

Petroleum review

JANUARY 2000 VOLUME 54 NUMBER 636
£12.50+ SUBSCRIPTIONS (INLAND) £145.00 (OVERSEAS) £170.00

PUBLISHER



THE INSTITUTE
OF PETROLEUM

A charitable company limited by guarantee

Director General: Jeff Pym

61 New Cavendish Street

London W1M 8AR, UK

General Enquiries:

Tel: +44 (0)20 7467 7100

Fax: +44 (0)20 7255 1472

EDITORIAL

Editor: Chris Skrebowski *FirstPet*

Associate Editor: Kim Jackson

Production Manager: Emma Parsons

The Institute of Petroleum

61 New Cavendish Street, London W1M 8AR, UK

Editorial enquiries only:

Tel: +44 (0)20 7467 7118/9

Fax: +44 (0)20 7637 0086

e: petrev@petroleum.co.uk

www.petroleum.co.uk

ADVERTISING

Advertising Manager: Jolanda Nowicka

Anne Marie Fox

Production: Catherine Meade

Landmark Publishing Services,

8 New Row, London WC2 4LH, UK

Tel: +44 (0)20 7240 4700

Fax: +44 (0)20 7240 4771

SUBSCRIPTIONS

Subscription Enquiries: Portland Press

Tel: +44 (0)1206 796351 Fax: +44 (0)1206 799331

Printed by The Thanet Press Ltd, Margate

US MAIL: Petroleum Review (ISSN 0020-3076 USPS 006697) 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.

ISSN 0020-3076

MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

ABBREVIATIONS

The following are used throughout *Petroleum Review*:

mn = million (10⁶)

bn = billion (10⁹)

tn = trillion (10¹²)

cf = cubic feet

cm = cubic metres

boe = barrels of oil equivalent

ty = tonnes/year

kW = kilowatts (10³)

MW = megawatts (10⁶)

GW = gigawatts (10⁹)

kWh = kilowatt hour

km = kilometre

sq km = square kilometres

b/d = barrels/day

td = tonnes/day

No single letter abbreviations are used.

Abbreviations go together eg. 100mn c/y = 100 million cubic feet per year.

© Institute of Petroleum

Front cover: Impressions of an industry moving into the next century

Millennium Dome photo by Stephen Tempest

Montage by Emma Parsons

inside...



news

- 3 UPSTREAM
- 6 INDUSTRY
- 9 DOWNSTREAM
- 40 TECHNOLOGY

special features

- 12 INDUSTRY – FUTURE PROSPECTS
Upbeat outlook for the Millennium
- 15 NORTH AMERICA – FUTURE DEVELOPMENT
Ample reserves but poor prospects for US oil and gas
- 18 FABRICATION – OVERVIEW
Bleak prospects for European construction yards
- 19 IP WEEK 2000 – DIARY OF EVENTS
- 32 SHIPPING – FUTURE TRENDS
Superb designs for 21st century tankers – but who will pay?

features

- 22 IT SYSTEMS – PROJECT MANAGEMENT
A new agenda for the 21st century
- 24 INTERNET – E-NABLEMENT
Powering up e-business
- 27 FORECOURTS – DESIGN
Driving forces for motorway forecourt design
- 30 NORTH SEA – OIL PRICE
Forties blend – a heir apparent to Brent still in waiting
- 34 GAS – PROCESSING
GTL begins to rival LNG
- 36 SOUTH KOREA – ENERGY
Economic recovery gives boost to energy consumption
- 38 OILFIELD SERVICES – MERGERS
And now mega-contractors
- 42 COURSES – UPDATE
IP Training 2000
- 43 IP – INFORMATION SERVICES
New library services for the millennium

regulars

- 2 FROM THE EDITOR/WEB WORLD
- 11 STATISTICS
- 44 MEMBERSHIP NEWS
- 45 IP DISCUSSION GROUPS AND EVENTS
- 46 IP CONFERENCE AND EXHIBITIONS
- 47 FORTHCOMING EVENTS
- 48 STANDARDS



The Institute of Petroleum as a body is not responsible either for the statements made or opinions expressed in these pages. Those readers wishing to attend future events advertised are advised to check with the contacts in the organisation listed, closer to the date, in case of late changes or cancellations.

Nervously awaiting the new century

The international oil and gas industry has a good claim to be one of the most successful industries of the 20th century – it has also been a key influence in shaping the 20th century.

The world's towns and cities have been built and rebuilt in reaction to the explosive growth in motor vehicles. Oil products, plastics and petrochemicals have changed the lives of not millions, but billions, of people around the world. Virtually everyone on the planet has been affected by the availability of oil and gas – for virtually all it has been a positive benefit.

The industry's detractors are, however, remarkably noisy and all too often unchallenged in their criticisms. The industry cannot let the latest challenge to globalisation from the 'Seattle' brigade go unanswered. The industry's truly remarkable record of consistent supply has underpinned its success. It is, therefore, very strange that as the century closes, the industry is so nervous and uncertain about the future.

Historically the international oil and gas industry has managed to deliver all the energy required to all those with the ability to pay. It has been a uniquely reliable supplier. Even in the face of the Suez Canal closure in 1956 and the Arab oil embargo in 1973 it managed to share out available supplies equitably.

The uncertainty about the future appears to stem from a number of areas. These can be loosely categorised as political, environmental, organisational, technological and resource based.

In the political arena many of the industry's fondest hopes have already materialised. Price controls have largely disappeared, government interference has been minimised. Everywhere, except Mexico and Saudi Arabia, is, at least theoretically, open to inward investment. Many state companies have been privatised.

Against this must be set the uncertainties engendered by Russia's ambivalent attitude to inward investment, China's territorial claim to virtually the whole South China Sea, the possible break up of Indonesia, re-emerging energy nationalism in Venezuela and possibly in Opec. Most immediately there is the continuing power play in the Caspian – a rivalry that could be immeasurably intensified if the Kashagan well, offshore Kazakhstan, does prove up large oil reserves.

The next area of concern is the environment and the Kyoto Protocol.

Historically the industry has always managed to adapt to tightening environmental legislation. Some within the industry are, however, beginning to worry that demands for 0% sulfur diesel and minimal carbon dioxide emissions are 'bridges too far'. Others are more positive, seeing gas-to-liquids (GTL) technology (see p34) as an answer to the first and emissions trading as an answer to the second.

A more immediate concern for virtually everyone in the industry is the size and extent of corporate change. The last 18 months have seen more change in companies and company structures than the previous 18 years. Famous names have disappeared, mega corporations have emerged. The unanswered and possibly unanswerable question is: Are mega-majors a permanent or only a temporary solution? Does vertical integration still offer synergies or is the next stage break up to release value? Some companies have been prepared to outsource virtually all aspects of the business – is the virtual corporation an answer for the next century?

On top of all these uncertainties comes the impact of the Internet. The potential gains are far too large to be ignored but the oil industry – very much the pioneers of large-scale application of computing to business in the 1960s and 1970s – has been slow to seize the opportunities of the Internet (see p22). The final concern is the resource itself. Oil is getting harder to find, while gas has always proved less profitable. Should the industry 'stick with its knitting' or diversify into renewables or nuclear? Should it integrate forward into electricity? Another intriguing idea is that oil companies should outsource the down hole operations and risks to the big contractors (see Dick Cheney speech, p12).

There is much uncertainty as the industry enters the new millennium but it is hard to believe that success will evade it for long. This is the industry that has discovered and developed resources in the most inhospitable spots on earth, from baking 60°C deserts to freezing Siberian wastes, from half-way up the mountains to two miles beneath the oceans. An industry that has survived nationalisations, revolutions, rebellions and wars will surely triumph over the uncertainties mentioned, even if they did all arrive at once.

Petroleum Review wishes all its readers a successful and prosperous millennium. But please cheer up.

Chris Skrebowski

The good news about the Web continues to ripple around the world. The Middle East, long known for secrecy rather than openness, now appears to be recognising the benefits. The Dolphin initiative (see *Petroleum Review*, November 1999) now has a site at www.uaedolphin.com to help the industry and media keep up with the latest developments. Another window into the Middle East is Saudi Aramco's new site at www.saudiaramco.com

Many companies soon find that having proved the usefulness of a site, the next step is to rebuild and expand. Syntroleum Corporation has just launched a redesigned corporate website (www.syntroleum.com) featuring a range of technical articles published by the company on gas-to-liquids (GTL) technology.

At a recent meeting in Stavanger organised by the Petroleum Engineering Association (PEA) and Offshore Technology Management (OTM) – suppliers and researchers heard of the increasing importance of sand and water management as North Sea production matures, driving the need for improved solutions. The next meeting is in Aberdeen in March 2000 – details can be found on their respective websites www.peajup.org and www.otmnet.co.uk

E-biz in brief (also p22)

E-business is booming. According to the US technology consultant Forrester Research, energy business on the Internet could reach \$265bn in 2004, with the bulk of this as inter-company business, sometimes referred to as B2B. Its estimate of Internet energy business in 1998 is \$8bn. In addition to e-procurement it notes increasing use of online trading auctions for supplies procurement and product sales. Companies including Schlumberger, Texaco and Caltex have already signed up auction platforms.

Just how important these can become can be seen from the chemicals industry. The global Internet exchange and information resource for bulk commodity chemicals reported record sales in November of \$11.5mn in transactions, involving 321,000 barrels (45,000 tonnes) of products. The exchange claims over 50 of the world's leading chemical companies are represented, with average transaction values of over \$0.5mn on its 24-hour per day site at www.chematch.com

For those concerned with the legal side, *Business, the Internet and the Law* – just published by Tolley's – claims to provide a way to avoid the potential 'minefield of litigation' for £49.95 (Tel: +44 (0)20 8622 2000 or contact order.line@butterworths.co.uk).

UKCS tie-back first for Coflexip

Coflexip Stena Offshore has completed its first contract for a tie-back pipeline project in the UK continental shelf for BP Amoco. The project involved the design, procurement, fabrication and installation of a tie-back from the NW Bell wellhead to the existing Bessemer platform.

The tie-back comprised 9.3 km of 6-inch rigid pipeline with a flexible riser at Bessemer and spool tie-in at NW Bell, trenched and backfilled, plus a control umbilical buried in a separate trench. The work also included the crossing of the main pipeline from Inde to Bacton, along the pipeline/umbilical route.



CSO Wellservicer alongside the Bessemer platform

Job losses as Kvaerner restructures business

Kvaerner has launched its new blueprint for the Group's future oil and gas business which aims to (a) service the needs of a developing industry and market by changing the company's emphasis from North Sea to international operations, and (b) shift from large-scale fabrication projects to subsea and process technologies. The overall objective is to improve shareholder value by focusing on margins and profits, states the company.

Oil & Gas is one of the three core businesses of the 'new Kvaerner' - headed by Jan T Jørgensen. The separate UK and Norwegian business units are to be combined and refocused, replaced by a single capital development projects business, and an onshore and offshore operational services business.

The capital development projects business - to be called Field Development - will service all of the North Sea. The lead location for this unit will be in Oslo, Norway, and will be headed by Otto Soberg, Senior Vice President.

The second dedicated business stream providing onshore and offshore operational services - to be called Modifications, Maintenance and Operations - will be based in Aberdeen, Scotland. This new unit, led by Alan Wilson, Senior Vice President, will initially focus on Norway and the UK and will act as one of the principal drivers of growth in Kvaerner's Oil & Gas division. A local presence will also be maintained at Teesside in the UK, and Stavanger and Bergen in Norway.

'These key organisational changes are in response to a declining capital projects

market in the North Sea which, until recently, has accounted for up to 80% of Kvaerner's entire oil and gas business worldwide,' states the company. 'It is anticipated that in future, dependence on North Sea activities will be reduced to approximately 50% of all business activity.' The balance of work is expected to focus on key developing regions such as West Africa and the Gulf of Mexico, although other well-established hubs of business, such as Houston in the US, are likely to benefit from a continuity and growth of development activities.

Kvaerner Oilfield Products, Kvaerner Process Systems and Kvaerner Eureka will continue to spearhead the other significant areas of growth in Kvaerner's Oil & Gas business. While for the immediate future, these units will continue to operate separately, new initiatives are planned to more closely integrate their activities in a bid to 'create a stronger focus for the Kvaerner brand' in the oilfield products and process systems sector.

A major consequence of the sharp downturn in oilfield capital development projects is the excess yard capacity held by Kvaerner. The Group has four major offshore fabrication yards: Stavanger and Egersund in Norway, and Teesside and Methil in the UK. The future of the individual yards will be reviewed as available work declines - however, a decision has already been made to mothball the Teesside yard following completion of the current Triton project later this month, and to close the offshore facility at Agotnes in Norway.

United Kingdom

Repsol YPF is to sell its UK assets to US company Kerr-McGee for \$555mn. Assets include 33% and 25% stakes in the producing Harding and Buckland fields, together with 33% interests in the Maclure and Skene North Sea prospects.

Ranger Oil has announced that its 20,000 bid Kyle North Sea oil field is due onstream, via Banff, in 2Q2000.

UK Energy Minister, Helen Liddell, has awarded a petroleum production licence over offshore block 98/11 to a consortium of BP Amoco, Kerr-McGee, Premier Oil and Talisman. The block is adjacent to the BP Amoco-operated onshore/offshore Wytch Farm field near Poole Harbour.

Europe

Elf and Norsk Hydro are understood to have joined forces to develop the Vale, Skirne and Byggve marginal gas fields as satellites to the Heimdal field in the North Sea.

Norway Statistics is reported to have upgraded its forecast of Norwegian exploration investment in 2000 by Nkr3.4bn to Nkr7.1bn (\$895mm). Spending in 1999 is expected to reach Nkr5.2bn.

The Greek Government is reported to have granted Kavala Oil a five-year concession to redevelop and operate the Prinos oilfield in northern Greece.

Statoil is reported to be considering the abandonment of two of its Statfjord platforms in order to extend the lifespan of the field by 10 years. The Nkr1bn plan would shift all production to the third platform. Oil output is expected to have reduced to 210,000 bbl/d in 2000, down from a peak of 716,000 bbl/d in 1987.

Elf Petroland is reported to have brought the L4 PN satellite platform onstream in the first stage of the joint development of several new gas fields in the Dutch continental shelf.

North America

Elf's Virgo field in the Gulf of Mexico is reported to have entered production. Output is expected to reach 23,000 boe/d in 2001.

High oil price is not sustainable

The average price of Brent crude oil during November 1999 - \$25/b - is an unsustainable price in the medium term and will fall when production constraints are lifted, according to the latest Royal Bank of Scotland *Oil and Gas Index*.

The belief among oil producers that prices will fall from current levels means that the investment outlook for 2000 is not looking as promising as it may first appear.

The very low prices of late 1998 and early this year still loom large in oil producers' thoughts. As a result, there will be only a limited increase in cap-

ital expenditure in the first half of the year, says the report.

For investment to increase, producers need to be confident that prices will remain above \$14/b for the foreseeable future, and that there is no repeat of December 1998's \$9 and \$10 prices.

Stephen Boyle, Head of Business Economics, says: 'This is a market in which governments effectively control 40% of production. They have recently shown the determination and ability to constrain output and, as a result, it is very difficult to determine the equilibrium price.'

Year Month	Oil production (av. b/d)	Gas production (av. mn cf/d)	Av. oil price (\$/b)
Oct 1998	2,600,813	8,832	12.60
Nov	2,612,843	10,738	11.07
Dec	2,715,056	11,123	9.81
Jan 1999	2,664,121	11,532	11.16
Feb	2,678,138	11,532	10.20
Mar	2,679,786	11,107	12.54
Apr	2,717,767	9,863	15.66
May	2,507,093	7,349	15.18
Jun	2,400,277	6,785	15.91
Jul	2,602,363	6,816	18.90
Aug	2,645,910	6,576	19.93
Sep	2,590,535	7,356	22.83
Oct	2,658,801	8,792	22.03

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Peciko onstream

TotalFina's Peciko gas field offshore East Kalimantan has come onstream at an initial rate of 11mn cm³/d of gas. Output is expected to reach 22mn cm³/d by January 2000. Gas is treated onshore at the Senipah terminal and sent to the Bontang liquefaction plant. Bontang's eighth liquefaction train was commissioned in early November, increasing the plant's total annual capacity to 21.8mn tonnes - making it the world's largest LNG plant to date.

TotalFina holds a 50% stake in the Peciko project, and acts as operator. Inpex of Japan holds the remaining interest.

Positive results for OMV

OMV Australia reports that its exploration well Nasutus 1, drilled in the Barrow sub-basin on the Northwest Shelf, Australia, has tested at 1,595 b/d of oil. It also reports that its Baleen 2 appraisal well on the Patricia-Baleen gas field in the Gippsland Basin, offshore Victoria, came in gas-bearing and has extended the southwestern limits of the field.

The company also reports that the Meranji East 1 extension well in the Cooper Basin, onshore South Australia, has added to reserves at the Meranji gas field. The well is due onstream in 1Q2000.

Exxon is understood to have brought the Sacate field offshore California onstream and an initial rate of 2,500 b/d of oil. Reserves are put at 50mn boe.

Middle East

Two new gas fields - Niban and Shaden - are understood to have been discovered in Saudi Arabia. Total reserves are put at 4tn cf of gas.

Technip of France is negotiating a contract for project management, front-end engineering and design services to develop a \$5.5bn gas field and pipeline project in Libya. The project will transport gas to Italy on behalf of Agip Gas.

Russia & Central Asia

The Turkmen Government is understood to have approved plans for the commercial development of the South Kamshlydzha oil field in west Turkmenistan. Recoverable reserves are put at 9mn tonnes of oil, 8.4bn cm³ of gas and 0.4mn tonnes of condensate.

The Russian Duma has approved a law enabling the Kovykta gas condensate field and the Shtokmanovskoye gas field to be developed under production sharing agreement terms.

The Kazakh Government has announced that it no longer plans to sell part of its stake in the Tengiz oil field. No reason was given for the decision.

A consortium of Saipem, Bouygues and a Japanese group comprising Mitsui, Sumitomo and Itochu is reported to have secured a \$1.7bn contract to design, engineer, procure and construct the offshore section of the Blue Stream gas pipeline linking Russia and Turkey.

Hungarian oil and gas company Mol and Yukos of Russia are to jointly operate the Zapadno-Malobalyk oil field in West Siberia. Proven field reserves are put at 175mn barrels.

Asia-Pacific

State oil company Petrovietnam is understood to be signing five joint venture E&P contracts with foreign oil and gas companies for blocks 102, 106, 09-2 and 09-3, the latter two lying in the Cuu Long Basin, offshore southern Vietnam.

Arco sells North Sea assets

Arco British has appointed investment banking firm Salomon Smith Barney to assist with the divestment of certain southern North Sea assets.

The sale is required by the European Commission as a condition of its approval of the merger between BP Amoco and Arco, completion of which is not expected before 2Q2000.

Arco is to sell its interests in the Thames area – including the Yare (43%), Bure (43.33%), Bure West (43.44%) and Deben (43.33%) fields – together with the Gawain (50%), Orwell (50%), Welland (33.73%), Hewett area (19.85%), Murdoch (34%) and Boulton (9.5%) fields. It is also to dispose of undeveloped Bedevere, Blythe, Horne, Wren and Wissey discoveries and nearby exploration acreage.

Arco's associated interests in the Thames (43.44%) and Hewett (19.85%) pipelines, the gas processing terminal at Bacton (19.85%), and the Caister-Murdoch system (17%) will also be sold. Net gas production from these properties currently averages 160mn cfd.

Venture secures finance

Oil company Venture Production has raised over \$30mn in new equity through a private placement to fund further acquisitions and on-going development activity in Trinidad and the UK Continental Shelf. It has also secured a \$10mn, five-year credit facility with the Bank of Scotland.

The company recently became the formal operator of the Brighton Marine field offshore Trinidad. Estimated to hold in excess of 500mn barrels of oil in place, the field currently has nine platforms and over 200 wells. Venture plans to increase production to over 3,000 boe/d by the end of 2000, a ten-fold increase in output.

Venture was originally formed to target the development of 'stranded' North Sea oil and gas reserves through the integration of advanced production technology, modern operating practices and new commercial philosophies. Its operations in Trinidad complement its planned North Sea activities by providing a steady, low-risk, low-cost production profile and operating track record both on and offshore.

Progress for TransCaspian pipeline project

The Presidents of Azerbaijan, Georgia, Turkey and Turkmenistan have signed a declaration underlining their support for the TransCaspian Gas Pipeline (TCGP) project. The countries have pledged their full commitment to the project and to cooperate in helping meet its target to deliver the first Caspian gas to Turkey by the end of 2002.

TCGP is a 50-50 joint venture between PSG (a pipeline development and invest-

ment company owned by GE Capital Structured Finance Group and Bechtel Enterprises Holdings) and Shell Exploration. It entails the construction and operation of a gas pipeline with a capacity of at least 16bn cm³ that will link Turkmenistan, Azerbaijan, Georgia and Turkey, and pass under the Caspian Sea.

The agreement puts additional pressure on Gazprom's competing Blue pipeline project.

Interim payment deal

Harland and Wolff, in conjunction with parent company Fred Olsen Energy, customer Global Marine, and the Confederation of Shipbuilding and Engineering Unions, has reached agreement regarding interim payments on two drillships currently under construction at the fabricator's Belfast yard.

Commenting on the deal, Brynjulv Mugaas, Chief Executive of Harland and Wolff, said: 'This agreement will enable Harland and Wolff to finish the two drillships for Global Marine and leave the company in a position to seek out and win new work. To assist us in this we would expect that the UK Government urgently address the issue of providing support to shipbuilding in such a manner so as to place us on an equal footing with other European countries.'

Faroës' offshore round

The first Faroës licensing round is expected to open in January next year. Some 56 whole blocks and 26 part blocks are expected to be on offer, with bidding closing in April or May 2000. Fiscal terms have yet to be finalised, although it is expected that corporation tax will be set at 27% and royalties at 2%. It is also reported that a special tax on a rate of return basis will be implemented for more profitable developments.

News in Brief Service

Visit *Petroleum Review's* News in Brief Service at the Institute of Petroleum's website at:

www.petroleum.co.uk

Woodside Petroleum has secured a production licence for the A\$110mn Legendre oil field offshore Western Australia. The field is due onstream in mid-2001, with output forecast to peak at between 40,000 b/d and 50,000 b/d. Field reserves are put at 40mn barrels of oil.

OMV is to supply gas from its Miano field in block 20 in Pakistan to Sui Southern Gas Company from 2001. Proven field reserves are 320bn cf.

Australia LNG is to supply 4mn ty of LNG to Tuntex Gas of Taiwan from 2003 in a \$6.4bn deal.

Latin America

BP Amoco has been awarded operatorship of block BFZ-2 in the deep-water Foz do Amazonas Basin offshore northern Brazil.

Petrobras is understood to be reassessing its development plan for the offshore Espadarte oil field. Plans are now to use one FPSO rather than two production units, and to drill 14 rather than 21 wells.

Enterprise Oil and Odebrecht have agreed terms with Petrobras to farm-in to the Bijupira and Salema fields in the Campos Basin offshore Brazil. Under the terms of the deal, Enterprise will act as operator.

PdVSA is understood to be planning to invest \$947mn in heavy oil upgrading projects in Venezuela in 2000.

Africa

Elf Aquitaine Nigeria is awarding contracts for the development of the offshore Amenam oil field which is expected to produce 100,000 b/d for 25 years.

EGPC has approved a development plan for the Hana oil field on the West Gharib block, onshore the Gulf of Suez.

The Nigerian Government is understood to be planning to offer 53 blocks for development under production sharing licences. The blocks include 29 new concessions in ultradeep waters.

Totalina and partners Repsol-YPF, OMV and Saga Petroleum have signed an agreement with Libya's National Oil Corporation to explore the M-4 block in the Murzuk region in southwest Libya.

Alaskan approval for BP Amoco Arco merger

BP Amoco has reached agreement with the Alaskan authorities regarding its proposed merger with Arco.

Combined with the agreement reached earlier this year with the Governor of California, this latest announcement will provide the company 'with the foundation for more focused and productive discussions with the Federal Trade Commission (FTC),' according to Chief Executive Sir John Browne.

Under the terms of the Alaskan agreement, BP Amoco has agreed:

- To eliminate price and volume provisions in the gas portion of the draft agreement and to make natural gas available at a competitive price to be agreed between the company, the state and prospective buyers.
- To publish an annual report detailing progress towards the environmental and community commitments made in the agreement.
- To guarantee, by contract, \$17mn in spending on oil spill response research and development, 'orphan' site (created and abandoned by other companies) clean up and assessment, and

pipeline oversight by the state.

- To clarify that BP Amoco's commitment to accelerate the introduction of double-hull tankers by one year applies to both chartered and company-owned vessels.
- To purchase, using a pre-determined pricing formula, up to 30,000 b/d of oil from minor producers with less than \$1bn in worldwide assets.
- To sell a 40% stake in the Alpine field and at least 50.01% in the Kuparak field. It is also to divest its operatorship in both fields.

The deal also confirms BP Amoco's undertaking to sell 175,000 b/d of production, 620,000 acres of state and federal exploration leases, and matching stakes in the TransAlaska pipeline systems (TAPS).

A number of other requirements are also to be met, including the provision of access to BP Amoco's North Slope spill response facilities by other companies, and the donation of the equivalent of 0.2% of production per year to Alaska (currently estimated at \$6mn/yr), of which 30% will go to the Alaska university system.

Chernogorfeft sold to Tyumen Oil

Chernogorfeft, the bankrupt subsidiary of Russian company Sidanco, is reported to have been sold by the receiver with the acceptance of a \$176mn takeover bid from Tyumen Oil Company. Chernogorfeft operates the northern sector of Samotlor field, said to be the largest oil field in Russia, while TNK operates the southern sector.

TNK is understood to be planning to enter into a number of joint ventures with foreign investors in a bid to minimise any losses from the sale of Chernogorfeft. The company is said to have stated that it hoped such a move

would help dispel any 'negative impressions' of the Russian oil and gas industry by those companies which had invested in Sidanco.

However, BP Amoco - which had taken effective management control of Sidanco - is reported to have claimed that the sale of its principal western Siberian investment to a local competitor was illegally forced and is now said to be reviewing its Russian interests. In defence, TNK stresses that the sale was made via a competitive auction. It is understood to have proposed a strategic alliance with BP Amoco.

Lasmo restructuring

UK independent Lasmo is understood to be selling its Azeri office to Shell as part of a worldwide restructuring of its operations to focus on its core areas of operation, including the UK, Indonesia, the Middle East and Venezuela. The company has already announced plans to sell its 12.5% stake in the Inam field in Azerbaijan - Shell being the main contender according to recent reports - and is understood to be now considering the disposal of interests in Algeria, Pakistan and Turkmenistan, perhaps via asset swaps rather than direct sales.

SABIC to boost output

Saudi Basic Industries Corporation (SABIC) plans to raise its total annual petrochemicals production capacity to 48mn tonnes by 2010, according to Fahad Al-Sheabi, President of the company's Polymers Group.

Production is forecast to reach 35mn tonnes in 2000, a rise of 40% over output in 1998. Estimated combined investments of more than \$9bn in joint venture projects across all sectors of industry in the country have been planned between 1998 and 2002.

United Kingdom

Enterprise Oil has signed a five-year contract outsourcing all its UK information technology (IT) and telecommunications services to Shell Services International (SSI). The contract covers such services as desktop support, networks, e-mail, video conferencing and technology planning.

Aberdeen-based Orwell Group has acquired the drilling and downhole technology centre based on the Aberdeen Offshore Technology Park from Scottish Enterprise and the former Grampian Regional Council for an undisclosed sum. The Group, which took over management of the Centre three years ago, is planning to invest £750,000 in state-of-the-art simulation equipment and classrooms and to recruit five new staff over the next year. According to Hamish Dingwall, Head of Energy at Scottish Enterprise, the Centre 'offers Europe's largest and most technically advanced land rig and is the only facility in the world open to any company to develop and test downhole products without the risk and expense associated with an offshore well'. Orwell Group is also considering the possibility of drilling a fourth test well at the Centre.

The UK Health and Safety Executive (HSE) has amalgamated the Chemical and Hazardous Installations Division (CHID), Offshore Safety Division (OSD) and HM Mines Inspectorate to create a new Hazardous Installations Directorate (HID). The formation of HID creates a single body responsible for the health and safety regulation of the majority of hazardous industries in the UK.

A second set of guidelines for vessels providing standby services to offshore installations has been published by the UK Offshore Operators Association (UKOOA). The guidelines - which were developed in conjunction with the International Association of Drilling Contractors (North Sea Chapter), the British Rig Owners Association and the Standby Ship Operators Association - set out standards for the safe management and operations of standby vessels, and complement UKOOA's recently revised guidelines on the technical standards required for such vessels and their equipment.

Lloyd's Register is strengthening its UK upstream oil and gas capability in Aberdeen by relocating its London and Croydon-based offshore services operations to the Scottish base.

Chevron outlines plans for the future

Chevron Chairman Ken Derr and Chairman-Elect Dave O'Reilly have reported that the company 'intends to achieve the best shareholder return among oil majors, even though the industry's competitive landscape has become tougher' by 2004. The company's financial targets include a long-term earnings growth rate in the top quartile of the S&P 500, a minimum of 12% return on capital employed, and a continuing reduction in operating expense.

The company also plans to increase its worldwide oil and equivalent gas production at an annual growth rate of 4% to 4.5%. Key growth areas include:

- The Tengiz field in Kazakhstan – where production has averaged 215,000 b/d in 1999 and is expected to exceed 250,000 b/d in 2H2000

when additional processing capacity comes online.

- Angola, where the country's first deepwater oil production is due onstream by year-end from the Kuito field. Overall production is expected to reach 600,000 b/d by 2002, from 450,000 b/d in 1999.
- The deepwater Gulf of Mexico, where Genesis and Gemini came onstream this year, producing 63,000 b/d and 37,000 b/d respectively.
- The East coast of Canada – where the Hibernia field's reservoir performance has exceeded predictions and the company has raised the estimate of ultimately recoverable oil to 750mn barrels. Current output is 150,000 b/d.

Other areas of development include North America, Canada, South America and Thailand.

Green light for Exxon Mobil merger

The US Federal Trade Commission has approved the Exxon Mobil merger, subject to a number of conditions, including the sale of 2,431 of the two companies' US service stations – about 15% of their combined retail network. The assets have been valued at \$2.5bn. Tosco is understood to have agreed to buy 1,740 of the sites for \$860mn. It is also acquiring the right to buy undeveloped sites and a distribution terminal in Virginia.

Exxon is also to sell its 130,000 b/d Benicia, California, refinery as part of the FTC requirements. Meanwhile, the Alaskan authorities have called for Mobil to divest its 3.08% stake in the TransAlaska pipeline system (TAPS) within the next nine months. Exxon already holds an interest in the pipeline.

Exxon Mobil Corporation – the world's largest publicly traded oil company following the merger – reports that it expects to achieve cost savings in excess of the originally forecast \$2.8bn. It is also in the process of reviewing the expected number of job losses to result from the deal, which, at present, is put at a little over 9,000.

The new company is to be headquartered in Irving, Texas, supported by a global upstream and chemicals head office in Houston and a downstream headquarters in Fairfax, Virginia. It is understood that the London, Aberdeen and Leatherhead (Surrey) offices will remain open, although the Aberdeen operation may be downsized.

Waste oil court ruling

The European Court of Justice has ruled that Germany has failed to meet its legal obligations concerning the disposal of waste oils, as imposed by the European Union Directive of 75/439/EEC, writes *Keith Nuthall*. The Court upheld a complaint by the European Commission which also accused Germany of failing to apply duty on waste oils used for heating and so encouraging their use, contrary to EU regulations.

Germany could have introduced a number of feasible measures aimed at the treatment of waste oils by regeneration, but had not done so. 'On the contrary, it has stopped applying one of them and has taken no further appropriate steps,' said the Commission.

Aker Maritime cuts costs

Aker Maritime is understood to be restructuring its operations in a bid to cut costs by Nkr500mn (\$63mn) over two years and improve efficiency. The company is to focus on two core markets – international deepwater and the North Sea – from offices in Houston and Stavanger, respectively. The international operation will incorporate London-based engineering company Genesis Oil and Gas Consultants and the Aker McNulty yard in the UK. The North Sea business will comprise companies currently part of EPC Norway and the maintenance, modification and operations areas, and Aker Oil and Oil and Gas Technology. The company has already reduced its workforce by 2,500 over the past year and further job losses are expected.

Wintershall of Germany has announced its intention to sell its London-based subsidiary Wintershall (UK) and Wintershall Exploration (UK), and to withdraw from the UK Continental Shelf. The company is focusing its attentions on 'strengthening and combining international E&P activities and the formation of new main areas in Argentina, Russia and Azerbaijan'.

Oil industry service company Atlantic Power Utilities Division, part of PGS Atlantic Power, has received a certificate of commendation in 'recognition and appreciation of the excellent services they provided' to Operation Allied Force, the NATO activities in Serbia and Kosovo earlier this year.

Europe

Henri de Roissard is understood to have resigned his post as Chairman of French offshore contractor ETPM in order to lead a management bid for the company. Coflexip Stena Offshore and Stolt Comex Seaway are reported to also be interested in acquiring the company, following the collapse of Global Industries' \$256mn bid.

Apache is reported to have budgeted \$650mn for capital expenditure in 2000. The company is also understood to be planning to expand its upstream portfolio through acquisitions.

North America

Wintershall of Germany has sold its Canadian affiliate, Wintershall Canada, to Calgary-based Startech Energy for an undisclosed sum.

Columbia Energy Services is understood to have sold its wholesale energy marketing business to Enron North America for an undisclosed sum.

Middle East

BG is understood to have announced plans to open an office in Israel in early 2000. It was awarded a number of exploration licences offshore Israel in 1999 and is involved in a joint venture with Isramco.

Iraq was reported in November to have indicated that it would agree to a six-month renewal of the UN oil-for-food programme on similar terms to those currently in effect.

BP Mobil's European fuels venture dissolved

BP Amoco and Exxon Mobil have agreed the terms under which they will dissolve the BP Mobil European fuels and lubricants joint venture in response to the European Commission's authorisation of the Exxon and Mobil merger.

Under the agreement, which is subject to a number of approvals and appropriate employee consultation, BP Amoco will purchase Mobil's 30% interest in the fuels business for \$1.5bn. The deal also includes the transfer of Mobil's stakes in certain pipelines serving Gatwick airport in the UK. In addition, the two companies are to divide the assets of the lubricants business broadly in line with their equity stakes: 51% Mobil, 49% BP Amoco.

The fuels part of the venture, operated by BP Amoco, currently operates around 8,500 service stations across Europe, representing about 12% of the market. The Exxon Mobil-operated lubricants part of the venture has a market share of just over 18% in Europe.

Under the deal, BP Amoco will receive the service stations and other marketing assets, together with the fuel refineries at Grangemouth and Coryton, UK; Lavera, France; Nerefo, The Netherlands; and Castellon, Spain, as well as the shareholdings in the Turkish Mersin, French Reichstett and German Bayernoil refineries. Mobil will receive the fuels refinery at Gravenchon.

On the lubricants side, Exxon Mobil will receive the Dunkirk refinery in France and the lubricants leg at Gravenchon. BP Amoco will retain the base oil refinery in

Neuhof, Germany, and the lubricants leg of Coryton, together with the blending plants at Neuhof; Ghent in Belgium; Gemlik in Turkey; Bastons in the UK; Drapetsona in Greece; and a 45% share of the Turkish Serviburnu plant. The remaining 10 blending plants will be part of the Exxon Mobile portfolio.

The companies have also agreed in principle to the following general provision for the marketing of lubricants in Europe. BP Amoco will receive:

- All the lubricant marketing businesses in Portugal, Spain, Greece, Gibraltar and Malta, including the business currently branded as Mobil and the Mobil brand for an interim period.
- All the direct commercial vehicle lubricants business throughout Europe, including the business currently branded as Mobil and the Mobil brand for an interim period.
- All the BP and Duckhams branded passenger vehicle lubricant business throughout Europe.
- All distributor relationships associated with the BP and Duckhams brands.

Exxon Mobil will receive (outside of Portugal, Spain, Greece, Gibraltar and Malta):

- All the direct industrial lubricants businesses, including the BP and Duckhams branded businesses.
- All the Mobil branded passenger vehicle lubricants businesses.
- All distributor relationships associated with the Mobil brand.

BTC celebrates 40 years in the business

The British Technical Council of the Motor and Petroleum Industries (BTC) is nearing its 40th anniversary. Formed in February 1963 by the petroleum industries and the motor manufacturers, BTC's current membership of over 30 companies embraces vehicle, engine and component manufacturers, test equipment and Reference Fuels suppliers, the military, oil companies, additive companies and independent test laboratories. The current Chairman of BTC is D F Covey, Industry Liaison Manager at Infineum International.

BTC brings technical focus to issues affecting its membership through a hierarchy of technical sub-groups. The technical work is organised on a cooperative basis through Fuels and Lubricants Technical Committees.

BTC is an active and influential member of a wider European organisation – the Co-ordinating European

Council for the Development of Performance Tests for Transportation Fuels, Lubricants and Other Fluids (known as CEC) – which is responsible for establishing the need for, assisting the development of, and promoting the use of standard test methods for assessing the performance of automotive fuels, fluids or lubricants.

BTC is ready to face the challenges of the next decade. These include continuing exhaust emission reduction, improved fuel economy in passenger cars and commercial vehicles, extended service intervals, and cost effective optimisation of fuels and lubricants to match the needs of future engines.

For further information, contact the BTC Executive Secretary, Lyn Bunker, on Tel: +44 (0)1203 355405, Fax: +44 (0)1203 355069, e-mail: lyn.bunker@mira.co.uk or visit BTC's website at www.btcmpi.org.uk

Russia & Central Asia

The Russian Government has announced plans to raise the export duty on crude oil from euro7.5/tonne to euro15/tonne. The duty rise is expected to cost the oil industry \$504 mn in 2000.

Tyumen Oil Company (TNK) has announced its second Rb2.5bn (\$94mn) dollar-hedged bond issue, reports the United Financial Group's Russia Morning Comment. The new bonds offer a 10% coupon. While the company is facing significant capital calls to rehabilitate the Samotlor field and upgrade the Ryazan refinery, it has been cut off from foreign long- and medium-term capital sources (such as US Eximbank) due to its allegedly illegal takeover of Sidanco's assets, comments UFG.

Gazprom is reported to have paid Rb8.17bn (\$305mn) in taxes in cash in November 1999. This represents almost one quarter of federal tax revenues in the period, reflecting the company's importance to the Russian economy.

The Russian Ministry of Federal Property has announced plans to sell 9% of its stake in Lukoil on the New York stock exchange in 2000, reports the United Financial Group's Russia Morning Comment.

Lukoil-Neftekhim has entered into a cooperation agreement with Fina Research which is aimed at helping Lukoil penetrate the European market of premium-priced polyethylene, reports the United Financial Group's Russia Morning Comment.

Latin America

ABB is to acquire Argentinian oil and gas equipment manufacturer DancoTalleres Metalurgicos for an undisclosed sum.

General

Houston-based ship classification society ABS has signed a cooperative agreement with the Government of Vietnam's classification society, Vietnam Register (VR). The agreement addresses new construction and conversion, as well as statutory surveys and the survey of materials and equipment intended for installation on board ships.

LPG growth forecast in Europe

The European market for LPG faces a mixed future with some markets enjoying robust growth while others stagnate, according to a new report from market analyst Datamonitor. Increasing competition from natural gas is expected to dampen domestic consumption of LPG, and demand growth is forecast to be modest until 2009. However, the report states that LPG for automotive and industrial use will grow at average annual rates of 6.5% and 5.6% respectively. Together, these two sectors are expected to generate 90% of overall market growth over the next decade.

The report – *LPG in Europe: Strategies for the New Millennium* – indicates that total consumption of LPG in Europe will increase by 35% to reach 29mn tonnes in 2009. Performance in eastern Europe is expected to outstrip that of western Europe, growing by 77% between now and 2009, compared with 31% in western Europe – largely due to the fact that per capita consumption in eastern Europe is currently less than half the western European average. This is forecast to boost eastern Europe's share of European LPG sales from 10% to 13%.

By 2009, Poland will have overtaken Germany as Europe's fifth-largest consumer of LPG, says the report. Turkey will become Europe's largest consumer of LPG for energy purposes in 2009, its market more than doubling to reach

6.8mn tonnes. Together, the three largest markets – Turkey, France and Italy – will account for half of total European LPG sales by this date.

Between 1994 and 1998, automotive LPG was the fastest growing sector of the market, and is forecast to remain so over the next 10 years. Between 1999 and 2009, sales of automotive LPG will almost double from 3.2mn tonnes to 6.2mn tonnes, driven by the promotion of LPG as a cleaner alternative to gasoline and diesel. Since most eastern European countries aspire to EU membership, they are adopting EU regulations concerning emissions control and the development of cleaner fuels – boding well for the development of autogas both in western and eastern Europe, comments the company.

Italy and the Netherlands are expected to remain Europe's largest auto LPG markets, together accounting for more than half the total. However, the UK market is forecast to grow fastest, at an annual rate of 40% to 2009.

The report also indicates that there will be a switch from cylinder to bulk sales in the LPG sector. In 2009, bulk LPG is predicted to represent 73% of total sales compared with 62% in 1998. Other than in the domestic sector, most uses of LPG tend to be in bulk form. The increasing share of automotive and industrial demand will therefore result in a further shift from cylinder to bulk sales.

FTA targets fuel taxes

According to the UK Freight Transport Association (FTA), the number of foreign lorries operating in the UK in the 2Q1999 increased by 25% compared with the same period a year earlier. At the same time, the number of UK trucks operating on international business increased by just 6%. FTA argues that these figures "demonstrate the harmful effects of ultra-high taxes on vehicle excise duty and fuel duty in the UK".

FTA's Head of External Affairs, Geoff Dossetter, said: "The fuel duty escalator has gone but its legacy is the enormous competitive advantage that now benefits foreign vehicles working in the UK. The pattern of foreign trucks operating in the UK is now very firmly established to the detriment of UK industry. The Chancellor must recognise that his welcome action in ending the fuel duty escalator can only be the first step in tackling very serious transport and industry competitive problems caused by high UK taxes."

Serbian oil sanctions

The European Union has embarked on a ground-breaking oil sanctions regime against Serbia, which attempts to supply fuel to towns where there is opposition to President Slobodan Milosovic, but maintains a ban to communities where he is supported, writes Keith Nuthall. It is the first time that the EU has tried to interfere in the internal politics of a country through an oil embargo, rather than putting pressure on a government by imposing a blanket ban on imports, across a whole country.

Under the EU's Energy for Democracy initiative, it is allowing a shipment of heating oil to be sent to the towns of Nis and Pirot, both in the south of the country. An attempt to deliver the first cargo was abandoned in early December due to obstructions by the Yugoslav customs authorities. However, the EU has stated its intention to continue trying to deliver further shipments of heating oil to the two communities.

United Kingdom

Kuwait Petroleum (Q8) is to trial its ultra-low sulfur City Petrol at four of its UK company-owned and managed sites in the New Year.

Conoco has unveiled a £700mn investment programme for its Humber refinery. The ten-year plan includes £90mn on new units to produce clean fuels and £250mn on an advanced combined heat and power plant.

Honeywell Control Systems has secured a \$6mn engineering and procurement contract from Conoco for the design, construction and commissioning of a TotalPlant Solution system at its Humber refinery in the UK.

The UK Office of Gas & Electricity Markets (Ofgem) has published proposals for changes to electricity and gas licences to stimulate competition.

Texaco is proposing to swap its 375-strong network of service stations and commercial fuel assets in Greece for a number of Shell forecourts (some reports suggest 80 sites) and other assets in the UK.

Amerada Hess is reported to have applied for a licence to supply electricity to domestic customers and small businesses in England and Wales from 1 April 2000 in order to meet demands for 'dual fuel' packages.

The UK Office of Gas & Electricity Markets (Ofgem) has proposed a cut of 5% to British Gas Trading's (BGT) customers' bills. This would mean a saving of around £14ly off the typical bill.

Europe

Norwegian oil company Statoil is reported to be planning to invest \$30mn over the next 12 months on expanding its 20-strong Polish service station network to 120 outlets.

Texaco and Shell Europe have completed an agreement to swap retail assets in Poland and the UK, subject to regulatory approval in Poland.

Repsol YPF is to build a new plant to produce more than 900,000 cm of high performance automotive gas oil at its Tarragona oil refinery in Spain. The facility is due onstream in 1H2002.

A new take on petrol station design



As artist-in-residence at the Centre de Sculpture, outside the village of Montolieu, France, James Trew was inspired to create a work that captured the modernity of the petrol station, writes *Helen Jones*. He decided to create a work that would embody the artificial, yet beautiful, geometry of the petrol station and to place it in the idyllic landscape surrounding the foundry and artists' workshops at the Centre.

The resulting piece explores the beauty of the familiar man-made canopy structures, yet sits, or rather hangs, upon the side of a cliff in a remote rural set-

ting. At night, the canopy-like sculpture is the only element of the landscape that glows. By day, the horizontal form provokes memories of roadside structures and car journeys. The powerful sculpture is deceptively simple, highlighting the fact that petrol stations are an instantly identifiable part of our environment.

Trew is currently exploring the possibilities of other works inspired by petrol station design.

For more information, contact Louise Romain, Centre de Sculpture, Fonderie de la Dure, Montolieu, France 11170. Tel: +33 468 24 81 81.

20,000 forecourt closures in W. Europe by 2004

The fiercely competitive fuel retailing market in western Europe continues to suffer from low operating margins and stagnant fuel demand, according to a recent report from UK analyst Datamonitor. As a result, oil companies are undergoing strategic and operational change, and many have considered mergers and acquisitions as a means to survive. The company predicts that the trends of merger activity and network rationalisation are set to continue, as margins within downstream operations are squeezed.

The report predicts that the visible benefits of mega-mergers such as the BP Amoco/Mobil joint European operation are likely to encourage other companies to consider a merger or acquisition in the future. BP Amoco is shown to have generated huge operational benefits from its previous BP/Mobil joint venture, with volumes per site increasing substantially, from 2.57m litres in 1997 to 2.74m litres in 1998. This was achieved through extensive rationalisation – 747 sites were closed between 1996 and 1998, equivalent to almost 10% of the entire network.

However, while BP Amoco achieved the highest volumes per site of any major oil company, Shell remains

western Europe's market leader. According to Datamonitor, Shell had a volume share of 10.7% in 1998, although the company achieved a lower average throughput per site of just 2.31m litres, versus 2.48m litres for Esso and 2.74m litres for BP Amoco.

The report suggests that Spain offers the best growth prospects over the next five years, with volumes forecast to increase by an average of 3.2% per annum. Greece and Ireland are predicted to be the only other European markets to experience significant volume increases, driven by economic growth and the growing size of their respective national car parks.

Network rationalisation is expected to continue, driven by the quest to improve volume per site and reduce costs. Over 20,000 service station sites are forecast to close across western Europe by 2004, representing an annual shrinkage of 3.1%. Datamonitor expects average volumes per site to rise by 0.88m litres by 2004 as a result of this rationalisation. Luxembourg is forecast to record the highest volumes per site, at just over 9m litres, due to the high levels of non-indigenous commercial traffic fuelling at enlarged motorway sites.

Mobil Oil and Wintershall have agreed to transfer their respective 28% and 15% stakes in Germany's leading fuels retailer, Aral, to Veba Oel for an undisclosed sum. The deal will increase Veba's stake in Aral from 56% to 99%. Veba is also to acquire Wintershall's refinery in Lingen.

Norwegian oil company Statoil has renewed its Irish fuel distribution contract with Wincanton Logistics until 2003.

Burmah Castrol and BMW are reported to have forged a strategic alliance to develop the next generation of lubricants products.

Veba's Horst, Germany, refinery has selected the Institut Français du Pétrole's (IFP) Prime-G+ technology for the desulfurisation of its FCC gasoline. The award for an 800,000 t/yr unit is said to be the first of its kind.

Hellenic Petroleum of Greece is understood to have acquired a 75% interest in Albanian petrol retailer Global which holds about 8% of the local market with an 11-strong network of outlets.

Klockner Industrie-Anlagen (INA) has signed a project development agreement for the first commercial-scale plant ever built using Syntroleum's proprietary gas-to-liquids (GTL) technology. It is as yet undecided whether the Sweetwater Project plant will be located in Australia or Trinidad. The \$400m facility will have a design capacity of 10,000 bpd, converting natural gas into high margin products such as synthetic lubricants, drilling fluids, liquid normal paraffins and speciality fuels. (See p34)

Russia & Central Asia

Azeri state oil company Socar and Lukoil have signed a Memorandum of Understanding under which the Russian oil company will provide crude at the Black Sea port of Supsa, Georgia, in exchange for fuels to be supplied to Lukoil's Azeri filling stations.

Asia-Pacific

BP is reported to be opening what is said to be its first service station in western Japan with a new outlet in Ayabe, Kyoto-fu.

Switching gas supplier

UK Secretary of State for Trade and Industry, Stephen Byers, has launched an investigation into the practical steps needed for customers to change energy suppliers. While average household savings of up to £65 per year are on offer to customers who switch, over 80% (14mn gas customers and 22mn electricity customers) have remained with their original suppliers. Byers stated that he wants to find out 'how we can help consumers feel comfortable about deciding whether to switch'. Some of the issues to be checked are:

- Is the process required to switch supplier too difficult or complicated?
- How can consumers get hold of easy to understand, fair price comparisons?
- Are potential switchers discouraged by stories about mis-selling, involuntary switching or double billing?

Baltic Rim merger cancelled

Fortum and Statoil have decided to discontinue the transfer of both companies' service station and oil terminal operations in Russia, the Baltic countries and Poland into a joint venture company. Both companies concluded that sufficient preconditions for cooperation on this scale could not be found at the present time. Instead, both plan to continue discussions with the aim of better exploiting shared logistic systems and oil terminals in the Baltic rim.

Fortum reports that it is also to continue the development of its Neste-branded service station network in Russia, the Baltic countries and Poland, with the aim of creating a 200-strong network of unmanned fuel outlets over the next few years. The current Neste network comprises 115 manned and unmanned sites.

Vopak (the Van Ommere/Pakhoed bulk storage joint venture), together with PSA Corporation, has acquired Intraco's 10% shareholding in Van Ommere Tank Terminal Singapore. The deal increases Vopak's stake by 7% to 66%, and PSA's by 3% to 29%. Vopak paid euro 12.5mn for its stake.

Africa

Algerian state company Sonatrach has signed an agreement with Greece to supply 700mn cmly of gas over a 21-year period. Algeria currently exports 60bn cmly of gas.

Canadian oil and gas company Ocelot International is reported to have been given the go-ahead by the Tanzanian Government for its \$340mn gas-to-power project. The company plans to develop over 1tn cf of gas in the nearshore Songo Songo complex. Gas will be supplied to the power generation and industrial energy markets in Tanzania and Kenya.

Nigeria's new President, Olusegun Obasanjo, is reported to have announced plans to deregulate petrol supplies in the country next year, which could lead to a 50% increase in petrol prices, according to some analysts. He proposes to end the Government's de facto monopoly on fuel imports.

Natural Gas of Spain is understood to be planning to invest up to \$400mn on developing a natural gas distribution network in Morocco.

Calls to EU for lower fuel excise duties and rebates

Italy has asked permission from the EU Council of Ministers to allow its commercial hauliers to apply for rebates on excise duty paid when buying diesel for journeys undertaken for a third party, reports Keith Nuthall. It has also asked the Council whether it can reduce excise duties for LPG and heating oil, supplied as heating oil to disadvantaged regions.

Meanwhile, France has applied to the Council for permission to reduce excise duty from the New Year on premium-grade unleaded petrol containing additives (probably potassium-based) to improve resistance to valve seat recession and valve burn. This fuel will replace

premium-grade leaded petrol, which is to be banned across the European Union from 1 January 2000 in a bid to reduce pollution from road traffic and improve air quality. While most European countries have either already phased out leaded petrol or plan to do so by 1 January 2000, some have applied for a derogation - Spain, Italy, Greece and French Overseas Territories.

Germany has asked the Council for permission to lower excise duties on heating gas oil, natural gas and LPG used by manufacturing industry, to enable businesses to cope with an earlier rise in mineral oil duty under an environmental law.

UK Deliveries into Consumption (tonnes)

Products	1 Oct 1998	*Oct 1999	†Jan-Oct 1998	*Jan-Oct 1999	% Change
Naphtha/LDF	228,974	224,430	2,340,869	2,624,601	12
ATP - Kerosene	854,911	796,141	7,637,731	8,000,564	5
Petrol	1,903,369	1,693,408	18,108,701	17,687,305	-2
of which unleaded	1,532,152	1,498,638	14,128,654	15,202,857	8
of which Super unleaded	33,970	40,164	344,369	310,429	-10
of which Premium unleaded	1,498,182	1,458,474	13,784,285	14,892,415	8
Lead Replacement Petrol (LRP)	-	-	-	13	-
Burning Oil	269,318	249,460	2,802,240	2,761,406	-1
Automotive Diesel	1,329,858	1,204,471	12,531,911	12,433,335	-1
Gas/Diesel Oil	624,279	843,631	5,966,428	5,872,872	-2
Fuel Oil	211,291	156,354	2,276,010	1,677,026	-26
Lubricating Oil	69,278	65,422	689,256	658,555	-4
Other Products	655,798	581,745	6,784,795	6,882,997	1
Total above	6,147,076	5,815,062	59,137,941	58,598,661	-1
Refinery Consumption	567,309	480,255	5,419,857	5,098,024	-6
Total all products	6,714,385	6,295,317	64,557,798	63,696,685	-1

† Revised with adjustments. * Preliminary

Visit the Institute of Petroleum's website @ www.petroleum.co.uk

Upbeat outlook for the Millennium



Addressing the recent IP annual lunch, Dick Cheney, Chief Executive Officer, Halliburton and former US Secretary of State 1989-93, took a positive view of the industry's prospects in the millennium. The following is an edited and shortened version of his presentation. The full speech is available on the IP website www.petroleum.co.uk

Let me say at the outset that I am unreasonably optimistic about our industry. For over a hundred years we as an industry have had to deal with the pesky problem that once you find oil and pump it out of the ground, you've got to turn around and find more – or go out of business. A merged company like Exxon Mobil will have to secure over a billion and a half barrels of new oil equivalent reserves every year just to replace existing production.

For the world as a whole, oil companies are expected to keep finding and developing enough oil to offset our 71mn b/d of oil depletion, but also to meet new demand. By some estimates there will be an average of 2% annual growth in global oil demand over the years ahead, along with a conservatively estimated 3% natural decline in production from existing reserves. That means by 2010 we will need in the order of an additional 50mn b/d. So where is the oil going to come from?

Governments and the national oil companies are controlling about 90% of the assets. Oil remains fundamentally a government business. The Middle East –

with two-thirds of the world's oil and the lowest cost – is still where the prize ultimately lies. Even though companies are anxious for greater access there, progress continues to be slow. In the early 1990s, expectations were that significant amounts of the world's new resources would come from such areas as the former Soviet Union and from China. It turned out to be deepwater successes that yielded the bonanza of the 1990s.

Fundamental challenges

A fundamental challenge for companies is to do more than replace reserves and production. The trick is also to replace earnings. For most companies the majority of their profits come from core areas but many of these are now mature and it can be difficult to replace the earnings from the high margin barrels there. Some of the oil being developed in new areas is obviously very high cost and low margin. Companies are turning to production deals where they can develop reserves that are already known, but where the country doesn't have the capital or the technology to exploit them. In production deals there

is less exploration risk but dealing with above-ground political risk as well as commercial and environmental risk is an increasing challenge. Many companies are more comfortable dealing with the below-ground risk, like drilling and reservoir performance, than they are with the above-ground political risks.

The other major element that is changing is the nature of competition and what the competitive field will look like in the new industry. Clearly the main driver behind the biggest mergers are the cost savings. Larger companies tend to have the highest credit ratings and therefore the lowest borrowing costs, but they also tend to have higher multiples in the stock market. The share price premium becomes a valuable currency for takeovers. The result of all this consolidation is that now four out of the five largest oil and gas companies by market value are European.

Who will survive?

I do not believe that the bigger is better model is the only viable one. Halliburton has certainly grown bigger through its merger with Dresser and other key acquisitions. This made sense in part because it gave our company both a broader array of services and also greater depth in products and services.

I see four basic types of firms that I think will survive and prosper. First, we will obviously have the super majors. There is a good chance they will avoid becoming bloated bureaucracies because they are very focused on delivering cost saving synergies for their shareholders.

The second will be those companies that have dominance in a region or a market. Repsol YPF is an example of this type of company; number one in Iberia and the southern corner of Latin America and very profitable.

A third model I would call the super independents. These are firms that focus on one line of business but have sufficient scale to have several core areas of material size where they can go head to head with anyone. These combine the advantages of a super major with the agility of an independent. A common element in these three classes of firms will be critical mass and concentration. A fourth category of survivor will be niche players who can prosper off the properties that the bigger firms don't want or because of the very special circumstances they find. The immense portfolio restructuring that lies ahead should create opportunities. New aggregators are likely to emerge which, together with a lot of the brain drain from staff cuts at the majors, could provide unexpectedly strong competition.

Managing risk

Increasingly we are seeing international oil and gas companies concentrating on managing investment, financial, commercial and political risk or above ground risk, while service companies are managing technical, completion and operating risk. Meanwhile, national oil companies (NOCs) are focused on managing their country's national interest and its resources. This is part of the new resource rationalism of the 1990s. NOCs may own the resources, but when it is in the national interest to bring in outsiders to help develop them, they do so. Venezuela obviously is a clear example of the new resource nationalism. NOCs can focus on becoming regionally dominant players. I think Petrobras in Brazil may be an example of this in Latin America.

Opec has shown an ability for crisis management every time oil prices have dropped to single digit levels. But the group may ultimately bring about its own undoing if it shoots for too high a level for oil prices, as this underwrites higher cost oil exploration and development while limiting demand growth. I think the world, the consumer as well as producers, are best served by stable prices at reasonable levels.

The oil industry will become more integrated in the new century but not necessarily in the traditional sense of link ups between producers and refiners. I see an integrated role for the oil service industry in helping to manage certain technical risk, leaving oil companies to retain control but focus on investment decisions, commercial and political risk



Left: Dick Cheney speaking at the IP's Annual Autumn Luncheon; Above (l-r): Jeff Pym, IP Director General, Chris Moorhouse, IP President, and Dick Cheney, Chief Executive Officer, Halliburton arriving at the Savoy Hotel, London.

and financial risk. Oil companies probably spend the most and make the lowest returns on the actual development and operation of their assets. It is here in the middle of the opportunity chain where service companies can add the most value on the below-ground aspects of the operation.

For NOCs, working with service companies can make use of the best technical expertise available worldwide, while still retaining control and managing the state's interest in its own natural resources.

New technology

Clearly technology has revolutionised the oil business in the last decade with rapid advances in data interpretation, reservoir management, enhanced oil recovery, directional drilling and deepwater operations, and the pace of advancement is accelerating. The oil industry is saddled with this image problem as a polluting manufacturing industry when in reality it has become a knowledge-based business. Our success as a company and as an industry will depend even more heavily in the future on our ability to develop and deploy new technology.

Gas demand

We think there will be tremendous growth occurring in natural gas usage in the years ahead. We are consciously bullish over the next five years and beyond for the North American natural gas market. The demand side has plenty of up-side and gas is likely to grab a greater share of US energy consumption in the decade ahead. Virtually all new US power plants are likely to be gas-fired and residential penetration is growing fast as well.

US onshore gas output should be weaker and this means that the demand gap will need to be met by, perhaps, double-digit growth rates and

Canadian imports, and significant increases in production out of the Gulf of Mexico. The industry will need to get busy bringing on new production facilities and pipeline systems to meet these needs. Deepwater gas, obviously, will have a very important role to play.

There are a number of factors that we believe will drive the growing role for gas on a global basis. The environment, obviously, will be a key driver. Gas is the preferred fuel for power generation. Gas-to-liquids is on the threshold of commercial success. There is growing demand in emerging markets like China, India and Brazil. For international oil and gas companies, gas is increasingly a key element of the E&P portfolios - oil becomes more difficult to replace while gas reserves and production will grow. The world's gas resources are obviously vast. Estimates of proved gas reserves understate the volumes as there is plenty of gas still to be found and many existing discoveries have not been booked. As companies find more gas, they need to find ways to monetise the remote fields. Developing stranded gas often entails new risk in building a new market to use the gas. The three main options for moving this gas to market are pipelines, liquefied natural gas and, now, gas-to-liquids.

The world will get more and more connected as high-strength steel and automated equipment allow gas pipelines to become economical over long distances. For LNG, new markets will fundamentally alter the nature of the business. The days of the 20-year take-or-pay contracts are over. New structures will be needed to share the risk in building the new markets. The long waiting list of greenfield and LNG expansion projects may signal market limitations. LNG producers are facing greater competition and lower returns and they may need to look at investing down the gas chain and in re-gasification and power as well.



Guests enjoying a pre-lunch drink

Long term, there are innovations on the way such as power generation synergies with re-gasification, cost reductions and smaller scale projects that could permit floating LNG terminals. An alternative to LNG as a means of monetising gas reserves is gas-to-liquids, or GTL, which serves a completely different market. With a huge world market for refined products, gas-to-liquids is much more flexible than pipeline or LNG projects, which require rigid contracts and offtake volumes. GTL products can be exported inexpensively on product tankers and distributed through existing infrastructures. The appeal is that there is no exploration risk and, no market risk as there is when trying to open up new areas to gas. The remaining hurdle has been the economics but, there are commercial projects that have attractive rates of return with the right tax incentives and when viewed as part of a larger strategy. Chevron and Sasol's GTL plant, at Escravos in Nigeria, is the enabler for additional gas processing with associated liquids production, lubes and an ethylene plant. The project, together with Shell's rebuilding of the MDS plant in Bintulu, Malaysia, and projects in Qatar and elsewhere show that GTL's time is finally arriving. The viability of gas-to-liquids will be further enhanced through incremental improvements and radical technology breakthroughs.

Opportunities ahead

Companies are looking at all the sectors: Gas transmission, gas distribution, gas trading, power generation, electric utilities, even electricity trading. Some think the opportunities are in owning the infrastructure, while others see the preferred role in the merchant banking function in the energy business, especially trading and providing financial instruments. Others think the key is in having the customers and cross-selling services. Gas and electric utilities facing the loss of monopoly positions want to diversify into higher growth, unregu-

lated businesses like oil and gas, while oil and gas companies may seek the earnings stability of a utility business. One of the companies whose earnings held up the best in 1998 during the oil price downturn was Repsol, due to its stable income from Gas Natural. In any event, gas and power will be of growing importance in the portfolios of many energy companies.

In addition to new risk there will be new competition. In the minds of many, the energy business is becoming a commodity business whether it's oil or gas or kilowatts. Oil is unique in that it is so strategic in nature. Energy is truly fundamental to the world's economy. The Gulf War was a reflection of that reality. The degree of government involvement also makes oil a unique commodity. This is true in both the overwhelming control of oil resources by national oil companies and governments as well as in the consuming nations where oil products are heavily taxed and regulated. Essentially, the petroleum industry deals with extreme risk and with billions of dollars on the line. It is the basic, fundamental building block of the world's economy. The oil and gas industry provides essential goods, at the lowest possible cost, with regular reliability while still ensuring a cleaner environment. The industry provides security of supply even though at the same time we are required to manage huge political risk.

Public image

The public doesn't always appreciate what we do and this is part of our industry's image problem that we need to work on in the next century. Ours are global companies that were investing outside the industrialised companies at the turn of the last century.

People need to realise that the energy industry often represents the largest foreign investment in many parts of the world and its interests need to be considered. Oil is the only large

industry whose leverage has not been all that effective in the political arena. I am struck that this industry is so strong technically and financially, yet not as politically successful or influential as smaller industries often are. We need to earn credibility to have our views heard.

Boom and bust

Another concern is the disruptive volatility of the industry – the boom and bust cycles we have experienced over the last century. One hope might be that the new super majors would use their financial staying power to keep capital spending steady throughout the cycle or even to invest counter-cyclically. Technology can help smooth out the cycles by lowering costs. A key challenge for companies in the commodity business is growth and there are basically only two avenues to grow earnings: One is through increasing volume and the other is through improved unit efficiencies.

On the volume side we can see the aggressive production targets that some companies have announced of late. On the unit efficiency side we have the cost-cutting targets most firms announced for 1999 and beyond, as well as the mergers designed to generate savings through synergies and economies of scale. The view is that in the commodity business the lowest cost producer will be the winner.

End of an era?

In the last century and up to World War II, coal was king. It was dethroned by oil, mostly due to transportation fuels, but also because oil was less polluting and easier to handle. Coal is still with us today, but oil is clearly dominant. In the new century, will the oil age give way to another source of energy or to new technologies? Some predict natural gas will erode oil's performance. Others say that technology, fuel cells, telecommuting on the Internet or some other breakthrough will lessen our dependence on hydrocarbons.

Well, the end of the oil era is not here yet, but changes are afoot and the industry must be ready to adapt to the new century and to the transformations that lie ahead. It will mean showing more speed and agility. This will be a challenging environment as we cross the threshold into the millennium.

I would conclude by saying that this industry must be at the forefront of moving into the Knowledge Age. Successful competitors will be those that best manage knowledge. I am proud to be a part of the industry and I am optimistic about our future in the coming century. ●

Ample reserves but poor prospects for US oil and gas

There are sound reasons for a gloomy prognosis regarding the domestic US oil and gas industry by the end of another decade – especially where oil production is concerned – despite the claims of geologists that there are plentiful US oil and gas reserves yet to be found and developed. For many of these reserves are located in offshore and onshore areas currently out of bounds to the industry for environmental reasons, while others are in remote Arctic regions where production is not considered commercially viable, at least in the foreseeable future, writes *Judith Gurney*.

US proven reserves of oil began their relentless decline in the 1970s, although the discovery of oil in Alaska partially counteracted this fall for almost a decade until Alaskan reserves also began to shrink.

By 1998, proven reserves were estimated to have reached 30.5bn barrels compared, for instance, to 35.4bn barrels in 1987. Oil production, which was 10mn b/d in 1987, was less than 8mn b/d in 1998. Proven gas reserves also declined over this period, but production mostly held its own and, at times, even increased.

Despite the historical evidence, the US Department of the Interior, along with other forecasters, foresee a near-term future of healthy production of oil as well as of gas from hitherto untapped US hydrocarbon resources. These optimists argue that, given reasonable future price levels for oil and gas and continued technological improvements, new resources will be developed to produce what is needed to meet the consumption levels expected by 2010.

But while the arguments put by geologists for a healthy US oil and gas industry

in the coming decade appear to be soundly based, they downplay the costs of extracting and getting remote reserves to market. In addition, they overlook the effect of politics on exploration and development of oil and gas fields. Environmental concerns over the last few years have been translated into laws and regulations which constrain the exploitation of many of the future reserves on which geological forecasts are based.

Federal government assessments

The official government position on the untapped US hydrocarbon resource base is a combination of a 1996 assessment made by the Minerals Management Service (MMS) of offshore OCS (offshore continental shelf) resources and a 1995 assessment made by the US Geological Survey (USGS) of resources onshore and in the offshore waters controlled by individual states.

Combined, these assessments estimate potential additions of technically recoverable reserves from undiscovered fields – reserves which could be produced using current recovery technology without reference to economic profitability – of 83.2bn barrels of oil (included NGLs), with more than half located in the OCS, and of 526.7tn cf of natural gas, again with about half in the OCS. In addition, they estimate that reserves will increase as a result of revised assessments of known fields to provide an additional 75.6bn barrels of oil and 354.7tn cf of gas.

Banking on Alaskan oil

In the MMS estimate for untapped OCS resources, listed in **Table 1**, Alaskan waters are said to hold 24.3bn barrels of conventionally recoverable undiscovered oil reserves, more than half of its 45.6bn barrel OCS total. These Alaskan reserves are located in the Arctic Ocean, Bering Shelf and Pacific Margin, with most in the Beaufort and Chukchi seas adjacent to the onshore oil provinces of the North Slope and National Petroleum Reserve-Alaska. The MMS suggests that 3.8bn barrels of these Alaskan oil reserves would come into play at oil prices in the range of \$18/b and 10bn barrels at prices around \$30/b. Even these low figures are surprising, given that current drilling costs for an exploration well in the Chukchi Sea is around \$2,000/foot, compared with the

Category	Oil (bn barrels)	Natural gas (tn cf)
Undiscovered reserves	45.6	268.0
Proved reserves	3.2	30.9
Known but not proved reserves	1.9	6.2
Field growth/reserve appreciation	2.2	32.7
Total	52.9	337.8

Location	Total (bn barrels)	Undiscovered oil reserves	
		Amount produced at \$18/b	Amount produced at \$30/b
Alaska OCS	24.3	3.8	10.0
Atlantic OCS	2.3	0.4	1.0
Gulf of Mexico OCS	8.3	4.9	6
Pacific OCS	10.7	5.3	7
Total	45.6	14.4	24.0

Location	Total (tn cf)	Undiscovered gas reserves	
		Amount produced at \$2.11/mn cf	Amount produced at \$3.52/mn cf
Alaska OCS	125.9	1.0	1.1
Atlantic OCS	27.5	5.2	11.0
Gulf of Mexico OCS	95.7	57.9	75.0
Pacific OCS	18.9	8.3	14.0
Total	268.0	72.4	101.1

Source: US Minerals Management Service, An Assessment of the Undiscovered Hydrocarbon Potential of the Nation's Outer Continental Shelf, 1996

Table 1: Minerals Management Services (MMS) Assessment – Untapped hydrocarbon potential of the US OCS

national average of \$79/foot.

The MMS estimates that the Pacific OCS, lying off California, Oregon and Washington, holds 10.7bn barrels of undiscovered oil, that the Atlantic OCS along the eastern coast of the US from Canada to Florida holds 2.3bn barrels, and that the Gulf of Mexico holds 8.3bn barrels, with some of the latter off the western coast of Florida. Although the MMS suggests production amounts which would be commercially attractive in these areas at different oil price levels, it apparently ignores the fact that the US Government currently bars companies from undertaking oil and gas exploration and production in 266.5mn acres of the OCS, including 121.9mn acres off the Pacific coast, 56.3mn acres off the western Florida coast in the Gulf of Mexico, and 55.8mn acres off the Atlantic coast.

Some of these areas have been off limits to oil companies since 1982, and it is hard to see how they could come into play in the next decade. The only auction for OCS leases outside of the central and western Gulf of Mexico and Alaska is scheduled for 2001 and involves only a very small area off the coast of Florida. Moreover, Florida may succeed in blocking this sale.

The MMS adds a further 7.3bn barrels to its untapped oil resources as coming from proven but not produced reserves, known but unproved reserves, and revised estimates of known reserves.

Relying on oil field growth

The USGS estimate of untapped oil resources, listed in Table 2, includes 37.6bn barrels of undiscovered oil, including NGLs, onshore and in state-controlled waters (coastal states have jurisdiction over waters within three statute miles of their shores, a boundary extended to 10.4 statute miles for Texas and Florida). These undiscovered oil reserves are said to be mostly in Alaska (26%), the Gulf Coast (22%) and the Western Interior (20%).

In 1998, the USGS estimated technically recoverable oil in the Alaskan National Wildlife Reserve (ANWR) in a probability range of 4.3bn to 11.8bn barrels. This places most, if not all, of its Alaskan oil estimates of undiscovered oil in ANWR where oil and gas exploration and production is currently forbidden. Some of this oil may also be located in the National Petroleum Reserve in Alaska, most of which is also forbidden to the oil industry.

The USGS also foresees an additional 73.4bn barrels of oil and NGLs – an impressive 52% of its total resource estimate – resulting from field growth (the revision of estimates of known fields due to improvements in drilling and completion technology); extended

Category	Oil & NGLs (bn barrels)	Natural gas (tn cf)
Undiscovered reserves	37.6	258.7
Proved reserves	26.8	135.1
Field growth/reserve appreciation	73.4	322.0
Sandstones, shales, chalks	4.2	308.1
Coalbed methane	0	49.9
Total	142.0	1,073.8

Location	Undiscovered oil reserves Oil (bn barrels)	Natural gas (tn cf)
Alaska	9.6	68.4
Pacific Coast	4.3	12.0
Gulf Coast	8.3	97.6
Central Interior	5.9	38.3
Western Interior	7.7	31.0
Eastern Interior	1.8	11.4
Total	37.6	258.7

Location	Unconventional reserves Oil (bn barrels)	Natural gas (tn cf)
Alaska	–	–
Pacific Coast	0.1	12.9
Gulf Coast	1.2	8.7
Central Interior	–	5.0
Western Interior	2.8	229.3
Eastern Interior	0.1	102.1
Total	4.2	358.0

Source: US Geological Survey, 1995 National Assessment of United States Oil and Gas Resources

Table 2: US Geological Survey assessment – Untapped hydrocarbon potential of onshore and state waters

field boundaries; the discovery of new pay zones, pools and reservoirs; well and reservoir stimulation procedures and enhanced recovery methods.

Estimating future field growth using sophisticated models based on historical data assumes that companies will continue to underestimate new field reserves for various reasons, regardless of the fact that more effective finding and development techniques, especially seismic technology, have enabled much more accurate estimates than those made in the past. It is notable, perhaps, that the MMS sees revisions of field estimates as accounting for only 4% of future OCS oil resources.

Enough gas to meet demand?

The US Energy Information Administration, Gas Research Institute and Enron have all forecast that, due mainly to changes in the electricity generating sector, US gas demand will grow from an estimated 22tn cf in 1998 to close to 30tn cf by 2010, with prices remaining around the current \$2.50/mn cf level. Even if imports of Canadian gas increase to 4.7tn cf/y, the capacity of existing and planned export pipelines, a greatly increased US gas production will

be needed to meet this higher level of demand. Current production from known reserves suggests that there is very little spare capacity for expansion. More gas has been reaching customers lately by optimal use of storage, not from increased peak deliverability. New, untapped gas reserves will be needed.

The MMS has modest hopes for 337.8tn cf of new OCS gas, with close to half of these undiscovered reserves off the coast of Alaska. It estimates, however, that only about 1% of these Alaskan gas reserves would be produced even if gas prices rose to \$3.52/mn cf. Another 17% of MMS new gas is located in the Atlantic and Pacific OCS, where, as noted above, regulations currently prevent exploration and production. The 36% of MMS new gas said to be in the Gulf of Mexico is more accessible, although some reserves are undoubtedly located off the coast of Florida where operations may continue to be forbidden.

The USGS estimate of new gas is more expansive, with a total of 1,073.8tn cf, with 24% expected to come from new discoveries and 30% from field growth. In addition, 33% is expected to be produced from unconventional sources, including sandstones, shales, chalks and

coalbeds. With regard to conventional undiscovered gas, some 38% is expected to come from states along the Gulf Coast, including the offshore waters administered by these states, and 26% from Alaska. Alaskan gas – even the 32tn cf to 36tn of North Slope reserves which are available for production – is not currently considered commercially viable due to the cost of pipeline construction to bring this gas to southern Alaska for a LNG project or to connect with existing Canadian export lines.

Making a guess

The wildcard in the pack for the US oil and gas industry in 2010 is Alaska. Both the USGS and MMS estimate that the largest untapped reserves of conventional, technically recoverable oil and gas are located here, mostly in the Arctic, both onshore and offshore. Alaska is also expected to contain the largest undiscovered fields in the nation. But the geologic potential of Alaska is qualified by economic and political constraints.

By 2010, one would hope – and hope is the operative word – to see restrictions eased for more operations in the Alaskan National Petroleum Reserve, and perhaps even some tentative inroads regarding

ANWR. Production from North Slope satellite fields and the bits of NPR which have been leased should be sufficient to keep the TransAlaskan Pipeline System (TAPS) alive, putting off the day, mandated by law, when it must be dismantled because oil has ceased to fill it. It seems likely that BP Amoco, in conjunction with Arco, will have a North Slope gas-to-liquids plant in operation with production moving through the TAPS system.

It also seems likely that plans could be underway, if not complete, for the construction of a second trans-Alaskan pipeline to carry North Slope and perhaps other Alaskan gas to a southern LNG plant. It's worth noting, however, that Alaskan LNG will be shipped to the Far East, and thus will not serve to satisfy US gas demand. The alternative, a gas pipeline to connect with existing Canadian lines to bring it to the Lower 48 states, could conceivably happen if this were seen more financially attractive than a LNG programme. Operations in Alaska will continue to be dominated by a handful of companies.

The surest scene for activity in 2010 is the Gulf of Mexico, which will undoubtedly still be yielding new discoveries of both oil and gas in deepwaters and some in deeper wells on the OCS. Lots of com-

panies will be involved and technologies will have been developed to overcome such problems as hydrate formation at great depths and the attachment of pipelines to floating production vessels for the export of gas. But the problem of how to harvest captured gas from frozen hydrates in deep marine environments will still be nowhere near resolution.

What then of onshore in the Lower 48? There will still be pickings here for companies large and small, especially in the Rocky Mountain area, along the Gulf Coast, in the Permian Basin of west Texas and southeast New Mexico and in the Anadarko Basin of Texas and Oklahoma. Unconventional plays will be doing well, especially coalbed methane.

Hopefully, the faith maintained by the USGS in field growth as a way of increasing reserves will turn out to be well founded, as it can take a long time for discoveries to be made and developed. John Grace, in an article published in the *Oil & Gas Journal* on 31 March 1997, estimated that at the rates of new field discoveries from 1976 to 1995, it would take 615 years to discover the USGS and MMS estimates of US undiscovered, conventional, technically recoverable oil and 301 years for the gas. ●



The College's Natural Gas Short Courses in Oxford – between two and five days in duration – provide an opportunity to gain current know-how, skills and understanding of the key technical, economic and market issues within the natural gas and energy industries. You would typically take part in such a course if you need an insight into a specific industry issue, need to update yourself to keep pace with industry changes and developments, or if you are facing a new career challenge or higher level of responsibility.

Courses are offered on a residential basis in venues selected for the quality of their training, accommodation and leisure facilities; offering delegates comfort, invaluable networking opportunities and a unique learning environment in the historic city of Oxford.

Each short course can be taken on a stand-alone basis or they may be grouped together in modular format to form The CPS Postgraduate Diploma in the Management of the International Natural Gas Industry (please enquire for further details).

- ✓ **Natural Gas: Technical Issues for the Non-Technical Professional, Part One: The Upstream Focus** Code: NG2/a 22 – 23 May 2000
- ✓ **Natural Gas: Technical Issues for the Non-Technical Professional Part Two: The Downstream Focus – Transmission, Distribution and Utilisation** Code: NG2/b 24 – 26 May 2000
- ✓ **The 'Gas-Chain' Concept – Industry Structure, Economics and Pricing** Code: NG3 5 – 7 June 2000
- ✓ **International Gas Trade – Issues and Prospects for the Next Decade** Code: NG4 8 – 9 June 2000
- ✓ **International Gas Contracts – Commercial Factors and Negotiations** Code: NG5 12 – 16 June 2000
- ✓ **Understanding a Liberalised Gas Business – Markets, Open Access and Impact of Regulation** Code: NG7 19 – 23 June 2000
- ✓ **The Futura Project® (Part One): Gas Project Planning, Development and Financing** Code: NG10 17 – 21 July 2000
- ✓ **The Futura Project® (Part Two): Gas Sales Contract Negotiation and Implementation** Code: NG11 24 – 28 July 2000
- ✓ **Natural Gas Sales and Marketing in a Competitive Environment** Code: NG15 26 – 30 June 2000
- ✓ **LNG – The Technical, Commercial and Strategic Issues** Code: NG16 12 – 14 July 2000
- ✓ **Natural Gas for Power Generation – Economics, Technologies and Financing** Code: NG9 3 – 7 July 2000
- ✓ **The Power and Energy Industry – The Management of Market Price Risk** Code: TRP 4 – 7 December 2000

For Further Information Contact:

Margaret Kelly (please quote ref GAS10)
The College of Petroleum and Energy Studies
52 New Inn Hall Street
Oxford OX1 2OD
United Kingdom

Tel: (+44) 1865 250521
Direct: (+44) 1865 260211
Fax: (+44) 1865 791474
e-mail: margaret@colpet.ac.uk
web: http://www.colpet.ac.uk

CPS/MSK

Bleak prospects for European construction yards

Prospects have improved little for Europe's fabricators over the past year with many having to adopt novel strategies in a bid to survive a project-starved market. New geographical markets are being tackled, bids for work are increasingly being undertaken on a consortium basis, and many yards are having to rely on repair and maintenance work to tide them over. Takeovers, redundancies, mothballing and yard closures are also becoming a harsh reality, reports *Kim Jackson*.

Current levels of activity in Europe's fabrication yards are the lowest experienced for some years and there is now a severe overcapacity problem. Not only are there are less projects in the offing, the recent spate of oil company mergers has contributed to pending projects being delayed. Operators are also increasingly pushing contractors to reduce costs on those construction projects that have been awarded. In addition, European yards are having to compete with the 'low cost' yards of eastern Europe and the more competitive Far East fabrication sector which is said to be able to offer up to 50% lower prices than in Europe in some instances.

Although oil prices – which bottomed out at \$10/b – have risen to reach \$25/b in recent months – many oil companies are reluctant to commit any meaningful capital expenditure because of continued uncertainty about whether prices will hold. In the UK, fabricators also have to contend with the fact that the strength of the pound makes them uncompetitive when bidding for over-



Intermare Sarda recently completed fabrication of the M20 stabilisation module for Statoil's Asgard B project

seas oil and gas projects.

Iain Bell, Chief Executive of the UK's Offshore Contractors Association comments: 'We are facing a UK market which has steadily fallen from an average requirement of 10mn manhours during 1996–1998, to 6mn in 1999, and which experts are predicting will be in the region of 4mn in 2000.' The yards in Europe are facing a similar predicament and it is unlikely that yards are going to be operating at anywhere near full capacity for some time to come.

Mothballing and closures

Recent developments in the UK fabrication sector have been particularly dismal. In November, the Lewis Offshore yard was put into receivership and serious

doubts were raised about the future of Barmac which revealed plans to reduce its 3,700-strong workforce at the Nigg and Ardersier yards to around 400 by the end of April 2000 – a decision which will effectively see the yards placed on a care and maintenance basis until they win new business.

In addition, having earlier sold its Govan yard in Glasgow, Scotland, to Marconi Electronic systems, Kvaerner recently stated its intention to mothball its Teesside yard following completion of the Triton project and to close its offshore facility at Agotnes in Norway. The future of its Norwegian yards in Stavanger and Egersund, and Methil in the UK, are to 'be reviewed as available work declines'. (see page 3).

Earlier in the year Aker Maritime



THE INSTITUTE
OF PETROLEUM

IP Week 2000

London:
14-17 February

IP Week in February is the focal point in Europe each year when leading figures in the oil and gas industry travel to London for an intensive round of conferences, industry and trade association events, company meetings and social functions. The Institute's own programme of events forms the core of these activities.

Monday 14 February

International Conference on Oil and Gas: An Industry fit for the Millennium?

The last two years have been momentous ones for the international oil and gas industry throughout the world. This major international conference will address the key issues in the industry today.

Who should attend?

- Senior Management in the Oil and Service Industries
- Finance Directors, Bankers and Professional Advisers
- Policy Makers, Planners and Commentators

Speakers include:

Mark Moody-Stuart
(Chairman, Royal Dutch/Shell Group of Companies)

Thierry Desmarest (right)
(President-Director General, TOTALFINA)

Rodney Chase
(Deputy Group Chief Executive, BP Amoco plc) and

Dr Rilwanu Lukman
(Secretary General of OPEC and
Presidential Adviser on Petroleum and
Energy of Nigeria)



Tuesday 15 February

Seminar Towards the Total Energy Company

Organised in association with



Seminar on Bunker Trading and Price Risk Management

Organised in association with
The International Bunker Industry
Association

Speakers include:
Dr Richard C Ward (right)
Chief Executive, IPE London



Annual Luncheon

Guest of Honour and Speaker:
Lee Raymond
Chairman and CEO, Exxon Corporation

Wednesday 16 February

The 13th Oil Price Seminar and Exhibition on Coping with Oil Price Volatility – Liquidity in the Pricing Instruments Organised with the support of



1999 has been, in many ways, the extreme case of how to manage price volatility both at low levels (\$10.05 in February) and high levels (\$22.90 in October). This 13th Oil Price Seminar will provide a cross-section of eminent speakers in the industry today and will discuss how different organisations in the international arena have been managing price risk in this extremely volatile period.

Annual Dinner

The Annual Dinner at the world famous Grosvenor House Hotel will be host to 1,500 of the world's senior oil executives. Tickets are limited, so early booking is essential.



Thursday 17 February

International Conference on The Middle East – The Key to Global Oil Supply

Organised in association with the
Centre for Global Energy Studies

Any informed opinion today on the future of oil supply or price must include consideration of the oil, economic and political outlook for the countries in this complex and frequently volatile region. This major international conference will address the key issues.

Who should attend?

- Senior Management in the Oil and Gas Service Industries
- Exploration and Development Staff and Professional Advisers
- Policy Makers, Financiers, Planners and Commentators

Speakers include:

**Sheikh Yamani (Former Minister of
Petroleum and Mineral Resources for
Saudi Arabia, 1962-1986)**

**Dr Ghanimi Fard (Member of the
Board and Director,
International Affairs, NIOC)**
Steve Ollerearnshaw (right)
(Managing Director of Petroleum
Development LLC)



The IP Week 2000 Programme of Events and registration form is available from
the IP Conference Department. To receive your copy contact:

Pauline Ashby, Conference Department, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK
Tel: +44 (0)20 7467 7100 Fax: +44 (0)20 7255 1472 e: pashby@petroleum.co.uk
or view the IP Web Page: www.petroleum.co.uk

made redundant 350 out of 1,070 workers at its Verdral yard – with more to follow – while Amec Process and Energy issued redundancy notices to all its 706 staff at its Tyneside yard, stating that they would be laid off in the New Year if no new work was found.

On a slightly more positive note, the immediate future of Harland & Wolff's yard in Belfast was recently secured following Global Marine's agreement to provide working capital that will allow the yard to complete construction of two ultra-deepwater drillships and will leave it in a position to seek out and win new work.

Redundancies, mothballing and yard closures are, unfortunately, a harsh reality of business today. However, the resulting reduction in overall capacity may actually be in the sector's long-term interest.

New approach to business

The move from 'traditional' platform-driven oil and gas development projects to marginal and deepwater subsea and floater development concepts has necessitated a change in the way that fabricators do business. The current trend is towards one-stop-shop EPIC (engi-

'A loosening of purse strings by operators is necessary before we are to see any improvements in the sector's fortunes.'
Iain Bell, Chief Executive, UK Offshore Contractors Association.

neering, procurement, installation and commissioning) contracts, which means that yards are no longer bidding directly for projects but as part of a consortium. Yards are also having to offer a range of construction capabilities, including floating production systems as well as the hybrid platform/floating production solutions required for the development of high pressure/high temperature or heavy oil fields, in order to stay competitive.

Fabricators are also diversifying geographically and into other industrial sectors. Emtunga of Spain, for example, opened a sales office in Houston, US, last year in a bid to target new projects in the Gulf of Mexico. The company – which was due to complete work on a 900-tonnes technical building project for Angola's Girassol field as *Petroleum Review* went to press – also plans to focus on the African and Caspian markets. It is also involved in the construction of pharmaceutical modularised plants and is currently building units for delivery to the

Operator	Field*	Work	Delivery
UNITED KINGDOM:			
Amec Process & Energy			
Walsend			
Shell Expro	Shearwater	10,500-tonnes integrated deck	Feb 2000
Barnac			
(a) Ardiesier PetroCanada			
	Terra Nova (Newfoundland)	Two 4,000-tonnes compression modules	March 2000
Texaco	Captain B	2,000-tonnes subsea manifold	May 2000
DML	–	250-tonnes dock reactor housing	February 2000
(b) Nigg Elf			
	Elgin	40,000-tonnes TPG 500 PUQ platform	March 2000
Consafe			
(a) Burntisland BP Grangemouth Burlington BP			
	Kinniel Millom West Schiehallion	pre-assembled unit (PAU) minimum facilities platform PAU	Spring 2000 Mar 2000 end-1999
(b) Aberdeen Bechtel			
	Karachaganak (Kazakhstan)	electrical control centre	1Q-2000
Harland and Wolff Global Marine			
	DP drillships	Bridging contract for design and construction of positioned deepwater monohull drillships	4Q1999/ 1Q2000
Heerema Hartlepool Shell			
	Shearwater	2-200 tonnes wellhead deck	Feb 2000
Kvaerner Oil and Gas Methil Texaco			
	Captain B	Process and utilities platform for Captain expansion	May 2000
Odebrecht SLP Teesside Shell Expro			
	Shearwater	living quarters and helideck	Jan 2000
UIE Enasco			
	Enso 72	jack-up maintenance	Mar 2000
THE NETHERLANDS:			
Grootint Wintershall Noordzee Wintershall Noordzee			
	A6-A L8-P4	deck	Aug 2000 Nov 2000
Heerema Havenbedrijf Wintershall Noordzee Norsk Hydro Wintershall Noordzee			
	Heimdal L8-P4	subsea protection structures 5,200-tonnes jacket jacket and spacer-frame	Dec 1999 May 2000 May 2000
Mercon Steel Structures Allseas Elf Petroland			
	MS Lorelay F15A	150-tonnes stinger extension EPIC contract for 350-tonnes compression module	Jan 2000 May 2000
SWEDEN:			
Emtunga Statoil			
	Åsgard B	1,700-tonnes living quarters	close to completion, 'over to Kvarner early 2000
Elf	MPG/Girassol (Africa)	900-tonnes technical module	Dec 1999
Bouygues Offshore	BOS 300	living quarters extension	1H2000
Maersk	Maersk Gallant	living quarters extension	1H2000
SPAIN:			
Astilleros Espanoles Navion			
	–	105,250-tonnes multi-purpose shuttle tanker	July 2000
Dragados Offshore Saga			
	Snorre B	57,000-tonnes semisub platform hull	Oct 2000
NORWAY:			
Aker Stord Norsk Hydro Phillips Saga			
	Oseberg South Eldfisk Snorre B	14,500-tonnes integrated deck 6,000-tonnes topsides 18,700-tonnes topsides for floating production unit	May 2000 Late 1999 May 2001
Aker Verdral Norsk Hydro Statoil			
	Oseberg South Huldra	7,000-tonnes jacket and 4,700-tonnes piles 5,200-tonnes jacket and 2,100-tonnes piles	Apr 2000 May 2000
Heerema Tønsberg Norsk Hydro			
	Heimdal	3,000-tonnes topsides for riser platform and 500-tonnes bridge	Apr 2000
Kvaerner Rosenberg Statoil			
	Åsgard B	20,000-tonnes semisubmersible platform	3Q2000
Leirvik Sveis Saga Petroleum Statoil			
	Snorre B Huldra	1,500-tonnes living quarters and helideck 230-tonnes living quarters and helideck	Apr 2000 2000

Current workload at European fabrication yards (continued opposite)

US, Lithuania, China and Ethiopia.

According to OCA Chief Executive Iain Bell: 'Other areas such as offshore-related decommissioning work; inspection, repair and maintenance; industrial and marine work; heavy engineering; and renewable energy projects all have potential to represent a significant proportion of future business.'

Future outlook

The preceding paragraphs and the accompanying table which shows rather empty order books after mid-2000, paint a rather gloomy picture of prospects for this year. However, a number of North Sea projects may be in the offing for 2001 and beyond for those yards which manage to sit tight. These include Phillips Petroleum's Jade and Kate fields, Kvitebjorn (Statoil), Grane (Norsk Hydro), Ringhorn (Esso), Tambar (BP Amoco) and Tune (Norsk Hydro).

The fabrication sector, indeed the whole UK service and supply chain, is also waiting to see how things develop West of Shetland, comments Iain Bell. 'There are large discoveries, such as BP Amoco's Clair field and Shell Expro's Goldeneye. If these were to be developed sooner rather than later, it would provide an enormous shot in the arm for the contracting sector generally.' However, he stresses that 'a loosening of

Operator	Field*	Work	Delivery
NYMO Norsk Hydro Statoil/Kvaerner	Troll Oil Stena Dan	3,800-tonnes subsea installations 1,200-tonnes drill package	Apr 2000 Aug 2000
Umoe Haugesund Statoil Statoil	- Gulfaks-A	mid-water riser buoyances - 350 tonnes modification of 450-tonnes unit	Jan 2000 Apr 2001
ITALY: Intermare Sarda Eni/Agip	Adriatic Sea	Two 2,600-tonnes jackets and two 1,000-tonnes wellheads and process decks	2Q2000
BELGIUM: Bluewater Woodside Energy	Lengende (Australia)	single point mooring buoy system as part of field's export system (to be installed in 49 metres water depth; suitable to moor tankers up to 120,000 dwt)	2000

Current workload at European fabrication yards

purchase strings by operators is necessary before we are to see any improvements in the sector's fortunes.'

According to a recent report from UK analyst Smith Rea there could be 147 mobile production units (MPUs) - ie. floating, production, storage and offloading vessels; tension leg platforms; floating production systems; and spar/jack-up production units - oper-

ating worldwide by 2002, rising to 180 in 2005. This implies that there could be demand for an additional 50 units by 2005, of which it expects 45 to be new-builds. If such a scenario does happen, then it is good news for the fabricators. The question is, which ones will actually survive long enough to bid for the work, and will they be undercut by their Asian competitors? ●



CPS
OXFORD ENGLAND

THE COLLEGE OF PETROLEUM AND ENERGY STUDIES

Aviation Fuels Courses 2000 Programme

The global growth of air travel is becoming an ever increasing topic of interest to those involved in the manufacture of aviation fuels and those who use it. Coupled with safety and environmental concerns, this business sector is the subject of much interest and debate at international level. During these courses both the technical and commercial aspects of the aviation fuels business will be covered by teams of experts, whose principal objective is to provide a comprehensive insight into current and future developments in the industry.

- ✓ **The International Aviation Fuels Market - Demand, Supply and Pricing**
Code: IM1 16 - 17 October 2000
- ✓ **Aviation Jet Fuel - Specifications, Manufacture, Product Quality, Properties, Distribution and Availability**
Code: RF7 17 - 19 April / 18 - 20 October 2000

Automotive Fuels Courses 2000 Programme

Vigorous regulatory and environmental legislation to reduce emissions and increase fuel efficiency has now overtaken performance issues as the key element in setting automotive fuel specifications. These courses are designed to provide an in-depth understanding of the latest gasoline and diesel technology covering manufacture, specification, performance, environmental aspects and the use of additives. They will examine the key elements of fuel specifications which are coming under pressure from environmental legislation and look at the way that industry is responding by producing reformulated gasolines, city diesel and other clean or 'green' fuels.

- ✓ **Automotive Diesel Fuels - Fuel Manufacture, Product Quality, Engine Design and the Potential for Additives**
Code: RFG 10 - 11 April / 13 - 14 November 2000
- ✓ **Gasoline Technology - Specifications, Quality, Blending Components, Additives and Market Developments**
Code: RFS 12 - 14 April / 15 - 17 November 2000

The CPS Postgraduate Diploma in the Management of the International Refining and Fuels Industry

The college recognises the importance of providing flexible methods of training, which can meet the needs of both the company and the individual, to develop the necessary combination of management, technology, and economic competencies. The RFS, RFG and RF7 courses listed here can be taken as part of **The CPS Postgraduate Diploma in the Management of the International Refining and Fuels Industry** and are designed to benefit managers, economists, marketers and technical and commercial staff involved in the downstream petroleum industry including specialised areas.

The IM1 course is a module within **The CPS Postgraduate Diploma in the Management of Petroleum Logistics and Marketing**.

Please Contact:

Lesley Rigg (please quote ref FUE10)
The College of Petroleum and Energy Studies
52 New Inn Hall Street
Oxford OX1 2QD
United Kingdom

Tel: (+44) 1865 250521
Direct: (+44) 1865 260219
Fax: (+44) 1865 791474
e-mail: lesley@colpet.ac.uk
web: www.colpet.ac.uk

A new agenda for the 21st Century

Getting project management right when implementing new information technology (IT) systems is a significant undertaking. Investment in IT is at an all-time high within the upstream and downstream oil industries, while downward pressure on oil prices means that any expenditure must be carefully controlled and cost-justified, writes Rod Baker of CMG.

IT departments are highly skilled at managing projects against tight time-scales and budgets, but they often forget to include the stakeholders of new systems within their project plans. And if the people who are going to be influenced by the system are ignored, then the project will be in danger of failing to succeed in its aims and objectives.

A basic question to address is the difference between *programme* management and *project* management – two processes that are often confused with each other. One way to look at this is to use the analogy of space exploration, which has the end goal of identifying new areas of space to colonise. The space programme is the overall process of achieving that goal, and it will have a number of projects within it, such as building a space shuttle.

In IT, there may be an overall programme to introduce e-commerce, and this will include individual projects that must be addressed and managed separately. A project, such as building a new oil rig or implementing a new system, will be unique. It will have a beginning and an end, and it will concern different stakeholders. By contrast, a programme will run continuously until the business benefits are realised.

It is at this very basic level that many projects fail – through poor definition. When a programme is confused with a project, timescales are very difficult to set, and aims and objectives impossible to define. A successful project will have most of the definition work done at the earliest stages, rather than at a late stage where fire-fighting needs to be done just to keep the project on track.

The first step must be to appoint an effective project manager. Critical to the success of any project, the good project manager will have a mixture of personal skills, and be a hybrid counsellor, technologist and analyst. He or she must have the authority and the confidence to negotiate with all project stakeholders, and be able to pri-

oritise and re-prioritise tasks within the project.

A fresh approach

The important point is that successful project management is no longer about maintaining a 'command and control' culture that is dominated by an autocratic and unsympathetic project manager. Instead, it is about negotiation and understanding individual problems and objections. Project management requires a fresh approach that is both firm and fair to everyone involved.

One of the most delicate parts of this process is identifying who the stakeholders are, and who has power and influence over a project. If there is resistance to changes introduced as a result of the project, and these are holding back progress, then the project manager must be able to escalate discussions and negotiations to those who have power and influence – only when all other attempts at negotiation have failed.

It is worth remembering that the larger the project, the larger the numbers of stakeholders that are likely to be involved. It is also why it is relatively easy to keep a smaller project on track, and why very large projects involving several interested parties (with their own agendas), can fail. If everyone is not working in the same direction, a project can easily fail.

The typical steps that today's project manager needs to follow when there are hold-ups in the project are:

- Identify the problems and flag them to the project team as soon as possible.
- Identify the stakeholders who are involved in the problem (which could be a missed deadline, failure of individuals to deliver information when required, or supplier problems).
- Find out whether the people causing the hold-up have bought in to the project and understand its aims and objectives. Explain those aims and objectives if necessary, so that requirements for information are put into

the context of commercial success.

- If there is still resistance, listen to individuals' objections and solve problems where possible. Involve other stakeholders who have bought in to the project, and who can persuade colleagues to cooperate.
- If all else fails, escalate the problem to senior management and explain the financial and other risks associated with missing project deadlines.
- Build risk factors that still remain into the project management plan

Risk management

Another area that a project manager must be prepared to deal with is change and risk management. An IT project is different to construction and engineering projects, in that the work involved in the IT project stages does not necessarily have to be completed in a specific order. Building a house, for example, requires the foundations to be built, followed by the walls and then the roof. Implementing an IT project may involve a number of tasks which can be carried out in parallel.

This introduces a level of complexity that must be managed carefully. The project manager needs to be able to understand the impact of change and the risks that are involved in not completing certain tasks on time and to budget. For example, the business stakeholders may decide that they need additional functionality from a system. The project manager needs to be able to consider the impact of that additional functionality in terms of cost and timescales, and work with the rest of the organisation to decide whether it should be included or not.

Without that tight control, many projects drift into trouble – and different parties begin to blame each other for failure. Again, it is vital for the project manager to work hard at this point to ensure everyone is clear about the progress on a project, and to involve relevant stakeholders when necessary.

User training

Another important part of the project planning process is ensuring that user training and acceptance is built into schedules from the beginning of the project. Some of the best run projects can fail at the last moment because training needs to be added on to the end of the process, or because the team does not secure acceptance for system design early on.

Project managers can use a number of tools to support these activities. These include project management applications,

such as Microsoft Project and Primavera, and risk management tools, such as @risk and Predict! The point to make here is that while applications of this kind help to focus and marshal thoughts, they are still no substitute for experience, common sense and careful planning.

Another group of support tools includes methodologies, such as PRINCE2 and CMG's Commander methodology, which has been developed specifically to ensure that all areas of IT projects are managed effectively, and that no processes are left to chance.

It is important to remember that applications and methodologies do not take account of some of the softer skills involved in project management. However, they may be adapted to include some of the stages that project managers need to go through when identifying and managing risk.

Critical Chain Method

A new approach to project scheduling is the Critical Chain Method, devel-

oped by Dr E M Goldratt. This covers the management of single projects from the perspective of managing variability in the duration of those projects, and on limiting the variability's impact on a team and its customers out in the business.

Risk management workshops are used to allow project managers to work through the effects of risk on project costs and time-scales with stakeholders. Project support offices provide a central resource of information and advice on projects. They will also manage risk registers and schedules, and provide staff who can mentor stakeholders and communicate information to and from the business.

The project manager's role is just as important at the close of the project as it is at the beginning. A project manager must be responsible for checking that user acceptance criteria – identified in the testing and training sessions – are met by the new system. If they have not, then the project manager needs to work with stakeholders to either extend the

life and costs of the project, or agree to sign the system off as it is.

Third-party option

An option for organisations who are concerned about identifying project management skills within the company is to work with a third party like CMG, which can provide highly experienced project managers. The advantage of following this strategy is that a third party can take a dispassionate view of projects, and will have no 'hidden agendas' when working through project and risk management strategies.

A popular view of IT project management is that it is a technical role played by technical specialists. But to be truly effective, project managers have to understand human factors, fears and doubts as well as the capabilities of technology.

Above all, they must be prepared to lead from the front and ensure that everybody's best interests are met – from the end-user to the managing director, and from the IT manager to the management accountant. ●

Computing extranets

Worldwide extranet solution for Sable

The Sable Offshore Energy Project (SOEP) has created an extranet for its global project management system using Salvo®, Simware's Enterprise-to-Extranet Solution™. Salvo, an application development platform, enables the exchange of critical business information between project member companies from multiple data sources via the Internet. Nick Andrews of NetManage's e-Solutions Group, formerly Simware, explains why this system was chosen.

SOEP is a multi-national alliance of Mobil Oil Canada Properties, Shell Canada, Imperial Oil Resources and Nova Scotia Resources – together with seven major international contracting companies with office locations in Halifax (Nova Scotia), Calgary (Alberta), Houston (Texas) and Teesside (UK) – formed to provide the facilities for delivering gas from the reservoirs around Sable Island, Nova Scotia. One of the alliance's challenges was to develop a system where the global partners, independent of their platform, could interact with data to more effectively administer this immense project and meet critical deadlines.

The Salvo solution enables SOEP

members to share data via a Web browser, synchronise the information requested from disparate sources residing on various platforms, and present dynamic Web-based business applications in real-time. Partners are able to manage, update and disseminate information regardless of time or location, in a flexible and easy way.

Prior to the deployment of Salvo, AGRA Monenco-Brown & Root – the companies jointly responsible for overall project management – relied on separate servers at two locations to maintain information. Relying on telephone links or physical back-up disks meant updates to the information at each location only took place once per week.

'Creating an alliance approach allows the contribution of all team members to be valued, shared and above all single focused,' said Ray Harker, Technical Support and Quality Manager at SOEP (Brown & Root).

'With Salvo, our contribution dramatically increased the effectiveness of the Alliance, allowing members to create and share information in a truly international environment. As a team member with the Information Management Group, we delivered a solution with a commitment to support the SOEP/Alliance breakthroughs in cost reduction initiatives.'

'This project is a prime example of how vital timely information sharing can be to the success of a business or, in this case, a global project,' said David Desjardins, Simware's Vice President, Solutions Group. 'Salvo enabled the SOEP team to function more effectively in a very short time without the frustration often associated with extending corporate information out to multiple end-users with a variety of existing systems in place.' ●

For more information, connect to www.netmanage.com or contact Nick Andrews on Tel: +44 (0)1344 869500.

Powering up e-business

Agility is the key to e-business. Though countless Internet-based start-ups are emerging daily, the pace of change in e-commerce is particularly challenging for larger organisations, such as the oil and gas industry majors and their suppliers, which still lag far behind the financial and retail sectors, reports *Brian Davis*.

According to a recent survey of 2,500 European organisations by UK consultant the Bathwick Group: 'On average it takes 14 weeks for a start-up organisation to set up and start trading over the Web. This compares with an average of 38 weeks for a large, established organisation to make a serious business change decision, let alone start an e-business initiative.'

Tim Burnett, Head of Energy, UK Consulting Services for Oracle Corporation UK, says that large organisations are anxious to be faster and more flexible, 'but face difficulties because of complex structure and decision-making processes'. He suggests that it often makes sense for large organisations to pace themselves and create separate bits of infrastructure for e-business applications.

Project synergy

Over the years the oil and gas industry has struggled to get joint industry agreement on data definition. Oracle has been involved in an initiative with a number of parties, including Chevron, Statoil, PrismTech and the Petrotechnical Open Software Corporation (POSC), called Project Synergy. Project Synergy will allow E&P co-venture partners and newly merged companies to share disparate data and monitor asset performance via the Internet. Studies show



that exploration and production costs could be reduced by 25% with efficient information sharing.

Integrating the new e-business systems with legacy systems of corporate data is a particular challenge. New tools are being developed by Oracle and others to enable easier and more flexible integration. These integration tools have evolved significantly recently using systems such as message oriented middleware, i.e. software which allows applications to communicate via the Internet without the need for special coding.

Oracle's Burnett explains: 'Creating special interfaces for enterprise-wide applications previously carried a high overhead, and maintenance was a significant expense.' The Meta Group estimated that 40% of the implementation cost of an enterprise resource planning (ERP) package in an organisation is spent on integration. According to a

report by Forrester Research: 'A major insurance company spent 50% of the IT budget on interfacing.' Faced with figures like these, new simpler and more cost-effective integration tools are especially welcome.

Creation of a website that provides a transparent view throughout the supply chain demands building a special online portal which links suppliers and customers with the organisation's internal community. Though there may be specific IT functionality and integration within an organisation, there are a wide variety of interfaces at the front-end where data has to be fed back to the corporation's main systems. Data can cover anything from parts replacement on offshore platforms or refineries, to petrol purchases at forecourts across the globe.

continued on p26...



netnet:

**It's e-business
or out of business.**

**65 of the Fortune 100
run Oracle for e-business.**

ORACLE®
SOFTWARE POWERS THE INTERNET™

www.oracle.co.uk

... continued from p24

Teamwork, an asset

Oracle (www.oracle.com) recently teamed up with IT service supplier EDS (www.eds.com) and PrismTech (www.prismtechnologies.com) to provide a comprehensive, Web-enabled data management product to monitor facility assets for procurement and replacement in the process industries. The joint package, called e-Asset, integrates and manages information throughout an asset's life-cycle, from the design and construction of a facility such as an oil platform, refinery or storage terminal through to decommissioning. e-Asset incorporates technology developed jointly with Chevron, Statoil and others in Project Synergy.

Creation of the e-Asset system has been stimulated by recognition of the enormous volume of information which is stored during the life of any major facility, often in a combination of paper and electronic storage. The process industries have long suffered the expense, inconvenience and time constraints caused by incompatible data for a given asset. For example, Nobel/Akzo estimated that project teams spend 30% to 60% of their time searching for information, most of which is avoidable by data integration.

The e-Asset system is due for launch in the first half of 2000, and will include an electronic business IT infrastructure, standard-based data management, application integration and business process and performance management throughout the life-cycle of the facility asset. e-Asset will incorporate PrismTech's OpenBaseT standards-based technical and business datastore, with Oracle's Project Synergy product set for database handling and Internet architecture. The e-Asset system also takes into account industry standards including ISO 15926, AP 221, POSC/Caesar and Epistle.

New community

Within the oil industry information is not simply engineering or finance related, but also covers areas like seismics, where data definition is also complex and challenging. Aberdeen-based geophysical company Granite Rock (www.granite-rock.co.uk) which specialises in seismic interpretation, is developing a new Internet-based community to share geoscience expertise. As Managing Director Stephen Birrell explains: 'Most major oil companies have been setting up knowledge networks on their intranets to distribute tacit, strategic knowledge on drilling, subsurface and production technology. When problems arise using geophysical software people tend to refer to experts within the organisation or the

vendor, but the amount of information available may be limited, so a virtual user community is being created online for reference purposes.'

Granite Rock is to start a pilot Internet-based knowledge network in January to provide geoscience software support. The database will be seeded with information on leading geoscience software packages, such as Landmark and Schlumberger's Geoquest, along with detail describing how the software works and where problems arise. 'The virtual community puts the emphasis on sharing user expertise, rather than the vendor, linking the user community through the Internet,' says Birrell.

Granite Rock will act as moderator for the geoscience community. The hub of the system will be a piece of knowledge software called Organic, supplied by Edinburgh-based Orbital Software. Oracle is working with Granite Rock to create the Web infrastructure, and is supplying the back office Oracle Financials suite, so any transactions made over the Web will pass directly into Granite Rock's sales ledger.

Safety initiatives

Another Web-linked initiative called Vantage was introduced recently to track the histories, competency and training experience of oil and gas industry workers offshore, following cross-industry concerns about offshore personnel holding the right qualifications and safety training. Vantage is a central database administered by the Offshore Petroleum Industry Training Organisation (OPITO) on www.opito.com, and is linked to operator personnel tracking systems with a smart card for each individual. Oracle is building the Vantage database working with smart card developer CIS, based in Aberdeen, who supplied the Oracle-based logistics system.

In a further safety initiative, an online service has been set up at www.baworld.com to provide global information for users of breathing

apparatus, targeted at key areas including the oil and gas industries. BA Worldwide has installed IET's ClickTroubleshoot software on its website to enable subscribers to get instant advice on repairs online, for six leading manufacturers of breathing apparatus. By logging on to www.baworld.com users can access instructions on how to carry out repairs themselves from the ClickTroubleshoot service. The service is powered by Techmate Software. British Gas is also using ClickTroubleshoot as an online diagnostics tool for advice about its appliances.

Mail-sort

With more and more people coming online every day, major corporations are finding themselves flooded with e-mails. Delayed and inaccurate responses cause tremendous frustration and lose custom. Fortunately new techniques are being developed to handle electronic enquiries more effectively. US-based company Kana Communications (www.kana.com) has installed special software to manage the 'Tell Shell' customer campaign, which enables customers to receive personal and timely responses to their online questions. Shell plans to integrate the system with other business infrastructure systems to optimise customer service.

Simon May, Group Internet Manager of Shell International, says: 'Since launching on the Web, our policy has been to be as open and transparent as possible. This includes communication with our online customers, where e-mail is a very important element of our interaction.' The Kana system helps keep this channel of communication as open and rapid as possible, by categorising e-mail as they arrive, recognising questions and creating an appropriate response using a template.

As Andy Makeham, Marketing Manager of ERP supplier Kewill Systems (www.kewill.com) recently quipped: 'Within a few years, if you're not an e-business then you'll be an ex-business.' ●

Oil and gas information online
 day-to-day
 week-to-week
 year-to-year
 century-to-century
 at www.petroleum.co.uk

Driving forces for motorway forecourt design

Andrew Morris, Director of JWA Architects, reviews the main trends in motorway service station development over the past decade. He shows how their design is increasingly moving away from the 'traditional' oil company branded-style site towards the creation of a unified aesthetic for the whole motorway service area.



In the past, the fuel filling forecourt located within a motorway service area (MSA) was often the poor relation in the overall scheme of development of the MSA facility. For example, in many instances, little thought was given to the slip road leading to the forecourt, which could involve complicated routes with many junctions and require vehicles to merge with articulated lorry traffic in the process. In addition, the positioning of the forecourt within the site often did not allow the motorist to return to the MSA's main car parking area in order to access the facilities of the amenity building.

The development and design of forecourts within MSAs has followed the trend of most trunk road sites which, in turn, has often followed the trend of market forces. The most prominent of these has been the expansion of retail sales within the forecourt shop, where, like the main supermarket chains, oil companies have strived to impose a strong brand image on this sector of the market.

Market Harborough-based JWA Architects' first involvement in the design and redevelopment of a motorway forecourt was at Toddington on the M1 motorway in 1987. The principles behind forecourt design at this time were often led by space constraints and the limited volume of traffic on the motorways at this point in time. Sites such as this do not allow for the easy free-flow nature of traffic required in a modern fuel forecourt. Indeed, in the case of Toddington, because future expansion of the forecourt was not a criteria, the site is often subject to traffic congestion at busy periods.

Expansion and approvals

Current design of forecourts now incorporates the future provision of extra islands, together with the necessary traffic circulation space which this requires. The UK Highways Agency insists

on traffic expansion zones for the main parking areas as a pre-requisite of planning approval based upon (a) the anticipated traffic turn-in rates on the day of opening, and (b) predicted rates in 15 years' time. This has given rise to similar expansion planning for the fuel forecourts, as developers and operators try to assess future forecourt requirements.

Gaining planning approval for a MSA has become more difficult as time has elapsed. In the early development of the UK motorway network, the Highways Agency (or the Department of Transport as it was then known) selected its preferred sites – a factor which obviously eased the planning process. However, during the late 1980s and early 1990s, this process was deregulated, allowing developers to select their own preferred site locations. Many of the chosen sites were in green belt areas, which led to planning difficulties and objections from local residents.

The time period involved in gaining a planning approval could be determined by the willingness of the developer to compromise certain design aspects in order to reduce the forecourt's impact on the environment and its visibility to the surrounding area. As regulations were still very strict regarding the proliferation of signage on the motorway, often the only indication to the motorist that a new service area had been built was that of the standard advanced warning signs.

The planning process was also influenced to a large extent by the approvals required for the access and egress arrangements. As safety for the motorway user is paramount, gaining technical approval for such arrangements often took longer than gaining the actual planning authority approval for the site itself.

Over the years, the ability to select an appropriate site location has become more difficult, with the actual number of desirable locations decreasing and

Above: Motorway forecourt of the future? JWA created this ultra-modern concept for Granada, which gives the canopy and building structure a lighter look.

the number of local planning authority objections questioning the actual need for a MSA rising.

Initial expectations

Early motorway forecourts like Toddington only required the forecourt shop to be used as a payment point and stockist of minor car accessories. The principle was that the customer would always utilise the main MSA amenity building for toilet facilities and refreshments.

Again, this has led to problems regarding future site development as space limitations do not allow the forecourt shops to be expanded as required. The designed area of the forecourt shop at Toddington, for example, totalled just 90 sq metres – half that of some more modern sites.

Obsolete functions

One final trend which appeared in the early development of motorway forecourts was the inclusion of an accident and repair garage twinned with the forecourt. This often led the aesthetic design of the forecourts to be dysfunctional and the extent of metal road surfaces being excessive.

Planning authorities now often require landscaping belts on the periphery of sites to be included in order to mask such features. The increase in motorway regulations and expansion of breakdown organisations such as the RAC and AA have now virtually eliminated this aspect of MSA design.

Flexible approach

A progression from the Toddington outlet design was Warwick MSA, which was opened in 1994. This twin site was developed by Welcome Break in conjunction with Mobil Oil, which subsequently became part of the BP Mobil fuels retailing alliance. This site was a newbuild project and allowed more flexibility in design. The car and light van forecourt consisted of 10 islands with all fuel grades being available on each island. The storage capacity for fuel totalled 600,000 litres, which provided more than adequate capacity during the busiest of periods. The layout and circulation space adjacent to the forecourt also allows for future expansion of the forecourt should it be necessary.

Following the trend of Mobil Oil's parent company in the US, a pressurised flexible fuel pipework system was used for the fuel lines. Such a system allows switching between fuel grades and easy replacement of a fuel grade should it become less popular. Greater scope for easier site maintenance was also introduced, allowing the site to



Figure 1: Oxford MSA forecourt on M40 motorway

remain operational during maintenance and repair works.

The forecourt shop had also evolved from the early days, in that there was a bigger emphasis on retail merchandising that was not connected with car accessories. The design of the Warwick forecourt shop incorporates full height glazing to allow the maximum visual impact of the merchandise from the forecourt, also facilitating panoramic views to the forecourt from the point of sale kiosk. The benefits of this progression was to give the retail space a fresh outlook, encouraging the customer to spend more time and money within a retail environment. The total area of the sales building is 325 sq metre, of which 145 sq metres is dedicated to retail space.

Further developments to the motorway fuel forecourt design are illustrated by the Reading MSA on the M4 motorway and the Stafford MSA on the M6 motorway, which both opened in 1995. These sites enhanced the progress made within the oil industry with the emphasis increasingly focusing on retail sales promotion. The Reading site has a 325 sq metre sales building, of which 145 sq metres is dedicated retail space, while Stafford has a 380 sq metres sales building of which 175 sq metres is retail space.

Both the sites were originally developed by Granada in conjunction with Mobil Oil. They are similar in layout, each containing 10 car and light van dispenser islands. The number of derv facilities has increased since the early days of MSA forecourt design – Stafford is equipped with four derv island facilities, and Reading three – partly as a result of the increased volume of freight conveyed on today's motorway network.

Oil company dictates

The architecture of the forecourt canopy and sales buildings was initially dictated by the application of corporate standards and finishes where possible. Some planning authorities, particularly during the 1980s, were starting to insist

on the use of local materials to clad buildings, along with incorporating pitched roofs to the buildings and sometimes even the canopies.

However, generally speaking, the amenity and forecourt buildings did not relate to each other architecturally and the planning authorities were usually more interested in the design of the amenity building rather than the forecourt.

Radical departures

The Oxford Services on the M40 motorway (see Figure 1), which opened in July 1998, differed from previous JVA design projects in that it was not a site which utilised a dedicated slip road off the motorway, but was positioned off a motorway junction which allowed commuter traffic from the trunk road network to utilise the forecourt as well.

The design of the amenity building on this site was a particularly radical departure from previous designs. It was proposed that the architecture of the forecourt canopy and sales building should reflect the design approach taken at the main MSA amenity building, with the same facing materials used and the same curved profile roof incorporated. Exposed steel structural trees were used to support the forecourt canopy, which reduced the edge profile and omitted the need for bulky fascias. A large forecourt shop was also incorporated with the ratio of retail space being increased while reducing storage areas so that products are 'stored' on the shop shelf. Staff facilities were concentrated within the main amenity building, reducing the overall capital cost of construction work. The MSA site itself is heavily landscaped with much use of water (a canal and waterfall), in order to create a relaxing atmosphere and 'transport' motorists from the traffic laden environment in which they have been travelling. This, in turn, helps encourage them to linger on-site and purchase more refreshments and goods.

Following on from Oxford, Hopwood Park Services on the M42 motorway opened in July 1999 (see **Figure 2**). Again a similar approach was taken with the architecture of the main amenity building following through in the design of the forecourt shop and canopy. Large areas of the canopy roof were glazed to maximise daylight onto the forecourt level to improve the general visual amenity. The shop itself again maximised the retail space, but also incorporated catering facilities to provide a 'one-stop-shop' for motorists.

Both the Oxford and Hopwood Park MSAs have been designed with future possible expansion in mind. The Hopwood Park forecourt was built to allow for LPG fuelling which we expect will soon become a common feature on all fuel forecourts.

The road ahead

The process of giving the customer all of the facilities available in the amenity building within the forecourt shop – giving the customer a quality of a



Figure 2: Hopwood Park Services on M42 motorway

product and service equal to that of the amenity building – is now becoming a common feature within motorway service station design.

As the number of MSAs increase, there will be continued effort to reduce the capital cost of construction works. We expect the developing trend to be for new sites which combine the amenity building and the forecourt

building into a single unit. These combined buildings will generally be of a smaller scale, but would contain all facilities under one roof, and will be linked to both the general parking areas and the fuel forecourt area. Not only will this involve a reduction in the building cost, but also a dramatic reduction in infrastructure costs for road networks and services. ●



THE INSTITUTE
OF PETROLEUM

New Publication

New Technical Guidance for Safer Petrol Filling Stations

Petrol is a dangerous and highly polluting substance which requires proper storage and handling if it is not to pose significant risks to the health and safety of people, and to the environment. This is particularly important at petrol filling stations, where the general public serve themselves. New technical guidance is now available which sets out how to avoid damage and pollution by following good design, construction and installation principles, and by taking advantage of the latest advances in technology.

Guidance for the design, construction, modification and maintenance of petrol filling stations published jointly by the Association for Petroleum and Explosives Administration and the Institute of Petroleum. The guidance has been compiled by working groups of experts co-operating under the auspices of a technical coordinating body comprising representatives from all relevant areas of industry and enforcement. This technical coordinating body was established following a request from the Health and Safety Executive to develop a replacement for the outdated guidance HS(G)41.

The new guidance, which should be read in conjunction with the HSE guidance note on risk assessment: HS(G)146, is based on good practice and reflects the latest state of knowledge in the industry. It is designed to protect people and the environment from harm.

The guidance has been reviewed by both the Health and Safety Executive and the Environment Agency. Nick Starling of HSE's Nuclear and Hazardous Installations Policy Division said, 'HSE is pleased to see the new guidance. It will be useful for the industry as we work towards introducing new petroleum legislation as part of the process of implementing the Chemical Agents Directive in 2001.' Phil Chatfield for the Environment Agency commented: 'This long-awaited guidance provides essential advice for the industry which will go a long way towards helping to reduce the risk of pollution from retail sites. It will also be an indispensable source of reference for our staff when dealing with such sites.'

Guidance for the design, construction, modification and maintenance of petrol filling stations (over 200 pages) is specifically aimed at designers, contractors and installers but will also be invaluable to enforcement authorities, developers, owners and planners of petrol filling stations.

ISBN 0 85293 217 0

Special discounts apply for IP and APEA Members – enquire when ordering

Available for sale from Portland Press Ltd at a cost of £90.00 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



Forties blend – an heir apparent to Brent still in waiting

Since Brent System crude oil emerged as the North Sea market leader in the early 1980s, the price of Brent has remained king in international oil price formation. However, as we enter the millennium, the Brent suite of contracts faces new challenges to this role. The Brent markets have seen off pretenders to the throne in the past – notably Forties and Øseberg – but the current extent of trader disenchantment means that a new challenge which is now emerging from Forties should at least be taken seriously, writes *Liz Bossley*, former Head of Marketing for Enterprise Oil.*

Brent production over the 1990s has been declining and it is expected to fall to less than one cargo per day over the next two years. At the same time, production of Forties Blend has risen – overtaking Brent Blend production in 1994 – a situation which is forecast to persist beyond 2005 (see **Figure 1**).

Predictions of the imminent ousting of the Brent market by Forties in the mid-1990s proved groundless, with the extent of the inertia and resistance to change of the Brent players having been underestimated. But at that time, the Brent market was functioning more or less satisfactorily, despite perpetual grumbling from traders finding themselves on the wrong end of the infamous '15-Day squeezes'. The old adage 'if it ain't broke, don't fix it' proved true of Brent.

However, the less liquid any market is, the more it lays itself open to accusations of manipulation by the dominant players. Although 15-Day Brent may have cleaned up its act on overt squeezes, wariness about the reliability of Dated Brent and CFD (contract for difference) quotes is growing. Could it be that Brent is heading for 'broke' and is in need of 'fixing' or even replacing?

It is not only physical Brent activity which has been on a decreasing trend –

15-Day Brent transactions have fallen over the 1990s too (see **Figure 2**). Offsetting this is the fact that OTC (over the counter) Brent and Brent futures volumes have been increasing exponentially. But these 'paper' contracts are linked directly to the dated and 15-Day contract prices, so their ability to thrive is contingent on the survival of the dated and forward contracts. On the other hand, it should be remembered that the OTC and futures markets are cash settled so, all else being equal, they could continue to grow despite the erosion on the Brent physical foundation of these markets. The cash settlement mechanism can lead to complacency about the reliability of Brent market price quotations. So long as the prices get reported, the paper markets can continue to trade on regardless, until a crunch point comes.

It is most likely that the dwindling volume on physical and 15-Day will continue indefinitely until an unforeseen event forces a change on the market and a sudden switch to a new contract. A number of things could happen to change this scenario. The likely possibilities are:

New fields will join Brent Blend. Sullom Voe terminal and Flotta Terminal are competing fiercely to capture throughput from the West of Shetland fields. Although Schiehallion is not blended with the fields feeding Brent Blend, there is no reason that future fields could not join Brent. This could give Brent a new lease of life.

Equally likely is that fields currently under consideration for development through offshore loading systems or declining fields which are currently offshore loaded, will take a fresh look at pipeline alternatives, given that the price of offshore-loaders has been hit hard by a glut of offshore grades in the limited North West European market. Again this would help Brent survive well into the next millennium.

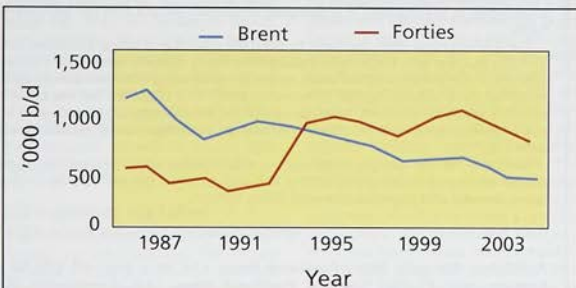


Figure 1: Brent blend and Forties blend production

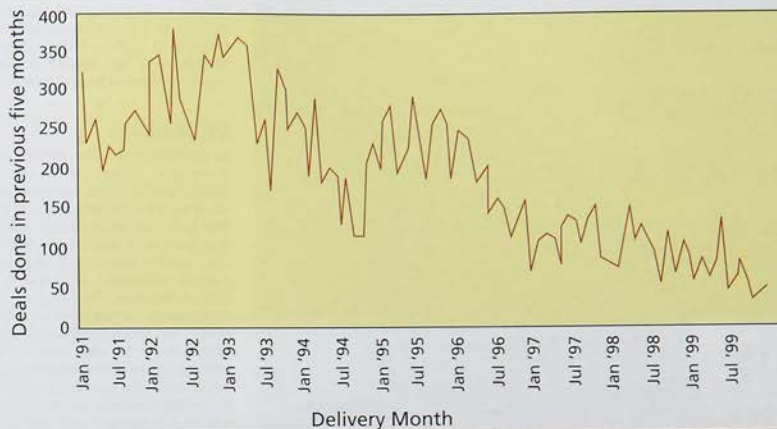


Figure 2: 15 day Brent transactions

The fact that so many producing countries have written Brent Blend into their sales contracts, production sharing contracts and oil taxation formulae, means that a baseload hedging volume is likely to persist regardless of the extent to which Brent price quotations are subject to unusual trading influences. Rumours abound that some of the Opec countries are becoming impatient with the results which Brent formulae throw up and the Norwegian authorities are known to be reviewing the process by which they set their norm prices. If the producing countries abandon Brent, they will take a large proportion of the remaining Brent trade with them.

The regulatory authorities have been somewhat *laissez faire* with Brent since its size makes it a closed shop for consenting adults. However any overt accusation of market manipulation by a player on the wrong side of a deal could attract the authorities' attention and kill volume overnight. This would be particularly so of the conservative American banks who dominate the OTC market. Such companies would take investigation of the markets or indexes in which they are involved very seriously.

Any prolonged *force majeure* event at Sullom Voe, such as was experienced when Cormorant A went down, is more likely to switch volume away from Brent than was the case before. While the wet and 15-Day players would scramble to fulfil contracts and avoid termination, the OTC players are more likely under their ISDA (International

Swaps and Derivatives Association) contracts to switch to another method of price calculation. Once this volume has switched, it is unlikely to switch back and this is the fastest growing area of trade.

All of this pre-supposes that an alternative to Brent exists. The Forties market has been waiting impatiently as their apparent to Brent's throne for some years.

18-Day Forties

While Brent Blend production has been declining, that of Forties Blend has been steadily increasing as new fields have come onstream and the facilities of the Forties Pipeline System have been upgraded to handle 1,150,000 b/d.

Like Brent Blend, Forties Blend has no quality or handling problems and there are about 20 regular buyers of the physical cargoes. Unlike Brent, Forties is considered to be dominated by one player – BP Amoco – who is the biggest equity producer, pipeline operator, terminal operator, shipping coordinator and biggest refiner of the grade (the Grangemouth refinery sits at the end of the Forties pipeline and runs almost exclusively on a diet of Forties Blend).

Nevertheless a forward market in Forties, analogous to 15-Day Brent, has evolved although its liquidity is minuscule. This is the 18-Day Forties market. This works on exactly the same principles as 15-Day Brent with some exceptions:

- The shipping coordinator endeavours to produce the monthly schedule of liftings 18 days before the start of the month to give end-

user refiners more notice of availability. If this is missed then the first cargo(es) in any month may not qualify to wet 18-Day chains.

- Cargo sizes are 600,000 barrels rather than 500,000 barrels, to be more compatible with refiners' preferences and to facilitate freight economics.
- There is no $\pm 5\%$ operational tolerance allowed. This is partly because BP Amoco is such a big player and there is no case for a shipping operational tolerance when deliveries are being made free-in-pipe (FIP) to the Grangemouth refinery. In reality, measuring and loading equipment efficiency makes the need for an operational tolerance a fallacy anyway and the Brent tolerance is frequently used for commercial, rather than operational, reasons.
- Cargo declarations are made at 4 pm rather than 5 pm in order to avoid time conflicts of date declarations – the operations staff making and receiving cargo declarations are the same in both markets.

The ingredients are all in place for Forties to take over from Brent. The two biggest stumbling blocks are trading inertia and BP Amoco's dominance in the Forties market. It is unlikely that Brent will abdicate or Forties will stage a palace coup. It is equally unlikely that Forties will erode Brent's position gradually. The most likely scenario is that one of the events described above will bring about a sudden shift. But it may be some time before we get to say 'Brent is dead. Long live Forties!' ●

Superb designs for 21st century tankers – but who will pay?



The basic design of oil tankers is very simple and largely immutable, hemmed in by classification society rules and the physics of floating objects. Trends in tanker design are being defined by the needs of regulatory compliance and cost savings. *Peter Mackay* looks at some of the key factors driving the future development of this sector of the shipping industry.

Ever since the tanker *Torrey Canyon* ran aground off the coast of south-west England nearly 33 years ago, changes in the design of such vessels have been primarily driven by regulation. Until then, tankers had developed to meet the need to transport an ever expanding volume of crude oil from producers to consumers. Through the 1960s, in particular, tankers kept getting larger, but at the same time simpler to build, stronger and equipped with a greater degree of redundancy than before. This process hit its apogee after

the closure of the Suez Canal in 1967 and for a few years in the mid-1970s tankers with a capacity of more than half a million tonnes were being built.

The *Torrey Canyon* incident was followed by a number of others which, although less serious, led international regulators to take a closer look at tanker design. Following the agreement of the MARPOL and SOLAS conventions in 1973 and 1974, respectively, a number of safety features had to be included aboard new ships, such as oily water separators and inert gas systems.

The US was already pressing for tanker hulls to be fitted with double bottoms as early as 1970 but this requirement had to wait for another accident to happen before being introduced.

US blueprint

As in many areas of life, to find out what is going to happen in the rest of the world tomorrow it is instructive to look at what is happening in the US today. The latest trends in tanker design are illustrated most clearly in the Millennium class vessels currently being built at Litton's Avondale shipyard in New Orleans for Arco. The series of 125,000 dwt tankers will be employed to carry crude oil from Valdez, Alaska, to refineries on the west coast of the US and will involve them operating in states which have the world's toughest environmental controls on oil activities as well as the highest potential penalties for oil pollution accidents. At a reported \$166m each, the ships are hugely expensive but, according to the shipyard, they are 'the safest oil tankers ever built'.

Sophisticated dynamic load analysis was employed to design a tanker with a 30-year lifetime, in contrast to the usual 20 years. This meant that the shipyard's engineers had to alter the detailed structural design to meet the close structural tolerances required. They are, of course, double-hulled and have a 10-foot space between the outer and inner hull, compared to the 6.5 feet which would be required for vessels of such size under the US Oil Pollution Act 1990 (OPA 90).

The Millennium ships also demonstrate advances in propulsion and steering systems that are likely to become commonplace on tankers in the next century. In particular, added redundancy is designed in, so that in the event of the failure of one piece of critical equipment the vessel can continue to navigate safely. The new tankers have two independent sets of engines, propellers and rudders, which have certainly added to the cost of the ships but could help the owner avoid the much higher penalties likely in the event of an accident. Manoeuvrability has also been addressed, with the inclusion of a powerful bow thruster that will allow the ships to be turned right around within their own length. Bridge control is effected by a joystick rather than the traditional wheel and sophisticated IT systems are included to ensure that the vessel stays on course and that the officer on the bridge is warned if it has strayed.

Tanker designers are currently focusing on the need to develop more efficient and reliable propulsion systems, not just for safety reasons. Many vessel groundings occur because of loss of propulsion or steering – the *Braer*

being one such example – and redundant systems such as those introduced on the Millennium tankers provide a straightforward, if expensive, way of guarding against such incidents. Diesel-electric propulsion systems possibly offer a cheaper means of achieving some level of redundancy and are now being installed on a number of new ships. In such cases a number of diesel engines of various sizes are employed to generate electric power and it is this that drives the propeller shaft. Such an arrangement has several advantages: Diesel units can be fired up as and when needed, allowing each to run at its most efficient rate while still meeting the variable power demand of the ship; some degree of redundancy is factored in; and the engines do not have to be located in line with the propeller shaft, thus allowing the designer more scope to optimise the hull shape.

Reducing air pollution

Having spent much of the past 30 years looking at ways of controlling pollution of the world's seas and shores, the International Maritime Organisation (IMO) has recently begun paying more attention to air pollution. Ships' engines are significant sources of oxides of sulfur and nitrogen (SO_x and NO_x) in the atmosphere and, while many tankers spend a great deal of their time on the open seas where their exhaust gases are dissipated and diluted, certain parts of the world with heavy maritime traffic are impacted quite significantly.

IMO has already recognised that some parts of the world need protection and has created 'Special Areas', such as the Baltic and North Seas, where a cap has been introduced on the level of sulfur in bunker fuel. While this measure largely impacts the oil companies, which will need to find an alternative outlet for sulfur-rich products or invest in additional desulfurisation capacity, it is also undoubtedly the case that ships will have to be fitted with cleaner burning engines and flue gas scrubbers.

In the wake of the Rio earth summit and the Kyoto Protocol on atmospheric pollution, the spotlight is also falling on emissions of volatile organic compounds (VOCs). Regulations have already been introduced in many parts of the world to mandate the use of vapour recovery systems at oil jetties, depots, service stations and other facilities where VOCs are released during product transfer. Crude oil, product and chemical tankers are now regularly equipped with vapour return lines so that cargo vapours displaced from the tanks during loading can be directed



Technological changes in the specialist tanker trades are expected to be reflected in the general fleet

back to the storage tank or shoreside vapour control unit rather than vented to the atmosphere. More recently, Statoil has been experimenting with onboard vapour control units on two of the shuttle tankers it employs in the North Sea, the idea being to capture vapours displaced during loading and convert them to usable fuel for the ships' engines.

A study sponsored by oil companies and tanker owners has also suggested that cargo vapours vented during the voyage also need to be controlled. On average, the study calculates, some 0.26% of a very large crude carrier's (VLCC) oil cargo evaporates between loading and discharge. This vapour needs to be allowed to vent to the atmosphere to avoid a build-up of pressure inside the tanks. More than 1.5mn tonnes of crude oil is lost each year in this way, it is calculated, and the problem is worst with light, volatile crudes. Some action on this is inevitable at some point, which is likely to involve either a restriction on loading capacities to provide more ullage space or the installation of onboard vapour control systems.

Rising costs

It is clear that if tomorrow's tankers are to be safer, cleaner and more efficient, they will also be more expensive. One major concern is whether the current ownership structure of the fleet is such that owners can ever achieve a just reward for the financial risks they take.

Once upon a time the oil majors owned the bulk of the world's tankers and the cost of running them was merely another element in the price of getting crude oil from wellhead to market – as is still the case in the LNG shipping business. Apart from the large, state-owned fleets of the major exporting nations, however, most of the tanker fleet is now in the hands of

independent owners. This situation presents charterers with a fragmented and powerless market.

Consolidation

Consolidation among tanker owners has long been propounded as a cure for its ills. It is not that a fleet with fewer owners would be able to exert positive pressure on freight rates; rather it is the case that larger owners would have access to more competitive capital, could achieve further synergies in other cost areas and improve fleet utilisation.

Bjorn Moller, President of Teekay Shipping, also pointed out in a recent article in the shipping magazine *Fairplay* that larger, publicly funded shipping companies would also be forced to think more rationally about their activities. When the return on capital invested in publicly quoted tanker companies through the 1990s underperformed US Treasury Bills over the same period, it is not always clear what the motivation is for investors to engage in the risk-laden business of owning oil tankers.

Shaping the future

Compared to the tankers of 30 or 40 years ago, then, those being built today are fitted with a range of equipment designed to make their operations safer, both in terms of their navigation and their cargo handling, and more efficient. It is not only regulation that shipowners and designers are responding to, financial imperatives also play a part. There is continuous pressure to traverse the seas more rapidly and to spend less time in port, to make the most of what are, for much of the time, inadequate returns from charterers. Ships must use less fuel and employ smaller crews. As we move into the 21st century there is every indication that these two forces will continue to shape new tankship design. ●

GTL begins to rival LNG



In just two hectic years of research, development and propaganda since the media woke up to gas-to-liquids (GTL), the conversion of natural gas to liquid fuels has become firmly established as an option when considering how best to commercialise remote gas. *Fred Thackeray reports.*

Evidence of this is widespread. Most telling is the strong public commitment to GTL by the new super-international BP Amoco. Announcing earlier this year the proposal to acquire Arco and to establish a major gas development programme in Alaska, John Browne, the company's Chief Executive Officer, claimed that BP Amoco has 'proprietary technology which we believe may allow us to convert some of Alaska's gas into liquids that can be transported by the existing oil pipeline... We have plans to build a \$70m pilot plant in Alaska to test that technology.' BP Amoco is, naturally, studying commercial-sized projects for moving gas by pipeline and as LNG. A pilot plant for GTL is a long way from a commercial project – but it will be a significant pointer nonetheless.

A meeting of minds

By its acquisition of Amoco and Arco, BP has added large natural gas reserves to its assets base. In particular, Arco's reserves in Alaska and at Tangguh in Indonesia make major contributions. With regard to GTL technologies, BP will

have brought together individual research and development programmes which were already being strongly pursued by each of the merged group's three constituent companies. BP had signalled its interest in GTL in an article in 1997 which claimed that, in conjunction with Kvaerner, it was developing a smaller and cheaper reformer for the first, and the most expensive, phase of the GTL process – the production of the synthesis gas feedstock. But after making this claim in its house magazine, BP went quiet on the subject. It did, however, provide the project leader for a multi-company research team studying ceramic membrane technology, which is a new approach to save costs in the supply of oxygen for this first phase.

Amoco was also a participant in the BP-led team studying ceramic membrane technology and Arco was a member of a separate team, partly financed by the US Department of Energy, which was studying different aspects of the same subject. These studies are long-term projects with commercially useful results not expected for at least another six years. However, if they are successful they

could result in cost cuts of 25% in the production of synthesis gas.

Arco has been particularly enthusiastic about the prospects for GTL. It is currently evaluating the operation of a 70 b/d pilot plant which has just gone onstream at its Cherry Point refinery in Washington state (see *Petroleum Review*, September 1999). Announcing the plans for this in 1997, the company's President for Exploration and Production, said: 'Gas conversion fits well into our global growth strategy and we are beginning to incorporate it into our exploration and development planning around the world.'

BP Amoco's declared keen interest means that each of the three largest non-state international oil and gas companies is now committed to the development of the GTL technologies. Shell committed itself financially – with Mitsubishi, Petronas and the Sarawak Government as partners – when it put its 12,500 b/d plant onstream in Malaysia in 1993. Exxon Mobil holds a highly patented GTL process on which it has spent large sums in research and development, and is seeking a government partner for a commercial-size plant, say 100,000 b/d.

Governmental agreement and financially acceptable terms to commercialise gas reserves are, in fact, a key issue. Today's worldwide gas surplus, however, gives GTL an important plus when compared with LNG. At 126m t/y, the worldwide nameplate capacity of LNG plants today is some 25% or more above prospective demand of up to 100m tonnes in 2000. The commitment of

finance for any new LNG project in the near future can only be justified if the intended market is established with certainty. By contrast, even a much larger GTL plant than any yet built will add only a marginal volume to the world's available supplies of petroleum products. Focusing on its targeted product of GTL technology – automotive diesel – the addition to supply is unimportant. On the contrary, because diesel produced by GTL plants is a high-cetane, low-emission product, it is likely, initially at least, to command a premium price.

Trinidadian developments

It is considerations such as these which have led the Trinidad Government to be the first to publicly proclaim its doubts about further investment in LNG, notwithstanding that in this case the market in Spain is already provisionally contracted.

At a recent conference organised by SMI in London, Charles Baisden, Project Development Manager of Trinidad's National Gas Company, asserted that further 'LNG exports could lead to extensive undervaluing' of Trinidad's depleting gas resources. He added that GTL 'is on our doorstep and we are certainly going to embrace the opportunity with all the resources at our command'. Trinidad has not so far implemented this plan to embrace GTL. It is, however, negotiating with two potential GTL promoters – Syntroleum and another referred to as a Qatari investor – and it has still not given the go-ahead for additional exports of LNG.

Despite the enhanced prospects for GTL, it has to be said that recent news gathered by *Petroleum Review* on already announced projects is unexciting:

Shell's SMD5 plant in Malaysia is nearing completion of its rebuilding and upgrading, following disruption by an explosion in its air separation unit in December 1997. But it is now expected to start up in the 2Q2000 instead of the 1Q2000 as previously announced.

Sasol now believes that its joint project with Chevron for a 30,000 b/d GTL plant in Nigeria will probably receive Government approval in late 1999 or early 2000, and go onstream in 2004 rather than 2003.

Sasol's highly significant deal with Chevron for worldwide cooperation on GTL, although still quite definitely active still remains at the stage of a Memorandum of Understanding.

Sasol's project in Qatar for a 20,000 b/d GTL project jointly with Phillips Petroleum and QGPC (Qatar General Petroleum Corporation) still awaits resolution into a firm engineering project more than a year after completion of the feasibility study and despite strong public endorsement by QGPC.

A project was announced last year by Syntroleum – a widely known GTL licensor – for a 2,500 b/d plant to be jointly owned with Texaco and Brown & Root. But Brown & Root withdrew from the project following its absorption into Kellogg Brown & Root. As a result, this GTL proposal appears to have been relegated to the back-burner, or may have been abandoned.

Sweetwater project

One other current project which appears to be making progress should also be mentioned. This is the so-called Sweetwater project, proposed by Syntroleum with a small equity participation by Enron. Originally intended to be built at Sweetwater in Wyoming, it is now expected to be located either in Trinidad (as mentioned above) or in Australia. It is planned to be a 10,000 b/d plant to produce high value products which, according to Syntroleum, will be lube basestocks, drilling fluids and chemical specialties. The project has just taken a step forward by the appointment for preliminary engineering work of an RWE subsidiary, Klockner-Industrie Anlagen.

However, it matters much more than the details of progress on particular projects – which will in any case come to fruition quite soon – that there is a continuing favourable shift of perspective on GTL. It is now more sensibly recognised that today's price of crude oil and petroleum products is almost irrelevant to the economic viability of GTL projects. When crude oil prices slumped with unprecedented force last year, the proponents of GTL research and development persevered with their efforts and took little notice. The belief that the low oil prices might affect GTL prospects sprang from the way in which the economic viability of GTL was frequently stated – ie viable at crude oil prices of \$20/b. But this meant, of course, at long-term prices of \$20 when plants not yet built will be functioning for 20–25 years ahead.

Already, Shell, which has been one of the most forthcoming in publishing the economic results of its ongoing research and development work, has gone way beyond its earlier cautious assessments. The group is now thinking in terms of commercial sized plants of 70,000 b/d. On this basis, it reckons, to judge by its recent presentation at the SMI conference in London, that a real internal rate of return (IRR) of 10% would be obtainable at crude oil prices of less than \$15/b. Such an assessment rests, inevitably, on a whole raft of assumptions. Particularly important – as Shell, Sasol and their competitors have all insisted from the start – are the availability, or the lack, of infrastructure and the price of natural gas feedstock. Thus, a plant built close to

an existing LNG export facility and able to make use of established infrastructure can avoid much of the investment in facilities outside battery limits. This is important because such investment can amount to as much as 30% of overall capital costs if it all has to be provided.

The price of gas feedstock is a vital issue too, especially since there is a tendency for governments to think that premium prices for the diesel produced will justify a price for gas feedstock higher than the figure of 50 cents/mn btu customarily assumed in GTL calculations. A related issue is that not just the price but the steady availability of natural gas feedstock is a key factor. This means that a single source of associated gas which would otherwise be flared is insufficient on its own if it is liable to strong fluctuations due to varying crude oil production.

Supporting GTL

The current world surplus LNG potential is a passing phenomenon which favours GTL. More important in the long-term are other industry-wide factors which will increasingly support GTL developments. One of these is the spreading belief that the world is on the verge of running out of economically viable oil. It is a belief not held by this writer, but the perception itself is a driving influence. Certainly over the next 10 to 20 years it must be likely that real cost increases of oil will be greater than technological developments can contain. But we have abundant and growing reserves of natural gas. We shall, almost certainly, be demanding increasing quantities of liquid fuels for road transport, not just in Europe and North America but even more in Asia, particularly in India and China. Compression ignition engines fuelled by diesel are in themselves more efficient than gasoline fuelled cars no matter how much improved. As dieselisation grows worldwide, there will be a growing opportunity for good quality diesel from natural gas.

The good quality of GTL diesel is indeed, the other main supporting factor for its forecast growth. Everywhere, governmental pressures are increasing to reduce the harmful emissions of road transport. GTL diesel is close to emission-free. When it can be produced economically in sufficient quantities, one could even envisage that it could lead to a gradual shift from refining crude oil to refining natural gas. Such a prospect lies a long way ahead, but in today's fast-moving world it could come about faster than expected. ●

Above left: Shell's 12,500 b/d GTL plant at Bintulu, Malaysia is now due to reopen in 2Q2000

Economic recovery gives boost to energy consumption

The past two years have been a challenging period for South Korea's energy industry after the nation's severe economic crisis caused a sharp drop in industrial activity and a consequent drop in energy consumption.

However, signs are growing that South Korea has turned the corner and the Government now expects the economy to grow 8% this year. *David Hayes reports.*

Following the recent revival in industrial output, energy consumption already has rebounded quickly to the levels recorded in 1997 before the recession struck. However, more challenges await the energy sector with the Government due to reorganise both the electricity and natural gas import industries after the oil refining sector underwent an involuntary restructuring earlier last year.

In spite of South Korea's rapid economic growth record over the past two decades, the country has few indigenous energy resources and has to rely on imported energy for the bulk of its needs. All oil and natural gas supplies are imported, along with most of the country's coal supply requirements. Domestic energy production currently provides just 12% of South Korea's total primary energy needs. Nuclear power is the main domestic resource, accounting for 83% of domestic energy production, followed by locally mined anthracite representing about 8%, hydropower 5% and renewable energy the rest.

According to Government figures, total energy consumption jumped 8.9% during 1H1999 to reach 88.7mn tonnes of oil equivalent (toe) compared with 81.4mn toe during 1H1998. Petroleum consumption of 48.2mn toe accounted for slightly over half of South Korea's total energy consumption during the first six months of 1999. Imported coal use reached 18.6mn toe, equal to 21% of total energy consumption in the first half, while natural gas imports equal to 8.3mn toe accounted for the remaining primary energy consumption.

Nuclear power and natural gas have been the two important new energy sources to be developed over the past two decades. Nuclear power generation, for example, accounted for less than 1% of energy consumption in 1980, but by 1998 had reached

22,422mn toe, representing 13.5% of energy consumption. Liquefied natural gas (LNG) imports have grown to almost 15,000mn toe a year and now represent about 8.5% of total energy consumption. In contrast, since 1980 coal usage has tripled and oil use has quadrupled.

Restructured oil sector

While Government plans to reorganise the electricity and natural gas import industries are due to get underway shortly, South Korea's oil refining industry went through an involuntary restructuring earlier in 1999 as several leading chaebol (conglomerates) were forced to dispose of shareholdings in oil refineries to solve their own financial difficulties caused by South Korea's economic crisis.

This first sign of changes to come occurred early last year when SK Corporation, the country's largest refiner, appeared poised to take over Ssangyong Oil. No sooner had this prospect been squashed by opposition from Ssangyong Oil shareholder Saudi Aramco, than Hyundai Oil concluded an agreement to take over the nation's smallest refiner Hanwha Energy – only weeks before the Hyundai Group itself was forced to sell a controlling 50% interest in Hyundai Oil to solve its own financial difficulties.

The latest development in South Korea's oil refining industry restructuring occurred in October 1999 when Hyundai Group sold a controlling 50% stake in Hyundai Oil to Abu Dhabi International Investment Co (Ipic) of the United Arab Emirates for Won 612.7bn (\$508mn).

Hyundai Oil is the third-largest of South Korea's four oil refineries with facilities to refine 585,000 b/d and upgrade 42,000 b/d of heavy oil. The three other refineries are Ssangyong Oil, SK Corporation and LG-Caltex Oil. SK Corporation has facilities to refine

810,000 b/d of crude plus facilities to upgrade 90,000 b/d of heavy oil while LG-Caltex can refine 610,000 b/d and upgrade 70,000 b/d of heavy oil. Ssangyong Oil, meanwhile, can refine 525,000 b/d and has facilities to upgrade 130,000 b/d of heavy oil.

As the country's largest refiners, SK Corporation and LG-Caltex have built up large domestic retail sales bases through their petrol station outlets and wholesale channels to ensure stable demand for their refinery products. SK Corporation, for example, is estimated to have about 33% of South Korea's gasoline, diesel and kerosene market, while LG-Caltex holds about 28%. Hyundai has about 21% of the market while Ssangyong has about 12%.

The Hyundai Oil share sale to Ipic follows a near doubling of crude oil prices this year, creating concern that the rebound in demand for petroleum products may not last long and will lead to slower growth next year. According to official figures published by Korea Energy Economics Institute, total imports of petroleum grew 3.3% to 73.4mn toe during 1H1999 compared with 70mn toe during the same period a year earlier. Total consumption of petroleum products during 1H1999 grew 7.9% to 48.2mn toe compared with 44.7mn toe in the 1H1998.

'1998 was the first time negative growth occurred for petroleum products since the early 1970s,' commented a Seoul-based energy analyst. 'Since then, South Korea has always seen positive growth for petroleum products with positive GDP growth. Last year the decline in demand for oil was about 15% due to the sluggish economy.'

As a result of 1998's financial crisis none of the South Korean refineries has expanded since 1997. Although petroleum product sales have started to grow again, the country's refining industry still faces an overcapacity of about 28% to 30%. Surplus production is exported, mostly to China and Japan which currently take an estimated one-third of all exports, as well as other Asian countries including the Singapore spot market. Ssangyong Oil is believed to be the largest exporter, shipping about half its refined products.

In fact, South Korean product exports have no economic advantage over southeast Asian refineries because of the shipping distance from the Middle

East. Consequently Korean refiners are exporting only to maximise their refinery utilisation rate.

Lpic's purchase of a controlling interest in Hyundai Oil follows Hyundai Oil's own September 1999 takeover of Hanwha Energy, which until then was South Korea's fifth-ranked and smallest oil refiner with the capacity to refine 275,000 b/d.

'No one expects more consolidation in the South Korean oil refining industry since Hyundai Oil took over Hanwha Energy,' the analyst said. 'The four remaining oil refiners are competitive and secure with strong support

representing an 8.6% decrease in imports compared with the 205 cargoes totalling 11.62mn tonnes imported in 1997. In 1999 demand for LNG bounced back, causing imports to rise above the previous year's level during most months of the year. In the 1H1999 Kogas imported 114 cargoes totalling 6.5mn tonnes compared with 91 cargoes totalling 5.06mn tonnes during the same period a year earlier.

The main reason for the fall in LNG consumption in 1998 was the sharp reduction in gas used for power generation. State-owned Korea Electric Power Corporation (Kepeco) used

take about 7.8mn tonnes last year – a 16% increase compared with 6.2mn tonnes in 1998.

Government sell off

Meanwhile, the Government has recently announced plans to spin off and sell Kogas' LNG importing and wholesale units. The Government also plans to sell off its stake in Kogas' LNG receiving terminals and storage facilities, along with the main transmission pipeline network by 2001. Under current plans Kogas will be split up into three to five units in 2000, which will be sold off in 2001.



Pyongtaek LNG Terminal, Kogas, South Korea



Gas tanker, Kogas, South Korea

from their major shareholders. None of the oil refiners have capacity expansion plans. There is still a 30% capacity buffer. The domestic market is more profitable than exports so they have no plan to chase exports.'

Opening gas market

Meanwhile, the past two years have been a challenging time for state-owned Korea Gas Corporation (Kogas), which has had to cope with a fall in LNG demand and now faces the prospect of being broken up as part of Government plans to open the LNG and city gas market to competition. After South Korea's financial crisis caused a sudden slump in demand for LNG and other energy resources in 1998, Kogas executives were forced to cope with the first downturn in gas demand since LNG imports began to arrive in 1986.

This year, with the worst of the economic crisis seemingly over, demand for LNG has increased again. Although LNG imports were not expected to reach their pre-recession levels in 1999, gas demand growth has begun to look more healthy again with the use of LNG feedstocks for electricity generation and for piped city gas distribution now expected to reach the same level as LNG consumption in 1997.

In 1998 Kogas imported 188 cargoes of LNG totalling 10.6mn tonnes of LNG,

4.18mn tonnes of LNG in 1998, a 22.6% decrease compared with 5.37mn tonnes used in 1997. However, city gas use of LNG feedstocks rose 10.1% to 6.2mn tonnes in 1998 compared with 5.7mn tonnes during 1997, helping offset some of Kepeco's reduced demand.

Kepeco's decision to reduce LNG consumption followed a fall in peak load demand for electricity caused by a decline in energy demand among industrial electricity consumers. This marked the first decrease in electricity consumption in more than 15 years. According to figures released by Korea Energy Economics Institute, electricity consumption fell by about 3.5% during 1998 to 193,470 GWh, compared with 200,784 GWh in 1997 as Kepeco's industrial customers reduced the factory operations and cut production output due to the drop in demand for their products.

This year, however, Kepeco is due to take 4.8mn tonnes, an increase of 15%, but still below the volume the power company purchased in 1997 before the economic crisis was felt.

City gas companies' use of LNG feedstocks is also expected to grow further. According to official forecasts Kogas will have imported 13.1mn tonnes of LNG in 1999, while total sales were forecast at about 12.6mn tonnes. Apart from Kepeco's 4.8mn tonnes purchase, city gas companies were expected to

As part of restructuring Kogas and South Korea's LNG supply industry the Government will seek ties with foreign companies with substantial experience in the natural gas supply industry. Plans for the Kogas break-up and sell off are due to be finalised shortly. Kogas' senior management is not happy with the proposal as it stands. Kogas executives would prefer the Government to privatise the corporation in its entirety and then open the LNG import and sales market to competition, and later also open the city gas market to competition.

Meanwhile, Kepeco is due to break up into six generating companies shortly following Government approval for the restructuring plan in July last year. Under the plan power plant generating capacity including all the various coal-fired power stations, will be divided almost equally among five generating companies while the sixth generator will be Kepeco which will continue to own and operate South Korea's nuclear power stations.

Each of the five generating companies will have about 7,000 MW installed capacity and will set up its own fuel purchasing section to do its own fuel procurement. The generating companies will sell their electricity to Kepeco which will retain its transmission and distribution services at first. Later a British-type electricity pool system will be established and all generators will sell into the pool. ●

And now mega-contractors

There were 10 top players in the global oilfield equipment and services sector before the 1998 oil price collapse. Subsequent consolidation in the industry led to contraction and six residual players. However the oil price is now around \$26/b and the outlook for the contractors is looking up, writes *Priscilla Ross*.

The top three global players in terms of oilfield revenue and market capitalisation – Schlumberger, Halliburton and Baker Hughes – have all recently made large acquisitions and are truly global companies. The remaining three – Wellflow, BJ Services and Smith International – are rather smaller and can be regarded as niche players. There is further consolidation among the top players, with Smith International having a drilling fluids joint venture with Schlumberger – said to be one of the largest businesses of its kind in the world.

Merger of equals

Schlumberger announced in mid-1999 that it was spinning off its offshore contract drilling business and combining it with Transocean Offshore in a merger of equals. The new Transocean Sedco Forex will be the world's largest offshore drilling company with a rig fleet of 75 units. Scheduled to be signed off by the end of 1999, the newly merged operation is projected to become the fourth largest oilfield service company measured by market capitalisation. Schlumberger owns 52% of the equity

and the 109mn shares to be issued for the transaction are valued at \$3.2bn. The shares of Transocean Sedco Forex will be traded along with those of Schlumberger, Halliburton and Baker Hughes on the New York Stock Exchange. Transocean Sedco Forex will employ 7,500 people worldwide and have operations in all of the world's major offshore drilling locations. In 1998 Sedco Forex's Offshore revenue was \$1.1bn and net income was \$390mn. In 1999 net income was expected to be around 15% of the annual net income of Schlumberger.

Chairman and Chief Executive Officer of Schlumberger, Euan Baird, said at the time of the merger announcement: 'The transaction between Sedco Forex Offshore and Transocean Offshore gives our shareholders premium investments in reservoir optimisation and offshore drilling, the two oilfield service sectors with the highest growth potential in the next upturn. For Schlumberger this transaction and the closing of the drilling fluids joint venture with Smith International are in line with our long-term strategy to focus on extending our leadership in value-added services to optimise reservoir performance.'

Schlumberger is spending \$1mn/d day on proprietary new technology. For the nine months to September 1999, oilfield services revenue decreased 28% year on year. Baird commented: 'The third quarter results for our ongoing oilfield businesses confirm that the second quarter of 1999 was the bottom of the cycle.'

The company continues to look to enhance its technology portfolio through the acquisition of smaller players. In October 1999 it purchased Secure Oil Tools for an unspecified sum. Rene Huck, President, Reservoir Development said: 'Secure Oil Tools enhances Schlumberger's position in the rapidly expanding market for multi-lateral and other advanced completion systems designed to improve reservoir recovery.'

New moves for Baker Hughes

Baker Hughes has a market capitalisation of \$9bn to 10bn. In May 1998 the company employed 36,500 and by September 1999 this had fallen to 27,600. In mid-1998, Baker Hughes merged with Western Atlas in a share swap valued at \$4.8bn and assumed about \$1.3bn in debt. According to Max Lukens, Chairman, President and Chief Executive Officer, the Western Atlas acquisition was 'the company's most important transaction since Baker International and Hughes Tool Company combined in 1987. The merger makes the company one of the leading integrated oilfield service providers. More significantly, we have transformed Baker Hughes from a provider of discrete oil well products and services into an integrated, life-of-the-field service company focused on the reservoir.'

The company spent more than \$220mn on new technology in 1999 with the emphasis on drilling systems, 4-

	Baker Hughes	Halliburton	Schlumberger
Revenues 1997	\$5.3bn	\$16.27bn	\$11.54bn
Revenues 1998	\$6.3bn	\$17.35bn	\$11.82bn
Revenues 9 months 1999	\$3.74bn	\$11.12bn	\$6.73bn
Operating income 1997	\$460.5mn	\$1.39bn	\$1.79bn
Operating income (loss) 1998	(\$135.7mn)	\$396.5mn	\$1.73bn
Operating income 9 months 1999	\$278mn	\$462mn	\$564mn
Net income 1997	\$33.9mn	\$772.4mn	\$1,385mn
Net income (loss) 1998	(\$297.4mn)	(\$14.7mn)	\$1,014mn
Net income 9 months 1999	\$122.8mn	\$203mn	\$355mn
Long-term debt 1997	\$1.47bn	\$1.3bn	\$1.17bn
Long-term debt 1998	\$2.72bn	\$1.4bn	\$3.28bn
Long-term debt 3Q1999	\$2.77bn	\$1.06bn	\$3.56bn
Employees 1997	36,500	102,000	69,000
Employees 1998	32,500	107,800	64,000
Employees 3Q1999	27,600	100,000	60,000
No. countries where operating	100	125	100

(Source: Company reports and Petroleum Review research)

Table 1: Comparative financial figures for the top-three global oil service companies

D seismic, reservoir modelling and multilateral systems. The company views post-discovery as the most profitable sector and its focus is 75% on development and 25% on exploration.

Thomas Bates, a Senior Vice President of Baker Hughes said that the consolidation savings flowing from the merger would amount to \$135m. He told *Petroleum Review* that he did not expect the multi-national oil companies to change their spending patterns more than 2% to 3% this year. He added: 'We see the international rig count moving up in the first quarter of 2000.' By the end of September 1999 the North American rig count according to Baker Hughes was 887 (637 in the US and 250 in Canada). The non-North American rig count was 565.

Bates believes that the healthiest energy market in the world is North America because 'decline rates [for exploration expenditure] in the Gulf of Mexico have been 40% to 45% in the last two years. Gas production was down 5% in 1998 and declines are continuing in 1999 of around 3%. He added that the largest cost to oil companies onshore is produced water and he claimed that Baker Hughes' water separation technology is 'one year ahead of the competition'.

In early November 1999 Lukens said: 'Although the third quarter's results reflected continued weakness in overall oilfield activity, we did see a bottoming and sequential improvement in North America.'

He added: 'With the exception of seismic, we expect activity in the Western Hemisphere to continue to improve in the fourth quarter while we expect activity in the Eastern Hemisphere to be flat before increasing in 2000... We are evaluating ways to further reduce costs, including adjusting our seismic capacity to match anticipated market demand.'

Industry collaboration

Baker Hughes collaborates with the multi-nationals in technology development. Current examples are:

- The AutoTrak rotary closed loop drilling system with Agip.
- Expandable pipe technology with Shell.
- Formation evaluation technologies with Shell, Elf, and Texaco.
- Downhole splitter with Marathon Oil.
- Downhole completions with Statoil.

The AutoTrak drilling system was used offshore Norway and resulted in claimed savings of US\$1.6mn in well construction costs. The Racepak fluid

	Baker Hughes	Halliburton	Schlumberger
Seismic	X	X	
Wireline & Testing	X	X	X
Drilling Systems	X	X	X
Drill Bits	X	X	X
Drilling fluids*	X	X*	X
Sand Control	X	X	X
Completions	X	X	X
Electrical Submersible Pumps	X	X	
Chemicals	X		

*Schlumberger and Smith International joint venture
Source: Baker Hughes

Table 2: Oilfield services provided

additive and cutter package resulted in a claimed saving of US\$1.2mn in well construction expenditure on Eugene Island, Gulf of Mexico. In the Voador field, offshore Brazil, the world's first deepwater level 5 multilateral completion from a floating rig was built. The operator, Petrobras was able to reduce wellheads from two to one.

New strengths for Halliburton

When Halliburton Company concluded its merger with Dresser Industries at the end of September 1998 it was announced that the combined revenues for 1997 were \$16.3bn with net income of \$772mn. Dick Cheney, Chief Executive Officer of Halliburton, said that the merger improved the company's competitive position 'as the leader in providing integrated project management services - from the earliest phases of field development through the production and delivery of oil and gas to the marketplace. The combination of MW Kellogg's engineering expertise with Brown & Root's project management and construction strengths enhances the competitive position.'

The mood was cautiously optimistic at the end of October 1999 when Halliburton released its nine month results - net income was \$203mn to end September 1999 against a loss of \$81mn in the comparable period for 1998. Cheney said: 'Significantly higher crude oil and natural gas prices have lifted customers' cash flows considerably, and they are now beginning to increase spending in certain geographic areas, particularly in North America. I am optimistic that as our customers' year 2000 spending budgets are finalised, we will see further activity increases throughout the world.'

Disbanding ventures

Following lower than anticipated financial results at the Dresser-Rand

and Ingersoll Dresser Pump joint ventures, Halliburton announced plans to sell its interests in both joint ventures to Ingersoll-Rand for \$1.1bn in cash. This will result in a 4Q1999 after-tax gain of \$380mn.

During the 3Q1999 Halliburton was awarded a number of significant new contracts:

- Providing Elf Exploration Angola with sand control and completion services for the deepwater Girassol oil field offshore Angola.
- A major contract with BP Amoco to standardise its drilling, reservoir, engineering, geology and geophysics applications.
- A contract from Texaco to provide completion products, production enhancement and screens for a deepwater project offshore Nigeria.
- A \$35mn contact for sand control from Brunel Shell Petroleum.
- A new \$35mn vessel was deployed to Carmen, Mexico to enhance well stimulation for Pemex.
- Participation in the successful drilling of the world's deepest water-depth turnkey well drilled in more than 7,200ft of water in the Gulf of Mexico.

The final word

To date merger benefits have taken more time than anticipated to work their way through to profitability in the remaining companies in the service sector. There is now clear evidence of an upturn, but further rationalisation and consolidation in the sector cannot be ruled out.

Debt levels still look hefty but cash flow prospects are looking more encouraging - particularly in North America - and the sector seems to have bounced back into profitability, especially with oil prices now at \$26/b - two and a half times what they were a year ago. ●

Asian first for Mobil's hands-free fuel payment system

Mobil is said to have become the first company to adopt radio frequency identification (RFID) technology for retailing in Asia, following the recent launch of its hands-free fuel payment system throughout its Singapore network of service stations. The Speedpass™ electronic customer recognition and payment system allows motorists to fill up their vehicle with fuel and pay without having to queue at a kiosk or use credit cards. The system not only provides more convenience and speeds up the refuelling process, but also increases sales as it generates more repeat visits through greater customer loyalty, states the company.

Based on Texas Instruments' TIRIS RFID transponder technology, the system was originally launched in the US where some 3mn Mobil customers now regularly use it. However, whereas the system adopted in the US uses a tag embedded in the customer's key fob, the Speedpass system in Asia uses a vehicle-mounted TIRIS transponder which is automatically recognised as soon as the vehicle approaches the fuel pump. A reader integrated in the pump transmits a signal to the transponder,

which activates it to transmit back a unique identification code that links securely to the customer's credit card account in a host database. The transaction is then authorised for payment and the pump is activated, ready for fuelling. The customer then simply fills up and drives away without having to queue at the cash desk.

Security in the Singapore system is enhanced by a digital signature encryption protocol based on a challenge/response authentication to ensure the validity of the credit card transaction. According to Texas Instruments, this technique makes it 'practically impossible to duplicate the smart tags and their encryption keys'.

'Many other retail operations are showing interest in similar automated customer recognition and payment systems,' states Dave Hyslop of Texas Instruments. 'These include retailers with drive-through facilities as well as hotel, restaurant and theatre applications wishing to offer a more customer-orientated and personalised service.'

Tel: +44 (0)1604 663399
Fax: +44 (0)1604 663099



Quarter-turn valve performs under pressure

Tyco Valves & Controls' Vanessa Series 30,000 metal seated, quarter-turn rotary process valve is said to offer bidirectional, zero leakage operation at full differential pressures. The combina-

tion of a non-rubbing metal seal ring and seat with torque sealing ensures zero leakage under pressures as high as ANSI Class 900 and temperature services ranging from -196°C to 815°C, claims the manufacturer. Designed for use in steam and process applications in the offshore oil and gas, chemical and petrochemical industries, the valves are said to reduce maintenance requirements, thereby minimising the costs and inconvenience of downtime.

The valves are available in a range of body designs, including double flanged, wafer and wafer lugged. They incorporate fully adjustable stem packing to prevent leakage to the atmosphere and avoid product loss and pollution, and eliminate risks to operator and plant. Their compact design offers weight and space savings over traditional gate valves, enabling installation, removal and maintenance to take place with relative ease, states the manufacturer.

The Vanessa Series also allows direct mounting of a quarter-turn electric, hydraulic or pneumatic actuator for fast and efficient local or remote operation.

Tel: +44 (0)141 810 3121
Fax: +44 (0)141 810 4724



New laser gas detector



Allison Engineering has launched onto the UK market the new GasFinder turnable diode laser (TDL) open path gas detector manufactured by Borel Laser. The unit measures all combustible gases, together with ammonia, carbon dioxide, hydrogen sulfide and hydrogen fluoride (in the presence of other gases). Employed as either a portable or fixed mounted gas detection system, the device is claimed to measure gas concentrations over an open path of between five and 1,000 metres. It operates in the near-infrared range and does not require cryogenic cooling.

Tel: +44 (0)1268 526161
Fax: +44 (0)1268 533144

Manual titration



A new range of manual titrators has been developed by Philip Harris Scientific. The Denver 280 model performs all manual titrations with a press of its mouse button. The integral 20ml burette is made of UV protected borosilicate glass and delivers solutions in 0.01ml increments, providing much more accuracy than titrations performed by hand, says the company.

The more advanced Model 285 allows the user to perform accurate manual titrations as well as dosing operations. For the latter, volume and speed can be set at the touch of a button. Incremental additions can be set by button too, including differing volumes and waiting times. A pre-titration volume can also be programmed in to reduce titration time. The unit can be controlled either with the mouse or by a keyboard on the titrator itself.

Both models feature an integral stirrer which is powered from the titrator. Both are manufactured from chemically resistant materials. Results are viewed on a large, easy to read, digital display, and can also be downloaded to a printer or PC.

Tel: +44 (0)1530 418000
Fax: +44 (0)1530 419300

Shell launches new slug-suppression device

Shell Global Solutions is launching a new slug-suppression device (SSD) following successful trials on Shell Expro's Gannet Alpha platform in the North Sea. The new system helps operators to reduce the cost of controlling 'slugs' – liquids which can collect in gas pipelines – and enables production operations to run without interruption.

Unlike previous SSDs, the new device 'can deal with the transient slugs commonly encountered in production flow lines,' states Shell. 'Installing the SSD, which consists of a small vessel with control valves, is a cost-effective modification with a payback period of about a year and lower capital costs than other slug catchers on production platforms'.

Shell Global Solutions tested the new SSD in a rig at its Amsterdam laboratory and during an extended field trial on the Gannet Alpha platform. The trials showed that gas surges, which can follow a liquid slug, were suppressed by the new SSD, thereby preventing large fluctuations in production. This represents a major time-saving over conven-

tional methods, says the company, dramatically reducing production deferment, and offers significant savings in production operating costs.

The control strategy developed on Gannet is said to be flexible and applicable to all of the flow regimes typically encountered in a flow line. The SSD is claimed to improve process stability, allow higher production rates and can reduce process downtime. The trials also showed that, after shutdown, full production could be achieved within an hour of flow line start-up.

According to Loek Vreeneogor of Shell Global Solutions: 'After the trials Shell Expro is considering two permanent installations on the 6-inch flow lines at Gannet. We're confident that production benefits from this system should pay back the investment within a year. We have also performed preliminary evaluations for a number of other oil companies.'

Tel: +31 20 630 22 67
Fax: +31 20 630 22 35

Submersible level measurement

The new Hawk PressureMaster PES – now available from sole UK representative Allison Engineering – is a low-cost, two wire loop powered, permanent or portable submersible level measuring device.

The unit provides continuous level measurement of liquids in various ranges to a maximum equivalent of 350 metres of hydrostatic water pressure. It is suitable for use in slurries, pump stations, sumps, liquid storage vessels, deep wells and bore holes.

Built-in temperature compensation ensures that the device is extremely accurate for both short- and long-term monitoring, states Allison. It is designed to be directly submerged in liquids compatible with 316 stainless steel and polyurethane jacketed cable – Teflon sleeving is available if chemical resistance is required. The unit can handle



temperatures of -20°C to +125°C. It features remote atmospheric sensing (with no capillary tube required for atmospheric changes) and is said to offer high levels of accuracy and repeatability, high noise immunity and simple calibration adjustment on-site.

Tel: +44 (0)1268 526161
Fax: +44 (0)1268 533144

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

Deputy Editor, *Petroleum Review*

61 New Cavendish Street, London W1M 8AR, UK

At the time of writing, our final course for 1999 – Price Risk Management in the Oil Industry – had just started at the Møller Centre, Cambridge, under the direction of John Dobson, and assisted by Daniel Carr of NYMEX.

The mix of delegates' backgrounds – product traders, marketing analysts, crude oil and operating managers and assistants, risk and project managers, together with auditors and refiners is as diverse as their countries of origin with participants from Israel, US, Brazil, Scandinavia, and several European countries.

Having participated in the forerunner course of 'Trading Oil on the International Markets' in October, I know the week will be demanding intellectually – and socially – but very rewarding and each delegate will learn new skills to help them in their daily roles as traders or in their support functions.

The combination of playlets acted out by the collective team of speakers, together with the development of the syndicates' books through live trading during the week, creates a stimulating and competitive environment upon which delegates thrive, thereby adding to the overall enjoyment of the course itself.

In true New Year's style, it's a case of out with the old and in with the new. The first training course of our extended portfolio for 2000 introduces both a new subject and a new providing organisation, namely: Environmental Risk Management (ENV), in association with Cordah Limited.

With even greater emphasis being placed on environmental matters, today's commercial managers can no longer take a passive approach to them, simply reacting as issues arise. They need to actively incorporate into their planning and strategic programmes measures that take full account of the potential outcomes and impacts of their operations on the environment.

Accordingly, the course seeks to instil and develop such an awareness in managers and to ensure that they are prepared for any eventuality.

March 2000 also sees an extension to the suite of Trading Courses currently provided in association with Invincible Energy, with the addition of the complementary 'Economics of the Oil Supply Chain (ESC)' course.

IP Training 2000



THE INSTITUTE
OF PETROLEUM

CORDAH

Environmental Risk Management

organised in association with Cordah Limited

1-3 March 2000 (3 days)

30 October-1 November 2000 (3 days)

The Institute of Petroleum, London

This challenging and interactive three-day course provides delegates with essential practical skills to manage their environmental risks and liabilities. Using presentations and discussions, a team of experienced lecturers will guide delegates through strategic, managerial and technical issues in environmental management. Simulation exercises from actual oil and gas projects provide hands-on experience of environmental risk assessment, strategy development, prioritisation and management.

Who should attend?

Anyone whose work includes environmental responsibility or who needs to understand environmental issues, including:

- Policy makers/senior management
- Technical managers/specialist personnel
- Civil servants/regulators
- Environmental/project engineers
- Engineering/facilities management contractors
- HSE managers/specialists
- Reputation managers/specialists

Economics of the Oil Supply Chain (ESC)

organised in association with Invincible Energy

27-31 March 2000 (5 days)

Møller Centre, Cambridge



INVINCIBLE

Delegates will examine the various activities of the fictional Invincible Energy Company to explore the economic forces which drive the oil supply chain. They will concentrate on the main areas of risk and opportunity from the crude oil supply terminal, through transportation, refining and trading to the refined product distribution terminal.

During their time in Invincible's refinery delegates will learn about the quality aspects of product supply. They will study refinery process economics and the effects of upgrading. Blending to meet quality requirements at optimal cost will be examined. Delegates will construct and negotiate a processing deal. They will then follow the crude oil and the refined products from the refinery and look at the economics of various alternatives. International markets and trading will be studied, together with the various methods of price risk management.

Who should attend?

This course is the essential foundation for people entering the oil industry or for those with single function experience. It is ideal for those:

- new to the downstream oil industry
- with single function experience in supply, transportation, refining or trading
- in the E&P, finance, downstream marketing or IT departments of oil companies
- working in energy-related government departments
- writing about the industry
- bankers, accountants, auditors and others associated with oil companies and oil financing.

For more information please contact:
Nick Wilkinson, The Institute of Petroleum,
61 New Cavendish Street, London W1M 8AR, UK.
Tel: +44 (0)20 7467 7151 Fax: +44 (0)20 7255 1472
e: n.wilkinson@petroleum.co.uk

or view the IP website: www.petroleum.co.uk

New library services for the Millennium

This summer saw the total refurbishment of the Institute of Petroleum's library. When it reopened, in the autumn, visitors found that the UK's premier oil industry library had been transformed. New pale oak shelving has brightened the room and provides ready access to over 200 periodicals and 10,000 books.

New purpose built and well-lit writing surfaces accommodate users' work in comfort, complete with points to plug in laptops. Computers for visitors provide access to the Internet and the wide range of computer-based data now available.

The library continues to offer the largest collection of oil-related books and periodicals in the UK (and possibly in Europe). The collection of historic publications stored in our newly refurbished rolling-stack store in the basement contains a truly unique archive of the industry's history and development.

In addition to the library's unrivalled stock of paper-based information, the collection of CDs, tapes and disks has become a major source of information in its own right.

The greatest resource of the library,



The new facilities enhance the services available

- 12 visitors have space and light to work – and points to plug in laptops.
- Two computers are dedicated for use by library visitors to:
 - access our in-house data-bases.
 - search the Internet (including the Telerate Service).
 - use Reuters Business Briefing.
 - search the CD-ROMs we hold in our collection, including Petroleum Abstracts, and make print-outs as required.
- a new colour printer allows you to print pages from the Internet.

You can also purchase photocopy cards if you need to make copies of journal articles.

You can borrow up to three books, at any one time, free of charge, for up to three weeks.

however, is its highly experienced staff. Their intimate knowledge of where to find data and information, their ability to conduct tailored searches and to aid and guide library users makes the Institute's library a real service to the industry.

The Institute's ever more comprehensive Website at www.ip.org.uk provides a wide range of industry information and links to other relevant sites. It can be used either remotely or on one of the visitor computers in the library which are rather faster than modern operated units. The website contains a full catalogue of books and information held in the library.



The IP Website

- Lists and catalogues of the items held by the Library; and IP publications for sale.
- The IP Members' section of the Website where you will find additional databases and extra statistical information.
- The IP Statistics Service to which you can subscribe for additional addresses, statistics, cumulative statistics, etc.
- Entries for IP members or consultants can have an entry.
- The Corporate directory for descriptions of our corporate members and links to their sites.
- Educational material for young people – and new industry employees.
- News in Brief.
- Hundreds of links to relevant sites.

Remote access to the library's services

Contact us by telephone, fax, mail, or e-mail for the following:

- Quick queries answered free. (E-mailed queries often allow us to give you information in a few seconds by sending you entries from our data-bases, or attaching word documents containing the information you require.
- Extended research can be carried out for you by either of our Information Officers using in-house material, books, periodicals, CD-ROMs, etc. or by searching the Internet, Reuters or other external databases. You will have to pay for extended research, but this will be within an agreed budget and our charges are very reasonable.
- Ask to borrow items and, assuming they are available for loan, we will send them to you through the post. You will just be asked to refund the cost of postage.
- Request photocopies of particular articles and we will, for a small fee, make copies for you, or will try to obtain them from another source if not in stock. Items will be despatched the day the request is received and can be faxed if required more urgently.

Membership News

NEW MEMBERS

Mr M W Andrews, FPD Savills
Mr J Brotherton, Chippenham
Mr A Brown, AMEC Process & Energy Limited
Mr T Brown, Aberdeen,
Mr A Dron, Ferguson Seacabs Limited
Mr S A Ellis, Ellis, Capel & Associates
Mr D J Flood, BP Amoco Exploration
Mr A Gupta, London
Mr S R Ireland, London
Mr R Kamat, Citgo Petroleum Corporation
Mr K H Lam, Hong Kong
Mr N P Laslett, Kent
Mr C Leeuw, Seawox BV
Mr E O Mertoglu, Caleb Brett/Deniz Survey AS
Mr F Morton, Redcar
Mr S R Parsons, SRP Design Developments Limited
Mr R Scholfield, Leatherhead
Mr B Sekar, Brunel Shell Petroleum Co Sdn Bhd
Mr B Simpfordorfer, Dun & Bradstreet Limited
Mr W H E Steinger, France
Mr K E Tan, Statoil
Mr C D Thompson, Hertford
Mr P Tsirogiannos, London,
Mr R A West, Redcar

NEW STUDENTS

Ms E M Fleckner, London
Mr X Lopez, Imperial College
Mr J R Philip, London
Mr J Wolsey, London

STUDENT PRIZEWINNERS

Mr J Horsburgh, Fife
Mr N J Pink, Troy Petroleum Management Services Limited
Mr K S Whaley, Aberdeen

NEW FELLOW

Mr R A Denyer *FirstPet*

Mr Denyer is currently Terminal Manager at Van Ommeren ENOC Fujairah Terminal, based in Fujairah, United Arab Emirates. Mr Denyer obtained his Class 1 Master Mariner certificate in 1984 from Poplar College. He joined BP Shipping in 1972 and left to join Van Ommeren Tank Terminal London in 1990. In March 1999 he took up the position in Fujairah. His current responsibilities include the management and developments of the terminal. Presently, he is busy with the terminal phase 2 expansion involving an additional 210,000 m³ of storage which includes six tanks and associated lines and systems for the storage and blending of Fuel Oil.

NEW CORPORATES

Oxford Instruments (UK) Ltd, Osney Mead, Oxford OX2 0DX, UK

Tel: +44 (0)1865 269500 Fax: +44 (0)1865 269502

e: richard.foster-turner@oxinst.co.uk

Representative: Mr R J Foster-Turner

Global leader in supply of instrumentation for scientific research, industrial analysis, healthcare and semiconductor processing. Customers include most of the world's major companies as well as the leading research institutes.

Waterous International Ltd, 5 Mount Street, Mayfair, London W1Y 5AA, UK

Tel: +44 (0)20 7495 2025 Fax: +44 (0)20 7491 4123

e: wlon@waterous.co.uk

Representative: Peter G Hill

Independent advisory firm specialising in transactions in the upstream petroleum industry, particularly active on clients' behalf on industries in Canada.

First Intervention Training Ltd, The Training Centre, Shell Haven, The Manorway, Corringham S517 9LD, UK

Tel: +44(0)1375 676779 e: fitteam@fsbdial.co.uk

Representative: Mr M G Willis, Director

Provider of training, services and equipment in the fire, health & safety, first aid and security sector. Fire Service awarding body (NVQs) accredited centre. Accredited security industry assessors and verifiers (NVQs).



THE INSTITUTE
OF PETROLEUM

New publication

Guidance Document on Risk Assessment for the Water Environment at Operational Fuel Storage and Dispensing Facilities

The risk of causing pollution to the water environment has always been an issue of importance to the petroleum industry, but is of increasing relevance as environmental awareness develops and new legal obligations are introduced. The Environmental Protection Act 1990, the Water Resources Act 1992, the Environment Act 1995 and the new Groundwater Regulations 1998 have all served to increase regulatory attention to the protection of the water environment. In addition, new regulations are being considered by the DETR to set minimum standards for above ground commercial and industrial oil storage facilities. This guidance provides a useful first step in enabling an owner or operator of a fuel storage and dispensing facility, or a vehicle maintenance facility, to assess whether the site is constructed and operated in a manner which will ensure the risk of pollution to the water environment is minimised. It will help to ensure regulatory compliance and to improve business performance by preventing loss of fuel due to inadequate engineering, human error and accidents.

ISBN 0 85293 256 1

25% discount for IP Members

Available for sale from Portland Press Ltd at a cost of £60.00 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-mail: sales@portlandpress.com

For a complete and up-to-date listing of all IP Publications see our website: www.petroleum.co.uk

IP Discussion Groups & Events

Energy, Economics, Environment

Jointly with British Institute of Energy Economics

'Oil Markets in 1999 and the Outlook for 2000'

Thursday 13 January, 17.30

Dr Joe Stanislaw, President, Cambridge Economic Research Associates

Contact: Mary Scanlan, BIEE, Tel: +44 (0)20 8997 3707

London Branch

'Competitor Data and Mapping in the Petroleum Retail Business'

Wednesday 19 January, 17.30

At The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK

Nigel Lang, Managing Director, Catalyst

Tea will be served beforehand and light refreshments afterwards

Contact: Carol Reader, Tel: +44 (0)20 8852 9168 if you plan to attend this talk

THE COLLEGE OF PETROLEUM AND ENERGY STUDIES PETROLEUM AND ENERGY TRADING, ECONOMICS, SUPPLY AND FORECASTING SHORT COURSES AT OXFORD — 2000

The College offers an extensive range of training programmes for personnel in the "downstream" oil industry. Each course contains vital elements for the development of personnel employability. The programme commences with the introductory SP1 course, an excellent overview module and a foundation for the other specific programmes listed below.

- ✓ **International Oil Supply, Transportation, Refining and Trading**
Code: SP1 20 - 24 March / 4 - 8 September 2000
- ✓ **International Oil Trading and Pricing**
Code: TR1 10 - 14 April / 9 - 13 October 2000
- ✓ **The Use of Advanced Instruments in International Oil Price Risk Management**
Code: TR3 15 - 19 May / 20 - 24 November 2000
- ✓ **Forecasting in the Downstream Oil Business - A Practical Approach to Techniques and Applications**
Code: SP0 23 - 27 October 2000
- ✓ **Trading Skills to Enhance Commercial Refinery Management**
Code: RFT 28 - 31 March 2000
- ✓ **International Oil Trading - A Practical Approach to the Legal Issues for Successful Management of Claims and Disputes**
Code: TRL 11 - 14 December 2000
- ✓ **Total Risk Management in the International Oil & Derivative Markets**
Code: TRM 21 - 25 February / 21 - 25 August 2000
- ✓ **The Power and Energy Industry - The Management of Market Price Risk**
Code: TRP 4 - 7 December 2000
- ✓ **Fundamentals of Petroleum Economics**
Code: FPE 24 - 27 January 2000

For Further Information Contact:

Jenny Butterworth, (please quote ref TRA10)
The College of Petroleum and Energy Studies,
52 New Inn Hall Street, Oxford OX1 2DD,
United Kingdom

Tel: (+44) 1865 250521
Direct: (+44) 1865 260203
Fax: (+44) 1865 791474
e-mail: jenny@colpet.ac.uk
web: http://www.colpet.ac.uk

IP THE INSTITUTE OF PETROLEUM

Branch Activities

Aberdeen

Contact: George Wood Tel: +44 (0)1224 205736
11 January: Aberdeen Harbour towards the 21st Century by Barclay Braithwaite
8 February: Annual General Meeting

East Anglia

Contact: Brian Holloway Tel: +44 (0)1953 601312
20 January: Health & Safety - the Vital Elements in Oil and Gas Operations, by Tony Stammers, HSE (joint meeting with IMechE)
23 February: AGM, and Road Tanker Construction by Graham Holiday

Essex

Contact: Arnold Carlson Tel: +44 (0)1268 794615
12 January: The Shell Haven Story by Chris Lambert and Lou Parsons of Shell Haven Refinery
9 February: AGM, and Energy Trends for the Millennium by Tamara Earley of Greenergy

Humber

Contact: David Hughes Tel: +44 (0)1469 555237
3 February: AGM, and Simon Storage Killingholme Project

London

Contact: Carol Reader Tel: +44 (0)20 8852 9168
19 January: Competitor Data and Mapping in the Petroleum Retail Business by Nigel Lang, Managing Director, Catalyst
16 February: 16th World Petroleum Congress: Why You Should be There! by Jim Gray, Chairman, Canadian National Organising Committee, WPC

Midlands

Contact: Margaret Ward Tel: +44 (0)1299 896654
21 January: Dinner dance (jointly with British Lubricants Federation)
23 February: Factory visit, AGM and technical paper on petroleum road tankers

North East

Contact: John Sparke Tel: +44 (0)1642 546411
25 January: Developments in Energy, by Ian Burdon, Merz & McClellan (joint meeting with the Institute of Gas Engineers)
1 February: AGM, and Transport and the Environment by Martin Maeso, IP Environment Manager

Northern

Contact: Alan Holt Tel: +44 (0)161 875 3242
25 January: Site visit to the Great Lakes Chemical Corporation, with a talk on fire resistant fluids
29 February: AGM and social event

South Wales

Contact: Steve Vines Tel: +44 (0)1646 600679
18 January: Visit to Thomas Within Brewery, Llandeilo
25 February: AGM, and The Story of Pembrokehire Wine, by John Hamilton-Cowburn

Stanlow

Contact: John Wellstead Tel: +44 (0)151 479 4962
20 January: AGM, and Sharing a Vision, by a speaker from Shell
10 February: Fuelling the Armed Forces on Active Service, by Capt. McIven, The Royal Engineers

Yorkshire

Contact: Ivor Bennett Tel: +44 (0)1484 713201
11 January: The World of Biocides (speaker TBA)
8 February: AGM, and hotpot supper with guest speaker

IP Conferences and Exhibitions

European Conference on

Transport 2000 and Beyond – Alternative Fuels in the 21st Century

London: 23–24 March 2000

- New improved engine technologies
- The development of 'cleaner' fuels
- Using gas and gas-derived products
- Daimler-Chrysler's commercially available fuel cell car in 2003.

These are just some of the developments that indicate the timeliness of this IP European Conference organised in association with AFTP (F), DGMK (D), CEP (E), RBPI (B) and ECN (NL).

Bringing together government and supranational authorities, suppliers of fuels and both fuel and engine technologies, evaluating the pace and direction of the development of transport fuels, this important European Conference will also consider how choices are made and the levers that can be used to direct public policy. These factors will dictate the strategic future of transport fuels and be of interest to suppliers of fuel, technologies and equipment, motor manufacturers, their customers and others interested in transport policy.

The programme and registration form will be available in January.

International Conference on

'Digital Black Gold' – E-commerce in the Oil and Gas industry

London: 11 April 2000

'E commerce has saved the corporation \$1bn'
Jack Welch CEO of General Electric

Maybe you buy books from amazon.com or groceries from Tesco on the Net but how does this relate to making the oil and gas industry more efficient, cost effective and competitive in managing the supply and customer chain?

The IP Conference 'Digital Black Gold' brings together experience from other industries, the facilities and services available from specialist Internet companies, analysis of financial and legal obstacles and initial findings of energy companies.

This conference is not aimed at IT specialists but rather at managers who need to understand the implications of e-commerce for their business and may have a part to play in implementing e-commerce strategies.

Sir John Browne has said that 95% of BP Amoco's supply chain management will be via the Internet by the end of 2000! Perhaps you should be there!

The programme and registration form will be available in January.

International Conference on

INTERSPILL 2000

Brighton, UK
28–30 November 2000



A major conference and exhibition featuring the activities of the European spill response industry, both at sea and on land, under the direction of the **British Oil Spill Control Association** and organised by the **Institute of Petroleum**. It is planned that **INTERSPILL 2000** will be the first in a regular series of such events.

Topics to be covered

The topics to be discussed during the conference sessions, and through the exhibition and its associated poster presentations, will include:

- the nature of the response problem in all its aspects;
- the avoidance of secondary releases in marine casualty situations and the implications for response provision;
- the influence of shoreline and inland characteristics, and the different response requirements for water and solid surfaces;
- the strengths and weaknesses of available techniques and equipment in respect of operational factors;
- waste disposal options and the impact of regulations on option choice, storage, handling, and transportation;
- the limited capacities of authorised waste disposal facilities, and the consequent need for ways of minimising the amount of waste arising from pollutant clearance operations;
- the means by which pollution response can be improved through the pooling of all available expertise and resources within governments and the private sector; and the scope for further innovation in equipment, techniques, and operational planning.

Who should attend?

INTERSPILL 2000 will be of interest to all who are concerned about the environment and involved in its protection, including:

- national and international environmental agencies;
- oil, chemical, and transport industries;
- port and harbour authorities, and offshore oil field operators;
- central and local authorities, and emergency services.

The programme and registration form will be available in March.

A Trade Exhibition will accompany this event.

To add your details to the mailing lists, please contact:
Pauline Ashby, Conference Department, Institute of Petroleum,
61 New Cavendish Street, London W1M 8AR, UK

Tel: +44 (0)20 7467 7100 Fax: +44 (0)20 7255 1472 e: pashby@petroleum.co.uk

or view the IP Web Page: www.petroleum.co.uk

EVENTS *Forthcoming*

JANUARY 2000

25-27

London

Petroleum Process Plant Maintenance
Details: Sarah Watson, Energy Logistics International Ltd, UK
Tel: +44 (0)1628 671717
Fax: +44 (0)1628 671720
e: sarah@energylogistics.co.uk

26-28

Houston, Texas

Oil & Gas Offshore West Africa
Details: Strategic Research Institute, US
Tel: +1 800 599 4950
Fax: +1 212 967 8021
e: info@srinstitute.com

20-21

London

Decommissioning of Offshore Oil and Gas Installations
Details: IBC Global Conferences Ltd, UK
Tel: +44 (0)20 7453 5491
Fax: +44 (0)20 7636 6858
e: cust.serv@ibcuk.co.uk

FEBRUARY 2000

9-10

London

3rd Annual E&P Data Management in Oil & Gas
Details: SMI Customer Services, UK
Tel: +44 (0)20 7252 2222
Fax: +44 (0)20 7252 2272

IP Week: 14 February
London: Oil and Gas: An Industry Fit for the Millennium
Details: Pauline Ashby, The Institute of Petroleum

IP Week: 15 February
London: Restructuring of the Energy Industry
Details: Pauline Ashby, The Institute of Petroleum

11-14 Surrey, UK
Understanding Oil Supply Logistics
Details: Petroleum Economist, UK
Tel: +44 (0)20 7831 5588
Fax: +44 (0)20 7831 4567/5313
e: jackets@petroleum-economist.com

IP Week: 16 February
London: 13th Oil Price Seminar and Exhibition on Coping with Volatility - Futures and Derivatives for the Oil Markets
Details: Pauline Ashby, The Institute of Petroleum

16-19 Pattaya, Thailand

Oil & Gas Thailand 2000
Details: Heather Edkins, Overseas Exhibition Services Ltd, UK
Tel: +44 (0)20 7862 2073
Fax: +44 (0)20 7862 2078
e: hedkins@montnet.com

IP Week: 17 February
London: The Middle East - The Key to Global Oil Supply
Details: Pauline Ashby, The Institute of Petroleum

22-23 London

North Africa Oil & Gas
Details: IBC Global Conferences Ltd, UK
Tel: +44 (0)20 7453 5491
Fax: +44 (0)20 7636 6858

23-24 London

Health Effects of Vehicle Emissions
Details: Energy Logistics International Ltd, UK
Tel: +44 (0)1628 671717
Fax: +44 (0)1628 671720
e: enquiries@energylogistics.co.uk

28-29 Vienna

1st European Catalyst Technology Conference
Details: EPC, Technology Conference
Tel: +44 (0)1483 771061
Fax: +44 (0)1483 756932

IP THE INSTITUTE OF PETROLEUM

New publication

OMS '99: International Conference Proceedings on Offshore Marine Support

A joint IP / ABR Company Conference held in Southampton 12 - 13 October 1999
Organised in association with The Nautical Institute and the Norwegian Petroleum Society
Supported by Offshore Marine Service Association, UK Offshore Operators Association, Standby Ship Operators Association, and The Institute of Marine Engineers

Marine services represent a substantial operating expense for all oil companies developing, operating or decommissioning offshore fields or other facilities. This conference brought together key personnel from both the oil and offshore marine industries to learn about the most significant recent developments affecting the offshore industry and the latest capabilities available to marine service companies, yards and naval architects. The bound proceedings are now available for sale, and will be of particular interest to vessel owners and operators, builders and naval architects, oil industry charterers, logistic managers, offshore contractors, shipbrokers, project engineers, regulators and safety authorities, and classification societies.

Over 150 pages of proceedings, including all speakers' papers.

ISBN 0 85293 268 5

Available for sale from Portland Press Ltd at a cost of £125.00 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-mail: sales@portlandpress.com

For a complete and up-to-date listing of all IP Publications see our website: www.petroleum.co.uk

Petroanalysis '99 – Automation for the Millennium: in-line, on-line and off-line

The Petroanalysis '99 symposium, jointly organised by the Institute of Petroleum and the Royal Society of Chemistry's Automatic Analytical Division, was recently held at BP Amoco's Sunbury Research Centre in the UK.

Presentations were made on developments in analytical instrumentation, techniques, technology and information technology (IT) which could be of major value to the petroleum industry. Particular attention was paid to developments relating to automation of monitoring and analytical procedures for measurement of quality and composition of refinery streams and products, both in the plant and in the central laboratory. An exhibition of equipment described in the presentations was held in conjunction with the symposium.

A variety of subjects were covered by the presentations: BP Amoco presented its on-line TOPNIR NIR/modelling system as applied to gasoline blending control. Changing gasoline specification requirements will require better control of a greater number of parameters and improved blending diagnosis. The TOPNIR system enables data to be fed to an optimiser, allowing closed loop control of the blending process to be maintained.

Shell Global Solutions explained how its NIR implementation team provides services in the implementation of NIR systems in refineries to assist product quality management to reduce avoidable product give-away by application of accurate and reliable instrumentation and back-up technology. Services provided include training, modelling support, master planning, scouting studies, technical coordination and commissioning assistance.

Petrospec presented an application of Mid-IR spectroscopy for determination of the chemical and physical properties of fuels. The company has developed various portable analysers for specific applications, such as gasolines, diesel fuels and aviation fuels.

Foxboro described its Nuclear Magnetic Resonance (NMR) process analysis system, illustrating its application by providing comparative predictive data for cetane index and distillation characteristics.

For some years a non-subjective instrumental method of rating JFTOT (IP 323/ASTM D 3241) tube deposits has been sought to replace the visual rating method as the specification method for jet fuel thermal stability. BP Amoco has identified ellipsometry as a suitable technique for accurately measuring the thickness/volume of the tube deposits. This has resulted in the development of a dedicated JFTOT tube analyser by collaboration between BP Amoco and Phillips, which satisfies the IP/ASTM requirements.

Stanhope-Seta presented its new instrument based on Shell's HiReTS (High Reynolds Number Thermal Stability) technology to measure quantitatively the thermal stability of aviation fuels. The principle of HiReTS allows the fuel to be pumped at high pressure through a heated stainless steel capillary tube. The thermal properties of deposits formed in the tube are measured using a pyrometer. The instrument is expected to be commercially available this month. Standard test methods (IP and ASTM) are being drafted, with 2002 being the target date for completion.

The measurement of diesel engine fuel quality by the IP 41/ASTM D613 cetane engine method, is seen by the industry to have several drawbacks. Predictive techniques to estimate cetane number from physical properties also have limitations. More cost-effective and more precise methodology is required to comply with approaching new fuels specifications. Esso Research described an ignition quality determination method, developed by SouthWestern Research, based on diesel fuel igni-

tion delay under real combustion conditions in a laboratory bench-top apparatus. Initial testing has been very successful, and inter-laboratory correlation tests are planned.

Analytical Controls presented its vision of the future for on- and off-line gas chromatographic (GC) techniques, illustrated by the company's predictive method for D86 distillation behaviour of gasolines calculated from GC detailed hydrocarbon analysis data.

On-line sulfur and nitrogen determination was the subject of Antek's presentation. Its instrumentation for this basically applies the same technology as the company's laboratory models for these elements, ie UV fluorescent for sulfur and chemiluminescence for nitrogen. This talk was primarily concerned with Antek's claims to achieve very low detection limits (mg/kg range) using its current (bench) instruments, but did not offer any specific evidence obtained with on-line instrumentation.

The meeting provided a good overview of what is currently available in analytical technology for improving refinery process quality, and also gave a good indication of the way in which future applications are developing. However, despite the various claims of the techniques described, one important factor remains common to all applications – to build and maintain a calibration/correlative database, accurate data from reference methods is still required to ensure the success of the predictive techniques.

A laboratory that can deliver accurate and precise results is therefore of paramount importance, otherwise the advantages offered by the quicker on-line and at-line techniques will be lost.

This emphasises the importance of applying good quality assurance practices such as SQC and participation in good and well-organised inter-laboratory correlation schemes such as those run by the IP and major oil companies. ●

More ISO/TC 67 successes

As reported during 1999, ISO/TC 67 succeeded in making considerable progress by publishing several standards for use by the petroleum and natural gas industry. Towards the end of the year the following were published.

- ISO 14691** 'Petroleum and natural gas industries – Flexible couplings for mechanical power transmission – General purpose applications'
- ISO 10432** 'Petroleum and natural gas industries – Downhole equipment – Subsurface safety valve equipment'
- ISO 14313** 'Petroleum and natural gas industries – Pipeline transportation systems – Pipeline valves'
- ISO 13879** 'Petroleum and natural gas industries – Content and drafting of a functional specification'
- ISO 13880** 'Petroleum and natural gas industries – Content and drafting of a technical specification'

Full details of these standards, and the benefits that their use will provide, will be outlined in future issues of *Petroleum Review*. The same details can also be found on the IP website at www.petroleum.co.uk/tech/stds Progress in meeting the challenge of ISO/TC 67 publishing 30 standards in 2000, will be reported throughout the year.

Is your company making use of the expanding suite of International Standards yet?

Our website can be found @ www.petroleum.co.uk