- Neil Peacock CEng FInstE, Branches Committee Chair
- Joanne Wade FInstE, Vice President
- John Ingham CEng FInstE, Secretary and Chief Executive (non-voting member)

The Interim Council is scheduled to meet every six weeks or so as the merger date to create the Energy Institute as a legal entity approaches. Following this, post-merger, it is anticipated that the Interim Council will operate for a period of approximately six months as the Energy Institute's Council, following which a new Council will be elected by members.

The first meeting of the Interim Council addressed the practical management of the merger process. A number of working groups led by senior staff working in partnership with Trustees, other members and staff of both organisations, have now been formed, with focused briefs to facilitate the merger process and to integrate and develop the key aspects of the Energy Institute's operations. Specifically these work groups will provide outcomes related to future strategy and managing performance, good governance and HR systems within an appropriate legal and financial structure whilst also addressing practical issues relating to facilities and IT requirements to support the new Institute. Most importantly, service integration and development in respect of membership (both for individuals and organisations), technical affairs, education and training, information services, publications and journals, events and branch networks is taking place in parallel with very valuable guidance from members close to the heart of current operations.

Some of these work groups will be short lived and others will continue through the transitional period as the Energy Institute becomes a legal entity, but all form an essential part of the practical process of integration. The spirit of teamwork and cooperation already well established through the preceding months of discussion and proposal will undoubtedly ensure successful progress over the coming months.

In addition, the last six months have provided many opportunities for Louise Kingham to continue discussion and consultation with members in nine of the IP's branches to date, with more meetings planned.

Meetings with other membership organisations with varying remits in the petroleum industry have also played an important part in shaping the role of the new Institute. We have also explored opportunities to develop, in many cases, already established relationships, but in others, break new ground by working together. Some of these organisations, certainly familiar to IP members, include COGENT, UKPIA, UKOOA, SPE, Engineering Council UK and SBGI.

Leading figures in industry, government and academic circles have also been welcoming and enthusiastic, to offering their contribution to shaping the Energy Institute. From discussions with CEOs and Chairmen of leading energy companies, Vice Chancellors and Heads of Faculty within universities providing learning opportunities as an important lead into energy related careers through to Lord Sainsbury, Science Minister, who is deeply committed to the engineering, technology and science community.

For the present we are on track to create your Institute the Energy Institute. It is hoped that the Royal Charter and Bye-laws will be granted in May and, if so, the timetable set out in the Prospectus will continue to be our reference and guide as we aim towards being able to launch the Energy Institute formally during the Autumn 2003.

The need for renewable energy

The offshore renewable energy sector has a history that stretches back many decades and, until recently, was regarded as 'tomorrow's potential' – a huge source of energy that the world may need sometime in the future. However, the impact of increasingly stringent environmental and related legislation, enacted in an effort to reduce the impact of energy production on climate change, has led to a dramatic rise in the use of renewable energy over the past ten years. *Will Rowley* and *Adam Westwood* of Douglas-Westwood report.*

A further factor is also becoming evident. European offshore oil and gas production is facing long-term decline. In the UK, for example, oil production is already falling and after nearly 30 years of abundant natural gas production the country faces becoming a net gas importer during the next eight years.

But this is only one manifestation of a growing global problem. The world is drawing down its oil reserves at an unprecedented rate. **Figure 1**, taken from *The World Oil Supply Report*, shows that even assuming no growth in demand it is possible that sometime over the next 20 years oil supply will be under pressure from global production capacity bottlenecks.

As the pressures to produce increased levels of power from alternative renewable energy have intensified, governments and developers are increasingly looking to the offshore environment to provide this. Within Europe, practical limitations placed on large-scale onshore renewable energy developments has acted as a further spur to move offshore, as has the availability of a highly skilled and experienced industrial base used to serve the maturing offshore European oil and gas industry.

Market drivers

There are a number of market drivers for the renewable energy industry in general and specific drivers for the offshore sector. These can be summarised as follows:

Environmental driven markets – These are generally comprised of the OECD countries who, in order to meet mandated emission targets emanating from the UN Kyoto Protocol, will sharply accelerate their use of renewable energy. These markets are expected to provide the largest gain in the use of renewables in the short-term.

Energy driven markets – Particular examples are the Asian and developing economies where demands for new energy resources are being propelled by population growth, industrialisation and urbanisation. Governments and industry are predisposed to meet requirements from renewable sources, which are indigenous and have relatively short installation timeframes. The demand from these markets is expected to over-

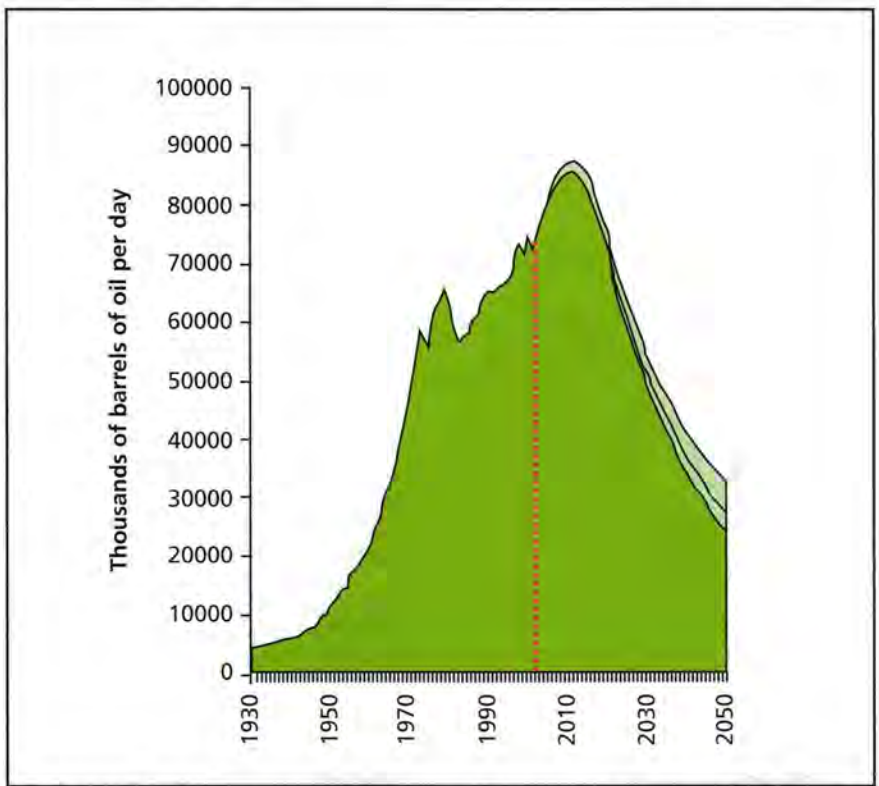


Figure 1: World oil supplies peak forecast – a 2% growth oil demand scenario results in an oil supply production peak in 2011; zero growth changes this peak to 2022.
Source: The World Oil Supply Report, Douglas-Westwood

take that of the OECD countries beyond 2002 and become significant by 2007.

The green consumer – The liberalisation of energy policy and the rise of the political and 'green' consumer are also driving demand. The break-up of state energy monopolies has spawned competition and allowed businesses and individuals to choose their provider of electricity. In many markets the options include 'green energy' programmes. While still a minor part of the mix, these will gradually cause increased market demand from some customer segments.

Economic drive – The market is increasingly being influenced by traditional (principally economic) drivers rather than by political forces. In some situations onshore wind, biomass and small-scale hydro are becoming viewed as complimentary to fossil fuels not as a replacement.

Security of supply – since the September 11th terrorist attacks in the US the issue of national security of supply of energy has increased in importance. The value of a diversified energy mix is now regarded by most national governments of being of strategic importance both in the short and long term.

Offshore drivers

Whilst the market for offshore renewable energy has the same overriding macro drivers as other renewable energies, there are also a number of specific drivers that are influencing the speed and nature of development of the sector.

Resource harvesting – It has been acknowledged for many years that the renewable energy resource available within the offshore environment is huge and that the key issue has been its exploitation. The value of the potential resource has often been ignored or undervalued as governments and developers have pursued easier and cheaper onshore alternatives. However, the past two years has seen a fundamental shift by several national governments and the necessary mechanisms, structures and legislation for successful exploitation are either now in place or under development in most of the major potential markets for offshore renewable energy.

Industrial development – It is rare that complete new industrial markets such as offshore renewable energy are created and a number of national governments are pursuing development strategies specifically designed to foster an industrial base to serve this market.

Diversification – The gradual decline of offshore oil and gas opportunities within Europe has seen suppliers examining diversification opportunities. The combined skills and experience built up over the past 30 years of offshore oil and gas development could enable many of these companies to operate within the renewables sector. They may also bring a range of ideas and solutions to improve the overall economics of offshore renewables.

Technology – The cost-effective exploitation of offshore renewable energy is very difficult but the past few years have seen the proving of enabling technologies that are acting as a catalyst to market development. Whilst some of these are relatively new or appear new, the key change has been the application of decades of offshore experience (oil, gas and marine) into the marinisation of established onshore technologies.

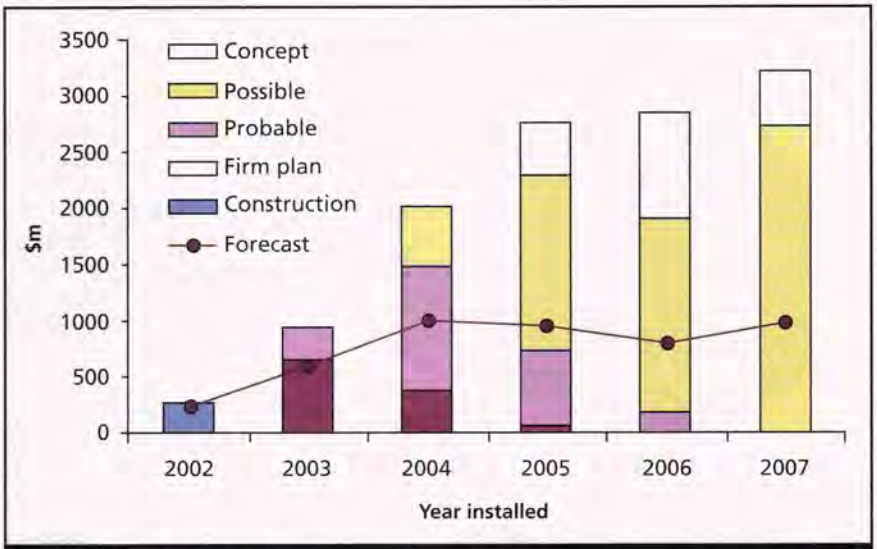


Figure 2: Global offshore renewable expenditure ($mn), 2002–2007 – this shows the status of all prospects on the Douglas-Westwood Offshore Renewable Energy Database and their associated capital expenditure, and illustrates the relatively conservative nature of the analyst's forecast

Source: Douglas-Westwood

Major growth in prospect

For the past three years Douglas-Westwood has been building a detailed database of offshore renewable energy projects. Our analysis of this data suggests that the offshore renewable sector will to grow four-fold over the period 2002–2007 with an increase from $266mn in 2002 to $966mn in 2007. The total expenditure is forecast at $4.6bn, with the European market accounting for 90%. Whilst this forecast growth is impressive **Figure 2** illustrates that this is a conservative forecast. If all the projects currently under consideration became reality a potential $12bn market would be created.

The rate of growth can be illustrated thus – over the past 18 months the number of identified future offshore wind projects has grown from less than 20 to over 100, 61 of which are scheduled for installation in the period to 2007. As shown in **Figure 3**, the largest constituent of the forecast expenditure is the offshore wind sector, which accounts for over 97%.

Whilst wave and tidal/current stream energy will both experience growth in expenditure over the period to 2007, the scale and sheer number of offshore wind developments mean that their levels of expenditure are dwarfed in comparison.

Across the largest forecast market, Europe, a number of national governments have put in place market mechanisms and legislation that support the development of offshore renewable energy. In particular, the UK and Germany are very active and this is reflected in the current number of offshore projects being considered in the period to 2007 – UK: 16 wind, 5 wave, 4 tidal; Germany: 19 wind. (See **Figure 4**.) These are actual identified projects for which formal offshore permit or licence applications have been made.

Offshore wind

The embryonic and high growth state of the offshore wind industry is clearly illustrated by the fact that only 2% of the potential capital expenditure for the period 2002–2007 is currently under construction. As we progress through the period to 2007 we should see a declining ratio of expenditure to output ($/MW) as larger turbines are introduced and operational experience brings cost savings and improved economics.

Over half the capex is for projects that are currently of a 'possible' status, whilst almost one third is for projects that are further down the planning process and of either 'probable', 'firm

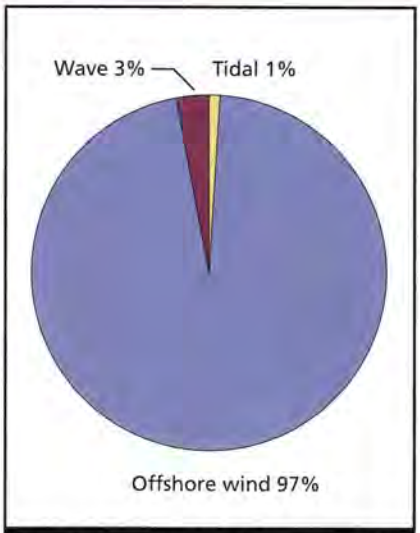


Figure 3: Forecast global offshore renewables expenditure (%) by energy, 2002–2007
Source: Douglas-Westwood

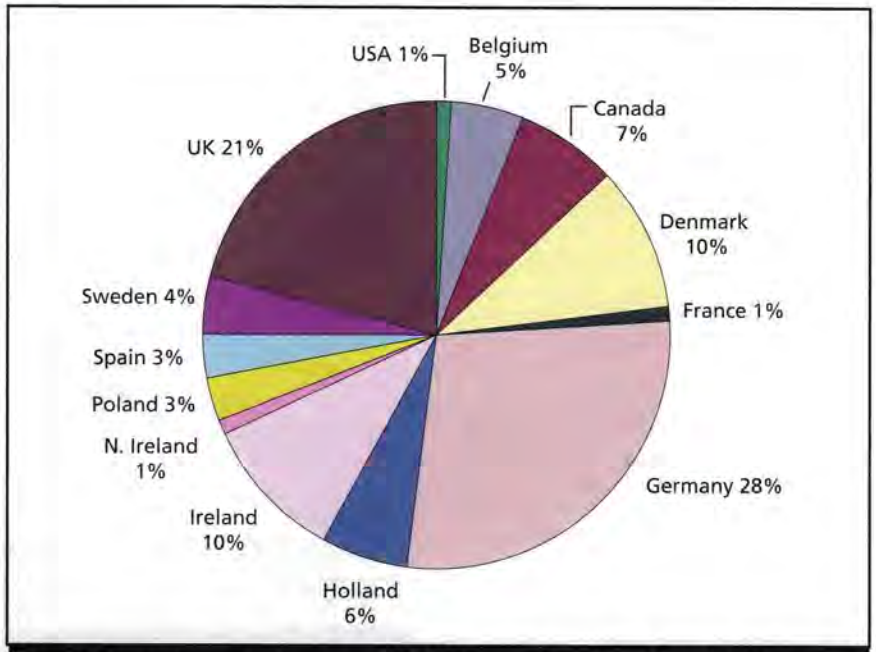


Figure 4: Forecast capex (%) by country, 2002–2007 – expenditure over the period is greatest for Germany with a 28% share of global expenditure; the UK retains a solid position with over one-fifth of the forecast global capex to 2007
Source: Douglas-Westwood

plan' or 'construction' status.

We forecast a slight dip in overall expenditure in 2006 as a number of national market mechanisms face reappraisal and reassessment in terms of levels of financial support. Whilst overall we expect political support to remain positive and strong growth to occur over the longer term and beyond 2007, the offshore wind market does not operate in isolation and the wider energy markets will be looking to the industry to naturally improve its economic and competitive position. This process of reappraisal is a common element in the development of new markets and reflects what should be a growing maturity by 2006.

Potential capex

With the offshore wind industry in the very early stages of its development and open to influence by many factors, it is of value to place the *forecast expenditure* within the context of the potential expenditure that would occur if every project under consideration at present became a reality. The *potential expenditure* gives an indication of the extent of the ambition within each country and its position within the offshore renewables development cycle. For example, with no offshore units at present but a number of very large projects under early consideration the US could potentially account for 5% of expenditure, but in the period to 2007 our forecast is for 1%.

If all the identified offshore wind projects in the period 2002–2007 became reality the total expenditure would exceed $11.8bn. Whilst it is unrealistic to expect this scenario to occur (hence the lower forecast expenditure) this potential is indicative of the scale of ambition within the industry. This ambition is an important element in the development of the industry as it provides a source of momentum to help provide solutions to the many hurdles and an impetus to immediate action.

Developing industry

The offshore renewable sector has changed over the past three years and can no longer be regarded as 'tomorrow's potential' but as a developing industry in its own right. Distinct from its onshore cousins, offshore renewable energy presents a new set of challenges, problems and opportunities. Across Europe and particularly in the UK there is a pool of skills and knowledge that, if applied, can significantly aid the speed of development of this emerging industry. As shown earlier, with nearly $12bn of identified potential, this market is about its realisation through commercial application not academic assessment.

The large number of developers looking to operate in the offshore market bring with them a depth of knowledge of operating onshore renewable energy schemes within tightly regulated markets, but the majority lack knowledge of operating offshore. The offshore oil and gas industry has decades of experience in operating within a demanding and difficult environment but lacks the experience of operating effective low-cost electricity production. In conjunction with operating experience, the oil and gas industry has a wealth of solutions in design, management and construction that can have a positive effect on the viability of many of the new and innovative concepts being pursued by developers.

Offshore renewable energy is a viable market undergoing substantial change and development as it experiences explosive growth. With continual support from national governments and the coming together of the required industrial knowledge this market has the potential to develop into a new and distinct industry that not only generates clean electricity but also brings major long-term economic benefits.

**This article is based on extracts drawn from* The World Offshore Renewable Energy Report 2002–2007, *a report produced by Douglas-Westwood for Renewables UK, the renewable energy division of the UK DTI. A summary can be downloaded from the Douglas-Westwood website at* www.dw-1.com

The offshore wind project information referred to in this article has now been made available as a commercial service. The World Offshore Wind Database *contains over 50 data fields of information on all existing and identified future offshore wind projects. For details see* **www.dw-1.com**

Watching over offshore installations

In the eight months since Robin Middleton was appointed the UK Secretary of State's Representative (SOSREP), he has been involved in 14 incidents affecting offshore platforms or pipelines, any of which could have ended in a pollution disaster. *Brian Warshaw* recently spoke to Middleton, to find out what he does and what powers he holds.

Robin Middleton owes his job to Lord Donaldson's March 1999 report entitled *Review of Salvage, Intervention and their Command and Control,* in which Donaldson indicated that a Minister of the Crown should have no operational involvement in offshore incidents; that intervention should happen when there was a significant threat of pollution to the UK's pollution control zone, territorial waters or the coastline; and that the Maritime & Coastguard Agency (MCA) should have an enhanced role in pollution control.

The role of SOSREP has a dual function, acting for both the UK Department of Trade and Industry (DTI) for offshore structures and also the Department of Transport (DoT) in relation to maritime incidents. He has to take ultimate control of any salvage operation where significant pollution might be involved, and he accepts responsibility for any actions taken as soon as he is aware of the incident.

SOSREP actions must be backed by the Minister or, alternatively, he must be sacked by the Minister. It is not acceptable for the UK Government to try to influence his largely technical activities with political imperatives. Notwithstanding that, the legislation appointing Middleton as the SOSREP to the DTI provided for the appointment of a political advisor. Nobody has yet interfered with any of his decisions, but possibly it is a little early to judge as none of the 14 incidents affecting offshore structures to date has resulted in SOSREP intervening. So far, Middleton has acted only to monitor a situation.

Wide ranging powers

With the offshore industry, Middleton believes that his powers will be used to get other commercial concerns to shut down operations, while the oil company tackles the problem. His appointment provides another benefit to the oil producers, in that they are no longer on their own but have the UK Government standing by them, saying that they are doing their best. Middleton's aim is to be in place to assist, but not to prevent or delay, a good response to an incident.

He points out that marine oil pollution, in its definition, also includes any substance prescribed by the Secretary of State and any other pollutant that is liable to create hazards to human health, harm living resources and marine life, or would damage amenities or interfere with other legitimate uses of the sea.

Middleton has very wide powers of intervention, including directing the offshore installation manager or the master and owner of a vessel, as to the action they must take. If cooperation is not forthcoming, he has the power to get others to do it for him. Within the 200-mile UK pollution zone, he also has the power to establish a temporary exclusion zone around a structure that is damaged or in distress.

Time to intervene

When the time is judged appropriate to intervene in an incident, an Operations Control Unit (OCU) would be established by Middleton, membership of which would include a single representative of the platform or pipeline owners and liability insurers, an environmental representative, the DTI's political advisor, a representative of the MCA's area Counter Pollution and Salvage Unit, and any technical advisors considered necessary. If a ship were also involved, the unit would include a representative of the vessel's owners and a salvage manager.

Safety takes priority over pollution control, states Middleton. Only when search and rescue is completed can any action be exercised to prevent or reduce pollution levels. The clean-up operation would be handled directly by the MCA.

Most probable involvement

The most probable involvement of the oil industry with SOSREP is likely to be incidents involving tankers. Such incidents are, perhaps, more numerous than one might expect. Middleton explained that within four or five days of the *Prestige* breaking up in Spanish territorial waters, the UK had a vessel named *Magnitude*, which, while it was waiting to dock at Milford Haven, was found to have leaked oil overnight.

More recently, after loading 106,000 tonnes of oil at Sullom Voe, a vessel was found to have cracks, and there was a further incident of oil pollution occurring off Donegal.

Planning for action

Two exercises with the offshore oil and gas industry have been completed under Middleton's watchful eye to date. 'Exercise Discovery' in January 2002, which simulated a damaged pipeline located between a producer well and the gathering platform, and 'Black Knight', which was recently held with BP on the Firth of Forth.

In the Black Knight exercise, a salvor changed the plan overnight. In the morning Middleton asked for details of the new salvage plan, together with a risk assessment. The company spent the next two hours writing the plan, when all that was required was to convince the specialist of its viability. Fortunately the plan depended on the tide, so nothing was lost, but it did provide another salutory lesson for all involved.

Pipeline and riser loss of containment

Brandon Courban of Mott MacDonald's Oil & Gas Division describes new offshore pipeline research co-funded by the Institute of Petroleum.

Mott MacDonald has recently completed a joint industry project (JIP) to update the PARLOC (Pipeline and Riser Loss of Containment) report. The PARLOC 2001 study* captures data up to the end of 2000, superceding the previous PARLOC 96 report published by HSE Books as OTH 551 in 1998. The Institute of Petroleum – through Oil Industry Liaison Committee (OILC) member company contributions – together with the UK Health and Safety Executive (HSE) as well as the UK Offshore Operators Association (UKOOA) funded the project.

In 1989, the former UK Department of Energy initiated the PARLOC database following the Piper Alpha disaster. Its purpose is to provide data for quantitative risk assessment (QRA) and formal safety assessments. Since then, the report has become the preferred reference document for generic QRA data used in safety assessments for offshore pipeline and riser systems. The latest revision has benefited from wider industry participation in its preparation.

Key starting points

The data contained in the report can be considered as a starting point in the identification of potential hazards, providing indications of the levels of the loss of containment frequency for typical pipelines and associated fittings. The data also provides indications of the level of reliability achieved in the operation of North Sea pipelines, which can be used in the context of QRA.

The report and its associated analysis is based on the contents of the compre-

Data in the pipeline

Pipeline database – contains details of almost all the known pipelines installed in the North Sea. A 'pipeline', as defined in this study, 'extends along the riser from the pig trap and associated pipework and valves, and includes all pipework and fittings on the main flow path and all branches on the main flow path up to and including the first valve on each branch.' Where a pipeline does not have a pig trap the first valve above the water level is considered the termination point.

Incident database – contains a description of each reported incident and data on the pipeline(s) or lines affected. For this study, an incident has been defined as an occurrence that directly results, or threatens to result, in loss of containment of a pipeline.

Box 1

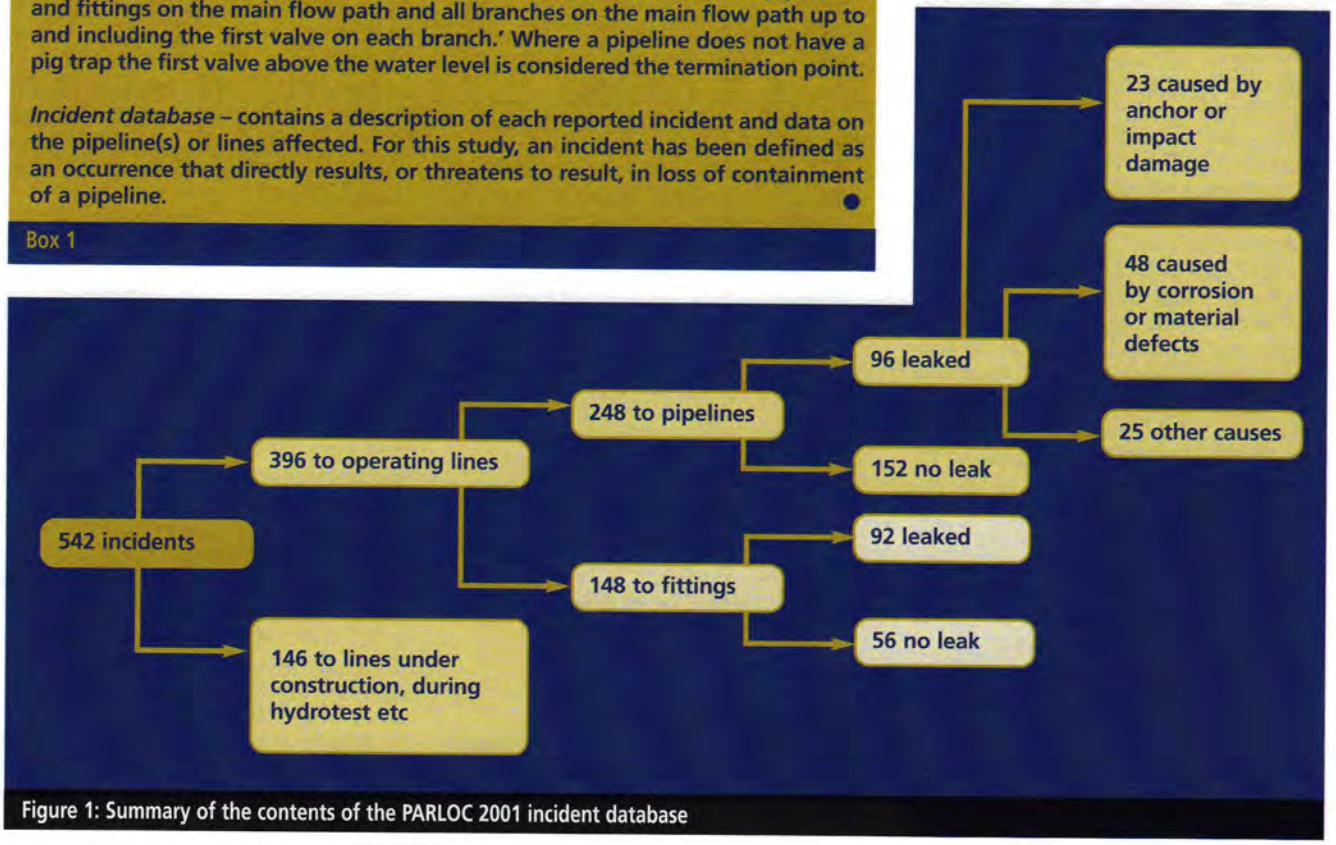


Figure 1: Summary of the contents of the PARLOC 2001 incident database

hensive and fully searchable pipeline and incident databases that Mott MacDonald operates and maintains on behalf of the JIP participants for the North Sea (see **Box 1**).

Presenting the summarised contents of these databases, the PARLOC report contains analyses of the incidents reported with respect to frequency, loss of containment and operating experience. This data has been accumulated during the preparation of this and four previous PARLOC reports, and is based on information provided voluntarily by various regulatory authorities in the UK and Europe as well as directly from operators in the Norwegian, Dutch, Danish, German and UK sectors of the North Sea.

Database analysis

The incident and pipeline databases have been used to assess the significance of factors affecting the frequency of incidents (see **Box 2**).

Figures 1 and **2** provide summaries of the contents of the PARLOC 2001 and 1996 incident databases.

The total number of pipelines (which include both steel and flexible lines) listed in the pipeline database was 1,567 at the end of 2000. The total length installed to the end of that year was 24,837 km, with operating experience equating to 328,858 km-years. This compares with PARLOC 96 when the number of pipelines was 1,003 and the total pipeline length was 19,770 km with a total operating experience of 195,690 km-years to the end of 1995.

Conclusions

From the analyses performed on the databases, it was found that the first two factors in **Box 2** are most important when considering the loss of containment frequency.

The significance of the other factors depends upon the location of the pipeline affected and the incident cause.

Database extracts

Tables 1 and **2** are extracts from the PARLOC 2001 report, illustrating typical data content and the manner of its presentation. The base data is extracted from the incident database. **Figure 3** is a typical illustration of the variation of frequency of loss of containment. In this case, the base data is extracted from both the incident database and the pipeline database. The latter is essential for the calculation of total operating experience, given in kilometre-years. A probability of loss of containment is then calculated based on a Poisson distribution curve.

Table 1 illustrates the number of incidents to operating steel pipelines and their causes, while **Table 2** illustrates the corresponding number of loss of containment incidents. From the two tables it can be deduced at a glance that up to the year 2000 there were 209 incidents to steel pipelines, of which 65 resulted in loss of containment. The causes of these incidents are presented, as is their relative location on the pipeline.

Figure 3 illustrates the variation of frequency of loss of containment incidents to flexible and steel lines of varying diameters for all anchoring and impact incidents occurring in the mid-line of pipelines. From this, it can be seen that of all the steel line diameter ranges the probability of loss of containment is greatest when lines under 9-inches in diameter are considered.

The examples shown are for illustrative purposes only. The full report presents the contents and analyses of the pipeline and incident databases in significantly greater depth.

Accuracy of data collated

In all, some 54 operators were contacted, with 23 providing a response. Taking into account the cooperation and funding received from the three

Factors affecting incident frequency

- Incident cause
- Part of pipeline affected
- Pipeline diameter
- Pipeline length
- Pipeline contents
- Whether the line has been trenched or buried
- Piggy-backed pipelines
- Bundled pipelines
- Pipeline age
- Type of line
- Hydrotest pressure
- The location of pipeline in the North Sea
- Location of riser
- Pipeline steel grade

Box 2

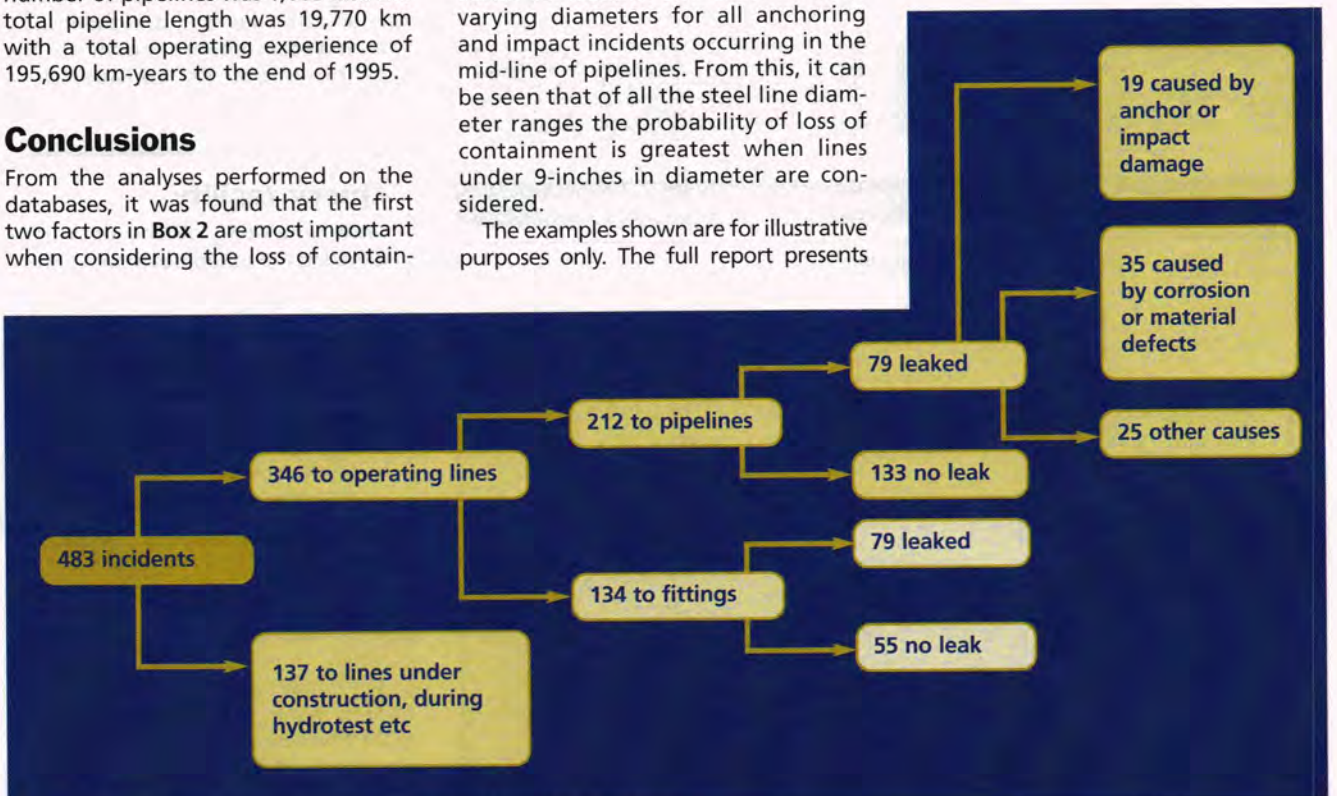


Figure 2: Summary of the contents of the PARLOC 96 incident database

		Total	Platform	Riser					Safety Zone								
				Total	Piping	Splash Zone	Subsea	Unknown	Total	Near	Far	Unknown	Mid Line	Well	Shore Zone	Land	SPM
Anchor	Ship / Supply Boat	17		0					10	1	5	4	6		1		
	Rig or Construction	9		0					6	4	1	1	3				
	Other/Unknown	14		1			1		3	1	1	1	10				
	Total	40	0	1	0	0	1	0	19	6	7	6	19	0	1	0	0
Impact	Ship on Riser	9		9		8		1	0								
	Trawl	27		0					2		1	1	22	3			
	Dropped Object	2		1			1		1	1							
	Wreck	1		0					0				1				
	Construction	2		1			1		1	1							
	Other/Unknown	15		1				1	3	1	1	1	10			1	
	Total	56	0	12	0	8	2	2	7	3	2	2	33	3	0	1	0
Corrosion	Internal	23		3				3	8	2	4	2	6	4			
	External	22		19	2	8	2	7	1			1	2				
	Unknown	7	1	3	1			2	1	1			2				
	Total	52	1	25	3	8	2	12	10	3	4	3	12	4	0	0	0
Structural	Expansion	6		5				5	1	1							
	Clamp Failure	1		1			1		0								
	Buckling	6		0					2	1	1		4				
	Total	13	0	6	0	0	1	5	3	2	1	0	4	0	0	0	0
Material	Weld Defect	7		3				3	2	1	1		1				1
	Steel Defect	8		4			1	3	1			1	2	1			
	Total	15	0	7	0	0	1	6	3	1	1	1	3	1	0	0	1
Nat. Hazard	Vibration	10		1			1		2		1	1	5		2		
	Storm	1		0					0						1		
	Scour	1		0					1			1					
	Subsidence	1		1			1		0								
	Total	13	0	2	0	0	2	0	3	0	1	2	5	0	3	0	0
Fire/Explosion	Total	0		0		0			0								
Construction	Total	2		0					0				1	1			
Maintenance	Total	1		1	1				0								
Human Error	Total	2		2	2				0								
Op. Problems	Total	0		0					0								
Other	Total	15		4	0		0	4	2	2			7	1			1
	Total	209	1	60	6	16	9	29	47	17	16	1	84	10	4	1	2

Table 1: Causes of incidents to operating steel pipelines

For example it can be seen that there were 22 incidents up to 2000 that were attributed to trawl damage in the mid-line of pipelines; of these six resulted in loss of containment

		Total	Platform	Riser					Safety Zone								
				Total	Piping	Splash Zone	Subsea	Unknown	Total	Near	Far	Unknown	Mid Line	Well	Shore Zone	Land	SPM
Anchor	Ship / Supply Boat	17		0					10	1	5	4	6		1		
	Rig or Construction	9		0					6	4	1	1	3				
	Other/Unknown	14		1			1		3	1	1	1	10				
	Total	40	0	1	0	0	1	0	19	6	7	6	19	0	1	0	0
Impact	Ship on Riser	9		9		8		1	0								
	Trawl	27		0					2		1	1	22	3			
	Dropped Object	2		1			1		1	1							
	Wreck	1		0					0				1				
	Construction	2		1			1		1	1							
	Other/Unknown	15		1				1	3	1	1	1	10			1	
	Total	56	0	12	0	8	2	2	7	3	2	2	33	3	0	1	0
Corrosion	Internal	23		3				3	8	2	4	2	8	4			
	External	22		19	2	8	2	7	1			1	2				
	Unknown	7	1	3	1			2	1	1			2				
	Total	52	1	25	3	8	2	12	10	3	4	3	12	4	0	0	0
Structural	Expansion	6		5				5	1	1							
	Clamp Failure	1		1			1		0								
	Buckling	6		0					2	1	1		4				
	Total	13	0	6	0	0	1	5	3	2	1	0	4	0	0	0	0
Material	Weld Defect	7		3				3	2	1	1		1				1
	Steel Defect	8		4			1	3	1			1	2	1			
	Total	15	0	7	0	0	1	6	3	1	1	1	3	1	0	0	1
Nat. Hazard	Vibration	10		1			1		2		1	1	5		2		
	Storm	1		0					0						1		
	Scour	1		0					1			1					
	Subsidence	1		1			1		0								
	Total	13	0	2	0	0	2	0	3	0	1	2	5	0	3	0	0
Fire/Explosion	Total	0		0		0			0								
Construction	Total	2		0					0				1	1			
Maintenance	Total	1		1	1				0								
Human Error	Total	2		2	2				0								
Op. Problems	Total	0		0					0								
Other	Total	15		4	0		0	4	2	2			7	1			1
	Total	209	1	60	6	16	9	29	47	17	16	14	84	10	4	1	2

Table 2: Causes of incidents to operating steel pipelines that resulted in a loss of containment

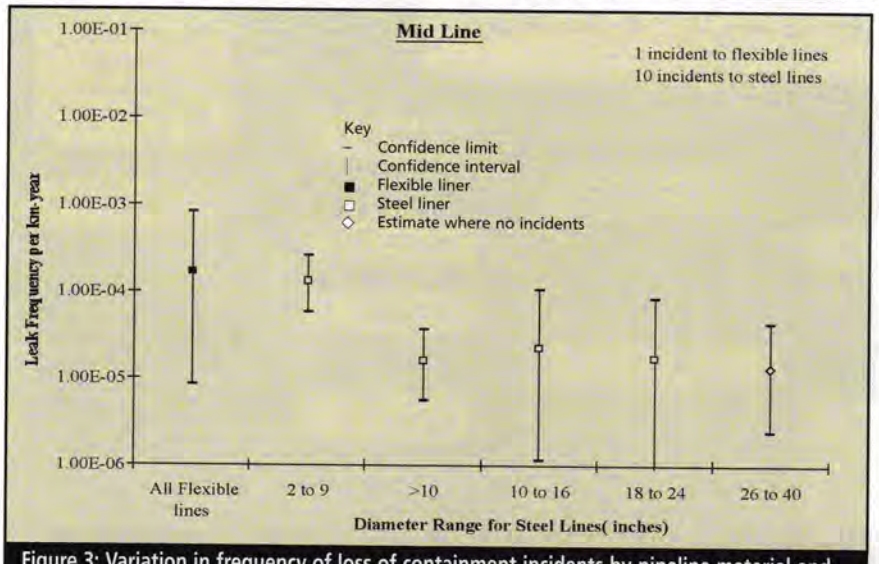


Figure 3: Variation in frequency of loss of containment incidents by pipeline material and diameter for all anchoring and impact incidents occurring in the mid-line of pipelines

project sponsors – IP, HSE and UKOOA – this represents an increase in industry participation over previous studies. The quality and completeness of the data submitted can only be as good as the sources of information, consequently, some under-reporting is inevitable.

However, PARLOC remains the most comprehensive source of data on incidents to subsea pipelines and systems installed in the North Sea, presenting the industry with an unsurpassed reference of generic safety data. Suggested goals for later PARLOC updates include increasing industry awareness and participation.

Study limitations

A number of limitations of the PARLOC study are to be acknowledged. While the database is over 99% complete regarding information on diameter, length, contents and installation dates of pipelines, other information such as wall thickness, burial conditions and steel riser type is only 70–90% complete.

It should, however, be noted that individual pipelines have case-specific histories, properties, characteristics and functions, many of which have not been considered in the analysis presented in the report. Such attributes as steel type or grade, the service of the pipeline, the nature of the field joints, whether or not the pipeline is part of a bundle, the routing of the pipeline and any protection afforded to it, and the inspection and maintenance regime for the pipeline might be considered in future updates to the databases.

Query facility

Since presenting all the data contained in the databases in one report is not possible, Mott MacDonald maintains a flexible enquiries facility. Those with unique queries or criteria not covered by the report can make use of this search facility by contacting Mott MacDonald, Oil and Gas Division T: +44 (0)20 8774 2000 or e: **jec@mm-croy.mottmac.com** or **bc3@mm-croy.mottmac.com**

**'PARLOC 2001: The update to the pipeline and riser loss of containment database' is published by IP on behalf of the project sponsors and is available both as mono hard copy or colour CD-ROM from Portland Customer Services, Commerce Way, Whitehall Industrial Estate, Colchester, CO2 8HP, UK T: +44 (0)1206 796351 e:* sales@portland-services.com

Forecourts and mobile phones – sound science

On 11 March 2003 the Institute of Petroleum hosted a technical seminar entitled 'Can mobile phone communications ignite petroleum vapour?' According to *Martin Hunnybun*, IP Technical Manager for Distribution and Aviation, the IP had been aware that reports of fires allegedly caused by mobile phones had been circulating, but it could not find any technical information to support such reports. The seminar was arranged to discuss the results of scientific research and investigations into this issue.

Speakers presented details of recent research programmes, including those undertaken by the Center for the Study of Wireless Electromagnetic Compatibility at the University of Oklahoma and the Department of Fire Technology at SouthWest Research Institute. The seminar also included a review of radio frequency-induced sparking and the possibility of electrostatic discharges occurring from handsets. It was concluded by a review of the facts behind some of the ignition incidents that have been allegedly caused by mobile phones.

Neglible risk

The seminar showed the findings of research undertaken to date, demonstrating that although the majority of mobile phones are not specifically designed and constructed to prevent them igniting a flammable atmosphere (in accordance with standards for 'protected equipment'), the risk they present as a source of ignition is negligible.

The Institute of Petroleum is not aware of any fire incident that has been substantiated as having been caused by a mobile phone anywhere in the world. Speakers indicated that all of the reported incidents were either hoaxes or have been incorrectly attributed to having been caused by a mobile phone.

The majority of fires that have been recently reported during vehicle fuelling in the US are attributable to electrostatic discharges from personnel, particularly when latched dispensers are in use. Further details of this were provided in a review coordinated by the IP, the UK Petroleum Industry Association (UKPIA) and the Society of Motor Manufacturers and Traders in 2000 (published as Report on the risk of static ignition during vehicle refuelling: A study of the available relevant research*).

However, in the UK there remains a legal requirement for operators of petrol filling stations to prevent the use of mobile phones by customers fuelling vehicles or filling containers. This is not the case in many other countries, including the US.

Sound science

Tom Wills-Sandford, Director of Information and Communications Technology at Intellect commented: 'We are delighted that the Institute of Petroleum has provided a forum to disseminate sound science on this issue. The research presented at the seminar shows that mobile phones pose a negligible ignition risk, and one that is far less than other ignition sources on a forecourt. We were pleased to note that the seminar confirmed that no known ignition incidents involving mobile phones have occurred anywhere in the world. We intend to work with the UK Petroleum Industry Association and other stakeholders to develop more fact-based guidance for mobile phone use on petrol station forecourts.'

Bound proceedings containing the ten technical papers and key points of discussion from attendees have been prepared and will be available to purchase, together with a free CD-Rom of the presentations, by mid-May 2003.

For further details or to discuss bulk discount orders please contact Sarah Frost Mellor, Publications Manager,
T: +44 (0)1386 701135
e: sfm@petroleum.co.uk

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The third scramble for Africa

Photo: Anadarko

Africa has been at the centre of world interest and competitive power positioning by foreign states, interests and companies, as well as local ethnicities and elites for the last 150 years. It has now become a cockpit again for a new surge of interests – this time in respect of oil and gas resources as great powers, mid-range states, African polities and the corporate oil interests of global, regional and local players vie for position, privilege and ascendance, writes *Dr Duncan Clarke*, Chairman and CEO of Global Pacific & Partners.*

Above: Located in block 404, the Hassi Berkine central processing facility (CPF) in Algeria has a production capacity of 285,000 barrels of oil per day through four production units. Another CPF with three production units is under construction at the giant Ourhoud field.

Global Pacific & Partners' recently published report on the African oil and gas arena – entitled The *Third Scramble for Africa: Origins, Insights & Dynamics to 2025* – documents the intimate character of this 'scramble for oil', outlining the differences from the original scramble (1884 onwards) and the second scramble for power in the Cold War and aftermath of African independence.

This present scramble for oil and gas continues apace, involving a myriad of both domestic and outside interests – super-majors, independents, NOCs (national oil companies) from Africa and elsewhere, local players, heads of state, political and commercial elites, middlemen, financiers, lobbyists, contractors and companies of a multitude of types. The world powers – US, China, Europe, India – see Africa as a diversified sourcing option against the Middle East, while companies are seeking new venture potential. Meanwhile, the African states themselves are more reliant on oil now than ever before.

Reserve potential

In Sub-Saharan Africa, the oil and gas reserve potential is promising, with greater prospect in the medium-term to 2010–2015 and towards 2025. While official data exist on reserve estimates in different places (and some third-party sources must be read with a grain of salt), there is no comprehensive state-of-art measure of the volumes of proven, probable and possible reserves for the region.

Global Pacific & Partners has based its estimates for Sub-Saharan Africa on various sources, including official data and company measures, as well as some independent geoscientists' measures. The estimates are made with the usual caveats, and focus on proven oil and potential (this implying best-estimate of oil to be discovered by 2025).

In Angola, reserves are estimated at around 12–15bn barrels proven, while Sonangol has cited potential as some 50–70bn barrels. Benin may have some 100mn barrels, but the deepwater sector has yet to be tested. Cameroon is under stress and estimates of oil may only be 200mn barrels, while others cite 400mn barrels, with potential in the 300–400mn barrel range – again deep-

waters have yet to be considered.

CAR (Central African Republic) has no commercially proven reserves, but industry sources indicate potential around 1–2bn barrels. In Chad, 1bn barrels is proven and further 1–2bn barrels may await discovery. Congo has suffered reserve downgrades in fields recently, but proven oil is around 1.3–1.5bn barrels. A new upsurge appears in-place with potential at 1bn barrels, much hinging on the deepwaters.

Cote d'Ivoire has had recent discoveries and a range of 0.5–1bn barrels is indicated, with the government claiming potential at 6bn barrels, a figure considered over-optimistic by industry observers. In DRC (Democratic Republic of Congo), fields are small and 100mn barrels may be proven now with potential standing at 150mn barrels. In Equatorial Guinea, some 2–3bn barrels may have been proven, with potential possibly at 2–3bn barrels. Meanwhile, Eritrea has neither proven oil nor a clear image of oil potential evident. Likewise Ethiopia, but for 300mn barrels reported in the Calub.

Gabon has suffered production decline, although 2.6bn barrels is thought to exist, with potential for another 5bn barrels. No oil has been discovered in the Gambia, but claims of potential at 100mn barrels are made. In Ghana, GNPC had claimed 800mn barrels, but 50mn barrels seems more likely now, with unclear potential for more. Guinea has no proven oil to date and potential is undeclared. In Guinea-Bissau, the Dome Flore may hold 1bn barrels of heavy oil.

Kenya remains a frontier with no proven reserves, but potential according to officials could be 2–3bn barrels – a claim awaiting exploration in deepwaters. Liberia has delineated offshore blocks and some place potential at 100–200mn barrels. Madagascar has recorded heavy oil finds, OMNIS suggesting that potential reserves might be 0.5–1bn barrels.

No one expects oil in Malawi now. Mozambique has been a gas play, and deepwaters will soon be tested. Mali has no proven oil, but one player puts potential at 2–4bn barrels. Mauritania has an estimated 300mn barrels and potential might reach 1.5bn barrels in time. In Namibia, it has been gas that has been key. In landlocked Niger, some 350mn barrels exist, yet to be commercialised, and potential might be some 1–2bn barrels.

Meanwhile, Nigeria's Government reports 33bn barrels of reserves at present, expected to rise to 40bn barrels by 2007. Potential reserves are put at around a further 25–40bn barrels to 2025 given continued success in deepwaters and ultra-deep plays, as well as the JDZ (joint development zone).

Rwanda only has methane gas reserves in Lake Kivu. In Sao Tome & Principe, talk of 4–8bn barrels potential remains untested. Senegal has only 10mn barrels and an 85% share of Dome Flore and AGC waters. Seychelles has not shown reserves but SNOC believes 1–2bn barrels exist in the Archipelago. Sierra Leone is just starting to award blocks, and potential is currently unknown. Somalia, mostly under *force majeure*, has proven oil and potential, perhaps as much as 100mn barrels within ready reach in the near term, some saying 1.2bn barrels potential in the long-run.

In South Africa, oil reserves stand around 40–50mn barrels. Potential is placed by state agencies at some 1bn barrels in time, with deepwater openings coming and the EEZ (exclusive economic zone) expected within 10 years. In Sudan, proven oil may already be at 2.5bn barrels – and growing with CNPC-Petrodar's recent discoveries – while suggested potential is up to 8–12bn barrels. Tanzania has been a gas play with the deepwater Mafia Basin currently under examination – potential is indicated by TPDC at 500mn barrels. Togo has had no luck to date and potential is undeclared. In Uganda, operators believe there could be a potential of 650mn barrels. Zamibia remains a long shot for any company, while there is little hope that Zimbabwe holds any reserves.

Although these are imperfect estimates, they are thought to be closer to the mark than most standard measures put out, usually in fragmentary form. With the figures suggesting that proven oil in Sub-Saharan Africa might measure 56–60bn barrels today, the region is certainly not yet a new Midde East.

Attractive hunting ground

However, Africa's geopolitical locus and character have attributes that make it an attractive hunting ground. For the long-term, the upside might really be the main prize, with oil potential over 2004–2025 possibly in the range of 100–120bn barrels – a considerable volume, even on a much discounted basis.

High upside oil potential in Sub-Saharan Africa is evident, even if uncertain. Much might be realised over 2004–2025. In this era, Africa will witness new basin openings, new discovery

Present focus	2000–2010	2010–2025
Maghreb	New openings	Eastern Margins
Gulf of Guinea	Interior basins	Rift Valley Zone
Chadian interior	Deepwaters	Exploitation-EOR
Central Rift (Sudan)	Ultra-deep	Stranded gas
Deepwaters	Unsanctioned	New basins
Offshore shelf	Marginal fields	Transactions
Select frontiers	North West Africa	Ultra-deep EEZ

Table 1: African petroleum future, 2004–2025

zones, basin maturations, a more extensive deepwater game, greater testing on interior basins, and more countries becoming oil producers. Then there will be some traditional players whose stars will fade by 2025 or well before, who will rely more on enhanced oil recovery (EOR), marginal field deals and the intensive exploitation of old fields to sustain volumes and oil status.

In the Maghreb, sizeable oil reserves are found – Algeria may have 10–12bn barrels, Egypt some 3.5bn barrels, Morocco a miniscule 2mn barrels and Tunisia around 320mn barrels, while Libya holds the greatest reserves volume with 30bn barrels.

Thus, there some 44bn barrels on the Maghreb-wide radar screen, with substantial upside and future potential – especially if and when Libya might be fully re-opened to the international oil and gas industry.

Future to 2025

So, how will the exploration, development and production game in oil play out over the next 20-plus years?

In acreage and exploration, there are at least 37 Sub-Saharan countries with bids open or that will accept negotiated offers for acreage. African acreage offerings make up a large share of global acreage supply, offering both reasonable terms and diverse basin and potential, including vast deepwater tracts. Companies have the added benefit that there is now a growing farm-in/out market emerging as corporate presence widens and deepens in African plays.

With global acreage competition, this pattern will remain over the next 10- to 20-year period. However, in the future, more of the marginal field ventures in mature areas will be promoted – such as Nigeria, Gabon, Cameroon. With time, average block sizes in Africa will become smaller, especially in prolific zones as governments seek to attract new players.

The discovery record in Africa has improved not only in the deepwater regions, encouraging new investments and entrants. Basin openings such as the Rift Valleys may eventually spur activity, as would the delisting of now sanctioned states such as Libya and Sudan.

Super-major disposals will feed independents, while some NOC privatisations will, in time, offer new opportunities. The rise of African independents will build regional asset spread and marginal field proliferation will bring in more players. These trends will encourage secondary asset markets, rebalancing the current emphasis on primary leasing markets. A trend to lower state take is inevitable in a more competitive global market over time.

The period 2004–2010 will be a major development phase in the key producer countries, especially in offshore and deepwater zones, and interest will be high in the ultra-deep arena. Any large discoveries will encourage this pattern. Super-majors will probably stick to core zones and may not step out into frontiers. Beyond 2010–2015 this pattern may again alter, dependent on above-ground realities.

The opening of the North West African play is still in its early days, as is the case on the Eastern Margins and deepwaters. Most likely – and, with success, the more so – these areas will capture increased attention.

Deepwater areas will be prime zones – already West Africa is an anchor in the 'Golden Triangle'. But there are also many new deepwater opportunities around the Continent – a vast zone that will be augmented by extension of EEZ spheres, nearly doubling the size of the offshore and, even more so, deepwater African acreage opportunities.

In the future much of Africa will be a deepwater game and the Continent will, in effect, bifurcate further into deepwater and interior basin plays as the shallow shelf becomes more mature and subject to exploitation deals.

In one schematic vision of Africa's petroleum future to 2025, the emphasis follows along the following broad lines (no exclusivity by phase implied) indicated in **Table 1**.

On track for development?

The African oil locomotive has arrived at the station. It is now the main generator of economic change and growth on the Continent and its relative scale by weight of investment, revenues, fiscal receipts, strategic significance, regional spread and potential impacts, dwarf any other industry upon which the region can now rely.

However, will it be able to carry the African train along the track? Or will the oil locomotive steam off on its own to leave an Africa in 2025 that has had its oil day, having exploited the best of its promising, but ultimately limited, hydrocarbon potential? Indeed, will Africa be found floundering in 2025 as it was in 2003?

The answers will lie in the interactions of global competitors in the current third scramble for Africa (the super-majors, independents, government-NOCs) and the highly turbulent terrain of competition landscapes in which this great oil game will be played out – in Sub-Saharan countries, along with those in the Maghreb.

Student prizes 2001/2002

On 27 February 2003 we held another of our IP student prizewinners ceremonies, here at 61 New Cavendish Street. This year, two of the 10 recipients made it to the ceremony writes *Gill Haben* IP Education & Training Manager.

All of the prizewinners were of the highest academic standard and all are now off to pursue careers in the oil and gas industry or further academic activities.

The two winners that we were lucky enough to celebrate with this time around were Gillian Aher and Charles George (pictured right).

They each received a cheque for £250, a free three-year IP Membership and a signed certificate.

A great time was had by all, both in the formal part of the ceremony and then afterwards, putting the 'world and the industry to rights'!

Well done to Gill and Jide – we wish you every success for your future careers and hope that you find membership of the IP useful over the next three years and beyond. ●

Gill Aher (left) – Institute of Petroleum Engineering Prize in Petroleum Geoscience.

Gill entered Imperial College in October 2001 as a full-time postgraduate student on the Advanced Course in Petroleum Geology. She has gained an MSc degree with 'an outstanding set of marks in the course work element of the programme' – to quote the Course Director, Dr Michael Ala.

Gill was accompanied by her boss John Myres, Unitisation Manager at Anadarko, and Pavlos Korakas, Petroleum Engineer, Anadarko. ●

Charles Babajide George ('Jide' to his friends) – Institute of Petroleum Prize in Petroleum Engineering.

Jide entered Imperial College in October 2001 as a full-time post graduate student on the Advanced Course in Petroleum Engineering, successfully completing his course to gain an MSc in Petroleum Engineering. Jide was accompanied by his wife at the ceremony.

He now works for ChevronTexaco Nigeria Ltd in Lagos. However, he often visits the company's London office in Canary Wharf, which was why we were lucky enough to have him with us. ●

IP branch meeting

IP Director General Louise Kingham recently visited the Institute of Petroleum's Aberdeen Branch to attend one of its regular meetings.

High on the agenda was a discussion with Committee Members about the future shape of the Branch under the aegis of the Energy Institute once the merger between the IP and Institute of Energy completes later this year.

Pictured here is Louise with Alan Higgins, Aberdeen Branch Chairman.

For more information about the merger between the Institute of Petroleum and Institute of Energy, please turn to p25.

Cetane number and cetane index relationship

It is a requirement of the European Specification for Automotive Diesel Fuel that both the Cetane Number (CN) and Cetane Index (CI) are determined and reported. This article, which summarises the findings of an IP-sponsored Technical Development Project carried out by *Cliff Lilley*, outlines a review of the suitability of the current equation used in IP 380 (ASTM D 4737)/EN ISO 4264 for calculating Cetane Index, to predict Cetane Number as measured by IP 41 (ASTM D 613).

The Institute of Petroleum (IP) runs a monthly diesel fuel engine correlation scheme under which approximately 23 laboratories worldwide determine CN. Most of these laboratories also determine density and distillation recovery temperatures, enabling CI to be calculated according to IP 380. The samples for the correlation scheme comprise commercially available fuels and special fuel blends to give a wide range of cetane numbers.

Data sets

As the occasional sample can have an undue effect on the trend between CN and CI, it is better to base any comparisons on larger data sets. This review looks at two ranges of data – the year 2002 and the five years covering 1998–2002. The former study period provides information on more recent fuels, whilst the latter provides smoother overall trends as it is less sensitive to individual samples. The five-year study also provides year-on-year information. For the sake of brevity the full monthly data for the five-year period are not given, but are available from the IP.

Outliers and unusual samples

The data for each fuel property were first checked in turn for unusual individual laboratory results. Any outliers detected by Hawkins' test according to IP 367/EN ISO 4259 statistical methodology were removed from further analysis. Such outliers may be the result of laboratory bias or transcription errors.

The means of the 'good' data were then used to provide estimates of the 'true' values of sample CN, density and distillation recovery temperatures. The means of the last two parameters were then used in IP 380 to derive the CI values.

Samples that were well outside the scope of IP 380 were excluded from the analysis. For example, the February 1998 and December 1998 samples had unusual distillation and density characteristics respectively, that were outside the scope of the methodology. These two samples appear to have been special narrow fractions and, as such, are considered to be too different from typical samples.

Analysis

There are various ways to assess the appropriateness of IP 380 to predict CN. They include:

- Overall bias between CN and CI, defined as mean (CN–CI).
- Bias standard deviation (SD) – a measure of scatter about the mean bias.
- A trade-off between mean bias and bias SD, as measured by the root mean square error ($RMSE_b$), ie the square root of the sum of the squared bias and squared bias SD.
- Correlation between CN and CI, a measure of dependence between CN and CI.
- Bias trend in terms of the slope of the 'best-fit' CN/CI regression line.
- Data consistency, as measured by the root mean square error ($RMSE_r$) about the best-fit regression line.

It is not enough to do well in just one of the above. For example, an overall bias of zero could hide either a bias slope very different to the ideal CN=CI slope

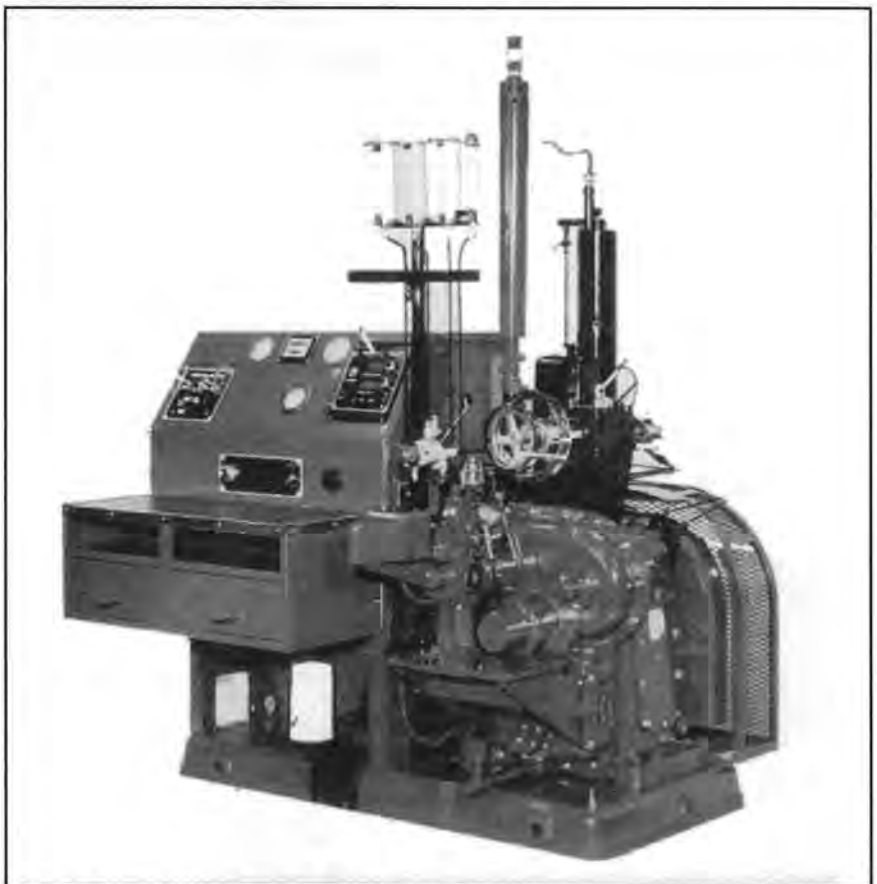


Figure 1: Cetane Method Test Engine Assembly

or a large scatter of CI about CN. Furthermore, a small $RMSE_r$ could hide either a large bias or a far-from-ideal bias slope. The precisions of the test methods involved imply that some scatter of CI about CN is to be expected. As this scatter is dependent on the choice of samples, then bias SD and $RMSE_r$ will naturally vary over time. Therefore, IP 380/EN ISO 4264 can be considered appropriate when (i) the overall bias is close to zero, (ii) the bias SD is small, and (iii) the $RMSE_r$ is consistent with test precisions. The bias slope will usually be close to ideal when both (i) and (ii) are attained, unless the range of CN and/or CI is relatively small, as in 1999.

Results

Trend information relating to CN and IP 380 is given in **Table 1**. For all date ranges considered, they are: (i) mean bias, bias standard deviation and a compromise between the two, (ii) correlation between CN and CI, (iii) best-fit regression slope, (iv) trend line $RMSE_r$, and (v) the range of CN.

The CN/CI results are shown graphically in **Figures 1** and **2**. **Figure 1** shows the best-fit regression line through the 2002 data, and **Figure 2** shows the best-fit regression line through the 1998–2002 data.

Points to note are :

- The overall IP 380 bias is effectively zero over five years, hiding a noticeable bias in 2000. Because mean biases per year are generally small, the various measures on scatter (bias SD, bias $RMSE_b$ and $RMSE_r$) tend to be very similar. The larger scatter of results in some years may be due to changes in fuel composition, or to the occasional unusual sample.
- Overall CI has a tendency to over-predict above 52 CN, and to under-predict below 52 CN. The subset of low (<48) CN fuels in **Figure 2** may indicate a bias problem for fuels with very low CN.
- IP 380 best-fit slopes were worst in 1998 and 1999. This reflects the risk of using small data sets. Over five years, the overall best-fit slope is better.
- For the third successive year the CN/CI correlation was good, which reflected recent consistent data. The poorer correlations in the other two years reflect the chance of the occasional unusual sample (eg May 1999).

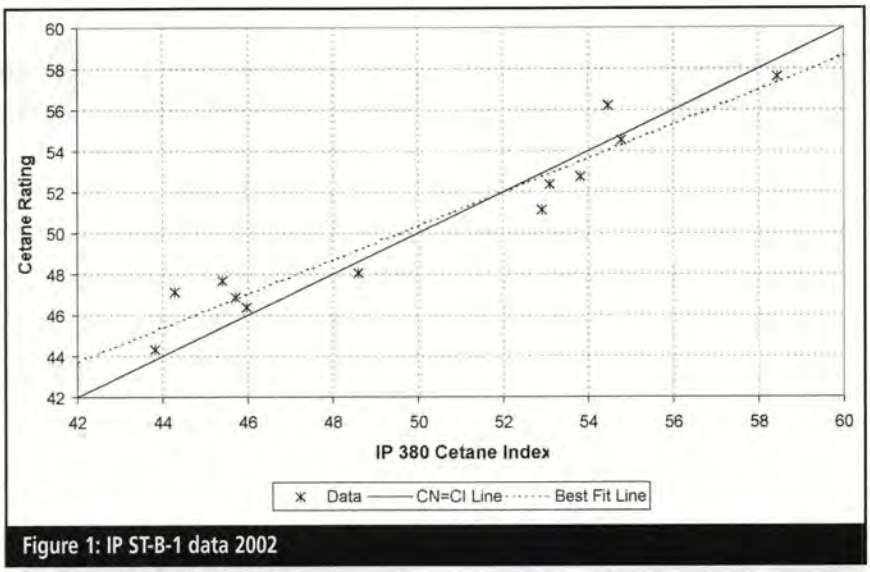


Figure 1: IP ST-B-1 data 2002

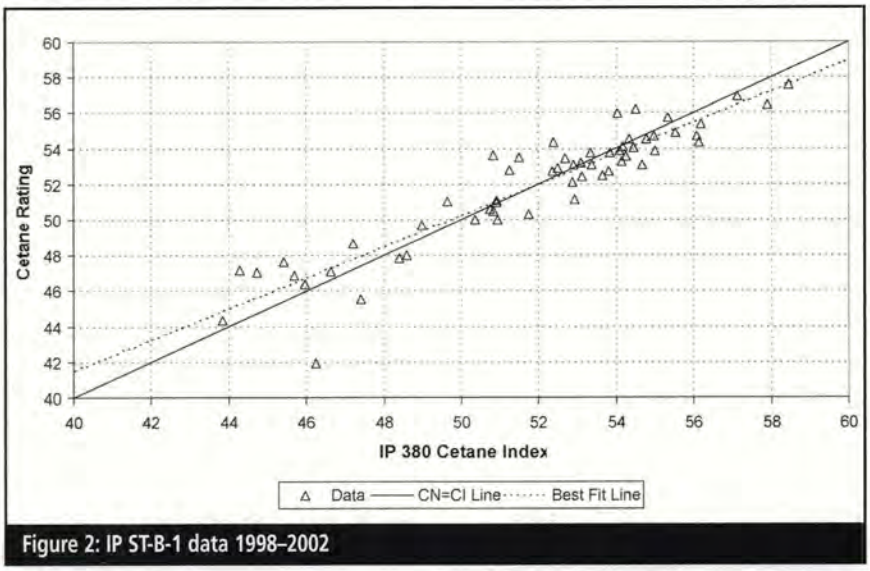


Figure 2: IP ST-B-1 data 1998–2002

Year	Bias — Mean	SD	$RMSE_b$	CN/CI correlation	Best-fit slope	Trend line $RMSE_r$	CN range Min	Max
1998	0.1	2.0	2.0	0.90	1.23	1.9	42.0	57.0
1999	0.1	1.2	1.2	0.84	0.78	1.1	49.7	55.7
2000	–0.6	0.7	0.9	0.96	0.88	0.7	47.8	56.4
2001	0.0	1.2	1.2	0.96	0.85	1.0	45.5	54.7
2002	0.3	1.4	1.5	0.96	0.83	1.2	44.3	57.6
1998–2002	0.0	1.3	1.3	0.93	0.87	1.2	42.0	57.6

Table 1: Trends in CN and IP 380/EN ISO 4264

Conclusions

Three main conclusions can be drawn from this review:

- The overall IP 380 bias is effectively zero when estimating CN. The unexpected bias in 2000 looks to be due to chance when selecting a small number of samples.
- On average, IP 380 estimates CN very well. The scatter associated with individual CN estimation fluctuates year-on-year, suggesting a chance element.
- The equations used in IP 380 for calculating CI are satisfactory and do not require revision at this time. However, a bias problem may exist for very low (<40) CN fuels. The IP will continue to monitor the relationship.

If you would like further information about this article or the IP's Gasoline and Diesel Fuel Engine Correlation Scheme, please contact John Phipps, IP Technical Manager–Standards on e: jp@petroleum.co.uk *T: +44 (0)20 7467 7130.*

Call for equal treatment

The UK Department of Trade and Industry's Research and Development (R&D) Scorecard for 2002 shows the oil industry in a bad light. As usual, the star performer is the pharmaceutical industry and, yet again, the villain is the oil business. Last year the pharmaceutical industry spent 14.8% of its sales revenue on R&D while the oil industry is reported to have spent just 0.3%. But there is something fishy about these statistics, writes *Richard Barry*...

Total British industry spends an average of 2.2% of sales on R&D. It is hard to believe that the oil industry, with its masses of PhDs, spends less than one-seventh of this overall average – after all, even the 'personal care' industry spends 1.3%... shampoo research presumably.

The rules governing the reporting of R&D expenditure are set out in the so-called *Frascati Manual*, published by the Organisation for Economic Cooperation and Development (OECD) in 1993. And this is where the problem lies. The committee that prepared the manual recognised that there are a small number of 'borderline cases' – do they count as R&D or don't they?

Inconsistent reporting

One of these borderline cases is the prospecting for and development of oil and other minerals. Unfortunately, it looks as though the committee failed to closely compare the oil industry with the pharmaceutical industry and, as a result, came to the wrong conclusion in this case. As a consequence the R&D reporting rules for the pharmaceutical industry and the oil industry are totally inconsistent.

All of the money spent by the pharmaceutical industry on discovering new products, testing and developing them for market, counts as R&D. Typically, it costs about £350mn and takes ten years to discover and develop a significant new drug.

By contrast, none of the money spent by the oil industry on discovering new products (oil and gas fields) and bringing them to market can be counted as R&D under Frascati rules.

Call for equality

The oil and pharmaceutical industries are similar in many respects. Just as for a significant drug, the discovery and development of a significant oil field also takes about ten years and upwards of £350mn. Really successful drugs are rare (only 49 had worldwide sales of more than $1bn last year) but so are really successful oil fields (only 120 had production of more than 100,000 b/d last year – that's roughly equivalent to sales of $1bn/y). Research failure – when a dry well is drilled or a drug doesn't work – accounts for a lot of expenditure in both industries. Similarities like these mean that the two industries ought to be treated in the same way when it comes to R&D reporting.

In 2001 BP reported R&D expenditure equal to 0.22% of sales. Restating this according to pharmaceutical reporting rules, the company really spent 4.8% on R&D. This is a much more realistic figure. OK, so it doesn't approach pharmaceutical levels, but it does put the oil industry well above the average of all industry, which intuitively seems about right.

Does it matter?

Does any of this matter – after all, it is only a league table? But as any hospital manager can testify, this government is very keen on rewarding and punishing according to league table position. The Chancellor is also very keen to see greater innovation in industry.

Put these two facts together and it is hard to avoid the conclusion that the oil industry would be wise to get the Frascati rules corrected now, before the government starts handing out rewards and brickbats to those at the top and the bottom of the R&D Scorecard. ●

Club on the web

Oil-in-water monitoring and analysis is a subject of considerable interest to both regulatory authorities and the offshore oil and gas industry. Accurate and reliable measurement of oil-in-water plays an important role in minimisation of oil pollution into the environment writes *Dr Ming Yang*, of the National Engineering Laboratory (NEL) who have initiated a web-based oil-in-water (OIW) monitoring club.

Oil-in-water has been traditionally measured using Freon extraction and Infrared (IR) quantification for many years in the North Sea. The method is simple to use and also a number of portable instruments have been available for routine measurements offshore. However, due to the phase-out of Freon for environmental reasons, continued use of this traditional IR method is now at risk. Tetrochloroethylene (TTCE or Perklone) has been officially approved by OSPAR (Oslo-Paris) Convention since 1997 as a direct Freon replacement that can be used in the analysis of oil-in-water, but its suspected carcinogenic property made it difficult being widely accepted by the offshore industry. Laboratory based techniques such as the ISO 9377-2 Gas Chromatography and Flame Ionisation Detection (GC-FID), which had been specifically developed to replace IR based methods, was made available in year 2000. However its suitability for offshore applications is still being investigated. Also on-line oil-in-water monitoring has been around for many years. Numerous testing and trials have been carried out.

As a result there is a considerable amount of information in existence about Freon and Freon replacements, alternative analytical methods, on-line monitoring, monitor suppliers, field operational experience (good and bad), new technology developments, and how to select an oil-in-water monitor for specific applications. This information is however not readily available which has resulted in duplication of work by for example. different offshore operators.

Following the successful organisation of two oil-in-water monitoring workshops, NEL were instrumental in establishing an extensive network of people who were interested in the subject of oil-in-water monitoring. Responding to this group's need for a focal point on oil-in-water monitoring, NEL set up a web-based Oil-in-Water Monitoring Club in October 2000.

Since the formation of the club, it has received a lot of support from the UK government, offshore oil and gas operators, oil-in-water monitor suppliers, other service companies and R&D organisations. To date there are 33 members in the club with nine countries represented. These members include offshore oil and gas operators, monitor suppliers, government and representational bodies (such as the Institute of Petroleum), as well as R&D and consultancy based companies.

Objectives of the OIW monitoring club

There were a number of objectives in forming the OIW monitoring club:

1) Keep abreast of the legislative and technology developments
2) Provide a central contact point on the subject of oil-in-water monitoring
3) Promote best practices in oil-in-water monitoring and hence reduction of oil pollution
4) Bridge regulators, users and R&D organisations

With these objectives in mind, the following club activities have been carried out:

a) Construction and maintenance of the OIW club website
b) Organisation of the club member annual forum
c) Gathering and distribution of the latest information

Perceived benefits to the club members
Fast and effective exchange of information as well as bridging the wide spectrum of organisations involved in this activity is at the heart of the objectives of the club. The club acts as a central point where club members are able to discuss and source the latest information available about oil-in-water monitoring.

Benefits to government bodies
Government and regulatory bodies may become permanent members of the club with their web address inter-linked to the club website. The club provides an excellent source of information regarding the implementation of legislation and what problems and difficulties may have been experienced in meeting legislation. It also helps formulate government regulatory policy at an international level on the issues of produced water discharge and produced water oil content monitoring and measurement.

Benefits to offshore oil and gas operators
The club provides useful information about how other people prevent oily water being discharged. It also advocates sharing operational experience on using on-line oil-in-water monitoring. In addition good practices ranging from monitor selection to installation, calibration to instrument maintenance and training are promoted. These will be particularly useful for those who have not had much experience with on-line oil-in-water monitors. The club activities also provide information on both new technology and legislative developments.

Benefits to manufacturers and suppliers
Manufacturers and suppliers have the opportunity to have their company web address linked to that of the club. The club also provides a good place to find out what the legislative and industrial requirements are, and to learn of the operational experience of operators and other monitor suppliers.

Benefits to R&D and consultancy based organisations
The club keeps R&D and consultancy based organisations informed about legislative and technology developments. It may also provide opportunities for the R&D organisations to find perfect partners in developing a prototype oil-in-water monitoring device and/or to arrange field trials.

Club website

The club website was set up soon after the club was formed. Club members have access to all the information on the website. Anyone who is interested in visiting the site, the address is **www.oiwclub.com**

Acknowledgement

In establishing the Oil-in-Water Monitoring Club, the National Engineering laboratory (NEL) received some seed funding from the Department of Trade and Industry (DTI) Oil & Gas Directorate. The DTI's support for the club is greatly acknowledged.

Space saving workbench launched in UK

The FlatMate is a new space saving combination of shelving system, tool cabinet and workbench that folds flat against the wall to take up almost no floor space at all. It is suitable for use in offshore applications where space may be at a premium, in production and processing and even onboard ships.

The modular design also allows users to choose only the parts they need, to save cost. These parts can be fitted in any location and at any height on the uprights, to create a workbench that is precisely tailored to the needs of each user. If requirements change in the future, parts can be added or taken away in seconds.

Like a traditional workbench, the FlatMate provides a surface to work on. However, unlike a conventional unit, it will support 100 kg in weight, and folds up to lock over the tools when not in use, states the manufacturer. This not only saves space, but also encourages tidiness and deters 'borrowing', tampering and theft.

When the workbench is lowered the tool cabinet can be opened to reveal a large tool storage area. The steel uprights allow the space above and below the workbench to be fitted with shelves and panels to store small parts and consumables.

The backbone of the system is the steel uprights, measuring 2 metres in height and made of 2.5 mm thick galvanised steel for strength and corrosion resistance. These are the only parts that fit directly to the wall. All the other components, which are made of epoxy powder coated steel, screw to the uprights quickly and easily in any position and at any height.

The tool cabinet has side cheeks that open out to create a tool board almost 2 metres in length, but which also folds to save space. The square perforations provide over 550 locations for tool clips and fixtures.

The folded edges of the workbench are designed to allow for workpiece clamping. Mounting holes are also provided for an optional vice. Other features include friction pivots to control descent rate, and an anti-tamper lock.

Prices start at just £100 for the basic uprights and workbench package. A typical installation comprising uprights, workbench, tool cabinet, side cheeks, tool clips, shelf, tool panel and Eurobins, as shown in the photograph, costs around £250.

T: + 44 (0)1352 810840
F: +44 (0)1352 810840

Loop powered level measurement

The Eclipse® 707 from Magnetrol is claimed to be the first 'radar type' level measurement that is able to measure both the upper liquid level and the liquid-liquid level interface over a two-wire loop powered connection. Hydrocarbon condensate/water interfaces are typical applications for this user-friendly transmitter with no moving parts, states the company.

The unit uses the technology of TDR (time domain reflectometry), sending high frequency pulses down a wave guide antenna (GWR probe). When the pulse reaches a liquid surface, part of the signal is reflected and level is accurately determined by means of a high speed timing circuit. The remaining energy continues travelling down the probe until it reaches a higher dielectric liquid. This pulse will once more be reflected and measured by the timing circuitry. By measuring the time of both reflections and the compensation of the speed of travel through the upper liquid layer, both the upper liquid level and the liquid-liquid interface level can be accurately determined.

The Eclipse 707 delivers a 4-20mA output for the liquid interface level and via Hart® a digital signal for both levels. The unit can also deliver, via a Hart module interface, multiple 4-20mA and relay outputs.

Applications range from high viscosity up to 10,000 cP or temperatures up to 400°C, saturated steam applications up to 110 bar boilers, high pressure up to 345 bar, liquefied gases down to an Er of 1,4 extremely aggressive or ultra clean applications.

T: +44 (0)1444 871313
F: +44 (0)1444 871317
e: **paul.sayers@magnetrol.co.uk**
www.magnetrol.com

Portable gear pump for viscous fluid transfer

The GVR range of self-priming, external gear pumps now available from Pump Engineering is claimed to be ideally suited to transferring viscous fluids such as lubricating and hydraulic oils that require a robust, reliable, yet competitively priced pump.

One typical application is the transfer of oils into and out of transformers at electricity sub-stations where the facility to reverse the pump flow at the push of a button is a particular advantage. The GVR pump can be supplied as a compact and portable unit that can be operated in remote locations powered by a generator.

The pumps are available in simple cast iron construction with hardened steel gears, wear resistant bearings and carbon, stainless steel and Viton® mechanical seal ensuring efficient, economical, trouble-free life. They are also offered in AISI 316 stainless steel and bronze, making them suitable for applications involving higher temperatures and pressures, or those with more aggressive liquids.

The standard pumps are suitable for temperatures up to 140°C and pressures up to 10 bar. All pumps in the range are available with an internal relief valve that protects the pump against over pressure.

Close coupled pumps are available for flow rates up to 60 litres/minute, while a foot mounted option delivers flow rates up to 600 litres/minute.

T: +44 (0)1903 730900
F: +44 (0)1903 730234
e: **sales@pumpeng.co.uk**

Fuels analysis

Oxford Instruments has launched a new, cost-effective XRF fuels analyser – the Twin-X. The unit can be configured as a dedicated high performance sulphur in oil analyser with detection limits that allow the measurement of the new <10 ppm sulphur limits, or as a multi-element analyser measuring sulphur in oil, potassium in gasoline, sulphur, nickel, vanadium, and iron in fuel oils, manganese in gasoline, and lead in gasoline.

T: +44 (0)1494 442255
F: +44 (0)1494 461033

A simple solution for high pressure applications

Dunlop Hiflex claims to have consolidated its extensive waterblast product ranges to offer a simple, no-nonsense solution matching generic industry pressure ratings while maintaining the highest level of performance. For additional operational flexibility a unique insert elbow fitting has also been added to the range of terminations.

The Waterblast range is produced in four pressure series with a safety factor of 2:5:1 in line with RMA (US), BFPA (UK) and DIN (Germany) standards. The new series enables the company to offer fully validated waterblast hose assemblies with colour-coded branding for ease of identification – White Brand WB 10 to 10,000 psi, Blue Brand WB 12 to 12,000 psi, Yellow Brand WB 15 to 15,000 psi and Orange Brand WB 20 to 20,000 psi.

Assemblies come in standard 20-metre of 50-ft hose lengths, with any combination of BSP, Metric DKO, NPT and NPSM terminations covering most requirements. For special requirements, assemblies can be supplied with bespoke hose lengths up to 200 metres,

with a choice of adapters and insert elbows with safety features for challenging applications. There is a choice between fire resistant anti-static covers for hazardous environments or TUFLEX® covers for super abrasion resistance.

T: +44 (0)1722 336231
F: +44 (0)1722 323914

NEWS Technology

New service includes bund wall surveys

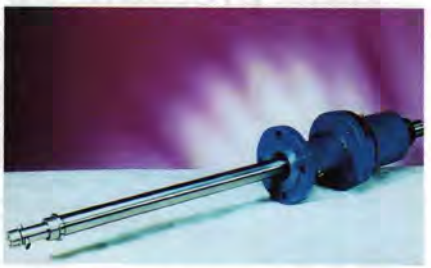
As part of its extensive range of environmental services, Darcy Products is now offering a survey service to companies involved in the storing or handling of liquids in tanks, drums or IBCs whereby it will assess the integrity of bund walls and other secondary containment systems. On completion of the survey, the company will recommend any remedial measures required and offer a variety of options tailored to the client's budgets and individual requirements of the site.

As well as assessing the condition of walls, floors, roofs, drainage outlets and storage capacity of the system, a typical survey would cover the overall environmental vulnerability of the site in relation to watercourses, lakes, land drains, ditches etc, whether site surfaces are permeable or impermeable, free draining or otherwise, and the standard of routine housekeeping within the secondary containment area.

T: +44 (0)1732 843131
F: +44 (0)1732 525500

North Sea sampling system design first

A Jiskoot sampling system engineered for mounting in the liquid leg of a compact separation multiphase metering system on Shell Expro's Brent Charlie platform is claimed to be the first system of its kind designed to extract representative, flow proportional samples of low GVF 'gassy liquid' multiphase flow, which can be used to assist in meter calibration.



The system comprises a Jiskoot 210 sample probe and high pressure sample receivers mounted in a heated enclosure with a short interconnect line to minimise the risk of sample cross-contamination and automatic full receiver changeover. The receivers are precharged with an inert gas and the extracted samples are maintained at process pressure and temperature so that they can be removed for composition and PVT analysis, with this data used on a regular basis to update or check the calibration of the multiphase metering system. Samples are taken from a point of homogenous flow and provide a time-based average of the phases.

T: +44 (0)1892 518000
F: +44 (0)1892 518100
e: **sales@jiskoot.com**

A breath of fresh air

Scott International has unveiled a number of further product options to enhance and upgrade its Protector Tornado modular powered air purifying and airline respiratory systems.

The new T25 helmet headtop (pictured) is claimed to offer a truly integrated system for users requiring high levels of respiratory, head and face protection. It has been designed for use in higher risk areas as well as first responders to incidents.

Two new filters have also been developed. The PF251/Super is a long life efficiency particulate filter designed for use in areas of high dust concentration. The TF233 is a multi-purpose filter offering protection against a wide range of particles, gases and vapours.

The Tor/Batt/Lite is a lightweight battery providing up to eight-hour working duration. It can be retrofitted to all T/power units and uses the latest NiMh (nickel metal hydride) cell technology. The unit offers a weight saving of 320 grammes compared to the existing eight-hour battery.

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www.scottint.com

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61 New Cavendish Street, London W1G 7AR, UK
or e: petrev@petroleum.co.uk

NEW Publications

Oil Company Crisis: Managing Structure, Profitability, and Growth*

Nick Antill and Robert Arnott (Oxford Institute for Energy Studies, 57 Woodstock Road, Oxford OX2 6FA, UK. T: +44 (0)1865 311377; F: +44 (0)1865 310527; e: **information@oxfordenergy.org**; **www.oxfordenergy.org**) *ISBN 1 901795 27 6. 42 pages. Price: £30.*

In the aftermath of a long period of cost cutting, the oil companies were left with little choice but to embark on a wave of mergers to rekindle growth aspirations. If these efforts founder, what should the oil companies do next? Should they accept fashionable arguments in favour of deconstruction and break up into focused entities, and would this actually add value? The authors of this book believe not and go on to suggest that companies must revisit the key issues of structure, profitability and growth if they are to differentiate themselves from their competition and maximise their shareholder value.

Oil and Gas: Crises and Controversies 1961–2000. Volume 2: Europe's Entanglement*

Peter R Odell (Multi-Science Publishing, 5 Wates Way, Brentwood, Essex CM15 9TB, UK. T: +44 (0)1277 224632; F: +44 (0)1277 223453; e: **mscience@globalnet.co.uk**; **www.multi-science.co.uk**). *ISBN 0 906522 18 8. 692 pages. Price: £55.50.*

Volume 1 of Professor Odell's collected studies and commentaries, *Oil and Gas: Crises and Controversies – Global Issues,* looked at issues of resource availability and exploitation, also charting how the structure of the industry had changed since the early 1970s and the implications for the western world's economy. Volume 2 on *Europe's Entanglement*, deals with the issues of international oil and gas. It reviews the succession of fundamental changes in the European energy economy during the last 40 to 50 years – imported oil's replacement of indigenous coal as the primary energy source in the early post-World War 2 period, followed by exploitation of the North Sea basin's hydrocarbons resources and the later evolution of the Continent's natural gas markets from the early 1960s. The publication puts these complex dynamics of Europe's energy sector in the context of the broader political and economic structures and policies that have emerged over the last four decades.

Method for Monitoring Exposure to Gasoline Vapour in Air – Revision 2002*

(Concawe, Boulevard du Souverain 165, B-1160 Brussels, Belgium. T: +32 2 566 91 60; F: +32 2 566 91 81; e: **info@concawe.be**; **www.concawe.be**) *42 pages. Price: Free download from website.*

A detailed method for the analysis of exposure to gasoline vapour, including identification and quantification of single constituents, was first developed and published by Concawe in 1986. Subsequent technical and procedural developments, including international standardisation of quality requirements for workplace assessment of exposure to hazardous agents, have prompted a revision of the recommended method. The revision includes a change to one of the recommended sorbents for capturing airborne gasoline vapour components, and an assessment of the validation status in comparison with international standards requirements. This report provides a short description of some practical issues that have been encountered during application of this method in a field survey of occupational exposures in the European oil industry. The revised methodology is presented in Appendix 1.

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- *Greenhouse Gas Emission Trends and Projections in Europe: Are the EU and the Candidate Countries on Track to Achieve the Kyoto Protocol Targets.* Environment Issue report No 33. Bernd Gugele, Bernd Strobel and Peter Taylor. European Environment Agency (EEA), Copenhagen, Denmark, 2002. ISBN 9291675253.
- *International Petroleum Encyclopedia 2002.* Rebecca Busby (ed). PennWell, Tulsa, US, 2002. ISBN 0878148388.
- *ITOPF Handbook 2003/2004.* International Tanker Owners Pollution Federation (ITOPF), London, UK, 2003.
- *Restructured ADR Applicable as From 1 January 2003: European Agreement Concerning the International Carriage of Dangerous Goods by Road. Volume I.* Economic Commission for Europe; Inland Transport Committee; United Nations, Geneva, Switzerland, 2002. ISBN 9211390788 (Vol I). [Volume II also held in IP Library.]
- *The Tanker Register 2002 (plus CD-Rom).* 43rd Edition. Clarkson Research Studies, London, UK, 2003. ISBN 1903352231.
- *UK Energy Sector Indicators 2003: A Supplement to the Energy White Paper: Our Energy Future – Creating a Low Carbon Economy.* Department of Trade and Industry (DTI), Norwich, UK, 2003.

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Branch Activities

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20 May: 18.00: *Alternative Transport Fuels – Strategy and Taxation,* by Sir Edward Greenwell, Country Land and Business Association; Nick Eyre, Energy Saving Trust; Colin Mathews, Powershift Register

This is a joint event with the Institute of Energy London and Home Counties Branch

Discussion Groups

ENERGY, ECONOMICS, ENVIRONMENT

The *Prestige* Disaster: Implications for the World Tanker Fleet

Tuesday 6 May 17.00 for 17.30

Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR *Refreshments provided*

Speakers: **Martin Stoppard, Managing Director, Clarksons**
Paul Gunton, Editor, Fairplay magazine
This is a joint event with the British Institute of Energy Economics

Contact: **Laura Viscione T: +44 (0)20 7467 7174**
F: +44 (0)20 7580 2230 e: lviscione@petroleum.co.uk

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**

Contact: **Laura Viscione T: +44 (0)20 7467 7174**
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IFP Chairman to address Oil Depletion conference

The Chairman of the Institut Français du Pétrole (IFP), Olivier Appert, will give the opening address at a two-day conference on oil depletion in Paris on 26–27 May.

Experts from Europe, the United States, Russia and the Middle East will assess the likely economic, social and geopolitical impacts of projected oil supply-demand imbalances due to global resource constraints, and options for addressing the problem.

The Association for the Study of Peak Oil (ASPO), an alliance of European scientists, is organising the conference, which will be held at the Paris headquarters of the IFP.

Details of the programme are available on the ASPO website at *www.peakoil.net*

Pre-registration is by e-mail to C J Campbell at *aspoone@eircom.net*

A comprehensive listing of events is available on the IP website *www.petroleum.co.uk*

MOVES People

ExxonMobil has announced the retirement of Production Company President **Dr Terry Koonce** and the nomination of **Dr Stuart McGill** as his successor. McGill is currently President of ExxonMobil Gas and Power Marketing.

Gazprom has appointed **Kirill Seleznev** as the new head of Mezhregiongaz – the company's domestic sales subsidiary.

Shell Hydrogen has announced that **Jeremy Bentham** has been appointed Chief Executive Officer. Bentham was previously Vice President, Hydrocarbon Logistics, Shell Global Solutions. He replaces **Don Huberts** who has been appointed Vice President, Refining and Chemicals in Shell Global Solutions and will be based in Amsterdam, the Netherlands.

The Scotoil Group has appointed **Gordon McLellan** as Director on the Group's Board following the death of Managing Director **Ian Davidson** earlier this year. McLellan has more that 20 years' international management experience in the oil and gas industry.

Apache has announced that **Janine J McArdle** has been appointed Vice President of Oil and Gas Marketing and **Michael J Benson** has been promoted to Vice President Security. **P Anthony Lannie** has been appointed Vice President and General Counsel.

It will be proposed that **R J Routs** be appointed Managing Director at the Royal Dutch Petroleum Company General Meeting with effect from 1 July 2003. It is intended, following his appointment as Managing Director, that Routs be appointed a member of the Presidium of the Board of Directors of Shell Petroleum NV and a Managing Director of the Shell Petroleum Company, thereby becoming Group Managing Director of the Royal Dutch/Shell Group of Companies.

OPS Group has promoted **Cerys Johns** to the newly created post of Head of Marketing and Media Relations. In her new role, Johns will oversee the marketing department and all associated OPS Group marketing communications activities, including advertising, media relations, e-marketing and production of communications materials.

BP and Alfa Access Renova (AAR) have released the proposed Board of Directors and CEO for their new holding company TNK-BP. The members of the advisory board are: **Mikhail Friedman** – Chairman, Alfa Group; **Rodney Chase** – Adviser to Group Chief Executive, BP; **Tony Hayward** – Chief Executive, Upstream, BP; **Viktor Vekselberg** – Chairman, Renova and Chairman of the Management Board, TNK; **Len Blavatnik** – Chairman, Access Industries; **Andy Inglis** – Group Vice President, Upstream, BP; **Alex Knaster** – Chief Executive Officer, Alfa Bank; **Patrick Chapman** – Group Vice President and Treasurer, BP; **Brian Gilvary** – Group Vice President, Downstream, BP; as well as another member to be appointed by AAR.

Managing Director of ITOPF, *Dr Ian White* (right), is to retire in December this year. He will be succeeded by *Dr Tosh Moller* (left), currently one of the Technical Team Managers. White joined ITOPF in 1977 and succeeded John Archer as Managing Director in 1987. He was made an OBE in 1998. Marine biologist Tosh Muller, joined ITOPF in 1979.

Corus Tubes has appointed **Jason Evans** to the position of Sales Manager, to be based in Corby.

Rhonda Zygocki has been named Vice President of Health, Environment and Safety (HES) for ChevronTexaco. Zygocki currently serves as Managing Director of ChevronTexaco Australia, based in Perth. In her new position Zygocki will be responsible for the company's HES strategic planning and issues management, compliance and auditing and emergency response.

The Board of Directors of New York Mercantile Exchange has appointed **Samuel Gaer** as Chief Information Officer; **Carole R Server** as Senior Vice President of Marketing; **Jeannine Ali** as Vice President and Controller; and **Ellen Steuerer** as Vice President of Contract Administration and Financial Services.

Baker Hughes Centrilift has appointed **Greg Schneider** as its new Regional Manager for Europe and Africa. Schneider has relocated to Aberdeen to take up the position following **Fred Chadwick**'s transfer to the company's head office in Oklahoma last year.

NEXT MONTH'S FEATURES...

The June 2003 issue of *Petroleum Review* will feature a review of the Chinese gas sector as well as recent oil and gas developments in Algeria. The Iraqi gas market will also be discussed and there will be comment from SAP on how to improve operations and enhance margins in an increasingly competitive market. We also take a closer look at the application of Enventure Global Technology's Solid Expandable Tubular (SET™) technology in a mono-diameter well, while Halliburton provides an overview of the use of magnetic resonance while drilling in the UK southern North Sea. The issue will also feature a review of the recent Offshore Technology Conference (OTC) in Houston, Texas, and an update on the merger between the Institute of Petroleum and the Institute of Energy.

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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.

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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:
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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

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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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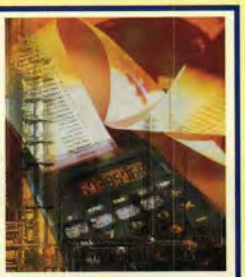
US SEC and FASB Accounting and Reporting Requirements for Oil and Gas Enterprises

This **three-day course** provides a basic understanding of current SEC and FASB accounting and reporting requirements for oil and gas producing companies.

Accounting for International Petroleum Contracts: Production Sharing and Risk Service Contracts and Joint Operating Agreements

This **three-day course** provides a comprehensive examination of accounting requirements associated with the major types of contracts entered into by oil and gas enterprises in carrying on international exploration and production activities.



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This **three-day course** provides a concise and informed introduction to operations, from the search for oil and gas to the delivery of products to different customers.

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This **three-day course** concentrates on the structure of the oil and gas industry, the geopolitics of oil and the workings of the principal markets. It provides an informed introduction to the economic and commercial background and general trends of the industry, underpinning an understanding of oil and gas and their markets with an awareness of global and strategic issues.

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