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JULY 2001

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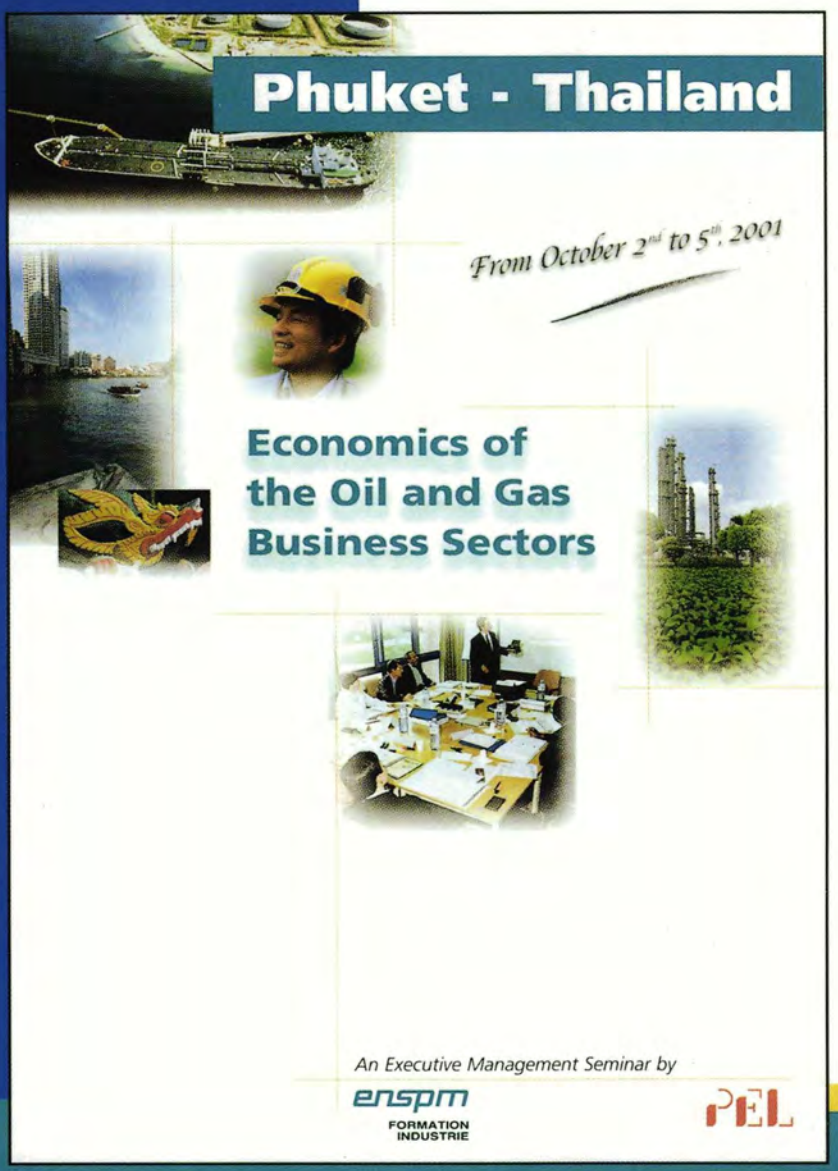

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Who should attend:

- Those within the international oil and gas industries whose work requires an understanding of the economics of all business sectors
- Those with expertise in one or more functional areas who need to be aware of their interrelationships with other parts of the business
- Those in government, industry, commerce and public institutions who need insight into the overall structure and functioning of the oil markets

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- Strategic Issues, Restructuring and Asian Oil Company Activities
- Work Group Activities including Board Investment Decision Making

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IFP ensPM FORMATION INDUSTRIE PEL

Petroleum review

JULY 2001 VOLUME 55 NUMBER 654
£14.00• SUBSCRIPTIONS (INLAND) £165.00 (OVERSEAS) £190.00

PUBLISHER

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A charitable company limited by guarantee
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SUBSCRIPTIONS

Subscription Enquiries: Portland Press
Tel: +44 (0)1206 796351 Fax: +44 (0)1206 799331
e: **sales@portlandpress.com**
Printed by The Thanet Press Ltd, Margate

US MAIL: *Petroleum Review* (ISSN 0020-3076 USPS 006997) is published monthly by the Institute of Petroleum and is available Periodical Postage Paid at Middlesex, New Jersey.

Postmaster: send address changes to *Petroleum Review*
c/o PO Box 177, Middlesex, New Jersey 08846, USA.

ABC
ISSN 0020-3076
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

ABBREVIATIONS

The following are used throughout *Petroleum Review*:

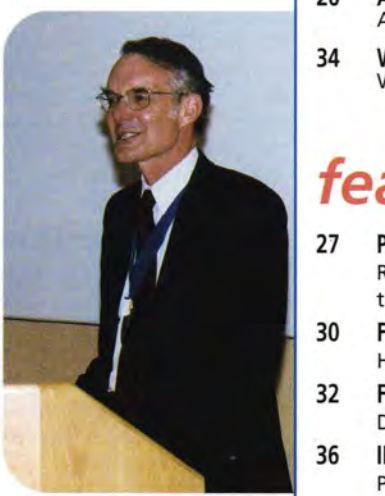
mn	= million (10^6)	kW	= kilowatts (10^3)
bn	= billion (10^9)	MW	= megawatts (10^6)
tn	= trillion (10^{12})	GW	= gigawatts (10^9)
cf	= cubic feet	kWh	= kilowatt hour
cm	= cubic metres	km	= kilometre
boe	= barrels of oil equivalent	sq km	= square kilometres
		b/d	= barrels/day
t/y	= tonnes/year	t/d	=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

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

Front cover: BP installed water spray lines (red) on individual components of its new HF alkylation unit (see p12), instead of around the unit battery limits at the Castellón refinery.

Photo: Phillips Petroleum

inside...



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ROUNDUP From the Editor

Straws in the wind

One of the great pleasures about writing on the oil and gas industry is that there is always something new. This last month has seen an unusual number of 'straws in the wind', the true relevance of which will only become clear with time.

The US gas market shows, once again, that economics work. High prices are drawing forth more supply, while inducing fuel substitution and non-use. US spot natural gas prices reached $10/mn BTU in the first half of January and then eased steadily to around $4/mn BTU by late May. By June, prices were slightly under year earlier levels, although still around $4/mn BTU.

Similarly, economics is working to alleviate low US oil stocks and tight, high price gasoline supplies. US refineries are operating at high levels, 9.5mn b/d of crude is being imported and a further 2mn b/d or so of products. As a result, stocks are rebuilding and prices starting to ease back – although not before the traumatic barrier of $2/US gallon had been breached.

Opec has rarely been more self-confident. Oil prices have been held within its desired price band despite slowing demand and the normal second quarter demand decline. Saddam Hussein's melodramatic cut-off of oil exports (roughly 2.2mn b/d) has been shrugged off by a market reassured that Opec has the spare capacity to make up the difference and the willingness to use it.

Adding to Opec's self-confidence is the steady filling of its treasuries which makes cutting back output to maintain prices easier. This in turn ensures the treasuries fill even faster. The key western agencies tend to assume that this will give them the resources to invest in new capacity. This seems a fairly heroic assumption as it means that Opec countries will spend their money to depress their income. Time for a new assumption?

In a timely reminder that things could easily go awry, the Centre for Global Energy Studies in its June monthly oil report makes a series of key qualifications:

- Iraq is engaged in a direct confrontation with UN plans to impose smart sanctions, as these directly threaten the region's income.
- Iraq has the ability to maintain the sanctions, possibly till year end, because of the $4bn of uncommitted funds in the UN escrow account.
- Substitution of oil products for gas in North America is maintaining strong oil demand and high imports.
- In contrast, weak and slowing demand in Europe and Asia has enabled stocks to be effectively transferred to North America.
- Normal seasonal factors will lead to an increase in European and Asian refinery runs in 3Q2001 and if North American demand continues strong there could be a crude shortage.
- If a crude shortage – and high prices – in 3Q2001 are to be avoided, Opec needs to start pumping crude now. It can always be turned off if Iraq production returns or demand suddenly weakens and stocks build.

In short, CGES sees an asymmetric risk with Opec's traditional caution, fed by its recent success, increasing the risk of a tight and high priced oil market in the third and fourth quarters. The report also provides a key graph showing that for the US economy every oil price rise is followed quite closely by a US economic growth slowdown. Oil prices reflect the supply/demand balance, so will prices be weakening or soaring by the end of the year?

Tales from the Brown Book

Every year the publication of the UK Government's 'Brown Book' provides considerable insight into the state of play of oil and gas development in the UK offshore. From its pages we learn that, by end-2000, of the 3.58bn tonnes (27.92bn barrels) oil proven and probable reserves some 2.57bn tonnes (20.05bn barrels) had been produced. This means that known reserves are 72% depleted.

A similar pattern emerges for gas – though less severe. By end-2000, of the 2,715bn cm of proven and probable gas reserves some 1,518bn cm had been produced – known gas reserves are therefore 56% depleted.

Over recent months there has been a positive rush to sanction new North Sea projects. The latest go-aheads are TotalFinaElf's Glenelg field (which will require a platform) and Dunbar South. The rush is to slow the production decline. The Brown Book reveals that of the 134 separately itemised fields, 90 are in steady decline, a further 17 are probably entering decline and 27 are expanding production with 16 of these having started up in the last two years.

Chris Skrebowski

e world

Dynegy is reported to have launched a real-time transactional wholesale gas liquids portal as an add-on to its existing Dynegydirect online service. The new site will offer fixed price quotes, spot sales and posted prices for Dynegy products that are sold across North America.

TotalFinaElf initiated a pilot e-commerce project in mid-2000, in which transactions usually take place on the TradeRanger marketplace. The Group reports that it has now carried out, on schedule, close to 1,000 e-catalogue procurement transactions covering exploration and production operations in the UK, the service station network in France and several chemicals plants. In addition, e-auction transactions have been completed in refining and marketing, and exploration and production sectors in Europe and the US, for a total of nearly euro10mn.

UK minnow Heritage Oil has launched its new company website at **www.heritageoilcorp.com**

Smartbunkers, the online exchange for marine fuels, claims that ship owners can achieve savings of up to 5% on bunker purchases by using its online Global Bunker Exchange.

Russian oil company Sibneft has unveiled the revamped version of its website at **www.sibneft.ru** The site also features a history of the Russian oil industry, an oil industry textbook delivered in partnership with the Institute of Petroleum, and a dictionary of industry terminology.

ABS has launched its newly designed website at **www.eagle.org** The new site is designed to 'better serve industry clients with the latest regulatory information, class suspensions, online ordering of select technical documents and a greatly expanded ABS Type approval progamme as well as technology updates.'

Croner.CCH has launched a range of web centres that it claims can be tailored to the needs of every single user. **www.environment-centre.net** is a free online service aimed specifically at the needs of environmental management professionals.

Conoco Marine has launched a new website at **www.conoco.co.uk/marine** In addition to information about Conoco, its marine logistics, products and contact details, the new site contains up-to-the-minute weather forecasts from the Met Office by port; current FT dollar/sterling exchange and euro rates; and links to its authorised marine agents representing the UK and Europe.

In Brief

UK

Phillips, together with partners Agip *and BG, is offering the Jill and Julia central North Sea discoveries for development under Logic's North Sea Satellite Accelerator initiative. The cumulative estimated ultimate recovery for the two discoveries is put at 9mn boe. Further details can be found at* **www.logic-oil.com**

TotalFinaElf's Glenelg gas condensate *field in the North Sea is to be developed via a wellhead platform and is reported to be due onstream in 2004. Reserves are put at 100mn boe. The company is also understood to be planning to develop the North Sea Dunbar South prospect as a satellite to the Dunbar platform by the end of 2001.*

Gaz de France is reported to have *acquired from Texaco stakes in 12 licences located near the existing Britannia and Elgin/Franklin fields in the UK sector of the North Sea. The average equity stake is 21%. No financial details have been disclosed.*

BG and PanCanadian Petroleum's *Buzzard exploration well in block 20/6 in the central North Sea is reported to have tested at 6,547 b/d of oil and 0.97mn cf/d of gas.*

In a meeting with the UK Offshore *Operators Association (UKOOA), Steve Marshall, BP's Scottish Regional President, reportedly outlined a $4bn investment package for offshore activities over the next four years, including $1.2bn in 2001.*

Conoco and BP have reportedly signed *a joint venture agreement to develop under-balanced drilling in the southern gas basin of the North Sea. A phased, four-well pilot project will be conducted at a cost of £60mn in summer 2002.*

Talisman Energy has reportedly found *oil in its Neso exploration well in block 13/29b in the UK North Sea. The well tested at 2,200 b/d.*

Europe

The timeframe for development of the *North Sea Ormen Lange gas field is reported to have been extended. The partners hope to put the development plan to the Norwegian authorities in 2003. The field is now expected to come onstream in autumn 2007.*

Moratorium on Great Lakes drilling may be lifted

A moratorium on the drilling of oil and gas reserves in the American portion of the Great Lakes could be lifted this autumn, just as President George Bush unveils his plans to dramatically increase the US search for new energy reserves, writes *Keith Nuthall.* The Michigan Department of Natural Resources (DNR) has recommended that Governor John Engler lift the leasing restrictions he imposed in 1997, which prohibited new drilling pending a study into its potential effect by the Michigan Environmental Science Board. The resulting report has now concluded that there has been no environmental impact from drilling thus far and the next step in the process will be a review by the Natural Resources Commission of leasing practices.

If all goes according to plan, then Governor Engler could approve lifting the ban as early as this month. This could result in the construction of up to 30 new wells, mainly along Lakes Michigan and Huron.

The US state of Michigan now has seven oil and gas wells in the Great Lakes. Directional drilling – where rigs sit on land about 1,500 feet from the shore, as opposed to sitting in the water, and drill at an angle underwater to hit oil or gas pockets – has been allowed under the Great Lakes by Michigan since 1945. Its gas wells produce 25% of the state's natural gas supply, according to Brad Wurse, Press Secretary for the DNR.

Not everyone is happy at this turn of events. Bob Meissner, Press Secretary to US Democrat Representative Bart Stupak, commented that Governor Engler is using the cover of a pro-petroleum government to lift the ban on drilling. He said that although Bush's Administration has not specifically outlined a plan that pinpoints drilling under the Great Lakes, it is looking to Michigan as a source of known oil and gas resources. 'In a glossy pamphlet outlining energy proposals, Michigan appears as a series of silver blotches with the caption "Tapping known energy resources",' he added.

In April, Stupak introduced legislation calling for a ban on additional directional drilling sites on the Great Lakes. It is Stupak's third attempt to get protective legislation through Congress – his last two attempts were unsuccessful. He and environmental groups say additional wells could pollute the lakes, some of Michigan's best-known natural treasures, and dampen tourism, without even providing a significant amount of oil or gas.

However, supporters of drilling, including Wurse from the DNR, told *Petroleum Review* that if the ban is lifted, additional leases could generate $100mn in new revenue for the state.

New Aussie project by-law provisions

The Australian Federal Government is to implement a number of reforms to the project by-law provisions in move 'broadly welcomed by the upstream industry,' according to the Australian Petroleum Production & Exploration Association (APPEA). APPEA Executive Director, Barry Jones, said: 'Modifications to the project by-law scheme were a key recommendation arising from the LNG Action Agenda. The government's in-principle agreement to expand the range of goods that can be imported duty free, particularly pipelines, was an important outcome of that consultation process.'

'Australia is facing an increasingly competitive international market for capital to fund investments in the nation's gas resources. Any action that is taken to remove taxes and charges on business inputs is supported by the industry', said an official APPEA statement.

'A particular concern with tariffs on capital equipment is that it can have a disproportionate impact on the economics of major resource projects. This is because tariffs apply to capital equipment which is invariably purchased at the early stage of a new project. Any increase in costs during the pre-production phase of a project will negatively impact on a project's rate of return,' explained Jones.

He also noted that a particular industry concern with the old provisions was the exclusion of pipelines from the definition of eligible capital equipment. Petroleum projects where oil and/or gas must be piped from offshore facilities or remote onshore sites to central processing plants are discriminated against under the existing provisions. The new provisions will provide an opportunity for a more appropriate treatment to apply to the circumstances surrounding these projects.

The new arrangements will not come into force until 1 July 2002. In the meantime, a range of imported equipment will continue to be denied duty relief.

NEWS Upstream

Impact of oil activities offshore Australia

The Australian Department of Industry, Science and Resources recently released the final report of the *Review of Environmental Impacts of Petroleum Exploration and Appraisal Activities in Commonwealth Waters*. The report provides:

- A detailed and comprehensive description of Australia's marine environments and current petroleum exploration activities.
- An analysis of the environmental effects of petroleum exploration and appraisal activities and the potential for significant impact on sensitive areas.
- A summary of the legal framework for the petroleum exploration industry environmental approvals process for petroleum exploration and appraisal activities.

The report will act as an expert guide for the petroleum industry in assessing its legal obligations under environmental legislation applying to these operations in the marine environment. It will also inform those with concerns about the impact of exploration activities on the marine environment and act as a source of accurate and comprehensive data on the petroleum industry for uses such as regional marine planning.

For further report information, visit **www.isr.gov.au/resources/petr_envr/**

Onshore seismic cable development

The UK's Nova Technology Fund has invested £350,000 out of a total funding package in excess of £1mn in Vibration Technology (Vibtech), a manufacturer of cable-free seismic acquisition systems. Other funders in this round of funding include Generics, Yorkshire Fund Managers on behalf of British Smaller Technology Companies VCT, private investors and a grant from the UK DTI Oil and Gas Industry Development Directorate.

The funds will enable the completion of the design and system development stages of a patented, lightweight cable-free seismic acquisition system for use in land seismic surveys currently being developed by Vibtech. 'The product uses patented cellular radio technology, is real-time and aims to be a direct replacement for the current seismic systems which are considerably more expensive, larger and heavier, and which tend to be awkward to operate, especially in difficult terrain in mountains, deserts and dense jungles,' reports the company. 'The system's low weight and volume will lower access requirements, lowering the environmental impact while easing the logistics of seismic surveys.'

Sibneft reserves

Sibneft reports that its proven oil reserves grew to around 4.64bn barrels last year, on the back of a rapid acceleration in drilling and greater reliance on enhanced recovery techniques. Drilling doubled to 740,000 metres in 2000, from 340,000 metres in 1999, and is set to rise further to 1.025mn in 2001. The number of new wells drilled more than doubled to 249 last year, and the tally is set to increase to 361 wells this year. In addition, the company reports that it plans to almost triple upstream capital expenditure this year to $595mn, up from $219mn in 2000.

The company's proven gas reserves totalled 43bn cm as of 1 January 2001, although this figure does not include reserves attributable to Sibneft through its Sibneft–Yugra joint venture with Sibir Energy or its acquisition of a stake in Onaco.

Kessog project

BP has announced the well design and technology team for Kessog, the third North Sea project to be developed under Logic's (Leading Oil and Gas Industry Competitiveness) Satellite Accelerator project.

The high pressure/high temperature (HP/HT) gas condensate field – estimated to contain reserves of 100mn boe, making it one of the largest undeveloped discoveries in the North Sea – presents a number of technological challenges to be overcome. As a result, an integrated well design team has been chosen: Halliburton's Energy Services Group, with Cooper Cameron, for HP/HT well construction services; Schlumberger, with M-I Fluids, providing the HP/HT completion and testing role; and Baker Hughes, bringing HP/HT multi-lateral expertise.

In Brief

***Enterprise Energy has awarded three** principal contracts – valued at euro 360mn – in connection with both the onshore and offshore development of Ireland's Corrib gas field to ABB Offshore Systems and Allseas Construction Contractors. ASI Corrib Joint Venture secured the EPIC contract for the onshore gas terminal, subject to receipt of planning permission from Mayo County Council.*

***FMC Kongsberg Subsea is reported to** have secured the contract to supply subsea wellheads and templates to Statoil's Mikkel field project in the Norwegian sector of the North Sea. Reinertsen Engineering is to design the pipelines and flowlines, with Kvaerner to modify the Åsgard B floating production platform. First production from Mikkel is slated for 2003.*

***Enterprise Oil reports that its Skarv** appraisal well in the Norwegian sector of the North Sea encountered oil and gas and has been suspended to allow a possible re-entry for production testing.*

***Denerco Oil of Germany and UK** partner Intrepid Energy are reported to have secured exploration licence B20 008/64, said to be the largest offshore licence in German waters.*

North America

***Canadian company Ranger Petroleum** is understood to have discovered 65bn cf of gas in the Sundance prospect in the Obed area of west-central Alberta, Canada.*

***Phillips Petroleum and Anadarko** Petroleum are reported to have made what is being claimed to be the first oil discoveries in Alaska's National Petroleum Reserve (NPR) on the North Slope since the area was reopened to exploration in 1999. The companies state that they are confident that the discoveries will prove to be of commercial quantities.*

***US company Murphy Oil is reported to** have discovered 60mn barrels of oil at Front Runner South in Green Canyon block 339 in the Gulf of Mexico.*

***Kerr-McGee's Durango exploration** well in Gulf of Mexico Garden Banks block 667 is reported to have encountered gas and boosted reserves for the Gunnison sub-basin by 120bn cf of gas equivalent.*

In Brief

WesternGeco is planning to acquire *Exploration Design Software (EDS) of Houston for an undisclosed sum.*

BP and Phillips are reported to have *discovered a 35mn barrel satellite to the Kuparuk field on Alaska's North Slope. Production from the Palm field is expected to begin in 2003, using the existing Kuparuk facilities.*

BP and Shell are reported to be planning *to build a $150mn gas gathering pipeline in the ultra-deep waters of the Gulf of Mexico. The 100-mile, 1bn cf/d capacity Okeanos gas pipeline will be built in two phases, beginning in 2002.*

Nexen's Aspen discovery in Green *Canyon block 243 in the Gulf of Mexico is reported to hold estimated reserves of 150mn boe.*

Middle East

Shell is reported to be planning to join *a Japanese consortium developing the Azadegan oil field in southern Iran, estimated to hold up to 24bn barrels of in-place reserves.*

The National Iranian Oil Company has *recently awarded OMV (Iran) Onshore Exploration a four-year oil prospecting contract in the Mehr block, sited between the city of Ahwaz and the Iraqi border in the central Zagros Basin. OMV plans to carry out a 2D seismic survey this year, followed by the drilling of two exploratory wells next in the block. Recent findings show potential oil deposits are significant, reports* Stella Zenkovitch.

Saudi Aramco is boosting its oil export *capacity by 800,000 b/d via a major expansion of production in the Khurais region, reports* Stella Zenkovitch.

Enron is reported to have sold its *24.5% interest in the Middle East Dolphin gas project to the UAE Offset Group for an undisclosed sum.*

Russia & Central Asia

Melrose Resources of Scotland is *reported to have signed an agreement with the Bulgarian authorities covering the development of the 80bn cf Galata gas field offshore Bulgaria.*

Sibneft has signed a $60mn drilling *contract with Pride International, the drilling contractor's first contract in Russia. Pride is to drill a series of*

NEWS Upstream

North Sea monthly output on the up

The Royal Bank of Scotland's most recent *Oil and Gas Index* (May 2001) reports that monthly oil and gas production increased during March. Tony Wood, Oil and Gas Economist at the Bank said: 'As expected, oil production rose in March as increased operator expenditures started to feed through. However, output remains significantly lower than it was 12 months ago. We expect oil output to continue to increase this year, although it now seems unlikely that oil output for 2001 will be as high as it was in 2000.'

March oil output rose to 2.3mn b/d, 4.3% up from February. In spite of this, production was 11.7% lower than March 2000 levels. Gas production also increased in March. Output was up by 1.4% and was only 0.2% lower than March 2000. Combined average daily production in the 12 months to March 2001 rose by 125,124 boe/d. Combined revenues are provisionally estimated to have fallen by £2.52mn/d on the month, down to £56.1mn/d. On an annual basis revenues are estimated to have fallen by 10.9%.

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price ($/b)
Mar 2000	2,606,250	12,485	27.27
Apr	2,480,945	12,149	23.15
May	2,222,686	9,089	24.15
Jun	2,436,450	8,609	30.50
Jul	2,383,944	7,531	28.90
Aug	2,339,363	7,464	31.60
Sep	2,281,516	8,080	33.70
Oct	2,247,307	10,172	30.90
Nov	2,322,296	11,621	32.80
Dec	2,399,038	11,439	26.30
Jan 2001	2,274,671	13,061	25.80
Feb	2,206,542	12,293	27.50
Mar	2,301,409	12,465	24.50

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Jade installation completed

Installation of Phillips' Jade platform was successfully completed with the topsides lifted into position on 27 May 2001 by the world's largest crane barge, the *S7000*.

Hook-up and commissioning work has begun, and Santa Fe's harsh environment jack-up rig, *Galaxy 1*, was scheduled to commence drilling the Jade wells as *Petroleum Review* went to press. First Jade production is slated for the beginning of October 2001.

European ban on single-hull tankers

Spurred by the international outcry that followed the economic and environmental damage caused to the coastline towns of Brittany, France, by oil leaking from the damaged tanker *Erika*, the Marine Environmental Protection Committee (MEPC) of the International Maritime Organisation (IMO) advanced their 46th session from July 2001 to the end of April. *Brian Warshaw* reports.

Delegates from the 158 member states agreed a timetable to eliminate most single-hull tankers from the world's sea lanes by 2015. Since 1996, all new oil tankers have been required to be double-hulled, a feature that can provide greater protection from the release of oil in the event of a collision.

The amendment to Regulation 13G of the International Convention for the Prevention of Pollution from Ships (MARPOL) 1973/78 specifies that single-hull tankers above 5,000 dwt will cease to operate after 2015. An opt-out enables flag states to allow single-hull tankers complying with certain technical specifications to continue trading until their 25th anniversary of delivery. However, the clause also allows states to refuse entry to these tankers. The European Union, along with Cyprus and Malta, have announced to the IMO their intention to adopt this exclusion.

An additional safeguard, the Conditional Assessment Scheme (CAS) for all single-hull vessels over 20,000 dwt was also approved. The CAS demands a stringent and transparent verification of the structural condition of the vessel. Category 1 oil tankers, those above 20,000 dwt without segregated ballast tanks, that convey crude oil, fuel oil, heavy diesel oil or lubricating oil, will be subject to the CAS after 2005. Category 2 tankers, having the same capacity and cargo but with segregated ballast tanks, will be inspected to CAS standards after 2010.

As a result of the action taken by the MEPC, it is anticipated that charter rates and new tanker construction will receive a boost. The Japanese Ministry of Transport has stated that there might be a shortage of construction capacity to meet an estimated national replacement demand for 30mn dwt in 2003, and 80mn dwt in 2008 or 2010, unless this is distributed over a number of years.

Clarkson Research Studies of the UK estimates that the IMO decision may require the removal of approximately 58mn dwt of non double-hulled tonnage by the end of 2005, with a further 41mn dwt before 2011. Between 2011 and 2015, an additional 28mn dwt would be phased out as the regulation comes into full effect. There is a further 44mn dwt of non double-hulled tonnage built after 1989 that might benefit from extensions to 25 years after 2015.

Improving offshore production

BP and Domain Dynamics are working together to develop a system that they claim will help to improve output from offshore oil production systems by reducing the need to cut back production rates in order to mitigate the impact of slug flow. Additional environmental and efficiency benefits may also come from avoiding production upsets that can cause gas to be vented off into the flare system.

Following the success of an initial research project, BP is to licence the technology developed by Domain Dynamics to develop a means of monitoring unsteady flows of oil, gas and water flowing to offshore production systems.

'It's a bit like drinking fizzy cola through a straw,' comments Martin George, Sales Manager at Domain Dynamics. 'As the mix of gas, water and oil flows from the well through long pipelines, slugs of liquid containing the oil, water and some gas may develop and must be identified and quantified in real time. A very long slug or a quick succession of slugs can oversupply the production process facilities [separators] causing liquid levels to rise rapidly, and gas pressure to build up. This can impose a cutback in optimal production. Software embodying TESPAR technology can analyse online measurements and estimate the speed and size of these slugs, enabling level and pressure control schemes to take action in time.'

TESPAR is reported to be capable of dealing with complex, noisy and chaotic waveforms such as those encountered in offshore oil production. 'Because TESPAR identifies the critical features of waveforms without needing powerful processors or elaborate monitoring devices, we were able to demonstrate a successful pilot solution for BP in a very short time,' explains George. 'We are very confident that our second contract will lead to a real-time, online slug-flow monitoring and control solution for BP.'

In Brief

horizontal wells over 16 months at the Sugmut field that is estimated to hold reserves close to 1bn barrels.

***A new oil field is reported to have** been discovered in Kyrgyzstan's western region of Dzhalal-Abad. Reserves are put at up to 10mn tonnes. It is understood that US-based Cadena Petroleum, which made the discovery, will be contracted to develop the field.*

Asia-Pacific

***Eni's exploration well HZ/19-2-1 in the** South China Sea's Pearl River Mouth Basin is reported to have tested at 4,700 b/d of oil.*

Latin America

***Single Buoy Moorings (SBM) is** reported to have secured a contract to supply an FPSO to Petrobras for its Roncador field offshore Brazil. The vessel will act as a temporary replacement for the P-36 platform that sank in March. It is hoped that construction of the FPSO will be fast-tracked to allow oil to begin flowing in August 2002.*

Africa

***Shell has awarded Mott MacDonald** the detailed design contract for its Cawthorne Channel associated gas gathering project in Nigeria. The $310mn project is to recover 200mn cf/d of associated gas from the Cawthorne Channel, Awoba and Krakama oil fields in the eastern Niger Delta.*

***Energy Africa has reported a second** 'significant' oil discovery in block G offshore Equatorial Guinea in which it holds a 15% stake. The Okume-1 well discovered 37° API gravity oil. Due to its proximity to the Ceiba field, located 15 km to the southwest, the well is not to be flow tested. However, estimated productivity of the well is in excess of 10,000 b/d.*

***BP has announced a 600bn cf gas discovery** in the North Alexandria concession offshore Egypt. The Fayoum well tested 21mn cf/d of gas.*

***Shell reports that the results of the** Bonga South-West exploration well offshore Nigeria indicate that recoverable reserves could be large enough to form the basis for a new deepwater development in OML118.*

In Brief

UK

Patricia Hewitt has been named the *new Head of the UK Department of Trade and Industry. Brian Wilson, a former Scottish Secretary, has been appointed as UK Energy Minister, replacing Peter Hain.*

Richard Warren, Chief Geologist at *Amerada Hess, and Karen Whitehead have each been awarded an MBE for services to the oil and gas industry.*

Shell is reported to have called in SAP *and SAPMarkets to provide the group with a globally integrated e-procurement system. The three companies will also work together on a strategic development project for master data synchronisation of Shell's heterogeneous back-end systems.*

Shell reports that it plans to invest *between $0.5bn and $1bn, subject to an ongoing review, in continuing to develop a range of new energy businesses over the next five years, concentrating on solar and wind energy.*

Europe

It is reported that the offer of shares in *Norwegian state oil company Statoil has been three times oversubscribed.*

The European Union is reported to *have stated that EU member countries will ratify the UN global warming treaty in 2002 in a bid to get the so-called Kyoto Protocol into force even without US support – EU Environment Ministers endorsed the policy at a recent meeting.*

North America

PanCanadian Petroleum is reported to *have acquired Causeway Energy for C$65mn plus the assumption of C$4mn of Causeway debt.*

US energy giant El Paso Corporation *has announced that it will acquire Calgary-based Velvet Exploration for C$353mn, writes* Monica Dobie.

Kerr-McGee is reported to be taking *over San Francisco-based HS Resources for $1.3bn.*

US company Westport Resources is understood to be planning to acquire Belco Oil & Gas in a stock deal valued at $334mn.

Maureen set for refloat

Phillips Petroleum's North Sea Maureen platform is slated for refloating in July/early August. The 110,000-tonne steel gravity platform is to be towed by six tugs over 165 nautical miles to Aker's Stord facility in Norway, where the decision will be taken on the final use for the platform.

According to Andy Halliwell, General Manager for the Maureen project, the company is still hopeful that the platform will be reused, although partial reuse options have also been discussed – the current best option being partial reuse as a quay in Norway. A final decision is expected no later than the end of the year.

Since its shut-down in October 1999, Maureen has cost $20mn/y to maintain. If no full/partial reuse option is agreed, Maureen will be recycled onshore. In this event, total decommissioning costs for the refloat and subsequent dismantling and recycling is put at £150mn.

Maureen is the biggest decommissioning project to be undertaken in the North Sea to date. The loading column is to be refloated a few weeks after the main platform and is to be recycled onshore. The main buried pipeline will be left in place. The satellite Moira wellhead is also to be removed and recycled; the tie-back pipeline has already been removed.

The thin pancake of drill cuttings (6,000 tonnes directly under Maureen; 22,000 tonnes over the wider area) will also be left in place in order to minimise environmental impact.

Both the cuttings and the main pipeline left in place will be monitored, states Phillips.

Breakthrough for marine logistics

UK oil and gas body Logic (Leading Oil and Gas Industry Competitiveness) has announced what it is heralding as 'a major breakthrough in North Sea logistics that will lead to considerable efficiency gains in the sector.' The LOGIC Logistics Team – made up of key representatives from the major oil and gas companies and service providers in the North Sea – has agreed to establish a Universal Trading Rate (UTR) for the sharing of deck space amongst North Sea marine logistics providers.

The UTR is reported to be a 'significant breakthrough in the industry' as, with an agreed back-to-back indemnity agreement, it represents the first UK all-industry mechanism to facilitate the sharing of excess deck capacity while protecting all current contractual agreements. The agreement is a single contract, which will be available for signature to any chartering or owner of vessels capable of carrying cargo.

'The UTR will benefit the industry by reducing overall costs by facilitating the more efficient use of existing assets and by encouraging a dialogue to identify other areas in which improvements can be made,' states LOGIC. Further details can be found at www.logic-oil.com

Improving environmental approvals process

The recently formed Australian Standing Committee on Environmental Approvals Processes for Offshore Acreage – comprising representation from the Australian Petroleum Production & Exploration Association (APPEA), Environment Australia (EA) and the Australian Department of Industry, Science and Resources (ISR) – has outlined the findings of its first Standard Committee meeting.

The meeting focused on how to give greater clarity on environmental approvals requirements to potential explorers prior to acreage bidding. The ISR agreed to continue to consult with EA to obtain further information for acreage release documents on key environmental sensitivities of the areas and, after release, EA is to provide updates on these sensitivities and requirements that ISR will pass on the to the oil companies via *Australian Petroleum News*. Options to assess common exploration actions in acreage release areas are also to be examined.

The Committee also considered industry recommendations from a February 2001 APPEA workshop held in Perth and established a three-member working group to report on how to progress suggestions from the workshop. Suggestions included:

- The compilation of explanatory material on individual companies' lessons and experiences with the EPBC Act, for distribution by APPEA's annual conference and website.
- Making the assessment and approvals process more efficient and faster within statutory requirements, particularly to match proponent needs.

NEWS Upstream/Industry

Don development

Logic has announced that the North Sea Don (NE, SW, S) and Don West fields are to be offered to the market place under the Satellite Accelerator initiative. The fields have an estimated 180mn barrels of oil in place and are operated by BP on behalf of licence holders Conoco and Britoil.

Assessments indicate that a redevelopment project could yield around 35mn barrels of additional reserves from the Brent Sandstone reservoir in the Don fields. In addition, there may be scope for developing further volumes from the Statfjord Sandstone reservoir in the Don fields, from Don West, and from a westerly extension of the Don field.

Gulf Canada sold

The Canadian oil and gas industry saw its largest corporate takeover when Houston-based Conoco agreed to buyout Gulf Canada Resources for C$6.7bn in cash, writes *Monica Dobie*. The deal will serve up a large piece of the natural gas pie for Texan giant Conoco in Canada, especially in the relatively untapped Mackenzie Delta gas deposits in the Northwest Territories.

The American company's decision to acquire Gulf Canada is politically timely, given the current desire of Washington to exploit new energy sources in Alaska and the far north of North America. Conoco will amalgamate Gulf into the existing Conoco Canada company.

Brownfield development potential

Logic (Leading Oil and Gas Industry Competitiveness) has launched a major benchmarking project which has been commissioned specifically to look at highlighting the potential of remaining reserves in 'Brownfield' developments in the UKCS. Brownfields are mature oil and gas fields, but are thought to offer significant opportunities for further development.

According to Logic Chief Executive, Chris Freeman, a recent position paper on the ultimate recovery of oil and gas in sanctioned UKCS fields concluded that a 'realistic target of some 2bn boe is recoverable from Brownfield sites over and above current proven and probable reserves. This figure could be as high as 4bn barrels.' He continued: 'One way to helping to release this prize is to benchmark the success of current development practices. It is believed that benchmarking will provide increased focus and hence added impetus to improve Brownfield recovery within participating companies.'

The benchmarking study is being administered by Logic on behalf of Pilot, the UK Government and a pan-industry group comprising BP, Shell, Talisman, Kerr-McGee, Enterprise and TotalFinaElf. Aberdeen-based industry benchmarking consultant AUPEC is to carry out the study.

Russian oil tax law

The Russian Duma has approved the first reading of a new oil tax law, reports UFG. The new royalty tax, targeting the production of natural resources, will replace both the oil Mineral Resource Replacement Tax (MRT) that soaked up on average 10% of hydrocarbon reserves and the old royalty tax that took away a further 8%.

The new average tax rate will be 13%, 5% lower than under current legislation. However, according to UFG, the improvement will be less significant in cashflow terms since oil companies are currently able to claim back up to 60% of MRT payments against exploration expenses. 'Nevertheless, we believe that this is good news,' comments the analyst,' as the MRT rebate was unpredictable while the spending of money on exploration was not always economically justified, leading to situations where companies only spent money on it because they knew it would be reclaimed against MRT payments.'

Norwegian gas sales

The European Commission is reported to have issued a warning to Statoil and Norsk Hydro that the joint sale of their Norwegian gas through the Gas Negotiation Committee (GFU) infringes EU competition rules as the GFU fixes the price and quantities of gas sold. Although not a member of the EU, Norway is covered by the EU antitrust regulations under the European Economic Area (EAA) agreement. The warning, which is expected to be issued to other licensees on the Norwegian Continental Shelf in due course, was issued in spite of the Norwegian Government recently suspending the current structure of gas exports and announcing plans to permanently abolish the GFU from 1 January 2002. According to Norsk Hydro, the action the EC has initiated 'refers to earlier gas sales... Hydro now handles sales of natural gas from the Norwegian shelf through the company's marketing businesses.'

Both Statoil and Norsk Hydro are understood to have rejected the EC claim.

In Brief

***Marathon is reported to be planning** to sell the bulk of its Canadian oil assets in Alberta and British Columbia.*

***Unocal's Northrock Resources subsidiary** has reportedly made a C$144mn agreed takeover bid for Tethys Energy, assuming C$30mn of Tethys' debt.*

***Kvaerner Oil and Gas is reported to** have acquired Houston-based engineering company Enercon Engineering.*

***US company Bellweather Exploration is** understood to have taken over Bargo Energy for $220mn, changing its name to Mission Resources Corporation.*

***AMEC and Berca Engineering have** established a new joint venture – AMEC Berca Indonesia – that will focus on the country's expanding oil and gas industry. The new company has also acquired assets of Bakrie Engineering.*

Russia & Central Asia

***The Ministry of Oil and Gas Industry** and Mineral Resources of Turkmenistan has appointed western energy consultancy RPI as its advisor on foreign investment. The Ministry predicts that $25mn investment is required in the Turkmen oil and gas industry between 2001 and 2010, while the market for oil and gas services is estimated at over $7.5bn over the same period.*

***The Russian Government recently** announced an increase in the export duty on crude oil from euro 22/t to euro 30.5/t (or $3.54/b).*

***UFG writes that** Vedomosti **has** reported that Interros, BP and Kandupan have signed a settlement agreement with TNK that will govern the return of Chernogorneft assets to Sidanco.*

Asia-Pacific

***China Petroleum & Chemical Corporation** (Sinopec) is understood to be acquiring Sinopec National Star, the oil producing unit of its parent group China Petrochemical, for $1.1bn.*

***Gaz de France is reported to have** acquired a 10% stake in Petronet of India in order to gain access to a project importing LNG to India from Qatar.*

In Brief

UK

***Intercontinental Exchange (ICE), an** electronic market for the trading of energy and metals products, has announced that its offer to acquire IPE Holdings has been declared unconditional in all respects. ICE has acquired 89.6% of IPE's issued share capital. The offer remains open for acceptance by IPE shareholders until further notice.*

***Forecourt Television has signed an** agreement with Safeway Stores under which FTV will place large TV screens, for which it will sell advertising spots, at 180 of the supermarket chain's UK service stations.*

***Wincanton has secured a three-year** Air BP contract for a second term to distribute aviation fuel to private airfields across the UK.*

***The state-owned Irish National** Petroleum Corporation (INPC) has signed a sales and purchase agreement with US company Tosco, whereby Tosco will acquire the government owned oil refinery at Whitegate, County Cork, and the Whiddy Island Oil storage terminal in Bantry Bay.*

Europe

***Vopak reports that it has completed** the sale of its bitumen fleet Theodora Tankers to Swedish company Terbit Shipping for a book profit of euro 12mn. Vopak has also sold its Liner Agencies activities to the Burger Group.*

***Petroplus is to acquire Frisol of the** Netherlands, a supplier and trader of fuel and gas oil, blending components and chemicals in the Amsterdam/Rotterdam/Antwerp (ARA) area and Far East, for euro 20mn.*

***TotalFinaElf has acquired full ownership** of Total Oil Turkiye, a petroleum product marketing joint venture in Turkey. Total Oil Turkiye owns a network of more than 330 service stations in Turkey – a market share of 6%.*

North America

***Accenture and BP have unveiled a** $175mn expansion of BP's US downstream refining and marketing energy outsourcing agreement. Accenture is to design, build and run the critical business systems that support the*

Call to UK government to cut fuel taxes

UK motorists pay 15% higher fuel duties than the EU average, according to new findings from Arval PHH Vehicle Solutions. In the run-up to the General Election, the fleet and fuel management company called on all UK political parties to lobby for harmonisation of fuel duty rates throughout the European Union in order to relieve the burden on British industry.

'Comparison of European fuel duties proves that the UK has the highest fuel tax rate of any European Union country,' states PHH. 'Tax, including VAT, makes up 78% of the price of a litre of unleaded petrol, compared with an average of 63% across the 14 other EU states. The lowest fuel tax rates are found in Portugal (47%) and Greece (55%).'

'The UK's high tax rate impacts upon the cost of fuel, which again is the EU's most expensive. The average cost of unleaded fuel in the UK is currently 78p/l, compared with an average cost across the European Union of 59p/l. Even if the mooted 6p/l tax cut proposed by the Conservatives was implemented, UK drivers would still be buying the EU's most expensive unleaded petrol at 72p/l. This is still a penny more than the fuel sold in the second most expensive country, the Netherlands, where unleaded petrol costs 71p/l. Unleaded fuel is cheapest in Greece (46p/l), Luxembourg (48p/l) and Spain (49p/l).' The situation for diesel users is reported to be no better. PHH says that: 'According to Euro Shell, UK diesel costs 77p/l, far higher than other EU member states such as France (53p/l), Germany (51p/l), the Republic of Ireland (46p/l) and Spain (43p/l).'

'All the [UK] political parties stress their willingness to help UK businesses, yet fuel remains one of industry's highest costs,' comments PHH. 'British competitiveness is being undermined while the difference between fuel prices in the UK and on the Continent remains so wide.'

Canadian call to use less fuel

The Canadian oil industry has taken the unusual step of launching a campaign to persuade consumers to use less petrol and diesel because its companies do not want to invest in new refinery capacity that could in future become redundant, writes *Monica Dobie*.

The Canadian Petroleum Products Institute has gone on record encouraging people to drive less, take public transport and to walk more. It has noted that Canada's consumption of refined products jumped nearly 5% in March from the previous year – partly due to the popularity of sport utility vehicles and mini vans – but fears that the future introduction of clean technology engines means that this growth will peak and then decline.

World Trade Organisation services round

Member governments of the World Trade Organisation (WTO) are to examine in detail proposals made by the European Union, US, Venezuela and Canada for the dismantling of national bureaucratic barriers that can prevent oil and gas companies from working effectively around the world, reports *Keith Nuthall*.

Their detailed suggestions were made in the ongoing WTO services round, which recently reached the end of its first stage. Diplomats will now begin a year-long examination of proposals before making formal offers to liberalise their service industries, including the energy sector. Obstacles highlighted by the EU as ripe for removal, included 'exclusive rights and monopolies, restrictions on legal forms of doing business, restrictions on foreign investment, unclear licensing and approval requirements, unspecified economic needs tests, residency and nationality requirements.'

Meanwhile, the US has stressed the need for the round to guarantee 'unrestricted movement of electronic information and transactions,' because 'many energy services today rely on electronic information flows... including geologic data analysis, trading and brokering, and energy efficiency services.'

Venezuela called for access to energy service markets to be liberalised for suppliers from developing countries. Canada highlighted the need to tackle visa restrictions for oil and gas professionals, import controls for special equipment, 'arbitrary business and licensing requirements' and unclear regulations.

NEWS Downstream

EU proposes sulfur ban for petrol

The European Commission has proposed that sulfur should be banned from petrol in the EU by 2011, and has proposed that sulfur-free petrol and diesel should be made available in every Member State from 1 January 2005, reports *Keith Nuthall*. Brussels thinks sulfur elimination is important because the chemical damages catalytic converters and makes them less efficient. With sulfur-free fuel, they would be better able to reduce greenhouse gas emissions, the Commission has said.

However, because the anti-pollution benefits of sulfur-free diesel are less certain, the date for banning sulfurous diesel is to be fixed 'as part of a later review.'

Meanwhile, EU Energy Commissioner Loyola de Palacio has repeated her call for Europe to diversify its energy sources, protecting it against oil price swings. She was speaking at a conference on the EU petrol market in Florence, Italy. The Energy Commissioner has also welcomed the agreement reached within the International Maritime Organisation to speed up the phasing-out of single-hull oil tankers. Under the deal, these vessels will be banned in European ports from 2015.

Saudi gas initiative

Shell, BP, Phillips Petroleum and ExxonMobil are understood to have been selected to participate in Saudi Arabia's South Ghawar project, the largest of three 'core ventures' to be offered under the Saudi Natural Gas Initiative. The multi-billion dollar gas value chain investment programme comprises exploration and production, power generation, desalination and chemicals projects. Shell is also involved in a second of the core venture projects, located in the Shaybah development area, together with Conoco and TotalFinaElf.

Solution to Ukraine's gas debts?

Gazprom has proposed a solution that could settle Ukraine's gas debts, reports UFG. Under the proposed scheme, Ukraine would issue special eurobonds to cover the money owed. 'However, Gazprom and the Ukrainian authorities are continuing to disagree about the size of these liabilities,' states the analyst. 'While the Ukrainian Government accepts that it owes $1.4bn of principal debt, it is currently refusing to capitalise $0.8bn of accrued interest.'

'If a deal is finally agreed upon, then it may be possible for Gazprom to extract a much higher recoverability ratio from these receivables,' comments UFG. 'This could mean the company actually recovering debts it had written off in the past. Even more importantly, if Gazprom and the Ukrainian authorities resolve their dispute, then the company will no longer have to construct the $2bn bypass pipeline to run through Poland, or any of its even more ambitious pipeline projects such as the Baltic underwater pipeline. However, the main sticking point is still the disagreement over these past debts, especially as, according to official reports, Ukraine did not undertake any non-contracted gas offtakes last year.'

In Brief

majority of BP's US downstream back-office business processes. The solution will be based on SAP's IS-Oil platform.

Russia and Central Asia

***Nafta Polska has announced that** Rotch Energy has been selected as the final bidder for the sale of state-owned refining and marketing company Refineria Gdanska, Poland's second largest oil company. Integral to the Rotch bid is a major expansion, upgrade and marketing project valued at more than $1bn.*

***Yukos and US-based Williams** International have agreed a deal under which Yukos will acquire 26.85% of the newly-issued Mazheikiu Nafta shares for $75mn. According to UFG, the cash will be used to modernise the Lithuanian refinery. In addition, Yukos will supply 100,000 b/d of oil to Mazheikiu, while Williams will retain operational control.*

***Nafta Polska is reported to be planning** to sell its 18% stake in Polish fuel retailer PKN Orlen by the end of the year. OMV of Austria is understood to have already placed a bid.*

***UFG reports that Yukos has acquired a** controlling stake in the 350,000 b/d Angarsk refinery for an unspecified amount.*

***Gazprom is reported to have awarded** a $400mn contract for two 390-km gas pipelines to four Japanese companies – Nippon Steel, NKK Corporation, Kawasaki Steel and Sumitomo Metal Industries. The award is part of a $2.8bn project under which Russian gas will be supplied to Turkey via the Black Sea.*

Asia-Pacific

***The Indian Government is reported to** be planning to soon invite bids for a 33.58% stake in domestic fuel retailer*

In Brief

IBP, which currently holds 5% of the Indian fuel retail market.

***The Vietnamese authorities are** reported to have given BP the green light to go ahead with the $359mn, Phu My 3 gas-fired power plant in Ba Ria-Vung Tau Province.*

***Indonesian state company Pertamina** is reported to be planning to set up a 150,000 b/d grassroots refinery in Tuban, East Java, in a joint venture with Hitec of Saudi Arabia.*

***Foster Wheeler Energy has been** awarded a project management contract by Petronet LNG to build an LNG terminal in India. The terminal, worth approximately $500mn, will have a capacity for receiving and re-gasification of 5mn t/y of LNG with provision for expansion to 10mn t/y. It will be located in Dahej on the Gujarat coast. The terminal is expected to be operational in 2003.*

Latin America

***TotalFinaElf is reported to have** signed a deal under which it will supply lubricants to 320 service stations operated by ALE Combustiveis in Brazil.*

Africa

***Foster Wheeler has been awarded an** EPC contract by Mossgas for a new $16.8mn low aromatics distillate plant at Mossel Bay in South Africa. The plant will produce 70,000 t/y of environmentally friendly, low aromatic diesel and kerosene.*

Q8 unveils 'first in tanker technology'

Q8 Fuelcare has unveiled its 'state-of-the-art' ERF E58-30RD3 petroleum tanker, claimed to be a 'first in tanker technology offering smarter safety equipment all round.' The 18,500-litre capacity, five-compartment tanker was designed by Lakeland specifically for Q8. New improved mechanics range from pump discharge measuring equipment, which controls the level of discharge through the bulk delivery, to a separate gravity meter system, that measures the fuel with the added ability of being able to multi-drop petrol from one compartment.

The tanker is also said to take a 'more environmentally friendly approach to fuel transit, storage and delivery.' The fuel hoses, valves and operating unit are enclosed within a protective cabinet that protects the equipment and reduces road grime, thus leading to a cleaner operating area. The cabinet is opened via a horizontal roller shutter door, which gives the driver the option to open the cabinet from either side depending on the delivery to be made – it can be opened forward when making a hose reel or bulk delivery, and backwards for gravity deliveries.

The vehicle is also equipped with a rear view camera. Attached to the top valance of the tank, this gives the driver an all round view of the vehicle from a colour monitor fitted to the dashboard. In addition, the front and rear bumpers are fitted with sensors which can be set to operate dependent on which side of the vehicle the hose delivery is being made. When a pedestrian passes the sensor, a recorded message alerts them that a delivery is taking place.

A remote shutdown system enables the driver to stop the delivery system by remote control from a range of 70 metres.

UK Deliveries into Consumption (tonnes)

Products	†Apr 2000	Apr 2001	†Jan–Apr 2000	Jan–Apr 2001	% Change
Naphtha/LDF	202,850	166,432	901,642	615,256	–32
ATF – Kerosene	755,113	865,177	2,981,205	3,244,148	9
Petrol	1,703,125	1,605,200	6,907,540	6,784,319	–2
of which unleaded	1,566,775	1,520,446	6,313,188	5,925,589	–6
of which Super unleaded	30,272	33,451	139,124	140,853	1
of which Premium unleaded	1,536,503	684,533	6,174,064	3,854,953	–38
ULSP (ultra low sulfur petrol)	–	802,462	–	2,369,358	–
Lead Replacement Petrol (LRP)	136,350	84,754	594,352	349,270	–41
Burning Oil	332,148	406,529	1,585,426	1,809,002	14
Automotive Diesel	1,237,876	1,390,748	5,070,189	5,267,256	3.9
Gas/Diesel Oil	554,058	493,725	2,473,675	2,206,856	–11
Fuel Oil	132,427	143,946	596,096	763,940	28
Lubricating Oil	65,834	65,879	266,296	283,714	7
Other Products	658,622	719,126	2,761,558	2,784,308	1
Total above	5,642,053	5,856,762	23,543,627	23,758,799	1
Refinery Consumption	450,987	347,374	1,762,312	1,457,484	–17
Total all products	6,093,040	6,204,136	25,305,939	25,216,283	0

† Revised with adjustments

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

Clean green Spanish gasoline

Photo: Phillips Petroleum

Spain's sixth-largest refinery at Castellón, near Valencia on the east coast of Spain, recently completed a $36.8mn project to make clean-burning gasoline. The project, completed in two years and within 2% of budget, followed a world-wide search for the best and safest method to produce high-octane unleaded gasoline.

BP installed a Phillips Petroleum HF alkylation unit at its refinery in Castellón, Spain, to produce high-octane unleaded gasoline for Spanish and other European markets.

BP Spain selected the Phillips Petroleum hydrofluoric acid (HF) alkylation process as the safest, most effective refining process to produce a low-sulfur, low-aromatic, low-benzene and low-Reid vapour pressure (RVP) component to boost octane in unleaded fuels.

'After examining all processes against our goals, we decided we needed alkylate to increase blend stock octane,' said Diego Fernández de la Mata, Process Engineer for the refinery. 'When we added safety, and capital and variable costs to our equation, only the Phillips HF alkylation process remained on our short list.'

The $36.8mn turnkey project cost included all licensing fees, construction, change-order and startup costs. The 3,500 b/d capacity unit came onstream in February 2000.

Need for clean gasoline

The refinery's primary goal was to economically produce an unleaded motor fuel with the desired low levels of aromatics, benzene, olefins and sulfur, and with low RVP. The gasoline also had to have good octane numbers and increased commercial value. The final specifications of the unleaded gasoline from the new unit are reported to be better than EU regulations require.

The alkylation unit also allows BP Spain to improve its profit margins – since the company no longer has to import alkylate to produce unleaded gasolines – while still maintaining a strong domestic market position, with some 95% of the refinery's output sold in Spain.

Phillips alkylation design

The alkylation process combines molecules of light hydrocarbon components (olefins and isobutane) – which are gases at ambient temperatures and pressures – into larger, high-octane molecules. The resulting alkylate is blended with other gasoline constituents to increase the motor gasoline blend's octane.

The unit design features the latest improvements, including the Phillips Inventory Management Process (IMP), which reduces the amount of acid catalyst in the unit and allows for a quick de-inventory of the catalyst in the unlikely event of a process leak.

Standard safety features for the updated alkylation unit design with IMP include the rapid acid dump system, reactor/settler partitioning, and continued reliance on gravity to circu-

late acid through the system, thus eliminating large HF process pumps and reducing in-line fittings that could leak.

Rapid acid dump

The Phillips rapid acid dump system is designed to empty the HF alkylation reactor of acid catalyst into a secure storage vessel within eight minutes, in any emergency. The storage vessel at Castellón is sized to hold both the acid catalyst and reactor hydrocarbons.

The Castellón refinery tested the rapid acid dump system before the alkylation unit started. The system was also activated during the early alkylate production run. In both cases, the dump was quicker than the design predicted. The pre-startup test was planned and conducted with water to prevent potential contamination and cleanup problems.

A second rapid acid dump occurred when an electrical malfunction in the control computer UPS initiated a dump sequence. 'Our operators did exactly what they were trained to do,' Fernández reported. 'They immediately shut down the unit, then analyzed the system to pinpoint the problem.' While the pre-start water test dump took about 10 minutes, the operating acid and hydrocarbon mixture was safely contained in the secure holding tank in about two minutes. The unit was recovered and back in full production within 10 hours. 'This is a very powerful system to protect refinery personnel and our neighbours in case of leaks, and now we know that the system works perfectly in real life', stated Fernández.

Public and personnel safety

BP Spain's focus on safety prompted the refinery to include all state-of-the-art safety equipment and technologies and to design some new ones. Both the unit first-aid room and the refinery dispensary are equipped with special acid neutralisation showers designed by BP Spain engineers and medical personnel. The showers are one-piece fibreglass with molded-in seats, thick plastic doors and special mixing equipment providing low-pressure, high-volume bicarbonate of soda-treated showers.

In case of a leak or other refinery incident, all power to the unit is cut, except for the power to the on-site first aid room and its special shower. Each refinery worker assigned to the alkylation unit is trained in how to operate safely around the acid catalyst and how to recognise and provide first aid for acid burns. They are trained how to neutralise any acid without spreading it.

Workers authorised to enter the HF alkylation unit have tubes of calcium gluconate gel at home to treat any residual acid burns that are noticed after work. Company physicians have trained local hospital personnel to identify and treat acid burns. Hospitals and emergency treatment facilities are also supplied with acid-neutralising calcium gluconate gel.

A communications system that lets refinery managers instantly notify area police, fire, medical and environmental protection officials of any refinery incident has been installed by BP Spain. Area residents can then get accurate information from any emergency agency without having to call the refinery. Trained BP Spain medical and first aid personnel also are available anytime to help nearby chemical plants and residents in an emergency.

Only a chain-link fence separates the BP Spain refinery from UBE Proquimed, a petrochemical production company, just dozens of metres to the west, and the companies work closely together to respond to any emergency. BP Spain has fire trucks, while UBE has an ambulance on standby. Shift supervisors of either company can unlock the single gate separating the two to permit immediate mutual assistance.

Refinery products

BP Spain Castellón produces some 5mn t/y of petroleum products, mostly for domestic use. Some 44% of the refinery's 1999 production was diesel fuel, while motor gasoline (24%), bunker fuel oils (14%), kerosene (8%), and LPG and asphalts (5% each) made up the balance of production that year.

The refinery processes some 100,000 b/d of crude, with between 35% and 40% of it sourced from Nigeria. Another 20% is from Russia, with the balance from Mexico, Libya and other suppliers.

While only about 40% of the refinery's crude is low-sulfur, higher feedstream sulfur causes no problems for the alkylation unit and its product according to refinery engineers.

'We decided to build this unit for the maximum isobutane in the refinery,' Fernández commented. 'We have a high-isobutane feed stream, and we wanted to convert it to gain the highest commercial value – the highest octane.'

Butadiene content in the refinery's isobutane stream maxes out at 3,000-weight ppm but, according to BP, this doesn't cause big problems with heavy acid soluble oil (ASO) production as engineers installed an automatic hydrocarbon-drying package to eliminate water from hydrocarbon feed and the acid recycle loop.

Water mitigation system

In its design to mitigate any potential acid escape, BP Spain revised the standard water curtain equipment used by many refiners. Instead of installing water piping and high-volume spray nozzles around the unit perimeter, refinery engineers placed full water curtain systems around each individual key vessel in the alkylation unit – reactor/settler, acid rerun column and acid coolers, for example.

'The idea is to knock down any potential acid vapours as close to the source as possible,' Project Engineer Javier Prats noted. 'We want to keep any acid drift to the absolute minimum.'

The innovative water curtain system also includes a pipe-and-nozzle framework over and around the truck pad where a tanker will park to feed fresh catalyst into the unit. The unit's water mitigation system also includes five

Photo: Phillips Petroleum

A BP worker checks controls for the water system at the refinery's new HF alkylation unit.

remote-control fire monitors (water cannons) placed so that operators in the unit or plant control rooms can aim a high-pressure water stream at any leak in the unit.

The alkylation unit site also includes a large reservoir to capture and hold any mitigation water, rain or runoff from the unit until it can be tested, neutralised and pumped through the refinery's primary and secondary water treatment systems.

Rogelio Ortí Doménech, the refinery's Environmental Protection Manager, stated: 'We want to make certain that anything we discharge is completely free of acid or any other contaminants.' The alkylation unit also uses a dedicated water-cooling tower to eliminate any possible water contamination. The tower cools water only from the alkylation unit and the hydrogen plant.

Ortí continued: 'While our region's air emission standards are similar to national and EU standards, our restrictions on water pollution and effluent controls are much more stringent because of our proximity to the Mediterranean Sea and the importance of groundwater to regional agriculture. We are taking all precautions regarding the environment, including effluent and end product treatment. We will continue to have independent, certified environmental labs collect and analyse area soil, vegetable and groundwater samples quarterly to monitor any changes for at least a year.'

Control for safety

'Everyone knows that the added risk of any alkylation unit comes from the management of the strong acid catalyst' said Javier García Goyeneche, refinery Safety and Security Manager. Otherwise, the Phillips HF alkylation unit operates in pressure and temperature conditions similar to other refinery units which safely handle liquid petroleum gas.

'To assure complete control over the alkylation unit, our control systems are duplicated so that every part of the unit – from lights to water mitigation system to acid dump – can be controlled from either the local alkylation control room or our blast-proof main control room six blocks away. Phillips Petroleum engineers helped us design the emergency system to safely shut down the unit in case of an emergency.'

Access to the HF alkylation unit is limited to trained personnel and controlled with a simple ID card system. Entry is through the local alkylation control room and its attached changing room. Workers leave the unit only through a shower room and separate changing area. There are six special showers at the unit clean-up shed, each providing a water and bicarbonate of soda mix to neutralise any traces of acid from workers' protective clothing. All unit equipment – from protective clothing to tools – are kept on the HF alkylation unit and maintained by contract personnel to prevent acid burns from even trace amounts of HF.

Protective lab design

Prats and Lab Director José M Pazos designed a safe HF-dedicated laboratory space to reduce manpower and risks associated with handling HF daily. Instead of simply installing a lab hood for an acid test bench, Pazos had one corner of his large, 700 sq metres lab completely walled off, creating a separate, 20 sq metres negative-pressure acid lab. Since the walls are glass from waist level up to the ceiling, anyone working in the acid lab is continuously visible to those in the general lab area.

'Instead of needing two technicians to safely run HF analysis, we need only one,' Pazos commented. 'This reduces the number of people working with the acid catalyst, and still maintains a continuous visual check on the technician, should help be needed.'

In addition, the acid lab's negative air pressure ensures that all air moves into it, rather than moving from the acid lab into the general lab. Air flow moves through exhaust hoods covering the two acid working areas and is channeled through a fluidised bed of caustic soda, a strong base, to neutralise any acid vapours before being vented to the outside

Automating shut-down

Once refinery engineers are satisfied that all unit sensors are fully functional and operating as specified, they will automate the alkylation unit shutdown and rapid acid dump system so it requires no operator action.

'This has added somewhat to the cost of our alkylation unit, but the extra level of safety and peace of mind will be worth any possible headaches caused by false alarms knocking our unit off-line,' Prats said. He plans to err on side of safety, saying, 'I can justify anything to my managers except an accident.'

From fire-damp to commercial gas

Fire-damp (methane gas derived from coal seams), the cause of anguish amongst numerous mining communities over the years, may soon be tamed and used to fuel British industry, writes *Brian Warshaw*.

Evergreen Resources exploration in 2000: the Cheshire area.

The UK's ninth-round award of onshore petroleum licences which were announced in July 2000 included more than 60 blocks for coal gas development. Some will be used to harness coal mine methane (CMM) emissions from abandoned mines, while several of the seven successful bidders are intending to drill directly into virgin coal seams to extract the coal bed methane (CBM).

Experience of CBM development is almost exclusively garnered from the US, where the two most prolific producing areas are the San Juan Basin, with a daily output of 24mn cm, and the Black Warrior Basin in Alabama, which is producing at 2.6mn cm/d. For an industry that started in 1978 with 12 wells, there are now in excess of 7,000 wells and development is continuing apace with the assistance of a favourable tax regime.

Methane formation

Methane was produced during the coalification process that transformed plant matter into coal. Much of it escaped during the process, but some was retained and stored within the micropore structure of the coal by adsorbtion on the pore surface. The highest volume of methane is found in the hard bituminous and anthracite coals.

British coal contains an estimated gas volume of 15 cm/t, with concentrations up to 95% methane; ethane content is less than 12%, with between 0.2% and 6% carbon dioxide, and between 2% and 8% nitrogen. With the minimum of processing the methane can be compressed and introduced into the national pipeline distribution grid or used by local industry.

Geographically, the most promising areas in Scotland are the Midland Valley to the north of Falkirk, Canonbie, and the east Fife coast – although much of this is offshore and would present further technological difficulties. For the rest of the UK, north Staffordshire, Lancashire and parts of north Wales offer good potential, while the coal fields of Somerset and Kent may prove fruitful – although the geology is less well known. South Wales has deep virgin coal seams, but these will probably need to await confirmation from other areas as to the viability of the industry, before exploratory work is undertaken.

The CBM is released by drilling into the seam and lowering the local pressure, thereby allowing the gas to desorb and flow from the micropores. It is anticipated that drilling will be into the hard coals that are found at depths of between 200 metres and 1,500 metres – any shallower and the gas will have been depleted through natural leakage, any deeper will exceed the economic return.

Drilling techniques

Drilling techniques have changed during the industry's short history. Originally the Americans used a technique called 'open completion' in which a hole is bored into the seam and enlarged, or under-reamed below the well casing. The under-reaming was to remove any damage to the coal seam caused during drilling, which could result in coal fines blocking the flow of gas and causing damage to equipment.

The current technique is to enclose the borehole in a cemented casing and create perforations with an explosive charge in the section of casing that is within the coal seam. The gas flows through the perforations, although the tendency is for rubble to obstruct the free passage of the gas. As an alternative, slots are sometimes used instead of perforations, the slots being formed by jetting which also flushes friable mate-

rial away from the gas entry points. This process is more expensive than perforation which therefore remains the more popular method.

Hydraulic fracturing, which is common in conventional oil and gas production, is less so in CBM development as the results cannot be predicted with the same confidence. However, few wells have produced significant volumes without its application. High pressure fluid is pumped into the well creating tensile fractures in the coal seam to increase permeability, thus forming a low pressure channel for the movement of gas or water. Water, gas, foams and gels can be used to create the fracture and, on occasion, a proppant, typically well-rounded sand, is carried in the fluid to prevent the fracture closing after pumping has ceased.

Unlike conventional natural gas recovery, where if wells are drilled too closely together, production can be adversely affected, close spacing of CBM wells can be beneficial. Typically, wells will be drilled at regular intervals, 500 metres to 1,000 metres apart. They require regular maintenance and, in the UK, constraints due to urban development, National Parks, and inaccessible areas, may restrict the size of a CBM field to between 30 sq km and 50 sq km with about 75 wells. Deutsche Steinkohle suggests that to be considered commercially viable, a well would need to produce a minimum flow rate of 8,000 cm/d.

UK first

The first CBM well drilled in the UK was undertaken by Evergreen Resources (UK) in 1992, at Sealand, near Chester, an area to which the company has returned for further investigation. Wells have also been drilled in Wales, at Rhuddan in the north, and Margam Forest in the south. Coal Bed Methane has a producing well in Kincardine, Scotland, but output is insufficient for commercial exploitation. Several other wells are under test and awaiting planning consent before the production stage.

Geomet UK has two concessions, one in southwest Scotland and the other in Somerset. Core drilling will start during the second half of this year using a British drilling company and drawing technical assistance from its American sister company, which is productive in Alabama and has high hopes for its licences in China. Octagon (CBM) has operating wells in Yorkshire, from a previous licensing round, while Edinburgh Oil and Gas is planning exploration drilling at its PEDL 079 permit area in Cannock Wood, South Staffordshire.

Photo: Octagon Energy

Hickleton Vent after development

Company	Main office
Alkane	Mansfield
Coal Bed Methane	Falkirk
Edinburgh Oil & Gas	Edinburgh
Evergreen Resources (UK)	Newbury
Geomet UK	–
Independent Energy Resources	Maidenhead
Octagon (CBM)	Exmouth

Table 1: Operators of CBM and/or CMM licences onshore UK

Country	Methane resources (x10^{12}cm)
Russia	17–113
Canada	6–76
China	30–35
Australia	8–14
US	11
Germany	3
Poland	3
UK	2
Ukraine	2
Kazakhstan	1
India	<1
South Africa	1
Zimbabwe	<1
Botswana	1
Total	**84–262**

Source: Coalbed Methane Extraction, *Robert Davidson, Lesley Sloss, Lee Clarke, IEACR/76, ISBN 9 29029 248 2, January 1995.*

Table 2: World ranking of coal bed methane resources

Commercial supply

The only UK company with experience of supplying methane gas commercially is Alkane Energy (formerly Coalgas UK). It currently has three CMM projects up and running, supplying gas from the Shirebrook and Steetley collieries to an electrical generator producing 9 MW and 6 MW respectively, and at Markham, to a local company who uses it to provide process heat. The waste gas that is extracted using pumps is 70% methane, 15% nitrogen and 15% carbon dioxide.

With 17 onshore licences and over 300 abandoned coal mines in its portfolio, Alkane Energy plans to have seven CMM sites operating by mid-2002, but has still to produce a profit.

Environmental impact

There are few adverse effects to the environment from CBM and CMM development, and it has the notable benefit of preventing millions of tonnes of carbon dioxide equivalent of methane entering the atmosphere from disused mines. The Intergovernmental Panel on Climate Change has estimated that methane has a global warming effect 21 times that of carbon dioxide.

Furthermore, drilling boreholes, unlike coal mining, does not cause land subsidence, and, after gas depletion, will leave the coal seam significantly safer should coal mining ever become attractive again. In addition, distribution pipelines can be buried and process plants constructed in a non-sensitive area, while the site can be visually re-established or improved after the initial disruption of the development period.

The major environment problem stems from produced water, its treatment and disposal, which can be extensive during development and remain so throughout the years of production. In the US, the average water produced is in the volume of seven parts water to four parts gas, or almost 14 times the volume of water that would be expected from a non-associated natural gas field. Treatment would be necessary where the water is saline or includes chlorides, iron and manganese; thereafter, the method for disposal would be subsurface re-injection, discharge to surface waters, and application on the land and surface evaporation.

Technological development

The development of the industry will provide opportunities for innovative engineering and the export of technical know-how. The UK Department of Trade and Industry is currently participating in a major project in Canada to develop enhanced recovery using CO_2 (carbon dioxide) injection. There are currently cost and technological problems associated with gas recovery, although using nitrogen or CO_2 inert gas stripping to increase production rates and extraction volumes effects the retention of the displacing medium while releasing the methane. The European Union is also supporting research and development in this sector, which is comparing numerical 3D modelling with actual production profiles from two test wells in a hard coal seam in the Saar region of Germany.

Looking ahead

Within Europe, besides the UK, Poland, Germany and Ukraine have similar, or better, opportunities to develop CBM reserves. Russia has by far the greatest potential in the world – although the jury is out on whether this will happen. Much will depend on technological advancement, improvement in techniques, favourable legal and tax regimes, and the price of the competitive natural gas before this industry becomes a commercial reality.

The next big thing in refining

Shawn Collinson **and** ***John Downie*****, Partners, Global Energy Practice, Accenture,** **assess the potential impact that e-business could have in the refining and petrochemicals sector.**

It may seem premature to be talking about the next 'big thing' in refining when the jury is still out on whether there is a current 'big thing'! There is certainly scepticism that 'e-commerce' (primarily web-enabled transactions and information exchange) is significant and substantial enough to be characterised as having a profound impact on refining. Who in the refining industry hasn't felt some satisfaction that the 'dot-coms' have largely become 'dot-bombs?' Or looked around and wondered where the value is amidst all the hype? Accenture's work with clients in refining and petrochemicals industries, however, leads us to believe that e-commerce is indeed the current 'big thing,' and that e-business – that is, e-enabled collaboration, information aggregation and e-enabled business processes – is where the refining industry has an opportunity to find the next big thing.

Growing support

There is growing support that e-commerce and e-business have a tremendous potential to create value for the refining industry. There is also growing belief that these 'big things' may ultimately change the structure of the industry itself. Evidence is mounting that the opportunities to dramatically cut costs and boost productivity are not merely possibilities, but are becoming very real. However, capturing their value will be difficult and it will take a few years to get new capabilities fully in place. A company's ultimate ability to leverage these capabilities will distinguish it from its competitors over the next three to five years. Indeed, over the next decade, we expect that this will result in the emergence of a clear set of winners and losers, and potentially a new industry structure.

Our perspective rests on well-known and widely adopted e-applications in supply, trading, and logistics. It is also founded on innovative applications of e-commerce and e-business to what happens inside the refinery gate (the focus of this article). Consider the profit generation possibilities if:

- E-enabled processes could squeeze an extra thousand barrels of capacity through the catalytic cracking unit?
- Refiners could leverage e-business to double the length of runs for their major pieces of equipment?
- The refinery could achieve product premiums through its e-enabled ability to identify unique market opportunities and be flexible enough to produce that extra tank of product?
- The new capabilities change the nature of the workforce to dramatically increase the effectiveness of the employee in identifying and capturing opportunities?
- E-business could improve health, safety and environmental performance?

Unique time for refiners

Refinery management asks a critical question when pursuing a given opportunity: 'How will it help me meet my most important objectives?' For today's refiner, these objectives centre around five themes – utilisation, margin, cost, HSE performance and employee productivity (see **Figure 1**). Over the past year, refineries have been in a somewhat unusual position – that of generating profits above their cost of capital. Margins for calendar year 2000 were at the highest level in several years (see **Figure 2**). Demand for refined products is straining refineries, which are running at record rates. As Bill Greehy, Chairman and CEO of Valero Energy, was quoted a few months ago, the industry appears to have entered 'the perfect refining cycle.'

At the time of writing, the near-term indeed looks favourable – assuming the principal risk of an economic downturn does not mature and undercut demand. In this profitable environment, priorities for refinery managers have not necessarily changed, but the trade-offs these managers make have. Recently, revenue levers such as utilisation and margin have gained prominence, even though one is hard-pressed to find a refiner who has decreased the emphasis on cost and HSE performance. A 'big thing' will have to help the refiner pull all of these important levers much differently, otherwise it will not be very big at all.

Because e-commerce can impact both the cost and margin levers, it definitely is a big thing. E-commerce will become the major format for transacting business because so much of the industry is investing in it, and consequently so much effort will go into making sure it will happen. E-business has potential to impact all the key refining levers – margin and cost as well as utilisation, HSE performance and employee productivity – by enabling step changes in the effectiveness of business processes and better leveraging the knowledge and

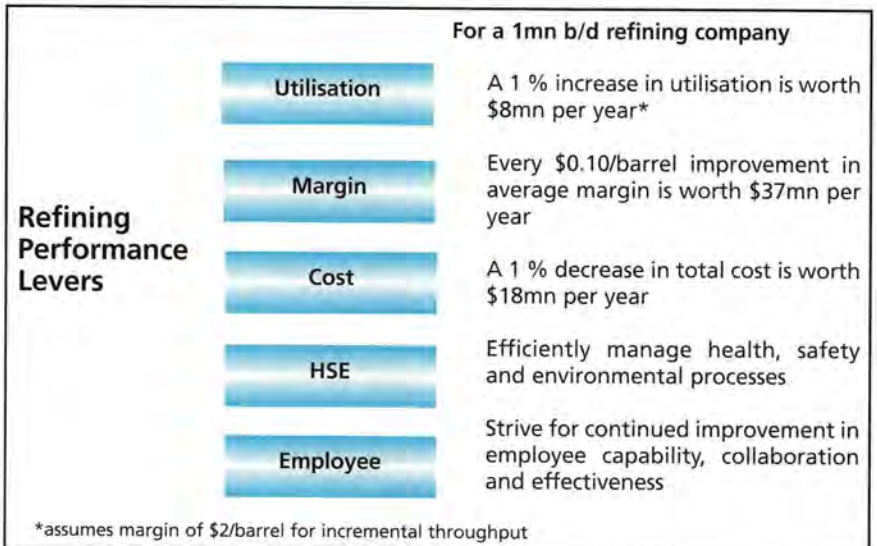


Figure 1: Opportunities for value capture for refiners

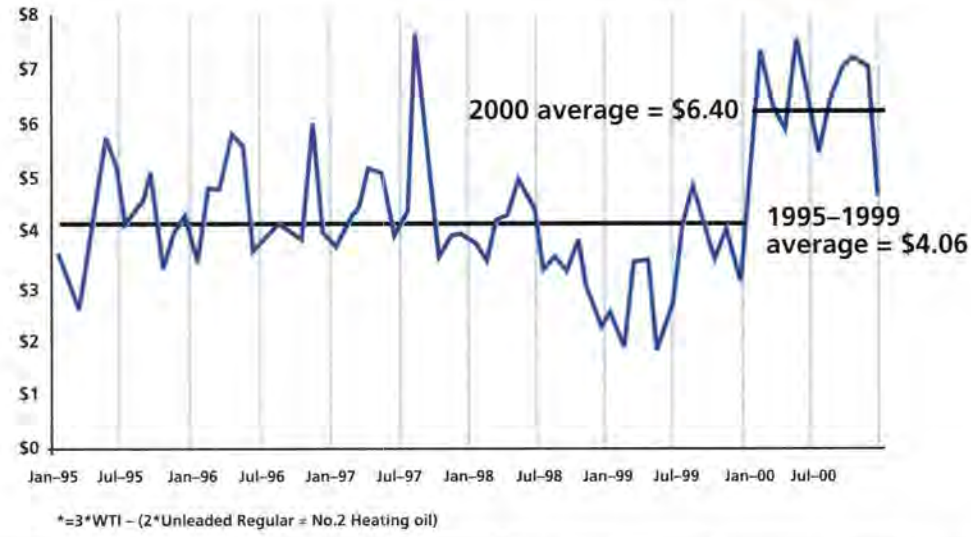


Figure 2: 3-2-1 cracking spreads*, NYH 1/95 – 12/00 *Sources: Department of Energy,* Wall Street Journal, *Accenture analysis*

capability of the organisation. The value promised over the years for more efficient processes may finally be reached.

Competitive advantage

But the technology of e-business is only an enabler – much more will need to be done within the organisation to use this capability for real competitive advantage.

The journey from transaction-based activity to more collaborative and transformational solutions will not be unique to the refining industry. Our analysis of the evolution of web-based capabilities (see **Figure 3**) shows the typical path. The refining industry, despite its slow start, is already moving well along this path. For example, every company now has a website, many companies are talking about customised portals and web pages to provide employees access to information, and most companies are considering taking part in some sort of web-based marketplace.

While the steps taken to date have been important, they are merely the initial phase of change. To get to the next phase – transformation – far more complex issues must be addressed to fully deliver the real benefits.

The current big thing

A quick scan of the World Wide Web reveals a tremendous number of refining e-commerce solutions that offer ways to help enhance product values and reduce a host of variable and fixed costs. Such e-commerce solutions include:

- procurement sites (to procure MRO (maintenance, repair, operations), indirect supplies – and even services);
- exchanges (to buy and sell feedstocks and products and to manage risk);
- logistics sites (to secure crude and products and monitor their flows); and
- information/decision support (to find useful information on specific topics, such as ship environmental records, assay publishing, transaction prices).

Regardless of which solutions refiners focus on today, they face two critical questions: Is e-commerce really adding value now, and where will it add value in the future?

Taking the first question – we believe e-commerce is already adding value and will continue to add value by dramatically improving the speed and quality of information, the decision maker's most important need. Exchanges, in particular, improve the refiner's core buy/make/sell refining processes. The ability to gain information in real time has enabled cost reductions in administrative (especially transaction costs) and materials costs, immediately enhancing the bottom line. **Figure 4** provides an illustrative breakdown of refiner costs and highlights where e-commerce is having its greatest impact – administrative costs, maintenance materials, and some raw material costs (however, many of today's crude and product markets are efficient and exchanges may do little to move prices).

While e-commerce will lift a refiner's bottom line, today that uplift does not create important competitive advantage for a variety of reasons. Can a company create competitive advantage by reducing indirect and administrative costs? It is not likely. As new capabilities come to fruition, early movers will surely gain an advantage, but, over time, the value created by the new capabilities, such as exchanges, will likely be available to all players in the industry. In fact, a 'consortium paradox' virtually assures that certain advantages – such as procurement – are 'leveled' as companies join forces for mutual benefit. Certainly there remain advantages in the quality of execution across the participating companies, but inevitably the first-mover advantages erode as savings get passed on to customers.

To create *sustainable* competitive advantage, refiners must control fundamental cost and performance drivers in operations, maintenance, energy, and project execution – the same capabilities that they have managed for years. So, while e-commerce is the current 'big thing' for enhancing success today, it will steadily become merely another required tool for survival tomorrow.

This leads us to the second question – where will e-commerce add new value in the future? While clearly new capabilities are emerging, so many companies are trying to offer such a wide variety and vast number of solutions that many of them are struggling just to stay afloat. As in every dynamic marketplace, e-winners will be those who capture the greatest value for their customers, either through transaction volume or level of value created.

E-commerce is currently transacted in three types of marketplaces – the independent or 'dot-com' sites (such as Industria for procurement, Houston Street for commodities), industry/consortia sites (for example Trade-Ranger), and proprietary sites (company-specific initiatives for procurement or commodities like Enron online). Although a handful of the dot-coms are starting to gain traction, several are struggling to

survive while others are merging (such as FuelQuest and Oilspot). The likely result will be the survival of a handful of dot-coms that will fill the gaps left by the industry sites and proprietary efforts. The reduction in 'me-too' independent dot-com sites will be beneficial to refiners who may be wasting time and resources on myriad e-marketplaces that will not be able to sustain themselves.

Apart from indirect and administrative costs, which have been the areas of greatest focus to date, there are far more significant areas along the value chain that need to be addressed, such as operations, maintenance, energy costs, feedstock purchases and product value. To create dramatic improvement, new solutions will demand across-the-industry involvement from the refining network (from suppliers, customers, employees and even competing refiners). Although the refining community has shied away from adopting much of what e-commerce has to offer, it will have to learn to leverage and expand this capability if companies are to squeeze out the remaining cents per barrel of value.

The next big thing

So, if the industry has not yet fully embraced the opportunities of e-commerce, what is the value of trying to understand the next 'big thing?' The broad sentiment today is to discount anything with an 'e' in front of it but, in this case, we believe the emerging tools of e-business will swiftly and permanently change how companies interact.

By 'tools of e-business,' we are referring to the technology and know-how that enables collaboration, information aggregation, and new business processes. Where e-commerce has helped address largely administrative costs, e-business can help refiners meet the challenges of utilisation, margin, cost, HS&E, and employee productivity – resulting in real improvements to the refiner's bottom line.

These savings have been sought after for years. Engineering and consulting firms have pitched the '$0.25–$0.50/b' improvement – from such things as process and throughput improvement, optimisation, human performance, and even contractor performance – that most refiners have pursued, with typical results of some improvement and some disappointment. Many companies would (and do) argue that the amount of improvements over the past few years leaves little, if any, incremental opportunity.

However, we believe that e-business can make a difference by dramatically changing the way work is done. The technology of e-business – portals, Internet-ready mobile devices, and other applications that allow seamless, continuous transfer and aggregation of information – is the critical enabler, not the entire solution. E-business must change business processes and create new organisational roles and responsibilities to truly leverage the technology. Only when e-business brings new collaboration to old problems and successfully aggregates available knowledge, skills, and information to attack opportunities will lasting value be created. Technology is a necessary part of the e-business equation, but only part.

Collaborative maintenance scenario A discussion of how 'e' can improve utilisation can help demonstrate the point. Keeping critical pieces of equipment available is an important driver of utilisation, but several aspects of performance must be managed simultaneously to improve availability. Monitoring must be done to understand how the equipment is operating, its exposure to operating conditions, and what performance problems or gaps exist. Once a problem is identified, problem solving and root cause analysis become critical. The ability to implement a solution or repair quickly, cheaply, and correctly determines ultimate success. A failure to collaborate across several groups within the organisation and outside it means delays in execution, surprises during repairs, last minute design changes, and substandard, costly equipment. Certainly the maintenance group is critical, but operations, engineering, inspection, equipment manufacturers, parts suppliers, contractors, and even transportation companies play critical roles in delivering against 'predictive maintenance' strategies.

E-business is perfectly suited to create value in the maintenance workflow. Web-based applications such as Internet portals can be leveraged in the monitoring stage, discussion groups and on-line document sharing can be leveraged in the problem-solving stage, procurement applications can be leveraged during the repair stage, and web-based training can be leveraged to learn how a previous repair was conducted. Mobile applications such as web-enabled hand-held devices (m-commerce) can be leveraged to arrange materials delivery and keep all parties informed during the repair.

The best companies find bottlenecks or breakdowns in their current processes, then determine theoretical limits, leverage technology and change their organisational roles and responsibilities to get their processes closer to those limits. With more real-time collaboration, how much more efficiently could turnarounds be executed? How quickly can repairs be made, or better yet, how accurately and closely can you monitor the equipment – with involvement from vendors and others – to

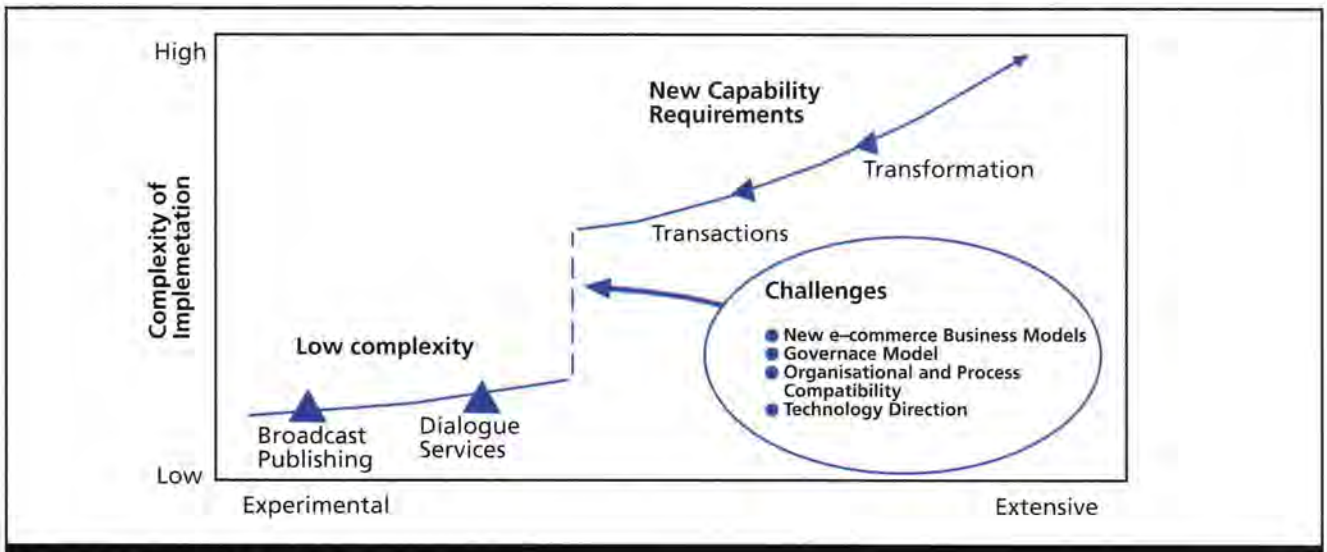


Figure 3: E-commerce challenges

extend run lengths? What if you knew a contractor had available labour due to the shift of another refiner's planned maintenance? How could you incorporate and act on this information more consistently and rapidly? How would assumptions about maintenance planning change with changes in the market, inventories, even weather?

While most refiners currently take these factors into consideration, few have the ability today to respond to, let alone forecast, how changes in these factors would affect operations to capture fleeting but potentially significant arbitrage opportunities. Because they lack the type of e-business tools we are describing, their mindset is to protect against changes in plan versus take advantage – or create – these changes.

Portal as 'Knowledge Central' A lot of companies have portals or home pages for their employees (or plan to create them) in an attempt to provide easy access to relevant information. **Figure 5** provides an example of what a generic portal might contain. The creation of the portal should be seen as the first step in building true collaboration capability. The right information must exist in a form that can be communicated, the user must be able to access it properly, and a host of change management and performance management issues must be addressed. The employee must have an incentive to get the information, know how to apply it, and change his or her behaviour to improve performance.

Let's be clear: *the portal is not the next big thing*, but a new capability enabled by e-business to collaborate, aggregate information, and apply new solutions to old problems is.

Refinery optimization scenario The e-enabled ability to collaborate and aggregate information can help the refiner create value in the other critical areas of utilisation, margin, and cost. Margin and utilisation often coincide – the higher margin crudes are usually the ones that allow the refiner to simultaneously maximise the throughput across the process units with highest conversion and uplifts. The critical levers to improve margins are purchasing the best crudes and feedstocks and then blending and selling the optimum mix of products and/or intermediates. Utilisation is driven somewhat by the purchase decision, but after the feedstocks have been committed, the challenge moves to operations and maximising throughput and yield. We believe that e-business can create value in purchase decisions, in determining the production signals, and in the ability to maximise utilisation once the feedslate has been committed.

Deciding which crudes to purchase requires input from the trading group, analysts/modellers, logistics and operations. The refinery's input into to this process is critical. To create accurate economic assessments for each purchase window, the understanding of what the refinery can run and how much it can produce, must be consistent with market economic views and logistics capabilities and costs. Collaboration in this context is bringing all the information together to create a single view of the market. A web-based portal becomes the enabler. In the portal, opportunity identification and the need for consistency is even greater when connecting refineries, traders, and analysts from across a global network to make the decisions about what to buy and where to run it.

Refiners have spent tremendous money and effort improving the optimisation process over the past few years, so there may be some scepticism about the additional value a portal can deliver beyond the sophisticated linear programs, economic analysis, conference calls and e-mails used today. We are not hypothesizing the Internet somehow gives refiners perfect information and eliminates the time between feedstock purchase decisions and product sales. Nor are we suggesting refiners will have unlimited flexibility to swap in and out of various feedstocks and products in real time.

We are suggesting, however, that in these times of increasing margin volatility and tighter supply/demand balances, refiners must increase the speed of decision making on both the purchase and the sell sides. How quickly can your refinery react to create the extra tank of reformulated gasoline when a competitor can't meet its commitments? How quickly can you evaluate an intermediate stream to determine whether it should be blended or diverted to chemicals as prices fluctuate? How quickly can you identify and respond to opportunities created by disruptions in the supply chain, especially as environmental pressures extend proliferation of product grades and further strain the distribution and logistics system? The companies that want to respond quickly to these opportunities will have to develop tools and processes to collaborate across operations, logistics, trading, and planning both within and outside of their organisation.

Utilisation is all about squeezing the most out of the existing equipment, and simultaneously pushing the limits of performance. How can e-enabled collaboration help in this area if the people who are best suited to make improvements are the operators and engineers that are in the plant running the equipment? Sharing collective operating experiences can have significant impacts. For instance, providing the cracking unit controller and operator with easy access to the operating experiences of the other shifts within the plant can be an important tool to increase throughput and yield. For those refiners who change crudes often to take advantage of market opportunities, best practice sharing about how to quickly line out the unit after a feed change is critical.

The portal becomes the delivery mechanism. If the portal can provide access to the experiences of the other conversion units within the system (not just a single refinery), a junior controller can access years of operating experience and apply those learnings to the operation of his or her unit. Add in the capability to post questions and to solve problems across the refinery system, across the central engineering group, and perhaps to the licensors and equipment manufacturers, and the best capabilities within the industry can be applied. The portal becomes a critical element of the overall

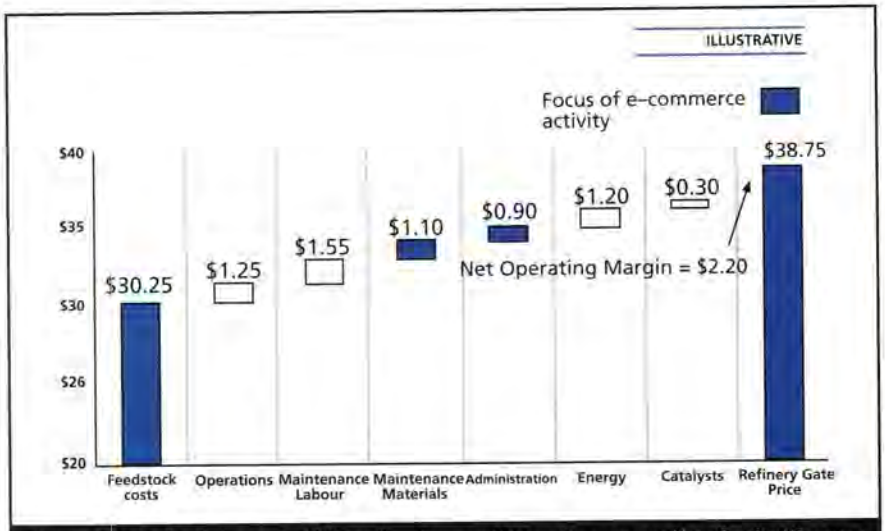


Figure 4: Typical refining costs ($/barrel) *Sources: 1999 performance profiles of major US energy producers and Accenture analysis*

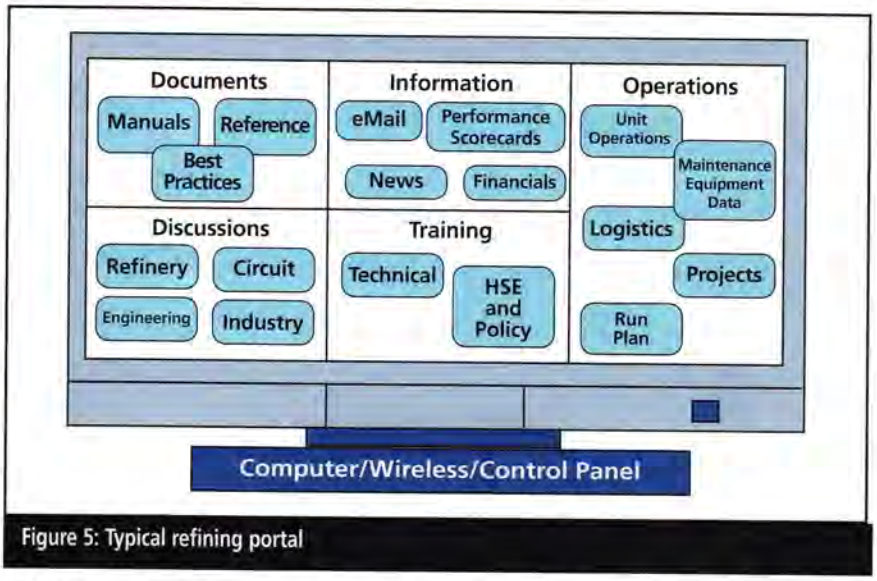


Figure 5: Typical refining portal

solution, especially if the external parties like central engineering can have access to data and problem solve remotely. The delivery mechanism must be backed up with the appropriate content, the processes to efficiently exchange information, and an organisation with a culture of performance and a culture of sharing to create real value.

This is where the current advances in e-business should not be confused with earlier attempts at 'artificial intelligence.' We are not talking about automating the collective wisdom of experts in order to create decision-making applications. E-business is about enabling employees to have access to the right information – stored, live or otherwise – to make decisions faster and with higher probabilities of success.

On the cost side, collaboration can create value beyond the benefits expected from the online procurement exchanges typical of the current 'big thing,' as participants in these exchanges act on information made available through a larger network than any individual would possess. Maintenance costs can be reduced through collaboration, as described in the workflow example earlier in this section. We also are beginning to see the profound impact of collaboration on the refinery labour force.

Our examples describe a highly informed, highly knowledgeable, highly skilled operator – a 'super-operator' able to diagnose and apply the collective knowledge from a host of resources. This new breed of operator will certainly make the labour force more productive, but it will also likely result in implications for the overall makeup and cost of the labour force. We believe the overall labour required to operate the plant will be reduced, but there is also an unmistakable trend toward two classes of labour, one a highly paid, highly skilled workforce that is trained and retained as a critical success factor for the refiner, and the other a less-demanding labour pool that can be outsourced to provide flexibility and/or specialised skills when needed. The issues of attracting, hiring and retaining these skills will pose a significant human performance challenge in the coming few years.

A new industry structure?

If we take a step back and look at what successful refiners might look like five to ten years from now, we might describe success somewhat differently than we do today. We do not see a 'virtual oil company' or 'virtual refiner' emerging – and we agree with many that this concept is over-hyped. For companies capturing and adding value in the e-business-enabled future, however, they will do so by creating and developing a specialised capability (such as maintenance, project management, optimisation), exploiting technology to deliver that capability (for example, over the web, across mobile devices), and changing processes and people required to make it all happen (flexible, highly-trained specialists). With these criteria in mind, we can envision several aspects of industry structure changing significantly within the next several years.

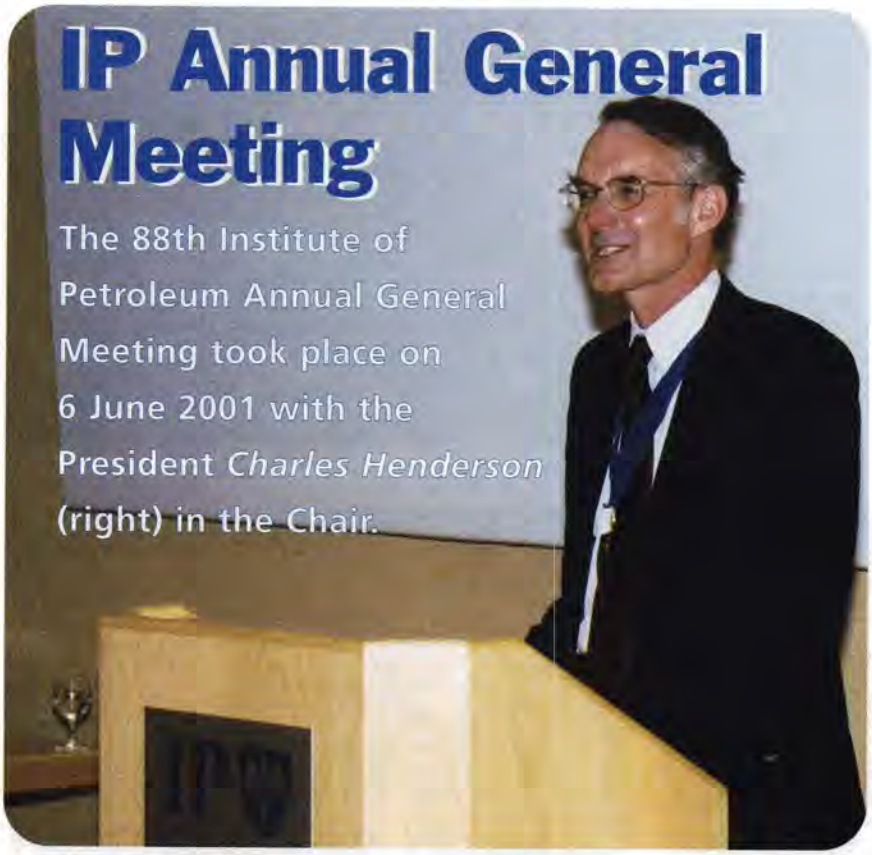
First, different types of players are likely to emerge. The companies that can provide specialised skills, leverage technology, rapidly adapt processes and change organisations are likely to be the smaller, specialised companies. We anticipate that these companies will be able to carve out niches and take on some of the roles held by current industry players. We could see maintenance specialist companies take on the responsibility for major equipment reliability in one or more refineries, sharing both the benefits and risks associated with keeping the refinery full and maximising yields. We could see optimisation specialists bringing their analytical and data gathering tools to tackle multi-refinery optimisation, perhaps for one company across the refineries in its system, or perhaps for several companies that have refineries in a particular geographic region. We could see companies emerge that specialise in operations – they train and develop deep operating experience across all aspects of refining, and serve refiners who choose not to take on operations as one of their core capabilities or who cannot source sufficient numbers of skilled operating personnel on their own.

Such a scenario would result in a highly fragmented industry in terms of the number of distinct roles that develop and the total number of players that fulfill these roles. Today's refiners would still participate in the business, but they might contract for competencies that can be better handled by companies that focus almost exclusively in an area, and deliver that expertise and technology at a competitive price. If and when these specialists emerge, the traditional refiner will have to ask some interesting questions about the roles it wants to keep and the strategies it might deploy. What core capabilities should the refiner develop? How many core capabilities are reasonable considering the competitive landscape? How am I going to compete? How do I ensure success? How do I manage the risk associated with the pieces of the business I contract?

Ultimately, could we see a major shift and rebalancing of the portfolio? What roles are the majors likely to carve out – and relinquish? Will it make sense for the refiners to retain ownership of the assets, or will they be able to participate through contracts and alliance-like agreements, shifting ownership to this new breed of sophisticated, nimble operator and maintenance provider? What role might the independents fill? Without scale they become disadvantaged from a cost perspective, but can they make up for it in terms of flexibility to become the preferred partner for the next generation of specialists? Who will be the natural owners of refining assets?

We have heard frequently over the past several months that 'there is no Amazon.com in refining' – meaning, of course, that it is impossible to sell and physically deliver refined products online. But is there a Cisco of refining, where manufacturing assets become flexible, contracted capacity to the value-added network? E-commerce and e-business have a long way to go before they can enable this magnitude of fundamental shift in the industry structure, but examples of this model are already beginning to emerge.

IP Annual General Meeting



The 88th Institute of Petroleum Annual General Meeting took place on 6 June 2001 with the President *Charles Henderson* (right) in the Chair.

Photo: Jim Four

Presenting the President's report Charles Henderson reflected on the past year in both the industry at large and at the Institute, and outlined some of the challenges that lay ahead. He stated that the first challenge was 'the general environment in which we work', noting that the past year had been 'slightly less turbulent than its predecessor.' He went on to state that 'although we all feel the oil price situation is on a knife's edge there has been relative stability for the last few months with merger fever less intense and the majors digesting their recent acquisitions.'

He reminded those present of the recent petrol price crisis and renewed calls for heavier taxation of upstream profits. 'I don't suppose we have heard the last of these,' he said, going on to point out that there had already been 'a modest attempt to re-ignite the petrol protests over the last weekend – and certainly once the election is out of the way, it would be surprising if the government did not embark on a further review of its oil and gas policies with regard to the regulatory regime and the fiscal regime.' On a positive note, he remarked that 'the dialogue that has been established through Pilot has helped to bring about a better mutual understanding between government and the industry' and stated that 'the importance of this dialogue and the need for us to play an active and constructive role in promoting it are likely to be all the more important in the coming months.'

Looking to the IP, the President outlined what he saw as its 'great achievements' over the past year.

These included:

- The consolidation of the role of STAC (Scientific and Technical Advisory Committee) and establishing its authority with the oil companies. 'The technical programme is one of the central planks of the Institute and I believe the oil companies now feel that this programme is in good shape and good hands,' he said.
- The launch of the IP Awards in 2000.
- Embarking on a revamping programme for the IP website **(www.petroleum.co.uk)**.
- Continued exploration of options for alliances and mergers.
- The ongoing development of the Institute's mainstream services of training, education, publications, conferences and *Petroleum Review*.

Having outlined the IP's achievements, Charles Henderson said that he hoped 'that you will conclude that the Institute is continuing to respond effectively to change and to the changing needs of its membership – both individual and corporate.'

Council Members, together with the Chairmen, Members and volunteers on IP Committees, and the IP staff were warmly thanked for their support and their excellent achievements in 2000. Particular thanks were given to Chris Moorhouse, Past IP President, for his 'continuing support' and to Jeff Pym, IP Director General. A special tribute was paid to Terry Moore who, although stepping down as Honorary Secretary, was to join as a Council Member.

Orders of the day

First order of the day was the re-election of Charles Henderson as IP President for the 2001–2002 session and the adoption of Dr Pierre Jungels, Chief Executive Officer, Enterprise Oil, as the President-Elect.

Having served two terms on Council as Honorary Secretary, Terry Moore had to stand down, with Sue Karlsen elected to fill the position. Peter Newman was re-elected as Honorary Treasurer.

There were four nominations for four vacancies for Ordinary Members of Council, which were filled by Terry Moore, Alan Higgins, Anthony Perry and Lord Colin Moynihan. Two vacancies needed to be filled for Additional Members of Council, following the retirement of Clive Fowler at the end of his three-year term and the recent resignation of Dr John Mills who has been posted to Japan. Wolfgang Scholinberger was chosen to fill one position. It was agreed that the remaining vacancy would be filled by the IP Council in due course.

It was also announced that Alan Higgins would be standing down as Branches Member of Council, having served his three-year term, and that Richard Barrett from the Yorkshire Branch was to fill the vacancy.

The Report of Council was then presented and subsequently adopted. The accounts were outlined to the meeting by Honorary Secretary Terry Moore, and adopted. Auditors Ernst & Young were reappointed as auditors for the coming year.

Charles Henderson went on to present an Honorary Fellowship to Terry Moore and Awards of Council to Clive Fowler, Dr Wilfred Howe, Andrew Sangster and Colin Weil. Unable to attend were award winners Captain George Buckenham, who stood down from the Aberdeen Branch Committee in February 2001 after 26 years' involvement with the Branch, and Dr John Mills, a Member of Council since 1998 and Vice President since 1999 and who has been posted to Japan following his appointment as Shell Vice President Marketing. They will be presented with their Awards of Council on other suitable occasions later in the year.

The President then thanked the retiring Members of Council: David

Brown, Graham Bell, John Mills and Clive Fowler, and welcomed all those who had been elected during the course of the AGM.

He concluded the proceedings on a lighter note, presenting Carmel de Nahlik (right) with the first-ever and one-and-only 'IP PILOT Award'. The award, a bottle of champagne, was in response to Charles Henderson's offer at last year's Annual Dinner of a prize for the best way of putting words to the PILOT initiative acronym. Carmel came up with 'People in Lots of Oil Talks' – one of the 'less embarrassing' suggestions that could be said aloud according to the President!

Photo: Jim Four

Photo: Jim Four

Honorary Fellowship
Terry Moore (FinstPet)

Over the past 21 years there have been 10 recipients of an Honorary Fellowship – awarded to 'persons of eminence who may or may not be actively engaged in the petroleum industry – including HRH The Prince of Wales and Past IP Presidents Sir Austin Pearce and Sir Geoffrey Chandler.

It was the unanimous wish of Council that Terry Moore join the ranks of previous winners, in recognition of all he has done for the IP during two terms as Honorary Secretary and for the part he has played in the industry over nearly 50 years.

After gaining an economics degree from London, Terry went on to work for Shell and Conoco during his career, growing as the companies grew with various positions in their European HQ and UK downstream operations – including economics and planning, finance, supply and trading, and marketing. He ended up as Group Managing Director and Chief Executive Officer of Conoco's UK downstream operations.

He was awarded a CBE in 1992. Retiring in 1995, Terry has remained closely involved with the industry through his work as Honorary Secretary of the IP – acting as an immense source of wisdom and guidance to Council. Although having to now step down from this position, he is to continue his involvement with his election to the IP Council.

After thanking the President, Director General, Council, his colleagues and friends, Terry stated that 'it had been a pleasure and had even been fun!'

Photo: Jim Four

Andrew Sangster (FInstPet)

Until his retirement in November 2000, Andrew Sangster, was a stalwart of the IP's Technical Department. He joined the Institute in 1994 after a long career, first in the construction industry and then in Esso Petroleum.

During his time with the IP, he had been involved with many of the IP's Technical Committees. Most notable are his contributions to the Safety Committee and the Distribution and Marketing Committee, helping to refocus them to create the solid contributions that they have made to STAC today.

Andrew's contribution is most visible in the products of these Committees, particularly his contribution to the redrafting and updating of the Marketing Code for distribution terminals; development of the Environmental Guidelines for Petroleum Installations; drafting of the Guidelines for Vapour Recovery Installations; pan-industry Technical Guidance for Service Stations; development of new road tanker standards, both IP and CEN; negotiation of reclaim of duty on recovered vapour and development of standard procedures; and the development of good working relationships with DETR, as well as the Environment Agency and HSE.

In addition to such tangible contributions, he was a great colleague and friend to all who worked in the IP – always most generous with his support and advice. Even in retirement, the IP continues to benefit from Andrew's support – he recently took over as Secretary of the IP's Benevolent Committee from Bob Edmondson.

Reflecting on his time with the IP, Andrew commented that he had found it 'particularly satisfying working with the various outside bodies and organisations, convincing them that the oil and gas industry is a responsible industry capable of self regulation.' He thanked his former colleagues and commented that the award had really been given for him 'enjoying himself'.

Dr Wilfred Howe (MInstPet)

Photo: Jim Four

Wilf Howe has been Chair of the IP's Occupational and Environmental Medical Sub-Committee (OEMSC) for almost a decade. Medical Director for Conoco first in the UK and later worldwide, he has been a key link to other industry health bodies such as Concawe, UKPIA and UKOOA. He has worked on guidance including stress, smoking in the workplace, occupational health, fatigue, air quality, effects of benzene, and what to do if you swallow antifreeze!

Particularly noteworthy has been his contribution to the debate on air quality and the discussions held at the IP on the role of EPAQS (Expert Panel on Air Quality Standards), with much of his advice incorporated into the final published draft from the DTI.

Thanking the IP for this recognition of his work over the past 10 years, Wilf said that the award came at an 'opportune time' for him as he was shortly to retire. He commented that the IP's work with industry was very much 'synergistic' and he hoped that IP Members and industry had benefited from the feedback provided by the guidance and workshops developed by OEMSC. He concluded by giving his best wishes to those that were to take over in the future.

Photo: Jim Four

Clive Fowler (MInstPet)

Clive Fowler joined Amoco as a junior geologist in the early seventies and had several assignments in the UK and overseas, culminating in his appointment as General Manager of Amoco UK Exploration. During his long and distinguished career in the upstream sector, he was closely involved in the discovery of a number of North Sea hydrocarbon deposits, including the Arbroath, Lomond and Montrose fields. Following the merger of Amoco and BP, Clive moved to Aberdeen to head up the West of Shetland Business Unit.

He has been active on behalf of the industry in conferences, trade association activities and with joint industry and UK Government initiatives such as Logic (Leading Oil and Gas Industry Competitiveness).

In the IP, he has also been an active member of the Management Committee and Council. His most important contribution has been as the first Chairman of STAC, which he has nurtured and steered into the effective force it is today.

On receiving his award, Clive reflected that he had been involved in STAC over 'turbulent' times, to quote the President in his speech. 'The oil price was $11/b when we started; three years later it has stabilised at around $25. Working in such an environment provided me with an insight into how companies handle their relationship with the IP. STAC was set up to convince the oil company MDs that the IP is value for money – and that is what it is seen as.' He concluded by thanking all in the IP with whom he had worked over the past three years, commenting that he had 'enjoyed all the good times.'

Photo: Jim Four

Colin Weil (MInstPet)

Colin Weil is now an independent consultant who has been involved with the petroleum and petrochemical industry for more than 35 years. He has specialised in the thermal and mechanical design of heat exchangers and pressure vessels, having worked for various design contractors and oil companies. He was appointed the Project Coordinator and Chairman of the Steering Group for a large joint industry project set up to carry out extensive experimental work to validate the computer models used to assess the safety of existing and newbuild shell and tube heat exchangers. Seven years of research later, the work culminated in the publication of an IP guideline document in August 2000, of which Colin was a co-author.

In 1996, he became the Project Coordinator for the Relief and Blowdown Systems (RaBs) research study, actively involved with the Centre for Marine and Petroleum Technology (CMPT) in all the preliminary work of setting up the large joint industry project. The IP was an early participant in the project, and eventually became responsible for its management when CMPT reorganised its activities. It is largely due to Colin's persistance and hard work that an extensive experimental work programme was successfully completed last year at the BG Technology test site at Spadeadam. The resultant IP guideline document was published in March 2001.

On receiving his award, Colin said that he was 'really grateful to the IP for allowing him to do the things that he enjoyed.'

A vision for the future

Photo: Jim Four

Presenting the Director General's Report of Council, Jeff Pym (above) stated that 'a very great deal' had happened over 2000, his first full year as Director General. He said that he hoped his presentation would show those present 'the vision that we have for the future of the IP' and recommended that people take the time to read through the Annual Report that would 'put some flesh onto the bones of what I have to say today.'

He first addressed the business environment, stating that year had been 'very vigorous' for the oil and gas industry. 'We know that our industry is at the heart of the global economy and this was made quite clear from the events in the world during 2000.' Such events included the protests about the implications of continued growth in major economies, not least in Seattle, and with it protests about all of the major international industries, including the oil companies; protests about the level of taxation levied on retail fuels, with all of the attendant discussions about the effect of oil pricing on the level of oil use and the implications for the environment; international disagreements about the way forward for climate change and the US attitude hardening with the rejection of the Kyoto Agreement; and the continuing rationalisation and simplification of the industry.

He reminded those present that in his 1999 address he had said that globalisation and e-commerce would be the 'buzz words' for the 21st century. 'Sure enough, they were throughout 2000. Globalisation is now pretty well an established fact in our industry, while e-commerce and e-business continue to develop in spite of the bursting of the "dot.com" bubble in the first quarter of 2000.'

The Director General went on to outline where the IP fitted in this scene. 'The IP remains at the heart of the oil industry,' he said. 'It continues to provide its service upstream, downstream, and mid-stream. As such, it is an organisation that needs to change to meet the changing needs of the environment in which it is operating. We do see the impact of mergers and acquisitions on the number of members joining and remaining in the IP and we have, therefore, seen a slight decline in the number of individual members of the IP during 2000. This decline is far less than many of our sister organisations but, nevertheless, is something the Management of the IP is very keen to address.'

He pointed out that the IP had already made steps to address this issue, embarking on a full review of the way forward for the IP at the beginning of 2000. 'Our conclusion was that the future for the Institute must involve cooperating and forming mergers and alliances with other similar organisations both here in the UK and abroad. By so doing, we believe we will be able to improve our "offering" to our Membership through reciprocal deals with these other organisations.'

'In order to do this we will need some additional tools. In particular, Council agreed that we would upgrade the IP's website. This approach was begun in 4Q2000 and is nearing completion. When it is launched in the very near future it will transform the quality and quantity of information and knowledge that we can impart as an Institute. When Phase 2 of the project is completed later this year it will give us, in addition, a transactional capability to sell membership and products of the IP on a global basis. This is a very exciting transformation of the IP's capability and we look forward eagerly to its delivery. In this way we are certainly responding to our industry's strategic imperatives towards globalisation and the creation of electronic business capabilities.'

He also highlighted the growing range of Institute activities over the past year, including:

- The expansion of the IP's training portfolio to some 20 courses.
- The continuing excellence of the IP education programme. 'For those who have not seen it I strongly recommend the highly applauded geography case study on Coryton oil refinery,' he said.
- The launch of the IP's very own 'Oscars' – the IP Awards – at the annual Autumn Lunch. 'This was a very successful ceremony for which we had some 80 nominations for the first year – good by any standard. It was so successful that this year we will have a stand-alone "IP Awards Lunch" – 22 November 2001.'
- IP Week – 'a huge success with a first class programme of events and in terms of its financial contribution to the IP, the most successful ever.'
- An 'exceptional range of conferences and events [in addition to IP Week] ranging from an outstanding conference on the opportunities in Nigeria to a much appreciated conference on legal mediation and the major Interspill conference and exhibition held in Brighton last November.'
- Continued growth in Library and Information Services, 'providing support to our Members, particularly electronically.'
- The IP's 'stalwart' *Petroleum Review* going from 'strength to strength.'
- The building of 'strong alliances with sister organisations here in the UK, in Europe and in many other parts of the world, with more in the pipeline.'

He went on to state that 'the heart of the IP though has always been its technical activities. It is on our technical prowess that much of the IP's reputation and brand is built and this, too, excelled in 2000 under the auspices of STAC which has quite simply transformed the way our technical activities are coordinated and run. The results are apparent in the products during 2000 – we issued 22 new codes and standards; we completed much of the long-standing programme on TC67; we continued to build alliances; and we increased our visibility and activities on a more European level to reflect the structure of the companies and the source of new legislation.'

'So, as you can see, our Institute continues to thrive. We are looking to the future and we have already taken major steps to create a new series of opportunities for the Institute, and there is more to come. So watch this space!'

He concluded by thanking all those involved in the work of the IP – Chris Moorhouse, President until last June and who has remained as Past President since; Charles Henderson, who has been a worthy successor to Chris; Council and Management Committee; the various Committees and volunteers upon which the IP is so dependent; those retiring from Council; and IP staff.

Real-time monitoring of corrosion in the pipeline

The annual cost of the impact of corrosion widely quoted for the US and Europe amounts to 3% of GDP, yet research has shown that 70% of this cost could be avoided, writes *Dawn Eden*, Consultant, InterCorr International.

In the US alone, it is reported by the Battelle Institute that corrosion of metals costs almost $300bn/y – more than the total cost of US environmental catastrophes such as floods and fires. Battelle also estimates that one-third of this cost – $100bn/y – could be saved by simply applying existing knowledge and technology.

In addition to the economics, the significance of the impact on public and environmental protection must also be considered. Catastrophic corrosion failure of pipelines has resulted in explosions causing both human fatality and ecological disaster – whilst the physical replacement of such pipelines may be straightforward, the greater cost has been counted in community remediation in terms of compensation and clean-up costs.

Corrosion control

Pipeline operators in the oil and gas sector and other industries employ various methods of corrosion control as a means of insuring against such disasters. However, much of the treatments are used in isolation with little or no means of establishing their effectiveness or maximising their efficiency. Improved profitability and operational availability can be achieved by evaluating the performance of corrosion control in real time – providing a feedback mechanism through which control measures can be optimised.

So how can this be achieved? Corrosion can be regarded as a process in the same manner as production, refining or manufacturing. The fact that it is a process means that it can be managed. What is required is a means of establishing:

- the existence of corrosion;
- the contributory causes of corrosion;
- a measure of the significance of the corrosion as regards detriment to operational profitability; and
- a feedback mechanism to prove how effective corrosion control measures have been.

This approach to managing both internal and external corrosion is equally applicable in the cases of the following pipeline operations:

- Pipelines that transport multi-phase gas, wet gas, dry gas, multi-phase oil, separated oil, dry oil, condensate, water injection.
- Onshore and offshore pipelines.
- Piggable as well non-piggable pipelines.
- Flowlines, gathering lines and trunk lines.
- Product pipelines (such as natural gas liquids (NGL), LNG, ethylene, naphtha, etc).

Cost efficiency conundrum

Corrosion control in pipelines is a key issue that is recognised and regulated at government level. In the US, federal regulations (49 CFR, Parts 192 & 195) require that pipeline operators both install and monitor the performance of corrosion control measures, including cathodic protection and protective coatings. Non-compliance with these regulations can result in civil and criminal penalties.

A move toward international standards for materials, equipment and offshore structures for the petroleum and natural gas industries is underway. Under ISO/TC 67 (WG8 Materials, Corrosion Control, Welding & Joining and NDE) a single set of standards, with equivalencies between ISO, EN and API, will be developed – work that is being fully supported by all the major exploration and production companies.

The choice of control measures and monitoring methods at present, however, is at the discretion of the pipeline operator, which means that different pipelines and/or operating companies will have different degrees of corrosion control.

The traditional approach to dealing with corrosion in any industry has been to view it as inevitable, a 'necessary evil' that is addressed by replacement of critical areas of plant when the projected lifetime is approached.

Where catastrophic failure has been experienced in the past, excess stocks of parts and piping etc are carried to tide over breakdown periods. If an unforeseen corrosion failure occurs, great expense arises in attempting to salvage production capacity. However, once production has been lost, the investment returns for the facility can only be regained through future improved efficiency or extended operational life.

Unscheduled maintenance activities, such as corrosion-related failures, also have the effect of pushing back all of the scheduled maintenance in a classic Catch 22 manner. Lack of scheduled maintenance leads to more unscheduled activities which, in turn, leads to less of the scheduled procedures.

The ideal scenario, then, is to maximise revenues and production by proactive corrosion control rather than relying on a reactive approach.

Illusion of control

Corrosion measurement has traditionally utilised offline electrical resistance (ER) probes, portable techniques or weight loss coupons. It has been very much a reactive process. Measurements are often only made available on a monthly or quarterly basis, meaning that plant engineers are locked into a strategy where they count how much damage has already taken place.

Even though steps may be taken to alleviate any corrosion problems, the offline nature of the traditional measurement methods mean that feedback on the success of remedial measures is not instantaneous. Whilst accountability is provided, there is only the illusion of control.

A common misconception is that corrosion damage happens at the same rate and by the same corrosion mechanism all the time. It does not. Corrosion takes place in episodes that are related to specific types of operational situation – caused by, for example, fluctuations in temperature or interaction between changed product chemistry and the pipe material. The severity, or potentially catastrophic nature, of the corrosion cannot be determined by rate alone. For example, in a pressurised system a lower rate of localised corrosion (such as pitting) may be of greater detriment to pipe integrity than a higher rate of general corrosion.

Multi-technique monitoring

The latest in real-time corrosion management systems utilise a combination of modern electrochemical techniques to evaluate the corrosion behaviour of a material. The combined approach increases the confidence in the data,

whilst examining localised as well as general corrosion.

This technology is proven for application in condensing and multi-phased systems, and helps to increase understanding of the corrosion mechanism whilst providing a rapid and continual assessment of corrosion rate. In the case of pipelines, the monitoring is usually required both externally and internally.

Electrochemical noise

Electrochemical noise (EN) technology has been in use for almost 20 years, yet still represents the most advanced technology for real-time corrosion appraisal. It is the most sensitive technique available for online measurement and is unique in that the 'signatures' from EN sensors can be used to derive not only corrosion rates, but also mechanistic information about corrosion type (general or localised)

EN provides data that can be correlated with the mode of corrosion because the signals recorded are characteristic of the corrosion process. Special, recently patented algorithms are available which can further distinguish the localised corrosion mechanism (such as pitting, crevice attack, stress corrosion cracking, bio-corrosion, etc).

Of particular interest is the fact that the EN technique has application in low conductivity environments (solution resistance, Rs >100,000 Ohms), where other electrochemical techniques are unable to function.

Linear polarisation resistance

Linear polarisation resistance (LPR) monitoring involves measurement of the polarisation resistance of a corroding electrode at low values of applied potential. Corrosion rate values are calculated from LPR, but the scientific basis of the technique assumes a steady-state condition such that all estimates relate to the likelihood of uniform or general corrosion. This fact renders LPR incapable of providing localised corrosion information.

Harmonic distortion

Harmonic distortion is a measure of the non-linear current distortion arising during LPR measurement. The data is analysed to provide a measure of the corrosion current and to provide an online estimate of the corrosion rate calculation (Stern-Geary) constant.

It is customary to use a combined multi-technique probe (EN/LPR or EN/LPR/HD) for aqueous environments to maximise the corrosion monitoring information gathered.

Hydrogen permeation current

Online monitoring of hydrogen permeation (HP) current can provide a causal link between the approximate magnitude of general corrosion, from which

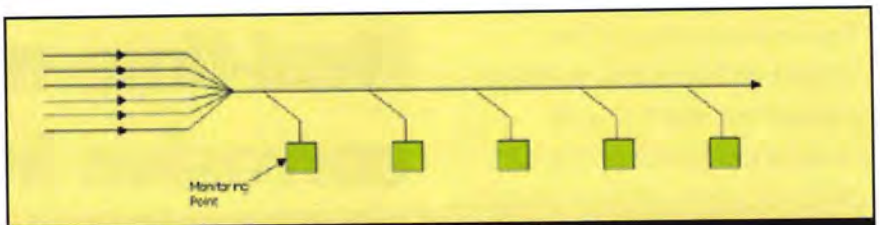


Figure 1: Typical hydrocarbon pipeline, showing monitoring points

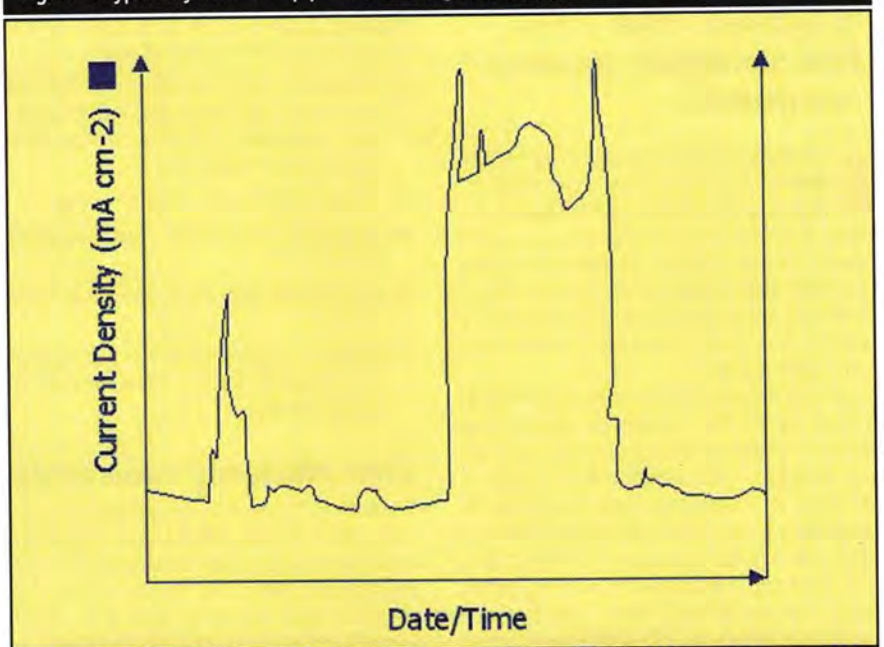


Figure 2: Trend graph showing the variation in current density with seasonal change

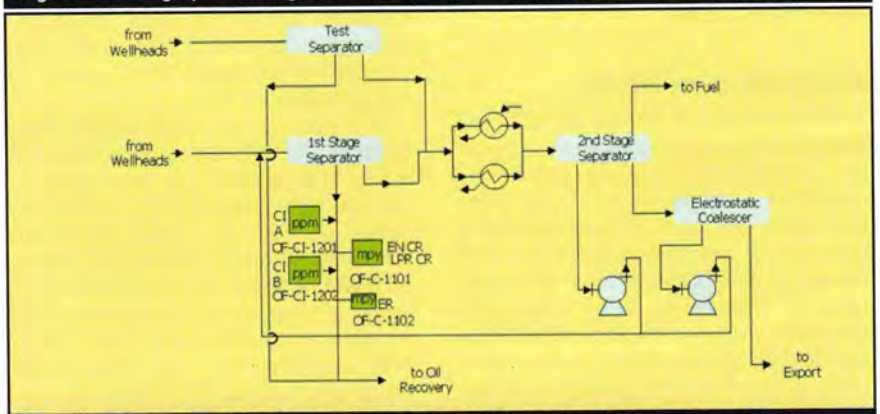


Figure 3: Mimic of typical oil separation and export plant, showing corrosion inhibitor injection points and installed EN/LPR and ER probes

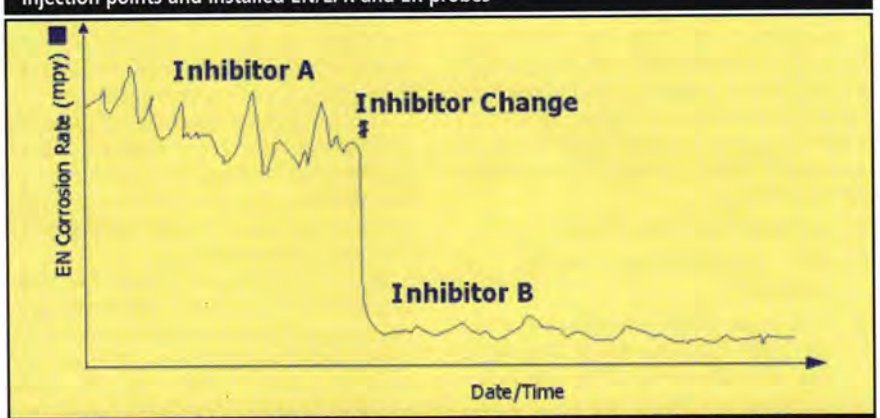


Figure 4: Trend graph showing rapid response of EN corrosion rate monitoring when Inhibitor is changed

Corrosion control method	Real-time monitoring solutions
CP system (impressed current or sacrificial anode)	Galvanic current (continuous) or potential
Protective coating	Galvanic current (continuous) or potential

Table 1: Corrosion control methods and real-time monitoring solutions applicable to external pipeline corrosion

Corrosion control method	Real-time monitoring solutions
Upstream product treatment/processing	EN/LPR/HD continuous plus data on dewpoint, outage recording, temperature, pressure, flow, watercut
Corrosion inhibitor injection	EN/LPR/HD continuous plus injection flow rate (continuous), outage recording, downstream inhibitor concentration
Biocide injection	EN/LPR/HD continuous plus injection flow rate (continuous), outage recording, sulfate-reducing bacteria (SRB) counts

Table 2: Corrosion control methods and real-time monitoring solutions applicable to external pipeline corrosion

the performance of inhibition treatments can be assessed, and provides an early warning of hydrogen damage for setting suitable inspection intervals.

Practical field applications

Electrochemical noise enables optimisation of process management through general and localised corrosion and bio-corrosion measurements and control, in mixed phase, hydrocarbon and aqueous environments.

Combined EN/ LPR is ideal for aqueous systems and is used for such applications as corrosion inhibitor and biocide treatment optimisation – further value opportunities through this type of monitoring are available through the advantageous utilisation of reduced quality, cheaper crude feed.

ER can be used for general corrosion measurements to predict plant lifetimes and reinforce the electrochemical real time methods.

Hydrogen permeation current monitoring is used to measure and control hydrogen induced cracking (HIC) and sulfide stress corrosion (SSC).

External pipeline monitoring

Limited methods are available to protect the exterior of pipelines (see **Table 1**). Whether buried underground, subsea or above ground, external pipeline integrity is subjected to both chemical and physical effects of the local environment. To ensure that the corrosion control method is performing as desired, it is necessary to monitor:

- coating performance (eg for coating failure, cathodic disbondment);
- transformer-rectifier performance (for impressed current systems);
- anode performance (for sacrificial anode CP systems);
- effect of impressed current CP on coatings performance (CP can bring about alkaline conditions at the interface between a buried pipe and ground – resultant hydrogen ingress into the pipeline steel can lead to catastrophic failure by hydrogen-induced cracking).

A specific example of practical field application is demonstrated through the following scenario that describes how real-time corrosion management can be used to verify the satisfactory performance of externally applied cathodic protection. **Figure 1** demonstrates a typical hydrocarbon pipeline with a protective coating and an impressed current CP network. Monitoring points are installed periodically along the length of the pipeline to measure the change in current density as corrosion activity compromises the integrity of the protective coating.

The trend graph in **Figure 2** shows the variation in current density with seasonal change. The accumulation of water around the pipeline is evident from the increasing trends in current density. The fact that the information is provided in real time enables the CP system operations to be modified rapidly (either manually or automatically) in response to the fluctuating demand, thereby ensuring continued protection of the pipeline.

Internal pipeline monitoring

The means of internal pipeline corrosion protection (see **Table 2**) are based mostly on chemical treatment, which provides at least two sources of monitoring opportunity:

- that the chemical treatment is effective, ie controls the corrosion to an acceptable level; and
- that just the right quantity of chemical is used so as to reduce both costs and environmental risks due to waste disposal.

A specific example of practical field application is demonstrated through the following scenario that describes how real-time corrosion management can be used to verify inhibitor performance in an oil flowline. The mimic display in **Figure 3** shows typical oil separation and export plant, with corrosion inhibitor injection points and installed EN/LPR and ER probes.

The trend graph in **Figure 4** shows the EN corrosion rate with Inhibitor A versus the immediately reduced corrosion rate upon switching to the higher performance Inhibitor B. The rapid response of EN, coupled with its ability to detect localised corrosion, enables the operator to see quickly that the localised corrosion has been brought under control by Inhibitor B.

Understanding the status quo

In order to have an effective level of corrosion control it is vital to understand the status quo by monitoring corrosion activity in real time along with the local environment conditions that can cause the damage.

In this way the operator can see the corrosion as it is occurring and carry out adjustments to minimise the damage, reduce the need for maintenance and lower the risk of unexpected failure. With this level of control in place and the corrosion rate known, it is possible to extend the periods between inspections and further reduce operation and maintenance costs.

The newer generation of online, real-time corrosion management system gives the operator the ability to monitor the condition of static plant (pipes, vessels, manifolds, etc) in much the same way as vibration monitoring on pumps and turbines, or even pressure, temperature and flow. Utilising a systems integration approach, the rate and mode of attack can be correlated online with process parameters via network connection to distributed control and asset management systems (DCS and AMS).

How do service stations pay their way?

A study into the costs and returns from building petrol forecourts by *PIMS Associates* of London reveals wide variations in performance between outlets across the world. Forecourt retailing has evolved into general convenience retailing and the trend is continuing, with supermarket retailers selling motor fuels and car washes, while oil companies continue to fill their sites with products and services far divorced from any oil-based ingredient.

In-depth research into the costs and returns of service stations across Germany, Spain, Portugal, Poland, the Netherlands, UK, Australia, South Africa and US reveals that many sites fail to maximise returns from investment. It has also identified potential average cost savings of $110,000 per site.

PIMS (Profit Impact of Market Strategy) uses qualitative and quantitative methods to determine the key drivers that distinguish good performance from bad. By undertaking benchmarking projects in many different countries and across many different industries, PIMS has at its disposal numerous databases of confidential data from which to determine benchmarks for cost, margin, growth, innovation, and customer satisfaction.

The company is currently running a number of benchmarking programmes for the oil industry, including lubricant and greases production and distribution analysis, and a retail network performance study, as well as the forecourt construction work.

The latter was commissioned by the major oil companies who wanted to look externally for insight into investment potential before initiating construction. In this study, PIMS captures site by site data on the costs of investment (broken down into categories such as forecourt civil engineering, tanks, pumps, canopies, shop/restaurant interiors, pipework, etc) and measures of performance (such as Year 2 operating margins and turnover/volumes of fuels, shop/restaurant, car washes, etc).

Also recorded is data on site location and configuration (plot size, number of islands, nozzles, shop area etc), as well as quantitative and qualitative data on key processes – for example, who is responsible for and how long does it take to identify a new site, obtain permits, tender, etc, and finally open the site.

PIMS emphasises that it is important to not only look at costs, but to relate those costs to some measure of success in order to determine capital payback. Reducing costs alone can be dangerous; what is more important is seeing how much value each dollar spent is creating.

External benchmarking

Most companies already employ internal measures (including internal benchmarking) to review site developments and appraise new investments. However, this is the first study of its kind to focus on external benchmarking against competing companies (see **Figure 1**). The objective of the studies is to make external benchmarking a key stage in the capital approval and post-completion review processes.

PIMS has built statistical models that identify the factors that drive bottom line performance. These key factors are made available to participants in bespoke reports for each site and for selective groups of sites. Given that the data is highly confidential, the company uses methods to ensure no individual business's data can be identified, but participants still get relevant and appropriate benchmarks.

The models provide three benchmarks; country quartiles, a configuration average, and a best 'look-alike' target. The country quartiles provide a straightforward range of performance (from poor to strong) for all the data collected in a single country and is useful for obtaining general measures, such as comparing a participant's car wash or shop penetration to that of its competitors. More in-depth analysis determines the configuration average and the best 'look-alike' target. A look-alike is a site that closely matches the characteristics of your site (eg it has a similar location, size and, facilities). The configuration average is used to derive the expected value of a factor (eg volume, cost, or contribution) based on the configuration of a site (eg the location, plot size, shop area, number of islands, etc). This type of benchmark points not to the lowest cost, but to the optimum cost.

For those companies in search of more challenging benchmarks, PIMS uses a similar scientific process to provide a best practice target; the best look-alike.

In the countries where PIMS has established these benchmarking circles, construction cost (excluding cost of land) of a new site varies from around £500,000 to £2.5mn. The study shows there is little correlation between cost and productivity. This finding remains true within countries and in comparisons across all countries.

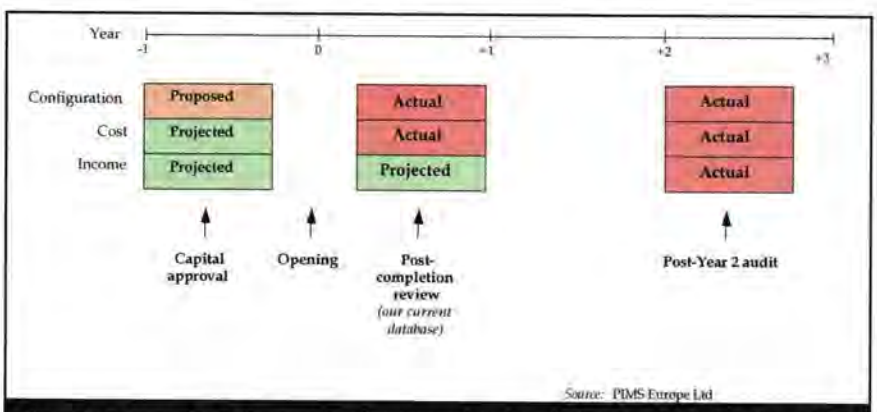


Figure 1: A successful station construction process benchmarked externally at three key points

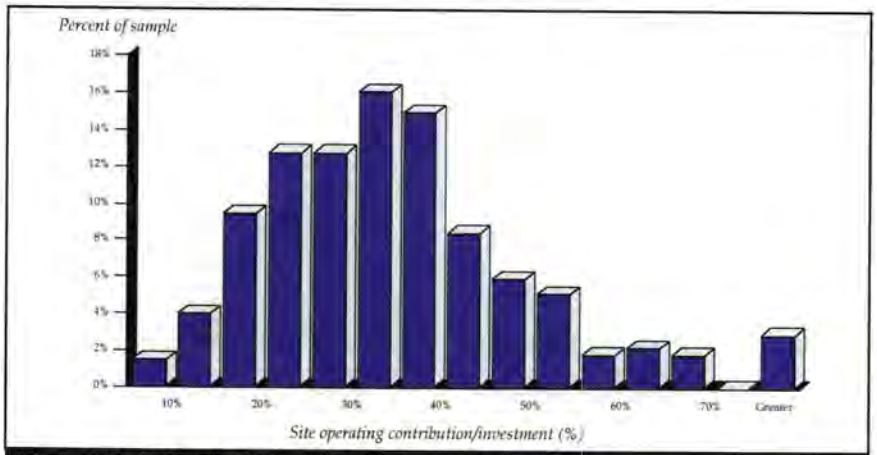


Figure 2: Capital productivity varies widely across the database

Within any country, the variation in performance on productivity is very large. **Figure 2** illustrates the distribution across the database as a whole, ie across all countries in the study.

Is investment worth it?

So, is it really worth spending huge amounts of money on forecourt sites? Our studies indicate that larger sites (particularly those with big shops) do generally tend to perform better, but there is no improvement once costs reach a certain threshold.

The tendency is to focus too much on the size of the land acquired for development. A large site is too often filled with facilities without first properly evaluating expected future earnings. However, the research shows that smaller plots tend to be more profitable in Spain, Portugal, South Africa and Germany, while bigger plots have better contribution in Poland, the Netherlands and the UK. Interestingly, bigger shops in general tend to bring higher returns across all countries.

Car washes (rollover as well as jet washes) only lead to better performance in the right locations. A number of new methods in station construction have recently proved popular, such as the use of modularised components that are assembled on site. The evidence indicates that modularisation does not generally lead to better performance on capital productivity. A more important factor leading to an improved return on investment is the actual construction time – sites built in less than 90 days tend to be more productive from a capital point of view.

Additional data reveals that sites focused towards private customers performed better than those aimed at diesel for commercial use. In most countries, it appears that sites located in central urban locations tend to do better than suburban, rural, or transient sites.

Site savings

The benefits of the PIMS studies are already being seen with typical savings identified of around $110,000 for the average site. Furthermore, even the best overall performing companies have discovered that there is something to learn from external benchmarking of this kind. This has now led many companies to start to use PIMS to test their sites against the database from a potential construction cost and capital productivity point of view even before capital approval is given, learning from benchmarked experience so that appropriate adjustments can be made.

For further information, contact PIMS Associates on Tel: +44 (0)20 7776 2800; Fax: +44 (0)20 7776 2828;

Diesel forecast to match gasoline sales

Consumer demands for better fuel economy coupled with pressure on carmakers to reduce carbon dioxide (CO_2) emissions is likely to result in diesel sales accounting for half of all passenger cars sold in Europe by the end of the decade, according to independent automotive technology provider *Ricardo Consulting Engineers.*

In terms of overall market size, four of the top six markets – Germany, France, Italy and the Benelux countries – continued to experience rapid growth last year, achieving record levels of diesel sales. Spain already exceeds 50% diesel penetration. Even the UK, the only European country to buck this trend over the past six years, showed signs of reversing its steady decline.

Ricardo's latest annual diesel report* also concludes that a further increase from the present level of almost one in three sales (up from 14% to 32% penetration over the past 10 years) is likely before the end of the decade.

Improvements in diesel engine performance and driving characteristics are reported to be driving this rapid growth of diesel engine sales in Europe. 'The car buyer's choice today is fundamentally an economic one,' according to the report's author, Martin Love. 'Although the near 30% fuel economy and CO_2 advantage between diesel and gasoline engines has always existed, the enormous improvements in diesel engine performance and refinement have tipped the balance in recent years and are steering large numbers of the buying public towards the diesel option. Diesel pump prices, which across Europe are on average 16% cheaper than gasoline, merely heighten the financial advantage.'

Voluntary agreements

Various voluntary agreements have been made between carmakers and EU Environment Ministers to reduce average CO_2 emissions for new vehicles to 140g/km by 2008. 'To help meet these targets vehicle manufacturers have increased the attractiveness of the diesel option, further driving diesel sales and penetration,' states Love.

'Last year we said it would not be surprising to see 40% share over the next five to 10 years. In view of the recent upward surge and with some major markets already exceeding this level we now see the possibility of diesel taking 50% of sales by the end of the decade.'

Record diesel sales

Overall, diesel penetration across Europe in 2000 increased by 11% from the previous year's record to 4.76mn vehicles, representing a market share of 32.3%. For the first time, both France and Germany exceeded 1mn sales. Sales of car-derived vans and light commercial vehicles up to 3.5-tonnes gross vehicle weight are already heavily biased towards diesel and in 1999 reached a new record level of 1.51mn units representing a penetration of approximately 90%.

France remains the largest market for diesel cars. In 2000, sales increased by 10.5% to 1.046mn vehicles, which took diesel penetration to 49%. Germany was the second largest market for diesel cars in 2000 – sales increased by 20% in line with the overall market to 1.03mn vehicles, maintaining a diesel share of 30.4%. Germany is Europe's largest passenger car market.

Continued rapid growth helped Italy re-take third place ahead of Spain, states the report. Diesel sales were up by 19% to 814,000 vehicles and market penetration increased to 33.7%. After nine years of significant growth in diesel sales, the Spanish market showed signs of stabilising at 733,000 with market penetration of 53.1%.

Total diesel sales in the Benelux countries increased to 445,000, with a market penetration of 38%. Belgium accounts for the majority of diesel sales and at 56.7% has the second highest diesel penetration in Europe.

Following six years of decline in the UK, 2000 saw the first signs of a reversal in this trend, with sales increasing by 3% to 313,000 vehicles and market penetration increasing slightly to 14%. Although the UK remains the only major car market where diesel fuel is more expensive than gasoline, consumer demand for better fuel economy indicates that there is potential for an increase in the UK from this level. Diesel penetration of the UK car market has previously been higher, peaking at 22.6% in 1994 – almost a percentage point higher than the penetration in Germany today.

The largest diesel penetration last year was 61.8%, a new record for any European country, which occurred in Austria. The Austrian market size in 2000 was 191,000, a 6.1% increase on the previous year's figure.

Enhanced desirability

Throughout Europe, technical developments have been dominated by the comprehensive move towards direct fuel injection in the design of all new engines. In addition, most manufacturers are increasingly using common rail fuel injection technology in preference to rotary or unit injector systems, principally because of the control flexibility and design simplicity that it offers.

Amongst the major players, the notable exception to this trend is the

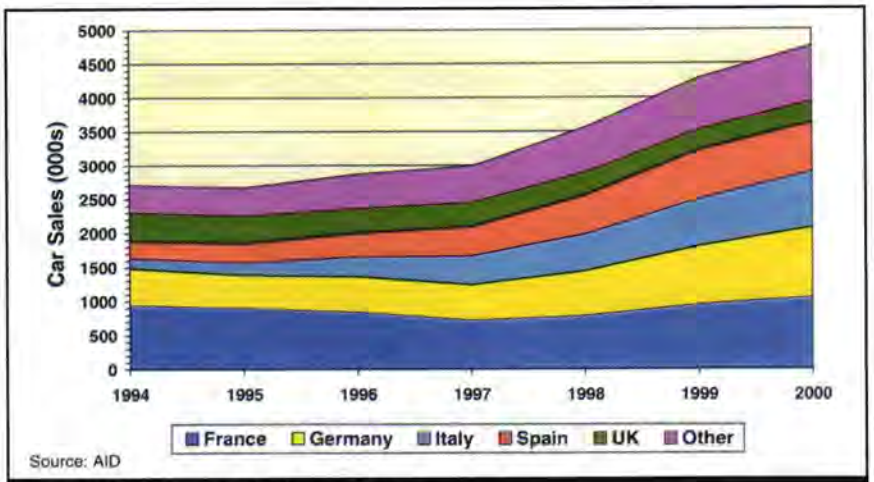
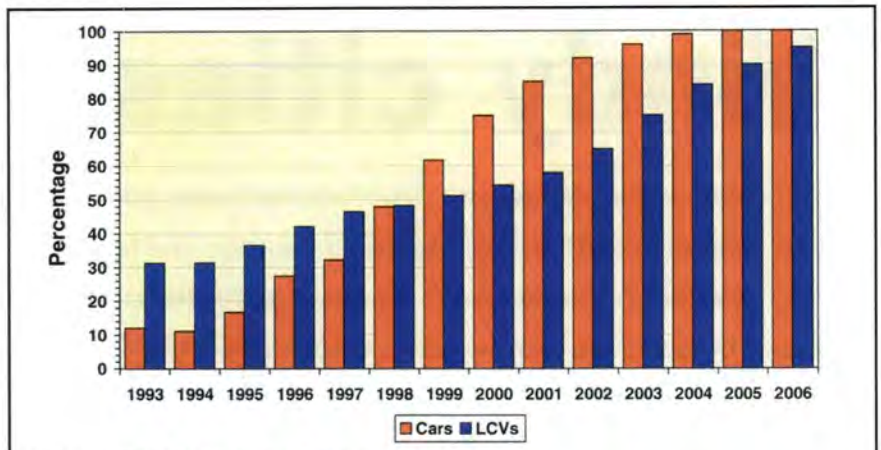


Figure 1: Diesel car sales in Western Europe

Volkswagen Audi Group (VAG), which is committed to using electronic unit injectors (EUI). EUI technology provides relatively high injection pressures, is flexible and is suited to high engine power output. However, its principal drawback is the development cost for new engines. VAG is able to justify its investment in EUI technology due to its high production volumes and modular approach to engine ranges. The company is the top producer and seller of diesel passenger cars in Western Europe and accounts for more than one in four (27.4%) sales.

Recent years have seen ever-increasing levels of power and torque output from new diesel engines, which are now available with maximum outputs reaching up to 240 bhp (180 kW). It is expected that within five years manufacturers will be able to offer customers the same number of diesel options as gasoline variants for each vehicle, further enhancing the desirability of the diesel car.



Data Source: PSR to 1999 - Ricardo projection from 2000.

Figure 2: European produced light duty diesel engines – percentage using direct injection

Looking ahead

Future developments will include a trend towards smaller displacement, higher power output diesel engines, which will ultimately use electrical power to boost vehicle acceleration. The development of new technology such as the flywheel mounted electric device (FMED), which will improve engine starting and power generation, will assist in meeting new fuel economy and emission targets.

Of the five main tailpipe emissions, future legislation could potentially create a level playing field with diesel and gasoline engines converging towards common standards. Inherently, diesel engines have lower carbon dioxide (CO_2), carbon monoxide (CO) and hydrocarbon (HC) emissions. Meanwhile, pressure for lower particulate and NO_X emissions will see the introduction of a new generation of filters and oxidation catalysts, in some cases combined, which will start to appear by 2004 prior to the implementation of the next level of European regulations.

The report reviews sales and production data, analysing trends by vehicle type and by manufacturer and for individual major markets as well as for Western Europe as a whole. It forecasts future marketing and technical trends. The electronic report, which costs £275 for a single user licence, can be obtained from the Ricardo technical library – Tel: +44 (0) 1273 794230.

Windy cities

As concerns grow about the environment and pollution, the UK Government is looking for a cleaner energy supply. Targets have been set by the Kyoto Protocol and to meet these there is a need to find a reliable, 'clean' alternative to hydrocarbons by 2010. *Cheryl Saponia* looks at wind power as one such renewable source of energy.

The UK is the windiest place in Europe. So windy in fact that if all the UK's wind was converted to electricity, it could power the country three times over. The UK is also the worst country in Europe at developing alternative energy resources according to last year's report by the European Environment Agency.

Germany is currently leading the way with wind power. In 1997 there were 5,200 wind converters. At the start of 2001 there were 7,800. The Germans produce over 4,000 megawatts (MW) of electricity from wind power – 2% of total domestic energy consumption and enough to supply 1mn homes with power. The German National Association of Wind Energy predicts this figure will rise to 5% in 2005. In contrast, the UK supplies just 0.3%.

In accordance with the Kyoto Protocol, the UK must supply at least 10% of its energy needs from renewable sources by 2010. Plans have recently been unveiled for the construction of 18 offshore wind farms, which should give power to over 1mn homes. If the plans go ahead, 540 offshore turbines will service the UK. Peter Hain, the former UK Energy Minister, prior to the recent General Election, pledged £260mn over the next three years for alternative energy sources, and stated that wind energy is the main focus of the government's alternative energy plans. Proposed locations of the offshore turbines include Redcar, Skegness, Clacton-on-Sea, Sheerness, Blackpool and Southport. Construction is slated for 2004.

The technology

The majority of wind turbines are horizontal axis turbines which consist of a rotor blade that rotates around a horizontal hub. The hub is connected to a gearbox and generator, which are located inside the nacelle (the outer casing). The nacelle houses the electrical components and the whole assembly is mounted on top of a tower. The blades rotate at a constant speed of 15–50 revolutions per minute, although many of the new machines can operate at variable speed. Sensors in the yaw mechanism monitors wind direction so that the tower head can be turned to line up with the wind.

Turbines range in capacity from several kilowatts (kW) to 3 MW. The key element of the turbines is the diameter of the rotor blades: the longer they are, the greater the energy output. Currently, the average size of a turbine is 600 kW capacity. The power available from the wind is a function of the cube of the wind speed. Therefore, a doubling of wind speed produces eight times more power output from the turbine.

A size issue

The main complaint that has been made against the use of wind turbines is their sheer size. They are placed in groups of 50 to 100 and some are the height of Big Ben. Blades can be larger than the wingspan of a jumbo jet. There are many people who, understandably, do not want the turbines 'ruining' the countryside and views. This issue recently came to a head in Wales. The tourism industry in Wales is worth approximately £2bn and with the addition of even more turbines, local economies could be 'in tatters' it is claimed. There is also concern that the onshore turbines effect local wildlife, such as impeding the flight paths of birds. However the Countryside Council for Wales (CCW) backs the UK Government's wind energy policy, on the proviso that the turbines do not compromise the quality of the area. One solution to this problem is to have the wind turbines located offshore as it has been suggested that this would significantly lessen the impact of the turbines.

Some people object that wind turbines are only useful when the wind actually blows. However, the fact that wind is an intermittent energy source does not reduce its value as a source of power. The changeable output does not pose any difficulty for power system operation. Electricity demand is fluctuating and supply and demand has to be continually matched on a minute-to-minute basis. The fluctuation caused by introducing wind to the system is not apparent above these normal fluctuations, and will not be until electricity generated from wind turbines reaches approximately 20% of the total system supply.

Offshore wind technology is not yet as advanced as its onshore cousin. Onshore turbines start generating at wind speeds of 3.5 metres/second and stop generating at 25 metres/second, that is, gale force 10 – so there should be enough wind at any one time for power generation. In addition, there should soon be the technology to store electricity for the times when the wind is at a lull. Constructors of offshore wind farms, despite the attraction of higher wind speeds – often above 8 metres/second – have to take into account complicating factors such as wind/wave interactions. However, there seem to be fewer planning permission issues surrounding the

installation of offshore wind farms.

The UK Government is keen to promote the use of wind power above other alternatives – solar and sea wave energy for example – because it is reported to be the resource that has made the most significant technological advances and has proved to have worked successfully elsewhere.

Targets

Another enormous benefit of wind power is, of course, the fact that it is 'green'. According to the British Wind Energy Association (BWEA), UK wind turbines generated 981,554,200 units of electricity – approximately 982 GWh (gigawatts per hour) – in 2000, resulting in emissions savings of over 930,000 tonnes of carbon dioxide (CO_2) and 16,000 tonnes of the associated greenhouse gases sulfur dioxide (SO_2) and nitrous oxides (NO_x). Each unit of electricity generated from the wind displaces one produced by a power station burning fossil fuel, with an associated saving of 860 grammes CO_2.

Current wind power outputs of 982 GWh represents only 0.3% of the total UK electricity supply. This illustrates the rate of progress needed in the UK to meet the wind power contribution of 4.7%, by 2010 as required by the Kyoto Protocol. Meeting the 2010 target will, therefore, require a further 2,515 turbines onshore – which would occupy 0.2% of the total land area of the UK – together with 1,300 turbines offshore. If this target is met, 16.7bn units of unpolluted energy could be produced – enough to power 4mn households per year and save the emission of over 14.4mn tonnes of CO_2. All UK electricity supply companies will be obliged under the new Utilities Act 2000 to source 10% of their supply from renewable energy by 2010. Companies will also receive cash exemptions if they use renewable energy under the Climate Change Levy.

Wind economy

The output potential of the 18 new wind farms proposed offshore the UK is estimated at 1,000 MW to 1,500 MW, a small amount compared with the output from coal-fired power stations. Drax, in Yorkshire, for example, produces 4,000 MW. Financiers in the City of London do not seem particularly enthusiastic about wind technology. Many city analysts believe that renewables make very little profit. Consequently there is no value attached to the commodity and no premium for being involved. However, big companies like Powergen and Innogy are investing in wind power, which perhaps is an indication of future planning.

The BWEA, however, has calculated some interesting statistics. It states that wind energy is getting less expensive due to: cheaper turbines resulting from technological improvements and availability of components; increased productivity so more electricity is produced; and larger machinery which reduces infrastructure costs as fewer turbines are needed for the same output. The cost of financing is also falling as lenders gain confidence in the technology. Wind power should become even more competitive as the cost of using conventional energy technologies rises BWEA says.

The downward trend in wind energy prices is expected to continue. The strongest influence will be the decrease in wind turbine prices: as the global wind turbine market booms, the price of the turbines will fall. Europe is the centre of the estimated £11bn world market, with six companies supplying over half the world's turbines.

Employment benefit

The World Watch Institute based in Washington DC recently estimated that 14mn jobs have been created due to the tightening of environmental regulations. In fact, the demand for workers is so great that people can not be trained fast enough to fill vacancies in the sector. In Europe, for example, the increase in wind farms has provided employment for wind meteorologists, metal workers, computer operators and engineers. The wind sector doubled in size between 1997 and 1999 and accounts for 86,000 jobs worldwide. The report added that resource-based industries such as mining and fossil fuel extraction are providing fewer and fewer jobs each year.

The future

It is inevitable that we need an alternative to hydrocarbons, but is wind power the solution? For environmental soundness, certainly, wind power is at the fore, but currently it does not have cost effective and reliable technology to store electricity for times when it simply is not windy. And of course, there is that small matter of size – a 50 ft wind turbine maybe a good idea until one is put up next to your own back garden.

Wind power is, however, ideal for generating at a local level. Clusters of 10 to 40 turbines can provide enough electricity to power 4,000 to 16,000 homes. The electricity can be fed directly into the distribution network, thus reducing electricity distribution and transmission losses. Electricity from larger power stations however, has to be transmitted on high voltage power lines and travel long distances before it gets utilised.

According to the BWEA, it is sensible for the UK to have a balance of power sources, rather than relying heavily on only one. Such a balance improves the security of electrical supply. Energy diversity lessens international political sensitivity concerning fossil fuel reserves, volatility of oil and gas prices and the risks associated with nuclear power.

Not in our backyard

Of course, there are many people who do not want to see the wind power network extended. The Country Guardian group believe that the development of commercial wind power is misguided, ineffective and neither environmentally nor socially useful. The group acts as a clearing house for information and advice, servicing the action groups which are created every time a wind development is suggested. It currently has only two hundred members, but of these, half have joined as representatives of action groups, so that in reality it is backed by many thousands of people, it claims.

The group accepts that wind energy has a role to play in the energy sector and that the countryside is a changing area, but argues that the environmental and social cost of the development of wind energy is out of proportion to any benefit in the form of reduced emissions. Country Guardian believes industrialisation of countryside landscapes, irrevocable ecological damage, loss of amenity and the social division of communities is a high a price for a small contribution to the UK energy supply and an unpredictable saving of emissions.

The group does believe that wind power can be a very useful method of electricity generation for households, farms and small communities located away from the national electricity grid and that turbines may be acceptable where they are not in conflict with the character of the local environment. However, the group states that wind turbines should not effect the lives of local inhabitants through noise, endangerment of residents or visitors; must not create economic disadvantage through reduced property values; must not damage the tourist industry or the local economy; and turbines must not divide communities. More details about the Country Guardian campaign can be seen on page **www.ourworld.compuserve.com/homepages/windfarms**

Prize-winning projects

Over the next few months *Petroleum Review* will feature a series of short articles from last year's winners of the IP Awards. These will describe how the companies are following up on the prize-winning projects and the impact on their staff of public recognition of their successes.

For more information on IP Awards 2001 and sponsorship and registration opportunities please see p42.

International Platinum Award – BP

BP was presented with the IP International Platinum Award for the development of its emissions trading system. Commenting on the award, BP says:

'We launched the first ever global corporate greenhouse gas emissions (GHG) trading system* in January 2000. The first yearly compliance period has passed and the system is continuing to operate successfully in 2001. The trading system has provided a robust framework for the 150 business units within the company to manage and reduce their emissions, and has enabled the business to incorporate the financial impacts of GHG emissions into project planning processes. Employees have been given the challenge to look for innovative ways to reduce GHG emissions in their operations and this approach has already identified unexpected economic opportunities.

The emissions trading system is continuing to develop – work this year is focused on the development of a credit-based trading system to compliment the existing GHG reduction tools.

Receiving the prestigious IP International Platinum Award in 2000 recognised the efforts of a large number of people within BP who were involved in the design, piloting and implementation of the system. BP communicated its prize-winning effort throughout the company, enhancing the already high profile of the emissions trading system within the group. The award has reinforced the success of the "learning by doing" approach BP has taken to this complex issue.'

For more information about the operation of the BP trading system, site projects that have been implemented, performance in 2000, and future plans can be found at* **www.bp.com

Environment Award – Conoco

On winning the IP Environment Award for its Deir Ez Zor integrated natural gas project in Syria* (operated by Conoco Syria DEZ Gas in 50:50 partnership with TFE of Syria) Conoco says:

'The award provided international recognition for what we had been saying internally within Conoco about the Deir Ez Zor integrated gas project. The project is a great example of an opportunity that, when captured, provides significant economic, social and environmental benefits to the host country, in this case Syria. This is Conoco's first project in Syria, and it is very important to our success that we execute the project in a way that clearly benefits the country. The recognition from the IP provides a third-party affirmation of the project's environmental impact.

Conoco is committed to sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Deir Ez Zor project demonstrates this commitment, supporting the continuing development of Syria by establishing facilities to collect up to 175mn cf/d of natural gas which currently is flared in association with oil produced near Deir Ez Zor in eastern Syria.

Natural gas gathered by the project will displace some 26,000 b/d of heavy fuel oil currently used to generate electrical power in Syria. It is estimated that the project will reduce carbon dioxide emissions by over 4.9mn tonnes and conserve 400bn cf of the country's remaining gas reserves. In addition, the project will eliminate the need to import 10,000 b/d of LPG and reduce power generation costs.

The news of the IP Award was shared widely with Conoco and contract employees working on the project, along with the Oil Ministry in Syria. Since the award ceremony, the award itself has travelled from London to Damascus, Houston and to Deir Ez Zor.'

For more information about the project, visit* **www.conoco.com/safety/news/awards.html

Diesel fuel lubricity and derived cetane number workshop

An invitation workshop on the determination of diesel fuel lubricity using the High Frequency Reciprocating Rig (HFRR) and derived cetane number using the Ignition Quality Tester (IQT TM) was held on the 26 April 2001 at BP Technology Centre, Sunbury-on-Thames. Over 30 delegates from Europe, the US, Canada and Australia attended the workshop, representing oil companies, additive manufactures, car and component manufacturers, test houses, government research establishments and instrument manufacturers.

Determination of lubricity

PCS Instruments made a presentation on the latest developments in industry instruments for determining lubricity using HFRR. Users were able to share their experiences using the rig and were given an opportunity to pass to the manufacturer their thoughts on instrument development. It was reported that there are 312 instruments currently being used in industry, but they are being used in accordance with three slightly different methods.

A presentation on the latest developments of the The International Standards Organization/European Committee for Standardization (ISO/CEN), CEC and the American Society for Testing Materials (ASTM) test methods followed. It had been agreed at the last HFRR Workshop that the IP would only hold a watching brief and follow the developments of the method within these three organisations. It was reported that the CEC Lubricity Task Force is collecting data, however, the data is currently only being provided by the Task Force members. A number of delegates thought that the data catchment should be expanded, although all agreed it was important to note the method used.

During a wrap-up session, the following were agreed:

- Liaison between the CEC Task Force and the IP Technical experts is to be improved.
- The IP will collect HFRR data and send it to CEC on a regular basis. CEC will supply data forms to the IP. Members wishing to provide data are to contact the IP as soon as possible.
- A ST B-12 Panel is to be constituted to deal with HFRR matters. It will be chaired by a representative from PCS, the instrument manufacturer. Membership is to include representatives from the CEC Task Group.
- PCS will determine which of the three test methods is being used by the companies owning the instruments, and relay this information to the IP.
- The development of a test method to determine the lubricity of gasoline at 25°C is to be considered.

Determination of derived cetane number

Presentations were made by manufacturers on the latest developments in instruments used to determine derived cetane number using the IQTTM. Two users discussed their experiences in setting up and operating the instrument and displayed some of the results obtained from test fuels and fuel components. Results of testing fuels containing varying amounts of cetane improvers using the IQTTM were compared with those obtained from a CFR engine. These clearly showed that the improvement in the fuel's cetane number was readily seen with the IQTTM but, due to the poor precision of the CFR, the improvement was not so apparent. Finally, development of the test method within the IP and the ASTM and the forthcoming round robin were discussed. During a wrap-up session, the following were agreed:

- The organiser of the round robin is to be informed that it should include samples representative of European diesel fuels. In order for the method to be accepted in European fuel specifications it should also contain a 5% FAME/mineral oil blend.
- The diesel fuel tested in the IP, NEG and Italian Correlation Scheme should, if possible, also be included in the round robin.
- Italy or France are to supply a sample of 5% FAME/mineral oil blend.
- The IP is to increase the membership of the STB-1B IQT Panel to include 'paper only' members. This Panel is to meet 3Q2001.
- Close liaison is to be maintained between ST B-1B and the ASTM.
- A presentation is to be made to CEN TC 19 WG 24 on the use of the IQTTM to determine derived cetane number at its meeting on 5 June 2001 in Milan. This presentation is to include the work with cetane improvers.
- A further IQTTM workshop is to be held in 2001.

Possible changes to IP131 (EN ISO 6246): Gum content of light and middle distillate fuels – Jet evaporation method

At a recent meeting of the ST B 8 and ST B 11 Panels, the use of a steam jet in this method was questioned. Previous studies have shown that if air at 232°C is used, instead of superheated steam, the method's sensitivity for detecting higher boiling point and less thermally stable contaminants may be improved. In addition, the use of heated air instead of superheated steam will make the method less hazardous. There could also be benefits from easier flow calibration, reduction in apparatus requirements and maintenance and savings in the time taken to carry out the test.

The IP's ST B 8 Stability of Light Distillates Panel will be conducting a study into the effects of such a change and would welcome the participation of anyone using this method. To become involved in this work or to obtain further information please contact John Phipps at the IP on Tel: +44 (0)20 7467 7130; Fax: +44 (0)20 7255 1472; e: **jp@petroleum.co.uk**

Fluids contractor – the newest specialisation

The whole history of technology in the oil and gas industry is one of increasing sophistication and narrowing specialisation. Drilling fluids have become ever more sophisticated and the range of tasks they can perform, but until recently there has been no dedicated fluids contractors specialising in all aspects of fluids handling and cuttings disposal. The cost of well fluids and the disposal of fluids and cutting currently accounts for 20–30% of the overall cost of a well. This means savings in the area can now be quite significant in cash terms.

M-I/Swaco was the first company to develop the idea that fluids handling and disposal was a single coherent well site discipline. Its single source service, Integrated Fluids Engineering (IFE), was set up to actively promote the idea in the US in 1998–1999, to prove the concept and starting to build a database of experiences and awareness that could be more widely applied. In 1999–2000 it began to market the service in Europe, working with BP and Phillips in the North Sea, and Statoil starting on a 20-well programme in Austria.

M-I/Swaco claims that the system IFE is operating has been well received by drillers and offers six ways to reach target depth faster:

- The comprehensive IFE plan claims to offer savings and efficiencies by establishing project goals – economic, environmental, production – and then devising an optimised solution. The plan takes into account all the well and drilling parameters and identifies options and alternatives. Similarly, plans are devised and optimised for the waste management and the disposal choices.
- Reducing the risk of unscheduled events, the M-I/Swaco IFE service claims that experience and planning can prevent or minimise lost time incidents. Of particular importance is matching fluid systems with the right solids control. Optimum fluid properties will reduce the risk of stuck pipe, well bore instablility, lost circulation and other problems.

  According to the IFE service, specific areas to be monitored include the interaction of drilling and drilling fluids with many of the drilling tools, in terms of the compatibility between fluids and elastomers in tools. As tools and techniques become more sophisticated with innovations such as measurement while drilling (MWD) and logging while drilling (LWD) now being widely used, the compatibility problem increases, especially as the range of mud formations widens.

  The concept of a plan means better coordination with the drilling company and is said to ensure the cementing services dovetail in with overall well planning while ensuring material compatability and optimised displacement rates.
- The IFE service also claims that the close coordination of the well services means that the producing horizon can be focused on earlier, allowing optimum fluids balance to be achieved to ensure minimum formation damage and maximum production once the producing horizon is reached.
- By integrating all the environmental requirements into the planning process, IFE claims to be able to make significant savings in disposal costs of both fluids and cuttings. It also claims to be able to minimise site closure costs while ensuring full compliance to ever more complex environmental regulation.
- As a single source for engineering, management and fluids, IFE claims to be able to offer lower costs than a 'bundled services' approach. This is said to be particularly important for waste management and disposal.
- The other area of cost reduction IFE claims to offer is through a four-step process of well planning, setting benchmarks, plus the recording results against benchmarks and a post-well report that features lessons learnt and further improvements.

IFE makes a number of claims about reduced well costs, faster time to target, reduced environmental compliance costs and reduced mud costs. It does however have a series of case studies on recent wells to support its claims.

Its confidence in the savings achievable is witnessed by the fact that its is prepared to work on risk/reward contracts where its shares the savings agains target with the client.

All the evidence suggests that the innovation of an overall fluids handling and wastes disposal contractor is here to stay.

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Analytical valves provide system solutions

Hoke has added selector valves, miniature metering valves and low dead volume fittings to its range of analytical instrumentation. The new five-way and seven-way selector valves have a simple low-maintenance low dead volume design and bi-directional flow with individual port shut-off. Manufactured in 316 stainless steel (SS) with Viton O-rings as standard, they are also available in a wide range of special materials and sealing elements, have a Cv rating of 0.10 and an operating temperature range of –40°C to +120°C.

The miniature metering valves give, according to the manufacturer, fine control within a compact design featuring micrometer vernier handle, external locking stem sleeve, panel mounting and $^1/_{16}$-inch Gyrolok end connections. For pressures from vacuum to 6,000 psig and temperatures of –55°C to +230°C, they come in 316 SS with Dyna-Pak Teflon packing or O-ring seals.

LDV low dead volume fittings in $^1/_{16}$-inch and $^1/_8$-inch sizes combine leak-tight operation with the ability to be repeatedly remade. Providing the same reliability connections as the proven Hoke Gyrolok tube fittings range, they are also supplied in 316 SS as standard or other materials to order.

Other Hoke analyser items include ball valves with 'unique' shut-off and diverting capabilities, needle valves for sampling as well as analytical systems and Gyrolok tube fittings now available with 'safety changers' for safe and effective component replacement.

Tel: +44 (0)20 8423 0113
Fax: +44 (0)20 8423 5933

Making a profit

Aspen Technology has launched its new ProfitAdvantage solution for the process industries. 'The solution enables companies to identify and maximise profit opportunities throughout their entire value chain – from the supply of raw materials, through the production of goods, to the delivery of the final products to customers,' states the company.

ProfitAdvantage encompasses engineering, manufacturing, supply chain and e-business collaboration technologies in an integrated solution. 'By addressing the major competitive challenges facing the process industries today, the solution can create substantial economic value. Potential annual returns can total between 4% and 6% of a process company's yearly revenues,' it is claimed. Increased revenues result from increased throughput, higher average selling prices and better customer service; lower operating costs result from reduced raw material, utility and logistics costs, optimised product sourcing, lower supply chain costs and engineering innovation.

'ProfitAdvantage allows companies to make the most profitable decisions quickly and to execute them in real-time; to collaborate with partners to reduce unplanned variability; and to exploit sourcing, selling and logistics opportunities,' states the company.

Tel: +44 (0)20 7349 2200
Fax: +44 (0)1223 819752

Easing process instrumentation field problems

Parker Instrumentation has unveiled a new manifold design that is completely free of taper thread connections. 'The manifolds make it possible to optimise the integrity of pressure and flow instrumentation systems by eliminating PTFE tape or liquid thread sealant when making connections, and with it any risk of introducing contaminants into the fluid system – a major cause of problems in the field,' states the company.

Called PTFree connect, the manifold range incorporates factory-fitted and tested compression tube ends, said to 'remove the last barrier to the process engineer's goal of building process instrumentation systems without taper threaded interconnections.'

Taper threads rely on the use of additives to ensure a seal and thus inevitably open up avenues for system contamination and/or mis-assembly. However, Parker states that PTFree connect provides a high-integrity pre-assembled connection for a compression fitting which is completed by simply turning the nut through a quarter revolution. In addition, this form of connection is claimed to ensure that a manifold need never be scrapped because of the common problem of galling or crossing threads, as the integral tube ends are low-cost sacrificial items which can be replaced with ease should they ever be inadvertently damaged.

PTFree connect, according to Parker, represents the final step in 90 years of engineering innovation aimed at eliminating the threaded connections required when constructing instrument manifold arrangements. Successive innovations in steel tubing, compression tube fittings and multi-valve manifold blocks have steadily eliminated taper threads and simplified installation. 'The only taper threads remaining today are the two that come as standard on manifolds,' states the manufacturer – 'the new PTFree connect innovation eliminates these.'

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Successful subsea pigging unit

Copipe Systems, part of the PSL Group, has reported two successful projects for its patented Subsea Pigging Unit (SPU) which recently won several awards, including Millennium Project Status and the Sir Ian Wood Award for Innovation.

The unit is a remote, self-contained device that floods and pigs subsea pipelines without the need for an attendant surface vessel. Once positioned and initiated by an ROV the SPU provides filtration, together with chemical injection and controlled flowrate flooding independently of support. This allows great flexibility for project vessels as well as providing significant cost savings.

The two projects are said to represent the 'extremes' of the unit's capabilities in shallow and deep water. The first was a 59-km x 16-inch pipeline offshore the UK, where the unit was positioned in 16 metres of water, the most shallow job completed to date. The SPU flooded the pipeline during actual installation, thus allowing the client to significantly reduce wall thickness.

The second project was in 1,366 metres water depth offshore West Africa where a 2-km x 8-inch pipeline was successfully flooded. This is the deepest project to to be completed to date according to Copipe.

Tel: +44 (0)1224 783008
Fax: +44 (0)1224 783005

Methanol transfer made easy

Milton Roy's new Primeroyal dosing pumps are designed to meet the ever-increasing pressure, temperature and corrosivity requirements of the metering industry. Recent applications include a methanol reforming hydrogen plant completed by Axsia for Kvaerner Process Technology in Taiwan.

The hydraulically driven pumps benefit from automatic control with 37 kW drive via an inverter and are reported to be capable of transferring 3,000 l/h at pressures up to 56 bar. The pumps can be supplied with diaphragm or plunger liquid ends, with or without stroke adjustment and in a choice of configurations, such as simplex or multiplex. Their modular design means that there is a high degree of flexibility, according to the manufacturer, and they are said to be easy to upgrade and maintain.

Options include double diaphragm, diaphragm failure detection, double check valves, slurry configuration, cooling/heating jacket and automated flow control.

Tel: +44 (0)118 9771066
Fax: +44 (0)118 9771198

Compact engine

Caterpillar has recently launched the 3034 DIT, 3034 DINA, 3054 DIT and 3054B DINA marine propulsion engines. The engines can be applied in single or twin engine workboat, fish boat, passenger ferry, patrol craft or sailing boats.

Engine operation is said to be quiet and clean with extremely low emissions levels. The units are environmentally friendly with no visible smoke throughout the engine's operating range. The low fuel consumption, low cost of replacement parts and extended service intervals are, according to the company, significant factors in the overall low operation costs of the engines.

The engines' small size, multi-directional exhaust outlet capabilities and allowable installer angles – from 0° to +17° engine front up – provide flexibility for new boat installations as well as gasoline engine repowers.

The 3034, 3054 and 3054B engines feature a high-tec rotary fuel injection pump and low inertia injection system that uses less engine energy to move fuel to the injectors. The combustion chamber design provides the correct fuel/air mix for combustion efficiency, power and torque, and low fuel consumption and emissions. The combustion system's relatively low peak pressure is said to reduce mechanical stress within the engine to improve reliability and prolong engine life, resulting in a marine propulsion engine that is very quiet.

The engines are reported to be capable of extended service intervals, with a recommended oil and filter change every 500 hours for the 3034 engine. The 3054 should be changed every 250 hours, depending on loads. Like the larger Cat engines, both seawater and freshwater pumps are gear driven on the 3054 and 3054B models.

The Cat 3000 family engines come with full support, including technical information, sales, service, parts and warranty coverage.

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If you would like your new product releases to be considered for our *Technology News* pages, please send the relevant information and pictures to:
Kim Jackson
Associate Editor, *Petroleum Review*
61 New Cavendish Street, London W1G 7AR, UK

Membership News

NEW MEMBERS

Mr R A Aderogba, Nigeria
Dr S Bailey, Ravensworth
Captain S P Barker, Isle of Man
Mr D Barrett, Oamps (UK) Limited
Mr M W Budge, Orkney
Mr K Dafe, London
Mr S J Harris, CVA
Mr N Holness, New Barnet
Mr J Hounsell, Harrison Lovegrove and Company
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Ms J Polwin, Accenture
Mr I Power, Conoco Limited
Mr J A Rimmer, Blandford Forum
Mr G C Sims, BP Oil UK
Mr D J Smart, Exchem Organics
Mr D A Smith, Oil Analysis Services (Midlands)
Mr A P Thomson, Shell Aviation Limited
Mr S Turton, Sheffield
Mr J R Wainewright, Wear Malvern

STUDENTS

Mr H Abdo, Dundee
Mr M Duffy, Dursley
Mr S Shankar, University of Reading
Ms D Wolseley-Opuogulaya, University of Dundee

NEW FELLOW

Dr Nina Parkinson F Inst Pet
Dr Nina Parkinson gained her MSc in Advanced Analytical Chemistry from Bristol University. She started her scientific career in Iran working for the Iranian Atomic Energy Organisation.

This was followed by working in Thailand for the University Chulalongkorn in Bangkok, starting up the Analytical Chemistry Laboratory for the Postgraduate Department. Nina then continued her international career working on ad hoc projects in South America.

In 1991 she joined ITS Caleb Brett, in the Analytical Instrumentation Section in the UK. During this time she also joined various panels of the IP Committees (STG 5), Gas Chromatography panel and she also presented a lecture to the Micro Analysis Group of The British Society of Chemists at The London School of Economics.

Whilst working for ITS in the UK she completed her PhD in the Characterisation of Fuel Additives at the University of Surrey.

In 1998 she was appointed Testing Director for the Caspian Region where she has since been based. This has involved the setting up of the laboratories in full accordance with international standards in various different locations including Georgia, Kazakhstan and Turkmenistan, with the centre of excellence being the Baku laboratory in Azerbaijan. Dr Parkinson is also responsible for the quality testing on one of the major oil producing PSA's in Azerbaijan.

DEATHS

We have been notified, over the past few months, of the deaths of the following members:

	Born
Mr H D Acres	1906
Mr N G Chadwick	1964
Mr D Kaye	1932
Mr N Miller	1927
Mr P W Needham	1930
Dr J N Paulus	1929
Dip Ing F Sager	1903
Mr D Trott	1931
Mr J B Williams	1921

EVENTS Forthcoming

JULY 2001

5–6 **London**
Investing in Great Libyan Jamahiriya
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcenergy.com/libya

5–6 **Amsterdam**
European Gas
Details: IBC Global Conferences, UK
Tel: +44 (0)1932 893857
Fax: +44 (0)1932 893893
e: cust.serv@informa.com
www.ibcglobal.com

6 **London**
Biotechnology for Industry
Details: Department of Trade and Industry, UK
Tel: Freephone UK – 0800 432100
Fax: +44 (0)1235 432997
e: biowise.help@aeat.co.uk
www.dti.gov.uk/biowise

16–17 **London**
Energy Trading
Details: SMi Conferences, UK
Tel: +44 (0)870 9090 711
Fax: +44 (0)870 9090 712
www.smi-online.co.uk

23–27 **Edinburgh**
Engineering of Gas Condensate Reservoirs
Details: Heriot-Watt University, UK
Tel: +44 (0)131 451 3014
Fax: +44 (0)131 451 3005
e: k.m.muir@hw.ac.uk
www.hw.ac.uk

23–27 **Edinburgh**
Welltest Analysis
Details: Heriot-Watt University, UK
Tel: +44 (0)131 451 3014
Fax: +44 (0)131 451 3005
e: k.m.muir@hw.ac.uk
www.hw.ac.uk

25–27 **London**
XML Integration for Chemicals
Details: IQPC, UK
Tel: +44 (0)20 7368 9300
Fax: +44 (0)20 7368 9301
e: xmlforchemicals@iqpc.co.uk
www.xmlforchemicals.com

30–3 August **Edinburgh**
Advanced Welltest Analysis
Details: Heriot-Watt University, UK
Tel: +44 (0)131 451 3014
Fax: +44 (0)131 451 3005
e: k.m.muir@hw.ac.uk
www.hw.ac.uk

SEPTEMBER 2001

4–6 **Antwerp**
MariChem 2001
Details: Turret RAI, UK
Tel: +44 (0)1895 454545
Fax: +44 (0)1895 454647
www.marichem.com

4–7 **Aberdeen**
Offshore Europe
Details: The Offshore Europe Partnership, UK
Tel: +44 (0)20 8949 9222
Fax: +44 (0)20 8949 8186
e: oe2001@spearhead.co.uk
www.offshore-europe.co.uk

7–8 **Singapore**
Pacific Petroleum Insiders
Details: The Conference Connection, Singapore
Tel: +65 226 5280
Fax: +65 226 4117
e: info@cconnection.org

9–12 **Alberta**
Changes Influencing International Negotiations – New Opportunities for Success
Details: Association of International Petroleum Negotiators (AIPN), Canada
Tel: +1 403 290 3155
Fax: +1 403 290 3517
www.aipn.org

11 **Wolverhampton**
Improving Safety in Petroleum Distribution
Details: Laura Viscione
The Institute of Petroleum

11–14 **St Petersburg**
Offshore Oil & Gas of the CIS
Details: RESTEC, Russia
Tel: +7 812 320 80 91
Fax: +7 812 320 80 90
e: oil&gas@restec.spb.su
www.restec.ru

11–14 **St Petersburg**
Development of the Russian Arctic Offshore
Details: RESTEC, Russia
Tel: +7 812 320 80 91
Fax: +7 812 320 80 90
e: oil&gas@restec.spb.su

26 **London**
Cadman Memorial Lecture
Details: Christine Pullen,
The Institute of Petroleum

13–14 **Stavanger**
Station Keeping Seminar
Details: IMCA, UK
Tel: 44 (0) 20 7931 8171
Fax: +44 (0)20 7931 8935
e: imca@imca-int.com
www.imca-int.com

15–18 **Dubai**
Arab Oil & Gas Show
Details: International Conferences and Exhibitions, UK
Tel: +44 (0)1442 878222
Fax: +44 (0)1442 879998
e: general@ice-ltd.demon.co.uk

17–18 **Dublin**
Irish Energy III
Details: SMi Conferences, UK
Tel: +44 (0)870 9090 711
Fax: +44 (0)20 7252 2272
www.smi-online.co.uk

17–18 **Houston**
Gas to Liquids – Viability, Economics and Strategy
Details: IBC Global Conferences, UK
Tel: +44 (0)20 7637 4383
Fax: +44 (0)20 7453 2058
e: sherri.wasmuth@informa.com

17–19 **Berlin**
ERTC Reliability Conference
Details: Global Technology Forum, UK
Tel: +44 (0)1737 365100
Fax: +44 (0)1737 353068
e: events@gtforum.com
www.gtforum.com

18–20 **London**
Advances in Risers, Moorings and Anchorings in Deepwater Fields
Details: IBC Global Conferences, UK
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Fax: +44 (0)20 7453 2058
e: sherri.wasmuth@informa.com

19–20 **Aberdeen**
Introducing Subsea Pipeline Engineering
Details: Trevor Jee Associates, UK
Tel: +44 (0)1892 544725
Fax: +44 (0)1892 544735
www.tja.co.uk

24–25 **Leeds**
Incineration of Municipal Waste with Energy Recovery
Details: University of Leeds, UK
Tel: +44 (0)113 233 2494
Fax: +44 (0)113 233 2511
e: cpd.speme@leeds.ac.uk

27–28 **Berlin**
World Trade and Standardisation
Details: IFAN, Germany
Tel: +49 (0)30 26 01 2485
Fax: +49 (0)30 26 01 4 2485
e: uta@djadali@din.de

NEW Publications

Energy Market Design and Creation in Asia Pacific*

Dr Graham Thomas (World Energy Council, 5th Floor, Regency House, 1–4 Warwick Street, London W1B 5LT, UK). 194 pages. Price: £45 (members), £50 (non-members).

This report focuses on the Asia-Pacific's liberalisation experience to date, drawing out the lessons learned for those countries currently embarking on market reform. It concludes that the task of market reform is much broader than the creation of arrangements for competition in electricity generation.

Guidelines for the Safe Packing and Handling of Cargo to and from Offshore Locations

(Available from UKOOA, Tel: +44 (0)20 7802 2400. Price: £25 (members); £50 (non-members)

Issued at the end of May by the UK Offshore Operators Association (UKOOA), this report offers practical advice on the packing, stowing, and handling of cargo carrying units (CCUs), tubular goods, and oddly shaped components. Despite statistics issued by the Marine Safety Forum showing that lost days accidents have been falling since 1996, the UKOOA working group found that between 1999 and 2000, the number of dangerous incidents increased. It has included in the guidelines a standardised form for reporting non-compliance incidents relating to CCUs, lifting and slinging, packing, dangerous goods, and documentation. When the guidelines come into universal operation on 1 January 2002, it is hoped that these reports will quickly highlight specific problems enabling the Association to target action for improvements. The guidelines will be kept under regular review and reissued biennially.

Using photographs and illustrations to demonstrate best practise for the selection of packing and handling methods, the guidelines will be of interest to inexperienced and experienced cargo handlers alike. Checklists are included for the condition of the CCU and vessel loading, with a flow chart for lifting operations.

Brian Warshaw

The Islamic Republic of Iran*

(Scottish Trade International and Scottish Enterprise Energy Group, 10 Queens Road, Aberdeen AB15 4ZT, UK). 83 pages. Copies of the report are free to Scottish-based companies.

This report highlights the range of opportunities available to Scottish oil and gas service and supply companies in Iran, underlining the growing demand for new technology to satisfy the current boom in the country's oil and gas industry. It also warns that opportunities will become limited once the sanctions on American companies are lifted, stating that US businesses are 'set to flood the existing markets,' possibly by the end of the year.

The United Arab Emirates – The Business Traveller's Handbook*

Richard Parry (Gorilla Guides, 128 Kensington Church Street, London W8 4BH, UK). ISBN 1 903185 0 25. 210 pages. Price: £12.50.

This guide, together with four other handbooks in the series – guides to Egypt, Turkey, Saudi Arabia and Argentina – offers pertinent business information and practical advice to business travellers including topics such as exploring the potential market; relevant visa/travel information; getting down to business; industry overviews; setting up permanent operations; and what to do on a break from business. It provides the business person with a range of easy to find, comprehensive information written by leading business figures who have spent many years in the respective regions.

Latest from the Library

YOUR OFFICE AWAY FROM HOME

IP Members are welcome to suggest additions to library stock. Please e-mail or write to Catherine Cosgrove giving as many details about the publication as possible, and quoting your IP Membership Number.

Some New Editions to Library Stock

- *Corrosion Protection – Carbon and Low Alloy Steels for Use in Hydrogen Sulfide Containing Environments in Oil and Gas Production: Materials and Test Methods Guidelines. Draft for Development, DD ENV 13797: 2001.* British Standards Institution (BSI), London, UK, July 2001.
- *Environmental Protection Yearbook.* National Society for Clean Air and Environmental Protection (NSCA), Brighton, UK, March 2001.
- *Geological Perspectives of Global Climate Change,* edited by L C Gerhard, W E Harrison, B M Hanson. American Assocation of Petroleum Geologists (AAPG) Studies in Geology 47, Tulsa, US, 2001.
- *Green Paper: Towards a European Strategy for the Security of Energy Supply.* European Commission, Luxembourg, EC, 2001.
- *Oil Supply Security: The Emergency Response Potential of IEA Countries in 2000.* International Energy Agency (IEA), Paris, France, 2001.
- *The Safe Use and Handling of Flammable Liquids, Ist Edition, HSG 140.* Health and Safety Executive (HSE), Sheffield, UK, 1996 (reprinted 1998).
- *Shale Oil: Scotland – World's Pioneering Oil Industry, 2nd (revised edition),* David Kerr, Scotland, 1999.

Library & Information Service Hours

Open 9.30 am to 5 pm Monday to Friday (except Bank Holidays). Non-members are welcome on payment of an entrance fee of £20 for half a day or £30 for a full day. Student non-members may use the library for £2 per day if they bring a letter of introduction from their tutor and their student ID card.

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  Sally Ball, Information Officer, +44 (0)20 7467 7115
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  Webmaster, +44 (0)20 7467 7112
- **LIS management queries to:**
  Catherine Cosgrove, Head of LIS, +44 (0)20 7467 7111
- **IFEG queries to:**
  Sally Ball, IFEG Secretary, +44 (0)20 7467 7115

Fax any of the above on +44 (0)20 7255 1472 or e-mail: **lis@petroleum.co.uk** Visit our website at **www.petroleum.co.uk**

Report on the risk of static ignition during vehicle refuelling: A study of the available relevant research

The IP has recently published the above report with the Society of Motor Manufacturers and Traders Ltd (SMMT) and UK Petroleum Industry Association (UKPIA). Following a significant number of fires at petrol filling stations outside of the UK, which could be attributed to ignition of hydrocarbon vapour by electrostatic discharges. It was agreed to review the belief that there was currently no significant threat of such incidents in the UK. IP, SMMT and UKPIA commissioned this report, which is based on a worldwide literature search and analysis of ignition risk. The report identifies key strategies for ensuring that vehicles and station facilities continue to be constructed in such a way as to minimise the risk. This report will be of interest to all those involved in the design of vehicles, design and operation of petrol filling station facilities, and concerned with the safety of personnel on forecourts.

ISBN 0 85293 306 1 £48.00 (25% discount for IP Members)

VOC emission control and its costs in the UK petrochemical sector. Impact of the 'Gothenburg' Protocol and National Emission Ceilings Directive

This new report assesses the impact of the Gothenburg Protocol and National Emissions Ceilings Directive on VOC emission control in the UK Petrochemical Sector. This is a key issue impacting on all aspects of industry operations, from production through to refining and distribution and is likely to remain a key issue as attention continues to focus on ozone over the next few years. The report provides a high level view of the background to legislation and discusses the most recent forecasts for VOC emissions within the UK, assessing in particular the likely costs of achieving legislative targets for the petrochemical sector.

ISBN 0 85293 338 X £20.00 (25% discount for IP Members)

Available for sale from Portland Press Ltd inc. postage in Europe (outside Europe add £5.00). Contact Portland Press Ltd, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0)1206 796 351. Fax: +44 (0)1206 799 331. e: sales@portlandpress.com

For further information please contact the IP Publications Department on 020 7467 7100

IP Discussion Groups & Events

Energy, Economics, Environment

'Implications of the Gas and Electricity Crisis in the US'

by **Graham Weale,** Director, European Energy Studies, Primark WEFA Ltd

19 September 2001, 17.00 for 17.30 at the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR, UK

Contact: Laura Viscione Tel: +44 (0)20 7467 7100

Energy, Economics, Environment

'West Africa – the Elephants' Graveyard'

by **Joseph Bryant,** President, Angola Business Unit, BP Exploration Operating Company

11 October 2001, 5 pm for 5.30 pm at the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR, UK

Contact: Laura Viscione Tel: +44 (0)20 7467 7100

Energy, Economics, Environment

'Merger Strategies and Outcomes – Winners and Losers in Oil and Gas Investments'

by **Martin Lovegrove,** Harrison Lovegrove & Co. Ltd

30 October 2001, 17.00 for 17.30 at the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR, UK

Contact: Laura Viscione Tel: +44 (0)20 7467 7100

IP THE INSTITUTE OF PETROLEUM

Branch Activities

Southern

Contact: *Veronica Cloke Browne, Tel: +44 (0)1962 715399*

TBA July: Visit to Enichem

TBA August: Softball tournament

TBA Sept: Talk by West Moors School of Petroleum

IP Training Courses 2001 – Brochure

For details of how to obtain your copy please contact Nick Wilkinson at the IP

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OBITUARY

NIALL CHADWICK

BA, MA Trinity College, MInstPet

It is with regret that Hibernian Oil announced the death of their esteemed colleague Niall Chadwick who died very suddenly at the end of April in Dublin.

He is sadly missed by all his colleagues and the many friends he made in the oil industry throughout the Caspian and elsewhere.

Niall Chadwick became a Member of the Institute of Petroleum in 1997.

IP THE INSTITUTE OF PETROLEUM

Seminar and Exhibition

Improving Safety in Petroleum Distribution

Tuesday 11 September
Wolverhampton Science Park
Wolverhampton, UK

For more information please contact the IP Conference Department
Tel: +44 (0)20 7467 7100 e: *events@petroleum.co.uk*

The IP's Distribution and Marketing Safety Committee's new seminar providing information on new initiatives, disseminating new IP guidance, and advising pertinent regulatory developments for SH&E professionals and managers of distribution terminals, distribution contractors and authorised contractors.

IP Conferences and Exhibitions

Cadman Memorial Lecture

Springboard for progress – building on the energy industry's record for responsiveness

Gibson Hall, Bishopsgate, London EC2:
Wednesday 26 September 2001,
16.30 for 17.00

Sir Mark Moody-Stuart KCMG
Former Chairman of the Royal Dutch/Shell Group of Companies

Admission, strictly by ticket only, is free of charge. In the event of the Lecture being oversubscribed, priority will be given to IP members.

Tickets and further information are available from the IP Conference Department.

The Russian Oil and Gas Sector: Prospects and Opportunities for Growth and Development

in association with **AFTP, Confitec, DGMK** *and* **Trade Partners UK**

London: 1–3 October 2001

Topics to include:

- Russian oil and gas production in light of the transforming global markets
- Pricing
- Reserves structures and management of resource allocation
- Infrastructure development
- Financing
- Risk management

Full details from the IP Conference Department.

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ip://awards/2001

Date: 22 November 2001
Place: The Savoy Hotel, London W1, UK
Time: 12.30 pm

TO REGISTER FOR THE AWARDS
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Photo: Emma Parsons

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For Luncheon tickets please contact:

Christine Pullen,
IP Conference Supervisor
Tel: +44 (0)207467 7106
Fax: +44 (0)20 7255 1472
e: *cpullen@petroleum.co.uk*

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MOVES People

Malcolm Webb **is the new Director General at UKPIA. He began his oil industry career in 1974 at Burmah Oil and went on to head legal departments at BNOC, Charterhouse Petroleum and Fina. In 1995 he took control of the Human Resources Department at PetroFina in Brussels, taking over as Managing Director of Fina in the UK in 1999 with a special brief to facilitate its merger with Total. Since leaving PetroFina he has undertaken consulting projects and has lectured at Kingston University Business School.**

The Institute of Petroleum is pleased to welcome back **Catherine Pope** as its new Webmaster/IT Manager. Catherine previously worked at the IP from 1996 to 1999.

Lukoil Europe Holdings President **Ralif Safin** has been named Head of the Board at Lukoil-Odessa oil refinery.

Noble Denton has appointed **Peter Nation** to its Singapore office.

UK energy regulator Ofgem has appointed **Nicola Northway** as General Counsel of its Legal Department.

Thierry Desmarest has been re-elected Chairman and CEO of TotalFinaElf.

The Hungarian oil and gas company Mol has named **Ferenc Denes** and **Zalan Barcs** as Board Members of Slovnaft, in which it holds a 36.2% stake.

Vera de Ladoucette has joined Cambridge Energy Research Association (CERA) as Director for Middle East Research.

Phillips Petroleum has named **Michael Panatier** Chief Operating Officer of its new Refining, Marketing and Transport Division once the takeover of Tosco is completed. **Tom Nimbley** will become Senior Vice President; **Steve Barham, Mark Harper** and **Dave Holthe** have been named Vice Presidents.

DONG, the Danish oil and gas group, has appointed **Anders Eldrup** as President.

Paul Clark **has been appointed Technical Sales–UK and Europe for Federal Signal, a supplier of public address/general alarm systems for the oil and gas market.**

Jonathan James has been appointed Regional Policy Manager by the UK Freight Transport Association (FTA), taking over from **Heather Crocker** who has been promoted to Northern Regional Director.

Law firm Sinclair Roche & Temperley has recruited offshore energy specialist **Russell Ridley** as a Partner in the firm's Energy Practice Group.

BHP has appointed **Steve Bell** President–Deepwater Discovery and Appraisal.

Graham Wright has been elected President of the Society of British Gas Industries.

Severn Glocon, the UK-based industrial control valve manufacturer, has appointed *A S Kumar* Regional Sales Manager –Asia Pacific. He will be organising Far East operations.

OBITUARY
Ir Dirk van der Meer

It is with deep regret that we announce the recent death of Ir Dirk van der Meer, who was a former President of the World Petroleum Congress (WPC), following his battle against cancer.

Ir Dirk, from the Netherlands, was elected as WPC President during its 14th WPC in Stavanger in 1994. He had spent many years being involved with the work of the Congress and his working career took him to various sectors within the Royal Dutch/Shell Group. When he first became involved with WPC he was General Manager and Director of Research at KSLA, Shell's Research Laboratory in Amsterdam.

His longstanding links with the Far East (he was born in Jakarta in 1935) proved his forte at the 15th WPC where he played host to over 5,000 delegates and dignitaries, including the President of China, Jiang Zemin.

Ir Dirk actively contributed to the increase in WPC membership from 26 countries when he assumed his Presidency to 59 countries when he handed over to his successor, the current WPC President Dr Eivald M Q Røren of Norway, at the end of the 16th WPC in Calgary in June 2000.

His two terms as President were distinguished by his excellent relations with the member countries of the WPC, as well as his outside links with the petroleum industry, his dedication to serving the WPC, and his good humour with colleagues and staff. His awareness and understanding of cultural differences gave him a unique sense of political awareness that held him in high regard among all who knew him at WPC.

Ir Dirk will be sorely missed. He will always be remembered as an honourable and distinguished President of WPC.

IP THE INSTITUTE OF PETROLEUM

IP Autumn Lunch

The Oil Industry and the Knowledge Age

Guest of Honour and Speaker

Euan Baird

Chairman and Chief Executive Officer
Schlumberger

Park Lane Sheraton, London W1
Tuesday 2 October 2001

The IP Autumn Lunch is now an established date in the oil and gas calendar of events, and provides a unique opportunity to hear an internationally-renowned figure speak on the issues influencing our global industry today.

The Institute of Petroleum is pleased to announce its fourth annual IP Autumn Lunch, this year with Guest of Honour and Principal Speaker, Euan Baird, Chairman and Chief Executive Officer, Schlumberger

Early bird discount on tickets purchased before 23 July

For more information on registering for the above event please contact: Christine Pullen, IP Conference Supervisor, The Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR Tel: +44 (0) 20 7467 7100 Fax: +44 (0) 20 7580 2230 e: cpullen@petroleum.co.uk

For more information on other IP events please visit the IP website: www.petroleum.co.uk

Euan Baird, a Scot educated in the UK, joined Schlumberger in 1960 as a field engineer. His career commenced with various field assignments in Europe, Asia, the Middle East and Africa, following which he was appointed Vice President of Operations, Technical Services, Paris. He moved to New York in 1979 as Executive Vice President of worldwide wireline operations, and in October 1986 he was elected Chairman of the Board, President and Chief Executive Officer.

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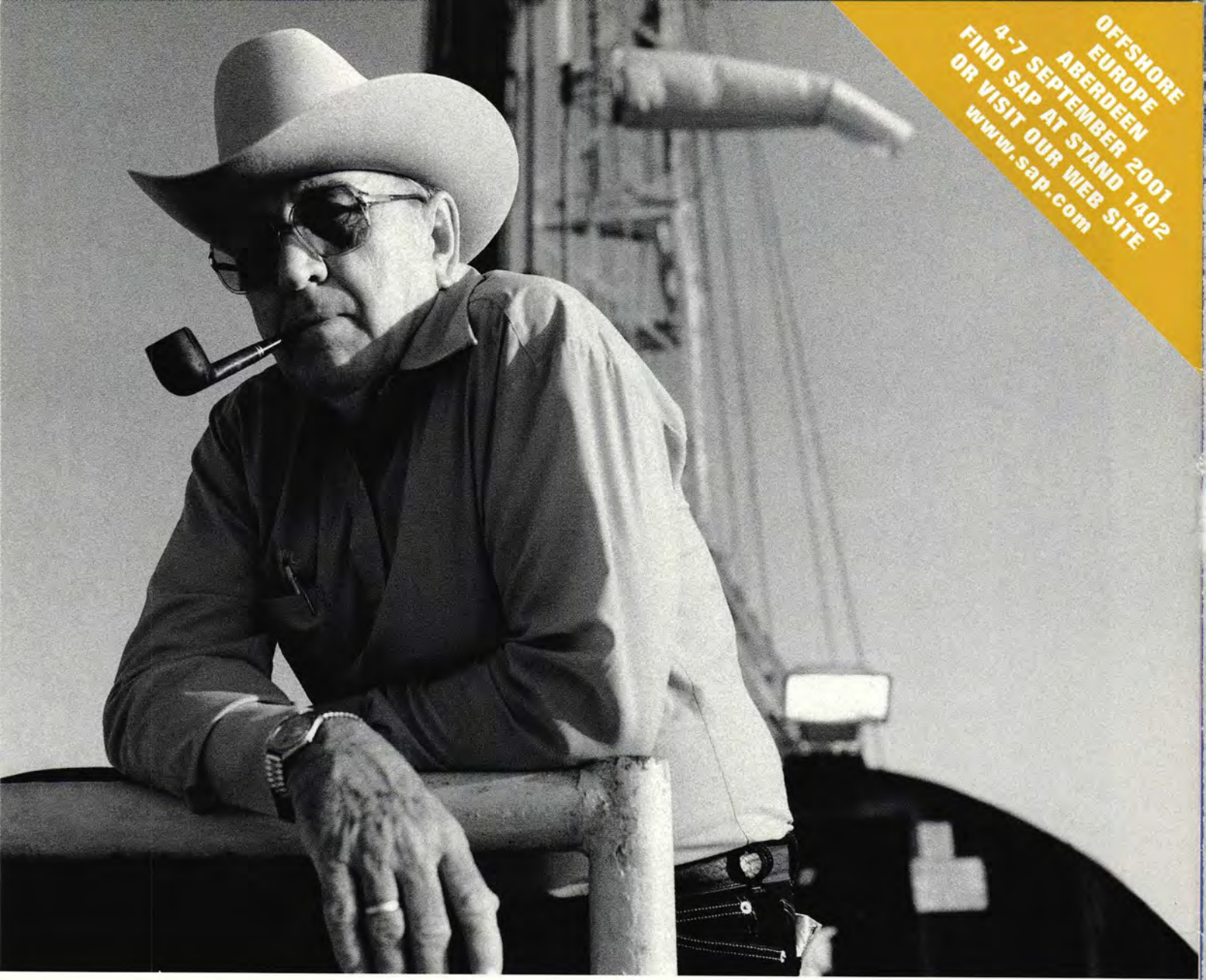

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