# Petroleum review

JUNE 2002


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**ABBREVIATIONS**

The following are used throughout *Petroleum Review*:

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

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



Front cover: Jose heavy oil upgrading plant, Venezuela
*Photo: Øyvind Hagen, Statoil*

# inside...

## news

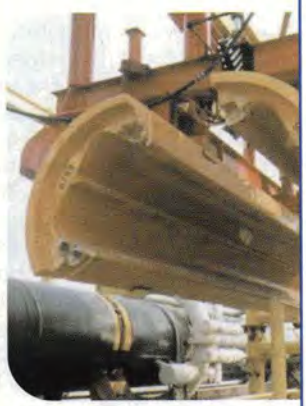


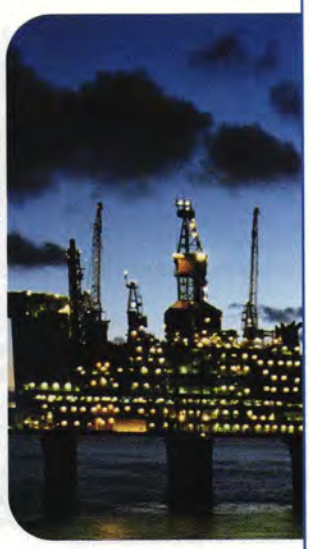
## special features



## features







## regulars

# ROUNDUP From the Editor

## Unexpectedly good prospects

The unexpected is a constant feature when observing the international oil and gas industry, so it is wise to be cautious in any assessment. However, even with all the caveats, current prospects look fair to good. The oil price is remaining firm and the stockbroker's analysts are now revising their oil price projections upwards. Oil stocks are generally at a level that is mildly price supportive, but not low enough to cause concern. Iraq's oil export embargo has now finished, having failed to attract any tangible support from other Arab/Muslim exporters.

Even US gas prices, which started the year at surprisingly low levels, are now moving up to around the $3mn/Btu level – a level that makes investment in both conventional supplies and LNG attractive.

Before reaching the conclusion that all is well, two areas of concern remain – taxation and demand. In Venezuela, President Chavez has changed the petroleum law in pursuit of a higher state share in oil developments – just at the point when most other producers have been reducing state involvement to speed developments and limit expenditures. In the case of Venezuela, failure to invest in drilling new wells rapidly erodes production capacity. Many commentators believe current Venezuelan capacity is now, after a period of reduced investment, no more than 2.95mn b/d rather than the commonly claimed 3.2mn b/d.

The other tax change that has unnerved the business is the UK's recent budget decision to raise North Sea corporation tax by 33%. The unexpected change is seen as a bad precedent in a high-cost province previously notable for its close relations between the industry and the government.

However, the most important uncertainty at the moment is demand. Economies may be less energy intensive but economic recovery still implies increased oil and gas demand. The latest IEA monthly report (May) notes 'OECD demand plunged in March, resulting in the steepest quarterly drop in OECD consumption in 12 years.' However, it remains optimistic of an overall demand growth in 2002 of 420,000 b/d over 2001 levels. Despite the lack of demand, stocks remained flat.

The scorecard for the first quarter compared with a year earlier is: Opec production down 3.1mn b/d, non-Opec up 1.5mn b/d, demand down 0.9mn b/d, but a stockdraw of only 200,000 b/d, leaving 500,000 b/d not immediately accounted for. It could be a run up in government stocks or a smaller than reported reduction in Opec production. The most likely source of the 'missing barrels' is stronger than anticipated non-OECD demand. Partial confirmation of this comes from Korea where March inland deliveries were up 2.9% while every other major economy was recording a decline.

Short-term prices may weaken but with mounting indications of economic recovery there could be a very rapid revival of demand later in the year. Russia and Norway are cancelling their cutbacks, but will Opec be prepared to supply the extra crude that will be needed? Or will prices spike?

### Caspian jigsaw

The Caspian region remains a web of competing nationalities and interests. One piece of the jigsaw has, however, just dropped into place. In one of those minor news items which ultimately prove so crucial, the Afghan President has just given the go ahead for oil and gas pipelines across his country.

For many years now there has been an uneasy truce between the countries – Russia and Iran which wished to treat the Caspian as a lake, with the resources shared by the littoral countries, and the recently independent Kazakhstan and Azerbaijan which wished to divide it as though a sea or ocean. Activity to date has been on the basis of a *de facto* division, but there is no final resolution.

Turkmenistan has always had to look to Russia as the only egress for Turkmen oil and gas was via Russia, effectively depressing the value of Turkmen hydrocarbons. A pipeline route to export Turkmen oil and gas across Afghanistan and sell it into the Pakistani and Indian markets would change the whole political dynamics of the Caspian region. However, there are deteriorating political tensions between Pakistan and India while meddling in Afghanistan seems to be a regional obsession. Clearly for the international oil and gas industry 'The Great Game' is still being played.

*Chris Skrebowski*

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

### e world

A new website aimed at bringing together all parties with an interest in developing Norwegian-based subsea and sub-surface technology is to be launched in July by Deep Community, an organisation set up by Norwegian and international oil companies, contractors and research institutes just over a year ago. The plan is to establish Norway as a global centre for the subsea and downhole industries, explained Torstein Hana at a recent press briefing. The founder members of Deep Community are: Norsk Hydro, Halliburton, Baker Hughes, Schlumberger, FMC Kongsberg, ABB Offshore Systems, Kvaerner Oilfield Products, Stolt Offshore, Statoil, Enterprise Norge, Conoco, Aker Olje & Energi, and TotalFinaElf.

Deep Community is also working on three other projects, including:

- Deep Simulation – a testing and training facility for subsea field developments.
- Deep Tank – a members network and meeting forum.
- Deep Intervention – which is looking at ways of increasing return from subsea wells.

Companies wanting to compete for the 15th ONS Innovation Award can submit applications at **www.ons.no** The Stavanger-based conference and exhibition will run from 27–30 August 2002.

Trade Partners UK is in the process of revamping and expanding its web-site-based database and is to launch a new worldwide projects database at **www.oilandgas-projects.com** this month. In the first month Angola and deepwater projects in the Gulf of Mexico will be added. An additional country will be added each month thereafter. The most recent monthly update to the existing site can be viewed at **www.oandgexport.com/monthly_update.asp**

UK energy industry watchdog Ofgem has published a list of generating stations accredited for the Renewables Obligation from 1 April 2002 on its website at **www.ofgem.gov.uk/renewables/renewables_obligation.htm**

Following extensive consultation with key audiences, the UK energy regulator has also published its first ever three-year plan and reaffirmed the five themes that will drive its work during that period. Full details can be found at **www.ofgem.gov.uk/public/pub2002.htm**

Visit **www.pmaconference.com/transrpt.pdf** to download a brochure on Skipping Stone's 228-page *Energy Transaction Software Report*, a benchmark analysis of the different transaction packages currently available for the energy market. The full report is available for $995.

# In Brief

## UK

***Burntisland Fabrications is reported to** have secured a £2mn project to design and build a 24-man accommodation module for BP's Schiehallion field, West of Shetland.*

***BG is reported to have stated that the** UK Government's recent 33% rise in corporation tax will add $50mn to company costs this year.*

***Gas has started flowing from BP's** Foinaven and Schiehallion fields to the Sullom Voe terminal in Shetland via a newly commissioned pipeline. Plans to deliver the gas to the Magnus platform for use in BP's enhanced oil recovery (EOR) operation have been delayed until 3Q2002 however. The Magnus EOR project aims to boost production from 38,000 b/d to 49,000 b/d in 2004.*

***Newcomer to the southern North Sea,** ATP Oil & Gas (UK), is planning to have brought the Helvellyn gas field in block 47/10 onstream by December 2002, writes* Brian Warshaw.*

***UK consultancy Douglas-Westwood** has forecast a massive increase in expenditure on FPSO newbuilds, conversions and renewals, exceeding $31bn over the next five years, in its latest edition of* The World Floating Production Report. *Annual spend is expected to rise to over $9bn in 2004. Details:* **www.dw-1.com**

***The UK Government closed its 20th offshore** licensing round with just 36 of the 300 blocks on offer attracting applications from 29 companies. Awards are to be announced in mid-summer.*

### Complete news update

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

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

Why not visit the site to find out more about the latest developments and trends in your industry? Log onto

**www.petroleum.co.uk**

# NEWS Upstream

# Statoil confident Snøhvit will get go-ahead

**Statoil remains confident that its Snøhvit gas field in the Barents Sea – Europe's first LNG project – will go ahead, Chief Executive Officer Olav Fjell told reporters in April. The NKr46bn project, which is regarded as the company's 'gateway to the LNG market', was put on hold in March after ESA (European Free Trade Association Surveillance Authority) raised concerns that a tax amendment could be regarded as state aid, contravening EU competition rules. The complex tax amendment gave the project partners a break by cutting the depreciation period from six to three years, even though the entire project is subject to a 78% onshore tax instead of the 28% offshore tax regime.**

**Although Norway is not a member of the EU, it has a special European Economic Area Agreement with the EU that requires it to meet EU competition requirements that are governed by ESA.**

**In a subsequent 22-page response to the ESA inquiry, the Norwegian Oil and Energy Ministry denied that the 33.3% depreciation rate was a government subsidy, stating that the tax scheme reflected the large, up-front investment costs needed to develop Barents Sea reserves and thus the low profitability of such projects.**

**Snøhvit is due onstream in 2006 and is to be developed as a subsea tie-back to a new LNG plant to be built at Melkoya, near Hammerfest in northern Norway. Nine wells will be drilled initially, eight producers and a carbon dioxide injection well. A number of gas sales contracts have already been signed, covering 2.7bn cm of gas, with Iberdrola of Spain and US company El Paso. Gaz de France and TotalFinaElf also have contracts in place for the supply of 1.7bn cm of gas that will be carried on their own tankers.**

**Snøhvit is expected to set the tax regime pattern for similar future LNG developments in the region.**

## No more deepwater drilling rigs needed

There are too many deepwater drilling rigs at present and there is no need to build more, Smedvig Chief Executive Officer Kjell Jacobsen told journalists in April.

He also pointed out that the continued development of new technology initiatives such as new risers will enable much more of the existing fleet of conventional water depth rigs to move into the deepwater market, although probably not the ultra-deep sector.

Jacobsen also stated that operators needed to take a longer-term view when awarding rig contracts, perhaps increasing the length of contracts to five years, otherwise rig owners such as Smedvig would be unable to justify building more rigs without assured income streams.

## IMO looks at improving oil spill response

Draft recommendations on improving the treatment of oil spills have been agreed by the International Maritime Organisation (IMO) during the UN agency's third research and development forum on high density oil spill response, writes *Keith Nuthall*. Experts discussed the particular problems posed by this kind of pollution, including its high viscosity and tendency to sink. The recommendations made promote the development of new detection and treatment systems, together with the sharing of technical expertise between the IMO, governments and industry (including oil producers, transporters and clean-up organisations).

This action has been encouraged by high-density oil spills from ships such as the *Nakhodka* off Japan, the *Erika* off Brittany and the *Baltic Carrier* in the Baltic.

The IMO's advice includes improving international cooperation in the development of laser and sonar technology for detecting such pollution, computerised modelling systems to help predict the movement of slicks and the harmonisation of national methods of dealing with the problem, so clean-up efforts dovetail.

# NEWS Upstream

## UKOOA unveils latest UKCS review

**The UK oil and gas sector continues to build on the recovery started in late 1999, with capital investment in 2001 up 25% on the previous year, production above 4mn boe/d and the number of new field development approvals reaching a six-year high, according to the latest economic review of offshore UK oil and gas activity published by the UK Offshore Operators Association (UKOOA).**

**The *UKOOA 2001 Economic Report* reveals that development expenditure last year was £3.5bn. If exploration and operating costs are included, total industry spend for 2001 is estimated at some £8bn. Daily production of oil and gas was maintained at similar levels to the previous year at around 4.3mn boe and 21 new field development projects were approved by the UK Department of Trade and Industry (DTI) – more than double the number approved in 2000.**

**Other facts highlighted in the report include:**

- **Around £0.4bn was spent in 2001 on new exploration and appraisal activity, compared with £0.35bn in 2000. Last year also saw one of the largest discoveries in the UK North Sea for a decade – the Buzzard field which holds an estimated 400mn barrels of recoverable oil reserves.**
- **A total of 14 new fields were brought onstream in 2001, including the Elgin/Franklin fields, the largest combined development in recent years and notable for their high pressure/high temperature technology.**
- **UK oil and gas production accounted for 85% of the UK's total primary energy production in 2001.**
- **Over 70 licence holders are currently active in the UK Continental Shelf (UKCS), indicating that, despite its maturity, the UKCS still continues to attract a wide range of oil and gas companies.**
- **Some £4.3bn was paid in upstream taxes in 2000/2001. The UK economy has benefited from £175bn (2001 prices) in taxes paid by the industry since the mid-1960s.**
- **Some 264,800 jobs were supported by the UK offshore industry in 2001, with industry related employment representing 6% of the total workforce in Scotland.**
- **Some £200bn (2001 prices) has been invested in E&P since the 1960s and over the last decade the industry has accounted for 18% of total UK industrial investment.**
- **Some 29bn boe has been recovered from the UKCS in total. UKOOA estimates that the UK's remaining oil and gas reserves range between 26bn and 34bn boe.**

## Recent developments upstream Africa

*Stella Zenkovich* reports on some recent African upstream developments:

- A major oil discovery has been made by a joint venture comprising OMV, TotalFinaElf, Repsol-YPF and Norsk Hydro's Saga Petroleum Mabruk in Libya's Murzuk Basin, with the exploration well A-1 in block NC190 flowing 700 b/d. Four successful exploration wells have already been drilled in the block, which has recoverable reserves put at 250mn barrels.
- Algerian Mine Minister Chakib Khelil aims to sign 10 upstream contracts per annum, some five times the annual level over the past six years, and to have 80 foreign companies involved in upstream projects in the country by 2005.
- Lukoil Overseas Holding has halted the development of the Fez Nord, Volubilis Est and Qued Sebou Quest blocks in Morocco, deeming them 'non-prospective'.
- Algerian state company Sonatrach has contracted to supply 1bn cm/y of LNG to Spanish electric utility Iberdrola, beginning this autumn. It is also in talks with Spanish oil and gas company Cepsa regarding the supply of 1bn cm/y of gas via the Medgaz pipeline link.
- Initiated by Libyan leader Moamar Ghaddafi, a deal was signed during the first visit of President Jiang Zemin to Tripoli in mid-April under which Libya is to open its oil sector to Chinese contractors for exploration, development and marketing.
- The Russo-Belarus oil joint venture Slavneft has started working on block 9 in the Sudan and intends to spend $126mn on exploration and development there, according to President Mikhail Gutseriyev. Sudan currently extracts 12mn t/y of oil. Reserves in blocks 9 and 11 alone have been assessed at 140mn tonnes.

## In Brief

***UK Energy Minister Brian Wilson has** granted consent for a 76-MW offshore wind farm to be built at Middle Scroby Sands, located some 2.5 km off the coast of Great Yarmouth, Norfolk.**

### Europe

***Marathon Oil is reported to have** warned that the UK will require the construction of four large gas import pipelines over the next five years to avoid a severe shortfall in gas supplies. The warning came as the company launched a five-month consultation into its proposed $900mn pipeline that will link Norway's gas fields to the southeastern coast of England.*

***Statoil is currently preparing to submit** a plan for development and operation of the 44-mn barrel Volve oil field in the Sleipner area of the Norwegian North Sea by December 2002. Two development concepts are under consideration – an FPSO vessel or a jack-up connected to a FPSO unit. First oil could be as early as 2004. Production is forecast to plateau at around 40,000 b/d. The field also has gas reserves in the region of 1bn cm.*

***Norsk Hydro's Troll field set a new daily** production record of 444,204 barrels on 8 April 2002.**

***The Norwegian Minister of Petroleum** and Energy, Einar Steensnaes, has stated that the government has no plans to further reduce its 82% stake in Statoil.**

***Norske Shell Vice President for Gas** Owe Prebe recently stated that a long-term gas market for the 20bn cm of Ormen Lange gas will be required before an investment decision is made.**

***A decision was expected as* Petroleum Review** *went to press on the timing of the start-up of a two-phase compression upgrade project on the Troll A platform in either 2005 or 2006. Two out of four planned 40-MW electrically driven compressors are to be installed under the first phase of the NKr3bn project in 2004.*

***Work is soon to start at Statoil's** Kollsnes gas processing plant to upgrade facilities to process gas from the Kvitebjørn field in block 34/11 of the North Sea. A new NGL extraction plant is to be built, as well as a new pig receiver and gas receiving facility. The 26mn cm/d capacity NGL plant is*

# In Brief

*due to be commissioned in October 2004 to coincide with first gas from Kvitebjørn. Recoverable reserves at Kvitebjørn are put at 56.5bn cm of gas, 0.5mn tonnes of NGL and 19.3mn cm of condensate.*

***The mystery surrounding 72 defective** flowline welds that shut down production on Norway's Åsgard B platform from the middle of August last year has been solved, reports* Brian Warshaw. *After six months of intensive investigation and tests, Statoil says the cause was due to vibration induced by resonance at certain wave frequencies, as gas flowed over the uneven internal surface of the flexible riser pipe. A joint venture between Stolt Offshore and Halliburton is working to repair the welds.**

***ABB has secured a $330mn contract** from Statoil for the maintenance and modification of six offshore oil and gas platforms in the North Sea as well as the onshore Kollsnes gas processing plant. The five-year platform contract is for Troll A, four Sleipner platforms and Veslefrikk. The terms also include the Huldra and Kvitebjørn platforms in the initial stages of the agreement. The contract has options for three two-year extensions.*

***Norsk Hydro Chief Executive Officer** Eivind Reiten recently confirmed that the company is working towards bring the Ormen Lange gas field onstream in 2007. Reserves are put at 400bn cm of gas and 23.7mn cm of condensate.**

***DONG is to take over Statoil's explo**ration and production activities in Denmark in a deal valued at DKr1bn. The acquisition comprises Statoil's 40% stake in the Siri field (bringing DONG's stake to 63.6%), 45.7% (bringing total interest to 68.6%) in the Stine Segment 2 field that is produced from the Siri platform, and 18.8% (total stake 32.4%) in the Lulita field. DONG will also assume operatorship of Siri. The takeover has yet to be approved by the Danish Energy Agency and the Danish Competition Authority.*

***Agip is reported to have discovered** gas offshore the coast of Sicily with its Panda 1 exploration well. Field reserves are put at between 9bn and 12bn cm of gas.*

## Eastern Europe

***Latvia is reported to have relaunched** its licensing round following a change*

# NEWS Upstream

## Mixed fortunes for UK oil and gas

UK oil and gas production showed mixed fortunes in February 2002, with year-on-year oil production up and gas production down, according to the latest Royal Bank of Scotland *Oil and Gas Index*. The upward pressure on oil prices remained, driven by a combination of the effects of a labour dispute in Venezuela, the decision by Iraq to halt exports and the ongoing tensions in the Middle East. The UK Chancellor of the Exchequer also announced a surprise increase in corporation tax on North Sea oil and gas profits in his Budget, increasing this from 30% to 40%, and introduced a 100% first year capital allowance on capital expenditure, up from 25% previously.

'There remains considerable uncertainty in oil markets with the ongoing tensions in the Middle East,' commented Tony Wood, Senior Economist, 'however, Brent crude prices remain around $25/b, which gives little concern for the pace of economic recovery.'

'The Chancellor's changes to North Sea taxation in his 17 April Budget came as a big surprise. These changes are expected to raise an additional £600mn in tax revenues by 2004/2005 and are weighed in favour of those operators that are investing most in the North Sea. Although significant, these changes are unlikely to adversely affect the operating environment for companies within the UK.'

| Year Month | Oil production (av. b/d) | Gas production (av. mn cf/d) | Av. oil price ($/b) |
|---|---|---|---|
| Feb 2001 | 2,206,542 | 12,293 | 27.50 |
| Mar | 2,301,409 | 12,465 | 24.50 |
| Apr | 2,223,924 | 11,918 | 26.00 |
| May | 2,170,520 | 9,155 | 28.30 |
| Jun | 1,993,483 | 8,639 | 27.60 |
| Jul | 2,033,323 | 8,841 | 24.70 |
| Aug | 2,018,982 | 8,814 | 25.60 |
| Sep | 1,984,388 | 9,091 | 25.90 |
| Oct | 2,169,226 | 8,909 | 20.60 |
| Nov | 2,161,755 | 11,949 | 18.80 |
| Dec | 2,425,159 | 12,621 | 18.60 |
| Jan 2002 | 2,270,322 | 12,303 | 19.30 |
| Feb | 2,247,395 | 11,732 | 20.20 |

*Source: The Royal Bank of Scotland* Oil and Gas Index

North Sea oil and gas production

## Additional funding promotes Atlantis project

**BHP Billiton has approved up to $355mn to progress the development of the Atlantis oil and gas field in the Atwater Foldbelt of the Gulf of Mexico. BHP Billiton holds a 44% stake in the project, BP holding the remaining 56% and acting as operator. Proven and probable reserves are put at 575mn boe, making it the third largest field in the deep waters of the Gulf of Mexico.**

**The funding will allow completion of front-end engineering and design (FEED) work, progression into detailed engineering and design, purchase of long-lead items and most major equipment, and the placing of major facility fabrication contracts. Full project approval is expected later this year on completion of the final capital cost estimate and project schedule. The gross capital cost of the project is expected to be in excess of $2bn.**

**Located in water depths of between 4,400 ft and 7,100 ft, Atlantis is to be developed via a moored semisubmersible production facility with a gross design capacity of 150,000 b/d of oil and 180mn cf/d of gas. The field will also have a separate semisubmersible drilling unit dedicated to development.**

**Produced oil and gas will be transported to a platform at Ship Shoal block 332 by the Caesar and Cleopatra pipelines, in which earlier this year BHP Billiton acquired a 25% and 22% interest, respectively. From there, oil and gas will be transported to markets in Texas and Louisiana.**

# NEWS Upstream

## Reducing gas flaring

The Global Gas Flaring Reduction Initiative concluded two days of deliberations on efforts to reduce natural gas flaring in its first international conference in Oslo. The initiative is led by the World Bank Group, in collaboration with the Government of Norway. Established in November last year, the initiative aims to support national governments and the oil and gas industry in their efforts to reduce the flaring and venting of gas associated with the extraction of crude oil.

Participants emerged from meetings with a consensus on the overall direction of the initiative and a specific agenda of activities for going forward, including the development of international measurement and reporting standards.

## NWSV gas sales

Partners in the North West Shelf Venture (NWSV) have signed sales and purchase agreements with Kyushu Electric Power for the purchase and supply of 0.5mn t/y of LNG from the North West Shelf offshore Western Australia, beginning in 2006.

It is the third such agreement to be signed for the supply of LNG from the project which includes a fourth LNG processing train at the gas processing facilities on the Burrup Peninsula and a second trunkline from the North Rankin platform to shore. First LNG from the fourth train is slated for mid-2004.

The Venture partners are: Woodside Energy (operator), BHP Billiton, BP, Chevron Australia, Japan Australia and Shell, each holding a 16.67% stake.

## Coordinated Norwegian gas sales procedure

**Gassco, the operator of Norway's integrated gas pipeline infrastructure, is currently working with operators on the Norwegian Continental Shelf to have a coordinated company-based gas sales procedure in operation by October 2002, Chief Executive Officer Brian Bjordal recently reported.**

**Norwegian gas sales were previously handled by the GFU. However, this was dismantled last year leaving individual companies responsible for handling their own Norwegian gas sales.**

**The GasLed II unitisation agreement is vital to ensure the future competitiveness of the Norwegian market where producer countries and import countries do not necessarily have mutual interests, Bjordal commented.**

**According to Bjordal, EU gas demand is expected to rise by almost 100bn cm/y by 2010, with contracted volumes from the Norwegian Continental Shelf expected to grow 40% to 70bn cm/y by 2005.**

**Additional capacity of 30bn cm could be made available within the existing system at marginal cost, Bjordal added.**

## *Wave power*

Norsk Hydro Technology Ventures (NTV) is to invest venture capital into a new wave power generation concept – Pelamis – developed by Scottish start-up company Ocean Power Delivery (OPD). NTV and a group including SAM Private Equity in Zurich and 3i are together committing £6mn in equal shares to OPD with the aim of getting a working prototype in the water, producing electricity to the grid within two years.

Pelamis is a semi-submerged structure composed of cylindrical sections linked by hinged joints containing hydraulic rams. Each device will be about 150 metres long, 3.5 metres in diameter, and generate about 750 kW of electricity. Several devices can be connected together and linked to shore through a single seabed cable.

## Upstream Africa

*Stella Zenkovich* outlines some more recent developments upstream Africa.

- Tullow Oil is producing some 8,500 b/d of oil from the Espoir field and plans to increase this to 30,000 b/d within a year, according to Finance Director Tom Hickey. Field reserves, originally estimated at 60mn barrels, are now reported to be double that.
- The US State Department has given permission to four oil companies – Marathon Oil, Amerada Hess, Conoco and Occidental – to renegotiate oilfield contracts in Libya. The assets of the Oasis group of companies have been held in trust by the Tripoli authorities since 1986.
- Angola is planning to make Russia a strategic partner in oil exploration, building on existing contracts with Lukoil, Yukos and Zarubezhneft, according to the Angolan Ambassador to Moscow Roberto Monteiro Ngongo.

# In Brief

*to the level of company revenue tax from 25% to 22%. Seven offshore blocks have been put out to tender for exploration and production, with a further 66 up for 'pre-investigation'.*

### North America

***Amerada Hess is reported to have** made a significant oil discovery on its Devils Island prospect on Garden Banks block 344 in the Gulf of Mexico, further delineating the prospect.*

***US gas reserves have reached their** highest level since 1987, reflecting growth in exploration, production and development, according to a recent American Gas Association (AGA) report. In 2001, gas reserve additions exceeded production for the eighth time in the past 12 years, boosting national inventories to 180tn cf.*

***Syncrude Canada is reported to be** planning to invest up to a further $1bn to complete the third phase of development of its oil sands project at Mildred Lake in northeast Alberta. Production from the first two stages has almost reached 250,000 b/d of synthetic crude. Phase three is expected to complete in early 2005.**

***Caribou birthing will not be impaired** if oil drilling is limited to the northwest portion of the oil-rich Arctic National Wildlife Refuge (ANWR), according to a new study by the US Geological Survey, writes* Philip Fine. *The oil industry has applauded the new scientific proof, but critics have dismissed the study as too narrowly focused.*

***PetroCanada and Devon Energy are** reported to have discovered 'significant' amounts of gas with their Tuk M-18 well in the Mackenzie Delta in Canada's Northwest Territories. The well flowed at restricted rates of up to 30mn cf/d of gas. Recoverable reserves have been estimated at between 200bn and 300bn cf.*

***The US Senate is reported to** have voted against the Bush Administration's proposal to drill for oil in the Alaskan ANWR (Arctic National Wildlife Refuge). The motion was defeated by 54 votes to 46.*

***El Paso is understood to have secured** a contract from US independents Mariner Energy and Pioneer Resources to build, own and operate a pro-*

# In Brief

cessing platform for the Falcons Nest project in East Breaks blocks 579, 580 and 629 in the Gulf of Mexico. The platform is expected to be commissioned in 1Q2003.

## Middle East

**Syria has been given the green light to** work an Iraqi oil field under a new agreement, according to local media reports. The agreement is also understood to set Syrian transit tariffs on Iraqi crude, as well as proposed pipelines for carrying Iraqi gas to Syria.

**TotalFinaElf (55%) has announced first** production from Iran's Dorood field. The entire 29-well project is scheduled to be completed in early 2004.*

**US company Occidental is understood** to be taking over Enron's 24.5% stake in Dolphin Energy Ltd (DEL), the joint venture that is running the $3.5bn Dolphin gas project that is to carry 2bn cf/d of Qatari gas to the United Arab Emirates. After the asset sale, UAE Offsets Group (UOG) will hold a 51% stake in DEL, with TotalFinaElf of France holding the remaining 24.5%.

**Foster Wheeler has secured a project** management contract from Abu Dhabi Gas Industries Ltd (Gasco) for a project to increase production of condensate and NGLs from the company's gas fields in Abu Dhabi.*

**BP CEO John Browne is reported to** have indicated that continued political turmoil in the Middle East will result in further delays for western investors in some $25bn worth of gas projects in Saudi Arabia. He said that investors were pushing for a return of 15%. The company holds a 25% stake in the $15bn South Ghawar development. ExxonMobil, Shell, Phillips Petroleum, Conoco, TotalFinaElf, Occidental and Marathon are also involved in various projects in the country.

**The first cargo of gas condensate from** Iran's South Pars gas field was exported on 29 April 2002, reports UFG. Field reserves are put at 12tn cm.

**Indonesian state-owned company** Pertamina is understood to have signed an agreement with the Iraqi Government to jointly explore for oil and gas in block 3 in the western desert. However, under UN-backed rules, Pertamina will be unable to invest in the block until international sanctions are lifted.

**It has been reported that Iraqi Oil** Minister Amir Muhammad Rashid and his visiting Indonesian counterpart Purnomo Yusgiantoro have signed a deal to boost bilateral co-operation in the Karbala and Najaf oil fields.*

## Russia & Central Asia

**Russian President Vladimir Putin and** Kazakh President Nursultan Nazarbaev have signed a protocol that equally splits the Kurmangazy, Tsentralnoye and Khvalynskoye oil and gas condensate fields in the northern Caspian Sea. A five- to 10-year agreement on exporting oil via Russia pipelines is to be signed by early June.

## Asia-Pacific

**Hardman Resources of Australia is** reported to have stated that likely reserves for the Chinguetti oil find offshore Mauritania, in which it holds a 21.6% stake, are over 100mn barrels.

**Cairn Energy has increased the oil** reserve estimate for its Lakshmi field offshore western India to between 100mn and 300mn following another successful appraisal well. There is also thought to be further reserves potential to the southeast of the field.

**Kvaerner is reported to have secured a** $15–20mn operations and support contract for BP's Nam Con Son gas development in Vietnam.*

**PetroChina is understood to have dis**covered gas with its Luojia 5 well in the Luojiazhai gas field in the northeastern part of Sichuan Province, which flowed at 700,000 cm/d. Plans are to bring the field onstream in 2005.

**Partners in the Gorgon gas field pro**ject offshore Western Australia are reported to be in discussions with Sasol Chevron regarding the possible supply of Gorgon gas for a proposed 30,000–45,000 b/d gas-to-liquids plant. Gorgon reserves are put at over 9.6tn cf of gas. Partners are ChevronTexaco (operator, 57.14%), Shell (28.57%) and ExxonMobil (14.29%).

**The $A450mn BassGas project is** understood to have been given the green light to develop the Yolla gas and condensate field offshore Victoria. The project, which includes the Yolla and White Ibis fields, will produce about 20 PJ/y of gas and supply 10% of Victoria's gas demand. Yolla is due onstream in 2004. Field partners are Australian Worldwide Exploration, Origin, CalEnergy and Santos.

## Latin America

**Conoco is reported to be planning to** begin development of the 400–500mn barrel Corocoro oil field in the Gulf of Paria offshore Venezuela later this year.

## Africa

**Chevron Petroleum Nigeria has** announced its second oil discovery in deepwater block OPL 222 offshore Nigeria. The Usan-1 exploration well tested at 5,000 b/d of oil.

**Amerada Hess (operator) and Energy** Africa have announced that the G-9 well in block G offshore Equatorial Guinea has proved a 'significant extension' to the recent Elon discovery in the Rio Muni Basin.

**Apache Corporation is understood to** have made a 5,103 b/d oil discovery known as the Selkit-1X on its 2.3-mn acre Khalda Concession in Egypt, marking the company's eighth discovery in the region this year.

**ExxonMobil, the largest oil producer in** Equatorial Guinea, is reported to be planning to raise output in the country by nearly 60% to 235,000 b/d in under the next two years by investing some $900mn on expanding production in the southern part of its 1.2bn barrel Zafiro field. Equatorial Guinea currently produces some 220,000 b/d of oil, which is expected to rise to 250,000 b/d by the end of the year.

**A FURTHER 71 OF THE MONTH'S UPSTREAM NEWS STORIES NOT INCLUDED ABOVE CAN BE FOUND ON THE NEWS IN BRIEF SERVICE @ www.petroleum.co.uk**

# BP targets German gas market

BP is hoping to play a direct role in the German gas market, Chief Executive Lord Browne recently announced, helping the country to meet emissions targets set under the Kyoto Protocol. He called for a new 'international dialogue' involving business and the emerging economies as well as the developed world to address the challenge of climate change and stimulate further progress.

Browne reported that whilst liberalisation of the European gas market was now providing BP with the opportunity to build positions in new countries, there were currently two barriers to the Group entering the German market. 'We have to sell our stake in Ruhrgas which is a financial investment in an activity [gas pipelines] that is not part of our core strategy,' he commented. 'Secondly, we, and indeed others, have to be able to secure fair and non-discriminatory access to the German natural gas pipeline network. That's why we very much welcome the recent announcement of a Task Force to deliver full implementation of the European Gas Directive by January 2003.'

The company has already established an energy trading operation in Hamburg and set up a direct sales force for German industrial customers which would enable it to move quickly as opportunities arise. Since entering the Spanish market, BP has succeeded in building a 7% market share in three years.

Speaking at Humboldt University in Berlin, Browne also highlighted the importance of gas in reducing emissions and how it had helped BP meet its target of reducing its own emissions of greenhouse gases by 10% from a 1990 base line seven years ahead of plan. The company is now setting a new target to enable it to contribute to the IPCC (Intergovernmental Panel on Climate Change) desire to achieve stabililisation of emissions despite the fact that BP intends to grow production of oil and gas by more than 5%/y until 2005 – with further increases beyond that – and to double the volume of refined products it produces worldwide over the next decade.

A number of initiatives are to be used to maintain Group emissions at 10% below 1990 levels, Browne reported, with existing knowledge and best practice being applied to all the company's operations and selective new capital investment in areas such as cogeneration achieving a 10–15% improvement in the efficiency of BP's own energy use. The company will also continue to develop markets for lower carbon content fuels such as CNG and LPG, increase sales of clean fuels, expand its solar business and explore other potential energy sources such as hydrogen. In Germany, that will mean more CNG retail outlets over the next four years, all of BP's German refineries producing only clean fuels by the end of 2002, and a state-of-the-art solar module plant in Hamlin, Lower Saxony, coming onstream in 2003.

Visit **www.bp.com/centres/press/berlin** for a full copy of Browne's speech.

## *Piping African gas*

**South African construction company Grinaker LTA has secured a SA Rand 1.7bn contract to design, engineer, build and manage a 865-km long natural gas pipeline linking Mozambique and South Africa, writes *Richard Hurst*. The company has been commissioned by Sasol and Empresa Nacional de Hidrocarbonetos de Mocambique to have the pipeline operational by 2004.**

**Frank Cowley, Managing Director of Grinaker, said that the pipeline project was part of his company's strategy to follow market demand in bringing infrastructure to the developing world, adding that 50% of the company's business comes from other African countries.**

**The pipeline will link the former Portuguese colony's Temane and Pende gas fields to Secunda and small power stations in the eastern sector of South Africa.**

## Bioenergy funds

A £66mn support scheme for bioenergy projects has been unveiled by UK Energy Minister Brian Wilson. The money will support the establishment of up to six power stations to produce electricity from burning fast-growing crops such as straw, willow or miscamphus (elephant grass), and up to 100 smaller power and heat plants. The Bioenergy Capital Grants Scheme, jointly funded by the Department of Trade and Industry and the New Opportunities Fund, a National Lottery good cause distributor, is expected to encourage a further £200mn of private sector investment.

Dovetailing into this initiative will be support from the government for planting energy crops and biomass, including a six-year, £29mn programme from the Department of the Environment, Food and Rural Affairs (DEFRA) and the Woodland Grant scheme.

# In Brief

### UK

***The Directors of Enterprise Oil are** reported to have resigned following Shell's successful takeover bid. Shell Resources now owns 94.1% of Enterprise Oil's issued share capital. The company has received European and US regulatory approvals the merger, which is expected to offer $300mn/y of synergies, according to Shell. The company reports that it intends to procure the making of an application by Enterprise to the UK Listing Authority for the cancelling of the listing of Enterprise Shares on the Official List and to the London Stock Exchange for the cancellation of Enterprise shares with effect from 25 June 2002.*

***Shell has posted 1Q2002 adjusted current** cost of supplies (CCS) earnings of $2bn, some 48% below the quarterly record a year ago. Return on average capital employed (ROACE) for the last 12 months was 15.7%. Meanwhile, BP posted a 57% drop in 1Q2002 net profit to £1.091bn, with a ROACE figure of 11%.*

***ABB has posted a net 1Q2002 income** of $114mn compared with $138mn a year earlier.*

***UK oil and gas executives earn as** much as 30% more than other industries, according to a recent survey conducted by the Hay Group. The report, which surveyed some 17,000 oil workers, also stated that base pay levels are approximately 18% higher than general industry jobs.*

***North Sea contractors Amec, Wood** Group and KBR have formed a new joint venture company – Sigma 3 – that is to provide integrated services for Shell Expro's centre and northern North Sea assets under a £750mn, seven-year contract.*

### Europe

***Repsol-YPF has posted a 1Q2002 net** income of euros 302mn, a year-on-year fall of 49.2% against 1Q2001.*

***Kvaerner has posted a 1Q2002 operating** profit of NKr160mn compared to a loss of NKr345mn in the previous quarter.*

***The Finnish Government is to reduce its** 70.74% stake in Fortum to 50.1%.*

# In Brief

***OMV has posted a 69% fall in 1Q2002*** *net income to euros 40mn.**

***Saipem is reported to be planning to*** *take a majority stake in Bouygues Offshore of France, having made a euros 60/share offer. The Italian oil field services company estimates cost synergies of euros 60mn by 2004.*

***Aker Kvaerner has strengthened its*** *presence in the Gulf of Mexico and Asia-Pacific with the integration of an additional 1,800 engineering and project management staff from Kvaerner E&C.**

***TotalFinaElf has posted a 2001 net*** *income of euros 7.52bn, down 2% compared to 2000.*

***The Norwegian Government is*** *reported to have indicated that it may reduce its stake in Norsk Hydro from 43.82% to 34%.*

***Vopak is proposing to split off its*** *chemical distribution activities into a separately listed Dutch company, while Vopak will continue with the group's tank storage and related logistics activities.*

***A consortium comprising Lukoil and*** *Greece's Laxis Group has become the only bidder in the privatisation of a 23% stake in Hellenic Petroleum following the decision of Yukos, OMV and other participants to withdraw from bidding, claiming the company was overvalued at euros 1.5bn, reports UFG.*

## Eastern Europe

***The Croatian Government is reported*** *to have given its approval for the privatisation of state-owned oil and gas company INA. A call for bids for 25% plus one share is to be announced soon.*

## North America

***Canadian Natural Resources is understood*** *to be taking over the Canadian operations of Rio Alto Exploration in a C$2.4bn deal that will create North America's fourth-largest independent natural gas producer.*

***The ChevronTexaco Chairman David*** *O'Reilly has reported that the company has achieved its interim synergy target rate of $1.2bn ahead of the original timetable and is making 'tremendous progress' toward its objective of $1.8bn by early next year.*

***It has been reported that federal*** *energy regulators in the US neglected to investigate Enron's energy trading practices last year. According to Senator Joseph Lieberman, the Federal Energy Regulatory Commission's investigation of the company's online trading activities 'failed to follow up some of the most serious concerns.'*

***Paramount Resources is to make a*** *cash offer to acquire all of the common shares of Summit Resources. Paramount further announced that it is considering the creation of a new royalty trust that will substantially maintain all of its natural gas assets in northeast Alberta.*

***US-based Aspen Technology is to*** *acquire Hyprotech of Calgary, a leading supplier of process simulation and engineering software and services to the petroleum industry, for $99mn.*

***ChevronTexaco has posted a 70% drop*** *in net income to $725mn for 1Q2002, compared with $2.433bn in 1Q2001. The fall was attributed to a depressed oil refining sector and 'significantly' lower oil and gas prices. Meanwhile, Unocal posted a 1Q2002 net profit of $22mn, down from $295mn a year earlier. Kerr-McGee net income fell to $5.5mn for the period from $335mn, while Amerada Hess posted a first quarter net income of $141mn, down from $337mn a year earlier.*

***The shareholders of Alberta Energy*** *Company (AEC) and PanCanadian Energy Corporation have voted overwhelmingly to merge the two Alberta-based companies to form EnCana Corporation, writes* Monica Dobie. *It is claimed the new venture will be the largest independent energy producer in North America. The merger is valued at C$23bn.*

***ExxonMobil has reported a 58%*** *decline in first quarter profit to $2bn.*

## Middle East

***It has been reported that Afghan*** *interim ruler Hamid Karzai will conduct a series of talks with his Pakistani and Turkmenistan counterparts at the end of this month about the proposal for a 850-km pipeline through Afghanistan, to export Turkmenistan's oil and gas reserves to the Indian subcontinent. The cost of the project is estimated at $2bn.*

***Jordanian officials say Iraq will initially*** *supply Jordan with 100,000 b/d of oil when a new pipeline linking the two countries comes onstream in October 2004. The Iraqi Ministry is reportedly evaluating bids from 35 international companies for the $100mn first phase of the build-own-operate-transfer (BOOT) contract.**

***Reports are circulating that Saudi*** *Aramco may be broken up and part-privatised.**

***Negotiations between Saudi Arabia*** *and Western oil firms to develop natural gas, electricity and water projects have been postponed according to local media reports.**

## Russia & Central Asia

***Yury Sukhanov has been elected the*** *new Chief Executive Officer of Slavneft.*

***Tyumen Oil Company (TNK) is understood*** *to have acquired a 44% stake in Rospan from Yukos, which retains a 56% interest. Rospan holds 550bn cm of gas and 750mn barrels of oil reserves. It produced 1bn cm of gas in 2001.*

***Gazprom has acquired a 49% stake*** *from Itera in Severneftegazprom, the holder of a licence for the 800bn cm South Russkoye field for a nominal price of $3,000, reports UFG.**

***Statoil is reported to have proposed*** *that it take on the operatorship of the Baku–Tbilisi–Erzurum gas pipeline that is to carry gas from the Azeri Shah Deniz field to Turkey. The Norwegian company, which holds a 25.5% stake in the project, is also understood to wish to head the marketing company selling the Azeri gas.*

***Tatneft is reported to be acquiring a*** *33.3% stake in UK company Sibir Energy for $240mn.*

## Asia-Pacific

***Santos of Australia is reported to have*** *completed it's A$148mn acquisition of Texan junior Esenjay Exploration. The company is to be renamed Santos Americas.*

***Sinopec of China is reported to have*** *posted an 86% fall in first quarter profit to yuan 542mn ($65.46mn) due to lower oil and gas prices.**

**A FURTHER 30 OF THE MONTH'S INDUSTRY NEWS STORIES NOT INCLUDED ABOVE CAN BE FOUND ON THE NEWS IN BRIEF SERVICE @ www.petroleum.co.uk**

# Guidance for offshore LNG terminal construction

**The global LNG market is forecast to double in size over the next 10 years and industry is readying to provide ample liquefaction capacity to meet demand. In the US alone, LNG imports reached 4.9mn tonnes in 2000, about 5% of global LNG trade and up from 3.4mn tonnes in 1999. Drivers for the rapid growth in LNG include continued demand for a cleaner-burning fuel and the need to bring 'stranded gas' from deepwater and remote areas to market. Concern over long-term US gas supply, a larger number of new supply projects, and lower LNG infrastructure costs from a decade ago are also contributing to the spurt in LNG growth in recent years.**

**In response to growing demand for LNG, ABS has issued *Guidance Notes for Building and Classing Offshore LNG Terminals* to help facilitate industry development of both gravity-based and floating terminals contemplated for offshore installation. Areas of emphasis within the Guidance Notes include the terminal structure, the hull design, mooring system, offloading system, LNG containment systems, process facilities, and support and safety systems. The document also addresses LNG terminal installation, hook-up and commissioning, and surveys during construction and operation.**

**According to J Sember, ABS Vice President of Offshore Development, anywhere from five to 20 offshore terminals could be built for US offshore installation in the next decade. Target locations include the east and west coasts as well as the Gulf of Mexico. Overseas locations where offshore LNG terminals are under consideration include Australia and West Africa. Such terminals are expected to be designed for site-specific environmental conditions and to be purpose-built rather than converted existing LNG carriers.**

# Bids in for Egypt–Jordan gas pipeline

Four international consortia have put in bids for the BOT construction of the Jordanian portion of the $220mn Egypt–Jordan gas pipeline through which Egypt is to deliver gas to Jordan, Lebanon and Syria starting from March 2003, reports *Stella Zenkovich*. Gas supply will be later extended to Europe.

According to the Jordanian Minister for Energy and Mineral Resources Muhammad Batayimah, the contractor selected to build the overland sector from Aqaba to the north, supplying gas to Rihab and Samra combined-cycle power stations, will be announced in June 2002, with a licence agreement to be signed in September. The Al-Arish–Taib Egyptian portion (from where a maritime pipeline will link up with Aqaba), will be financed by the Arab Fund for Economic & Social Development and the Kuwaiti Development Fund.

The bidders are (1) ABB with Texas-based Petrofac; (2) CCC of Greece with Shell and Canadian Enbridge; (3) EPEG of Egypt, including EHGC, GASCO, Petrojet and Emppi; and (4) SIL Team of Jordan, Crown Resources Company of Russia and GENCO of Egypt.

## Hazardous by-products

An American agency has proposed the addition of certain hazardous waste materials to its country's fledgling gasification programme, reports *Philip Fine*. The Environmental Protection Agency (EPA) estimates that between seven and 10mn tonnes of hazardous by-products from the petroleum refining industry could be put under high temperatures and converted into gas.

Proponents of gasification maintain that refineries would more likely recycle solid waste if gasification systems became a part of the fuel manufacturing process.

The by-products include acetic acid, acetic anhydride, oxo-alcohols, butanol, methanol, ammonia, and hydrogen.

## *Bioethanol first*

Shell has acquired an equity stake in Canadian bioethanol technology company Iogen Energy Corporation for $29mn. The deal will help progress rapid development of what is claimed to be the world's first commercial-scale biomass to ethanol plant.

Unlike conventional fuel ethanol, a high-octane alcohol produced from the fermentation of sugar derived from the starch in grains such as corn and wheat, bioethanol is made from the fermentation of sugars derived from the plant fibre in renewable feedstocks such as wood and straw. Compared with gasoline, ethanol made from plant fibre is reported to release over 90% less emissions of the greenhouse gas carbon dioxide.

# In Brief

### UK

***New car registrations in the UK in April** 2002 rose 16.1% compared to a year ago, according to the Society of Motor Manufacturers and Traders (SMMT). Company car sales are reported to have been affected by the recent tax changes in favour of diesel engines, with the sale of diesel-powered cars rising by 60.5% in April to gain a 23.2% market share, up from 16.8% last year.**

***The International Petroleum Exchange** (IPE) has posted what it claims is an all-time record in Brent crude futures trading, breaking through the 2mn lot mark for the first time in April 2002 to trade a total of 2,068,250 lots.*

***Veeder-Root has secured a contract** from Total to provide fuel management services (FMS) for the entire company-owned UK network of over 750 service stations. Roll-out of the leak detection and wet stock management service will be completed by the end of this year.*

### Europe

***Fortum's Porvoo refinery has commenced** the pilot production of liquefied wood fuel. Claimed to be the first such plant in Scandinavia, the pilot plant will use forestry residues and sawdust as raw material, which is converted into liquid fuel to be used as heating oil in both the domestic and industrial sectors.*

***Vopak has divested all of its 'B' shareholding** in product tanker operator Bromstrom, representing 49% of the capital and 29% of the votes of the company, for euros 58mn. Vopak retains its 'A' shares, representing 1% of the capital and 6% of the votes of Bromstrom. The two companies also recently entered into a strategic alliance to jointly initiate and develop integrated logistics solutions for the oil and chemical industry, combining their liquid sea transportation with tank storage terminals and inland barging operations.*

***Yukos is reported to be negotiating** the acquisition of BP's 55% interest in Bayernoil, a 15,000 b/d refinery in Germany that produces ultra-low sulfur gasoline and owns a 650-strong network of service stations. It is also negotiating with BP regarding the*

# In Brief

*purchase of the 2,500-strong network of Aral-branded service stations in Germany.**

***Repsol-YPF and Gas Natural SDG have** approved a series of structural company reforms in a bid to strengthen their resources and capacities in the gas and power arena. The reorganisation will include the creation of a 50:50 joint venture company that will focus on the integrated development of the whole LNG value chain.**

### Eastern Europe

***The finalisation of Shell's sale of its 61** Baltic filling stations to Statoil will depend on the market inspections of the three Baltic countries.**

***Lukoil is reported to be acquiring a** 75% interest in the 80,000 b/d Gdansk refinery together with UK-based Rotch Energy for an undisclosed sum, reports UFG. If completed, the deal would not only provide access to refining capacity but would also provide Lukoil with the country's second-largest network of 285 service stations.**

### North America

***El Paso Corporation is understood to** have shelved plans for three new LNG import terminals in the US because of expected problems in gaining planning permission for the sites. Instead, the company is reported to be planning to modify three LNG tankers so that they can convert their cargo back to gas some 12 miles offshore the US before delivery to shore via a mooring buoy system and subsea pipeline.*

***The New York Mercantile Exchange** has announced that it is to introduce clearing services for 25 of the most commonly traded over-the-counter (OTC) energy contracts, beginning 31 May 2002.**

***General Motors is reported to have** unveiled what is said to be the world's first drivable fuel cell vehicle that extracts hydrogen from gasoline to produce electricity. The fuel-cell powered Chevrolet S-10 pickup is equipped with an onboard fuel processor that reforms low-sulfur gasoline through a series of chemical reactions.**

***BP is reported to have said that it is to** switch federally mandated fuel additives in California, phasing out the*

## Alternative fuels

**The US Environmental Protection Agency (EPA) is looking to add certain waste materials, now classified as hazardous, to its programme promoting alternative fuels, writes *Philip Fine*.**

**The EPA is trying to expand the country's use of gasification, a process that puts materials under high temperatures to convert them into synthetic gas. The resulting 'syngas' is comparable to natural gas.**

**Officials estimate that US petroleum refineries alone could transfer up to 10mn tonnes of hazardous by-products to gasification systems, including oil-bearing residuals and oil from associated petrochemical facilities.**

## Baltic gas development

Baltic Gas, an association of gas companies in the Baltic Sea, has entered into a formal agreement with the region's authorities to promote investment in gas infrastructure under a new BASREC Synergy Programme.

It has been forecast that natural gas consumption in the Baltic Sea region could increase from the current level of 125bn cm to 190bn cm/y by 2015. Baltic Gas believes that investment in gas infrastructure, particularly transmission lines, storage and interconnections in the region must be made in the coming years in order to facilitate this growing demand for natural gas and further improve present levels of security and flexibility of supply.

## Latest European Union developments

A raft of legal cases are being prepared by the European Commission against eight European Union Member States to force them to monitor and restrict their production of the key greenhouse gas carbon dioxide ($CO_2$), reports *Keith Nuthall*.

In a bid to make the EU stick to its Kyoto Protocol commitments, the Commission has formally warned the UK, Luxembourg, Portugal, Italy, Ireland, Greece, Spain and Germany of potential legal actions at the European Court of Justice (ECJ). These concern alleged failures to implement directives including those on monitoring $CO_2$ in ambient air and from passenger car emissions, plus the limiting of sulfur dioxide, nitrogen dioxide, particulates and lead pollution.

Other petroleum-related EU news includes:

- Political agreement has been secured at the Council of Ministers on the proposed directive that would lead to the introduction sulfur-free fuels in the EU.
- A directive reducing pollutant emissions from new motorcycles by between 65–70% within four years has gained final approval.
- The Commission has approved the securing of sole control by TotalFinaElf Deutschland of Michel Mineralolhandel, Total Saarberg and Elf Mineralol Berlin in the German non-retail market for refined oil products.
- Brussels is threatening Sweden and Denmark with legal action at the ECJ for failing to give 'adequate priority' to the regeneration of waste oils.
- Lithuania has won the right to apply total or partial reductions on excise duty rates on mineral oils in its EU accession negotiations with Brussels.
- Opec countries supplied 45% of the EU's euro 90bn imports of crude oil in 2001, down from 55% in 1995 and 50% in 1999, according to a recent Eurostat report.

## UK power and gas utility merger

**The UK National Grid and Lattice have unveiled plans to merge their operations to form a new power and gas utility company – National Grid Transco. The £15bn deal will give National Grid shareholders 57% of the new company.**

**Cost savings are not expected to be large, in the region of £100mn in the first year. Instead, the rationale behind the merger is reported to be that it will make it easier for the larger, combined operation to expand overseas, in particular in North America where the utility markets are currently liberalising.**

# NEWS Downstream

## Developments downstream Asia-Pacific

*Swineetha Dias Wickramanayaka* reports on some of the latest downstream oil and gas developments in the Asia-Pacific region.

- TotalFinaElf has been talking to ExxonMobil about buying its Indian LPG business, boosting its India sales volumes by 50%. TotalFinaElf would take over the 60 LPG dealerships held by Mobil Peeves, ExxonMobil's joint venture with NRI of Kerala.
- Japan's Nippon Mitsubishi Oil Corporation is reported to have said that it intends to follow up its planned merger of three group refineries by expanding exports of gas oil, fuel oil and other petroleum products by 50% in the 2003 fiscal year. The company plans to export 3.5mn kilolitres of petroleum products in 2003, up from the 2.3mn projected for fiscal 2002, utilising the company's excess capacity with extra sales in China and other Asian countries.
- The Sri Lankan Government has announced that it is imposing 10% VAT on bunker and aviation fuel from 1 June 2002, from which they have been previously exempt.
- The Maharashtra Government, which controls Mumbai (Bombay), India, has levied a surcharge of 1 rupee on every litre of petrol and diesel sold in the state.
- The Indian Government has cut by half the price increase of rupees 40 per LPG cylinder that it had proposed in its 2002–2003 budget. A rupee 1.50 price rise per litre of kerosene has been maintained however.
- India's Reliance is close to a deal with the Indian Oil Corporation, Bharat Petroleum and Hindustan Petroleum for marketing petroleum products from its Jamnagar refinery in Gujarat. The Press Trust of India said that Reliance had dropped demands for take-or-pay contracts with the national oil companies.
- Competition is intensifying to supply the planned new 615-MW power plant in Saurashtra, Gujurat, India, with fuel. Gujarat State Petronet will submit a feasibility report on a rupees 1,650mn subsea gas pipeline connecting the mid-Tapti fields with the port of Pipavav. Plant constructor Kribhco had asked Petronet to consider either a dedicated pipeline or a shared gas transmission line. Meanwhile, British Gas India (BGI) could supply re-gasified LNG through Gujarat Pipavav LNG Company.
- The Ceylon Petroleum Corporation has modified its refinery to remove lead additives from petrol marketed in Sri Lanka. It has expanded sales outlets for unleaded petrol throughout the country.
- The Indian Cabinet has cleared a bill that would lead to the establishment of a petroleum refining and marketing regulatory board to monitor prices in the newly deregulated sector. It will also have powers to check profiteering and ensure availability of products.

## In Brief

*additive MTBE (methyl tertiary butyl ether) in the US state by 31 December 2002. It is understood that the company plans to use the alternative additive, ethanol.*

***InterContinentalExchange (ICE) has** launched 'E-Confirm', a fully web-enabled application that allows any energy or metals market trading firm to automatically submit trades for confirmation, regardless of execution means or proprietary data formats.*

***Centrica is to acquire the electricity** supply operations of Texas-based Central Power and Light Company (CPL) and West Texas Utilities Company (WTU) from American Electric Power (AEP) for a purchase price of between $133mn and $153mn.*

### Middle East

***Technip-Coflexip has secured a** lumpsum, turnkey contract from Saudi Aramco for the design and construction of a sulfur plant at the Riyadh refinery in Saudi Arabia. Work is expected to complete in April 2004.*

***The Omani authorities are understood** to have approved the expansion of the Qalhat LNG plant with the addition of a third train that will boost output by 50% to 9.9mn t/y from 2005.*

**A FURTHER 9 OF THE MONTH'S DOWNSTREAM NEWS STORIES NOT INCLUDED ABOVE CAN BE FOUND ON THE NEWS IN BRIEF SERVICE @ www.petroleum.co.uk**

### UK Deliveries into Consumption (tonnes)

| Products | †Mar 2001 | †Mar 2002 | †Jan–Mar 2001 | †Jan–Mar 2002 | % Change |
|---|---|---|---|---|---|
| Naphtha/LDF | 144,092 | 75,848 | 450,121 | 263,977 | –41 |
| ATF – Kerosene | 987,367 | 848,318 | 2,604,610 | 2,237,951 | –14 |
| Petrol | 1,788,953 | 1,772,949 | 5,052,317 | 5,067,771 | 0 |
| of which Unleaded | 1,694,621 | 1,727,013 | 4,802,623 | 4,933,160 | 3 |
| of which Super unleaded | 34,613 | 46,380 | 89,488 | 129,151 | 44 |
| of which Premium unleaded | 974,153 | – | 3,146,239 | – | –100 |
| ULSP (ultra low sulfur petrol) | 685,855 | 1,680,633 | 1,566,896 | 4,804,009 | 207 |
| Lead Replacement Petrol (LRP) | 94,332 | 45,936 | 249,694 | 134,611 | –46 |
| Burning Oil | 487,116 | 410,147 | 1,455,078 | 1,229,436 | –16 |
| Automotive Diesel | 1,438,126 | 1,436,148 | 3,900,256 | 4,161,434 | 6.7 |
| Gas/Diesel Oil | 584,657 | 518,001 | 1,656,731 | 1,605,199 | –3 |
| Fuel Oil | 213,364 | 212,543 | 645,045 | 602,292 | –7 |
| Lubricating Oil | 77,949 | 66,984 | 236,017 | 221,558 | –6 |
| Other Products | 743,113 | 790,561 | 1,894,888 | 2,023,117 | 7 |
| Total above | 6,464,737 | 6,131,499 | 17,895,063 | 17,412,735 | –3 |
| Refinery Consumption | 414,355 | 411,978 | 1,250,522 | 1,301,929 | 4 |
| Total all products | 6,879,092 | 6,543,477 | 19,145,585 | 18,714,664 | –2 |

† Revised with adjustments

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

# 6th Petroleum Geology Conference:

## North West Europe & Global Perspectives


### 7-9 October 2003,

Queen Elizabeth II Conference Centre, London

In the tradition of the highly successful "Barbican" conferences, the PESGB, The Geological Society of London and The Institute of Petroleum have joined forces to bring you the next in the series. The 6th Conference will showcase major advances in petroleum geological understanding and exploration technology. The conference will feature key NW European studies, supplemented by generic or general interest themes from around the world.

Sessions will include:

**Innovative Geophysics**
Contact: Etienne Robein e-mail: etienne.robein@totalfinaelf.com

**Better Recovery Through Understanding Reservoir Models**
Contact: Jon Gluyas e-mail: jon.gluyas@acorn-oil.com

**Deep Water Plays & Reservoirs**
Contact: Andy Hurst e-mail: a.hurst@abdn.ac.uk

**Structural Application in Exploration & Production**
Contact: Simon Stewart e-mail: stewarsa1@bp.com

**3D Visions**
Contact: Richard Davies e-mail: richard.davies@exxonmobil.com

**Understanding Petroleum Systems**
Contact: Paul Nadeau e-mail:PANA@statoil.com

**Atlantic Margin: New Insights, Regional Synthesis & Large Scale Tectonics**
Contact: Pat Shannon e-mail: pshannon@pop3.ucd.ie

**Underexplored and Unconventional Plays of North West Europe**
Contact: Jim Munns e-mail: jim.munns@dti.gsi.gov.uk

**Exploration Histories, Field Case Studies and Play Life Cycles: Lessons From North West Europe**
Contact: Duncan Erratt e-mail: duncan.erratt@exxonmobil.com

**Gas Renaissance – opportunities for new plays and new technology in existing fields in the liberalised gas market place**
Contact: Stuart Burley e-mail: stuart.burley@bg-group.com

To submit an abstract or for further information on the technical programme please contact the session chairs as listed right or Tony Doré, Technical Chair, e-mail: tony.dore@statoil.com

Sponsorship enquiries should be directed to: Helen Wilson, Conference Manager, Geological Society, Burlington House, Piccadilly, London, W1J OBG
Tel: +44 (0) 20 7434 9944,
Fax: +44 (0) 20 7494 0579,
e-mail: helen.wilson@geolsoc.org.uk

General enquiries should be directed to: PESGB Office, 2nd Floor, 41-48 Kent House, 87 Regent Street, London, W1B 4EH
Tel: + 44 (0) 20 7494 1933,
Fax: +44 (0) 20 7494 1944
e-mail: pesgb@pesgb.org.uk

Further information regarding this conference will appear in the organising societies' publications and on the respective web-sites as soon as it becomes available.

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# Re-energising the search for oil

**The discovery by BHP Billiton Petroleum of a new 1bn barrel oil field in block 2c in the Atlantic Ocean 30 km off the north-east coast of Trinidad in 40 metres of water has transformed the prospects for the country's declining oil production sector. *David Renwick* reports.**

BHP Billiton achieved the feat of tapping into the Oligocene sand for the first time in Trinidad and Tobago. Geologists have been looking for this zone both on land and offshore Trinidad since the mid-1980s when Venezuela first identified its 'super giant' El Furrial fairway in the north-eastern part of the country, said to contain about 9bn barrels of reserves. Nicholas de Verteuil, BHP Billiton Petroleum's Trinidad and Tobago Vice President and resident manager, says the fairway sits within a frontal thrust belt north of the Venezuelan town of Maturin and he was 'struck by the possibility that it could continue over into the Trinidadian sector of the Eastern Venezuela Basin.'

Others thought along similar lines. For example, in the early 1990s, Exxon drilled deep on land in South Trinidad, Mobil in the S11 block off the southeast coast and Pecten in the Lower Reverse L block just east of S11 – but none found any oil.

However, de Verteuil has now demonstrated that they were looking in the wrong place and points out that 'the Oligocene trend is not something that is a continuous body of oil that exists under there. There are sweet spots and there are areas where you don't find anything.' Fortunately for Trinidad and Tobago, and BHP Billiton Petroleum, de Verteuil hit one of these 'sweet spots', quickly elevating the country to the status of a core exploration area.

Trinidad and Tobago's Minister of Energy and Energy Industries, Eric A Williams

When the Greater Angostura Structure (GAS), as it is called, enters

production in mid-2004, local oil output will increase dramatically to about 220,000 b/d, a level last seen in the mid-1980s. GAS will be producing 100,000 b/d in its early years from the two fields identified so far – Kairi and Canteen. This represents 82.6% of the country's current oil output (see **Table 1**). BHP Billiton expects to be able to commercially recover about 300mn of the 1bn barrels. Block 2c is the first of the 17 production sharing contracts (PSCs) the Energy Ministry has signed with international oil companies since 1993 that has yielded oil. Others have proved to be mainly gas prone.

The government will benefit to the extent of about 60% of production, after 'cost oil' has been deducted. BHP Billiton Petroleum, which holds 45% in the block, and its partners France's TotalFinaElf (35%) and Talisman Energy of Canada (20%), will share the other 40%.

Over the 17-year productive life of the current contract, de Verteuil estimates that the government's coffers could be swelled to the extent of $2.3bn at $20/b oil or $3.5bn at $30/b oil. Either way, the Trinidad and Tobago Treasury is in line for a windfall from the energy sector, since it also expects to rake in billions of dollars in taxes from other major projects such as increased gas production to feed the planned expansion of LNG facilities.

## Exploration prospects

The block 2c discovery has re-energised the search for oil in Trinidad (Tobago has no hydrocarbons), with BHP Billiton itself leading a new consortium to explore in the 61,410 hectare block 3a immediately to the east. It has taken 30% in that block, partnered by BG Group (30%), Talisman Energy (30%) and TotalFinaElf (10%).

De Verteuil told *Petroleum Review* he is 'cautiously optimistic' about the prospects in 3a, because 'we see the potential for the Oligocene trend extending into that block too.' A PSC was signed off between the consortium and the Ministry on 22 April 2002, providing for a minimum of 300 sq km of 3D seismic and six exploration wells within three years – the first time a company has offered to drill so many wells in the first exploration phase of a PSC.

The companies also offered one of the largest signature bonuses paid in the last nine years – $19mn. If the exploration programme is successful, de Verteuil says 'the money will have been well spent.'

The possibility that the fairway could also be present on land has encouraged Talisman Energy to farm-in to an area called the Eastern Block, held by the state energy company Petrotrin. This is located in the southeast of Trinidad, away from the area in which ExxonMobil unsuccessfully tried to identify productive sands.

Even blocks in the Gulf of Paria on Trinidad's west coast, which are closest of all to Venezuela, may be part of the fairway and BG is looking again at blocks 1a and 1b in the northern Gulf, for which it earlier made what the Ministry considered an unsuitable bid in the 1999–2000 block auction.

## Gas developments

While the oil discovery has naturally grabbed everyone's attention – since oil is easy to monetise and provides a bigger tax take to the government – it should not be forgotten that Trinidad and Tobago is now more of a gas province than it is a crude oil province. Converting today's gas production (see **Table 2**) to equivalent barrels of oil (boe) increases Trinidad and Tobago's oil output by well over 200% – from 121,000 b/d to 400,000 b/d.

If gas production continues the way it

**BP Trinidad Mahogany A platform, off Trinidad's east coast which supplies gas to Atlantic LNG**

has been going, Trinidad and Tobago could be producing 1mn boe/d as early as 2015 – and that is not counting crude output from block 2c and other blocks that may follow. Audited gas reserves as of 1 January 2001 amounted to 19.7tn cf proven, 7.3tn cf discounted probable and 5.6tn cf discounted possible – or a total of 32.6tn cf, according to US consultant Ryder Scott. These estimates were quickly rendered out of date, since additional reserves were discovered during 2001 and BP Trinidad, for one, is determined to find 5tn cf each year up to 2004.

The prospects appear to be favourable because Ryder Scott also said the offshore region contained an extra 30.7tn cf of 'identifiable exploratory gas resources' as well as 28.0tn cf of 'unidentifiable exploratory resources', a grand total of 91.3tn cf. This puts Trinidad and Tobago well up there with some of the world's leading gas reserve holders, at least on a per capita basis (the country only has 1.2mn people).

Robert Riley, Chairman and CEO of BP Trinidad, told *Petroleum Review* that $90mn would be spent on a gas-specific exploration programme in its east coast offshore acreage this year. BP already holds 70% of total proven country reserves, but other companies are proving equally adept at finding new gas accumulations, including BG, EOG Resources and even BHP Billiton, whose first successes in the GAS were actually gas wells. De Verteuil estimates there is 2.5tn cf of gas reserves in block 2c.

The Trinidad and Tobago province has proven so gas rich that at least one of the companies, the US independent EOG Resources, only goes after blocks believed to have gas reserves. As recently as 29 April 2002, it signed a PSC for the 36,382 hectare Lower Reverse L block southeast of Trinidad, abutting the maritime boundary line with Venezuela. It is the operator and sole holder of the block and Lindell Looger, Managing Director of EOG Resources Trinidad says that, unlike most other companies, 'EOG is looking to find gas, hoping to find gas and expecting to find gas.'

| Company | Production (b/d) | 2001 average |
|---|---|---|
| BP Trinidad and Tobago | 58,912 | 49,257 |
| Trinmar | 32,011 | 32,994 |
| Petrotrin | 19,879 | 20,501 |
| Primera Oil and Gas | 759 | 816 |
| Trintomar | 154 | 239 |
| EOG Resources Trinidad | 2,320 | 2,620 |
| Trinidad Exploration and Development (TED) | 31 | 29 |
| Moraven | 784 | 731 |
| Venture Production (Brighton Marine) | 508 | 537 |
| Neal and Massy Energy Resources | 423 | 469 |
| Venture Production (Point Ligoure) | 145 | 119 |
| British Gas | 303 | 374 |
| National Gas Company (NGC) | 151 | 236 |
| Lease operators | 3,819 | 3,768 |
| Farmout operators | 859 | 906 |
| New Horizon Exploration | 70 | 17 |
| **Total** | **121,058** | **113,595** |

*Source: Ministry of Energy and Energy Industries*

**Table 1: Trinidad and Tobago oil and condensate production in b/d, February 2002**

## Main attraction

Trinidad and Tobago's attraction for companies discovering gas reserves is that they do not remain stranded for long, unlike many other gas locations worldwide. Andrew Jupiter, Permanent Secretary in the Energy Ministry, points out that 'the activity required to establish a gas reserve base does not occur unless there is some reasonable expectation that the gas can be sold under commercial conditions.'

Trinidad and Tobago's record in gas-monetisation so far includes:

- Nine ammonia plants in operation (4.1mn t/y) and one in preparation (610,000 t/y).
- Five methanol plants (4.58mn t/y), a sixth under construction (at 1.7mn tonnes, the biggest in the world) and a seventh of similar size planned.
- One LNG train, two being completed and a fourth going forward (projected total output 14.4mn t/y).
- One gas liquids extraction plant.
- One urea plant.
- A total of 4,000 CNG-fuelled vehicles.
- Three gas-fired cooling projects.
- Four gas-fired electricity generating stations.
- Four gas-fuelled steel plants.
- Some 90 small gas-fired industrial and commercial plants.

Outside of LNG expansion, the major gas projects for the future will be an aluminium smelter and an ethylene complex, both of which were recommended in the Natural Gas Master Plan completed earlier this year by consultant Gaffney Cline and Associates.

A gas-to-liquids (GTL) plant was also identified as a potential user of Trinidad and Tobago gas, since the demand would be huge, about 600mn cf/d, one-third more than a single LNG train. Both Shell Gas and Power and Sasol Chevron have shown interest.

## Drilling disappointments

Trinidad and Tobago's energy success story would be complete if it could only lay claim to having done well in the new frontier of the deepwater.

| Field (company) | Production (mn cf/d) | 2001 average |
|---|---|---|
| Cassia (BP) | 29.92 | 42.48 |
| Teak (BP) | 14.75 | 27.94 |
| Trintomar (Petrotrin/NGC) | 0.06 | 0.07 |
| Flambouyant (BP) | 39.03 | 51.61 |
| Immortelle (BP) | 123.05 | 132.19 |
| Kiskadee (EOG Resources) | 135.48 | 136.40 |
| Dolphin (BG/Texaco) | 179.82 | 236.52 |
| Mahogany (BP) | 430.21 | 495.59 |
| Amherstia (BP) | 431.03 | 247.29 |
| **Total** | **1,383.35** | **1,370.09** |

*Source: Ministry of Energy and Energy Industries*

**Table 2: Trinidad and Tobago non-associated gas production in mn cf/d, January 2002**

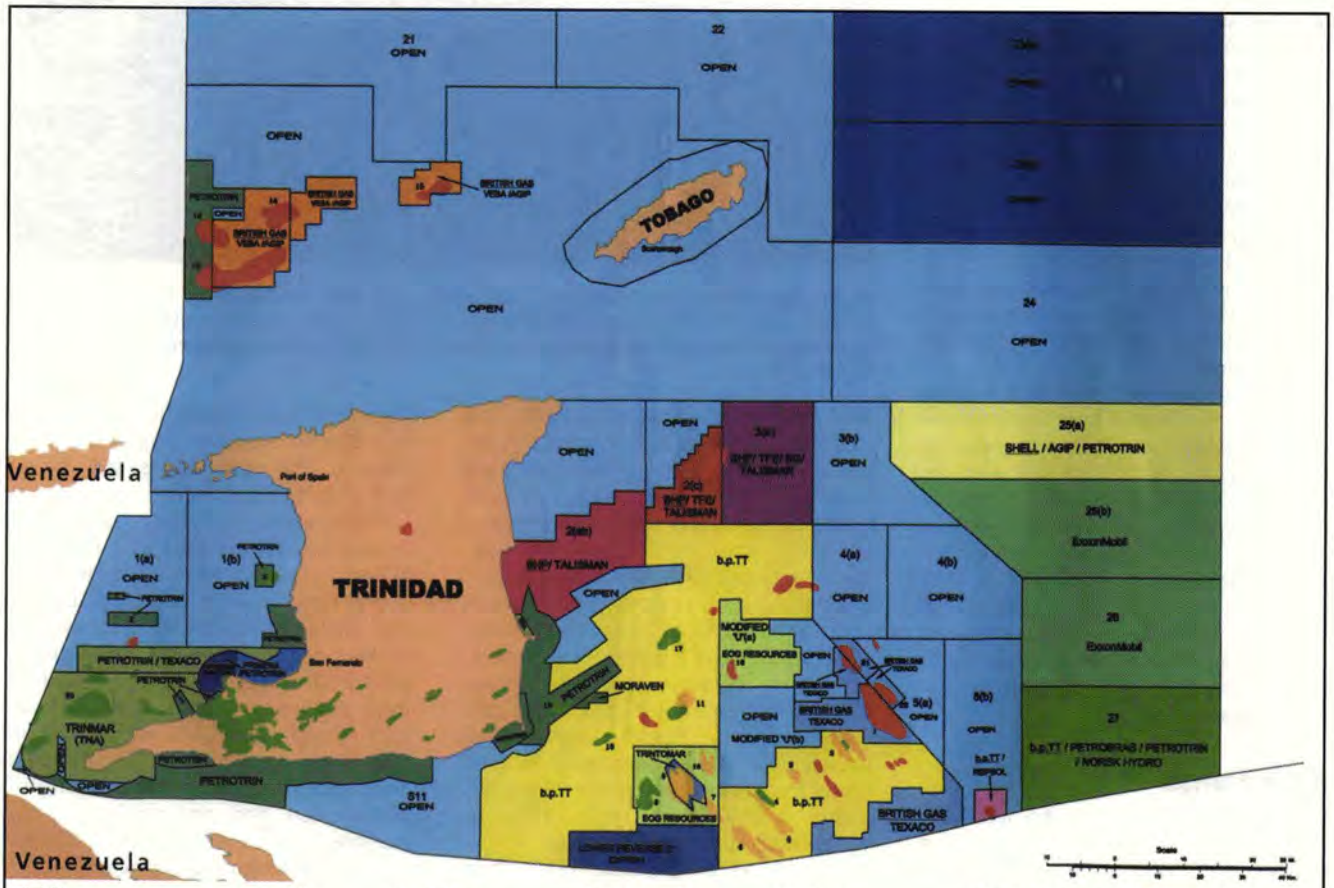
Unfortunately its deepwater exploration drilling effort – which began in 1999 with Shell's Haydn One well drilled in 1,000 metres of water in the 138,811-hectare block 25a located 80 km off Trinidad's north east coast – have so far proved a great disappointment.

Haydn One found a small quantity of gas (about 0.3tn cf) but none of the oil for which the company and its joint venture partner Agip had been hoping. ExxonMobil has drilled one well in each of its deepwater blocks 25b and 26. The first, Adelpha One, was beset by mechanical problems and fell short of target depth of 15,000 ft; the second, Dynamine One, met its target depth but found no hydrocarbons.

Both Shell and ExxonMobil are supposed to drill two more wells each this year, but Trinidad and Tobago's Energy Minister, Eric Williams, told *Petroleum Review* that 'Shell has asked for time to do some additional work on 25a because of the BHP find. The trend BHP discovered may take a turn and pass through part of Shell's block.' Block 25a is slightly to the northeast and two blocks away from block 2c.

The fourth deepwater block, 27, has just had the first well drilled into it by operator BP, partnered by Braspetro, Norsk Hydro and Petrotrin. Everyone is hoping that BP, which acquired the block when it bought over Arco, can break the pattern of bad luck in the deepwater. Its Catfish One well took over four months to be drilled by the *Navis Explorer One* rig in 4,000 ft of water 100 miles south-east of Trinidad. Total depth of 16,334 ft, was reached at the end of April, the deepest of the deepwater wells.

The result? BP declines to say, deeming the well a 'tight hole'. 'All I can tell you,' Riley says, 'is that it cost us over $100mn, the most expensive well ever drilled in Trinidad and we are now into the post-appraisal phase. We want to be very careful in our review of the data before we say anything publicly.'




**Trinidad offshore areas under exploration, showing licensed and open areas**

# Venezuelan wake-up call

**The recent political events in Venezuela can be seen as a wake-up call for the government and state-owned oil company PdVSA to strike a balance between the needs of the country and the company. While the situation is not yet critical or desperate, if there is no consensus achieved it could spiral that way, reports *Priscilla Ross*.**

All photos: Øyvind Hagen, Statoil

**Production liners to be installed in one of the 260 wells drilled so far by the Sincor project. Statoil (15%), TotalFinaElf (47%) and PdVSA (38%) have invested $4.2bn in the heavy oil project. Onstream since March 2002, production is expected to plateau at 180,000 b/d.**

Petroleos de Venezuela (PdVSA) is Latin America's largest company. It provides around 50% of Venezuela's tax revenues and 70% of the country's export revenues, predominantly from crude and oil products sales. In April 2002 export capacity was under threat as the world's fourth largest oil exporter was dealing with a wave of strikes leading to a progressive shutdown of oil production and refinery capacity, significantly compromising export capability – a situation that had been festering for months. In parallel, the Middle East political temperature rose and oil prices became increasingly volatile, a bellweather of bellicose global events.

The state-owned PdVSA was formed after the oil industry was nationalised in 1975. Under previous governments, the company had been allowed to manage operations relatively free of political influence. PdVSA earned revenues of $53bn in 2000 – the entire Venezuelan budget amounted to 43% of this figure, some $23bn, while GDP stood at $146.2bn. PdVSA managers prided themselves on instituting merit-based promotions and on being an apolitical organisation.

## All change

However, in April 2002 the left-wing populist President Hugo Chavez raised the political stakes by firing the entire Board of PdVSA and replacing it with mostly his chosen appointees. The CEO position went to a Chavez loyalist and academic Gaston Parra Luzardo. Parra was a strong supporter of the controversial hydrocarbon law of November 2001, which increased the royalty tax rate from 16.7% to 30% for new oil ventures and established a minimum state participation of 51% for all future joint ventures. He is reported to have been a persistent 'enemy of PdVSA management's attempt to remain apolitical and of their expansion plans.' With Chavez's appointments, PdVSA seemed to be transforming into a political instrument.

Western investor reaction to the PdVSA Board removal was swift and uncompromising. Top three credit rating agency Fitch IBCA downgraded PdVSA's rating from investment grade BBB to B+, giving it the same credit rating as Venezuela's own sovereign risk.

Complicated economic difficulties and a fiscal squeeze forced the government to float the currency and re-adjust the budget in mid-February 2002. One foreign view is that the exchange rate has been artificially high and, even at 900 Bolivars to the dollar, it is still too high and should be closer to 1,200 to stimulate non-traditional exports. The currency is still being Central Bank supported.

Politics came to a fiery head when Chavez was deposed in April 2002 in a military coup reacting to the death of 15 protesters and his autocratic behaviour. Striking PdVSA executives and workers provided the immediate catalyst for the coup; however, President Chavez's friendship with President Fidel Castro (supplying 53,000 b/d to Cuba on preferential terms), his visits to Iraq and Libya, and criticism of the bombing of Afghanistan had antagonised many and strained relations with the US, the biggest importer of Venezuelan oil.

When Chavez managed to regain the Presidency a mere 48 hours after being ousted, Condoleezza Rice, the Bush Administration's National Security Adviser did not mince her words – 'I hope Hugo Chavez takes the message

his people sent him that his policies are not working.'

## Opec developments

Under Chavez, Venezuela's compliance to Opec quotas improved from one of the worst to one of the best. Ali Rodriguez, Chavez's Oil Minister, was appointed Opec General Secretary and helped achieve an impressive level of compliance to Opec quotas. Rodriguez has now been appointed the new PdVSA President.

Steve Turner, an Oil Analyst at Commerz-bank Securities said: 'The appointment of Ali Rodriguez is positive. It means he will review PdVSA and look at their investment plans going forward. They will need to strike a balance between the company's investment needs and the revenue needs of the country. Several majors have investments in heavy oil projects that were negotiated prior to the new hydrocarbons law and are "relatively happy". The difficulty will be doing deals with a tightening royalty and tax regime. TotalFinaElf is still optimistic about good returns on the $4bn Sincor heavy oils project.'

Prior to the brief deposition of Chavez, Venezuela was producing 2.55mn b/d and its Opec quota is 2.5mn b/d. Turner noted: 'With Opec cutting quotas, Venezuela still produces a surplus. If Opec raises quotas – as we expect in the second half of this year – the under investment will limit their capacity.'

Turner at Commerzbank, an equity institution, primarily reviews European oil majors that have little exposure to the Venezuelan oil patch that is dominated by PdVSA. He commented: 'They are not excited by gas prospects [in the country] – except for Shell. Shell is considering the Suape LNG project, which would supply Venezuelan gas from as yet unnamed fields to the Suape import terminal in Brazil. This 4.7mn tonnes LNG plant would have five stages and the go-ahead will be finalised in 2003.'

Can Suape be financed? Turner replied: 'Everything has a price. Suape is do-able. Brazil is starved of energy.' Suape project partners are: Shell 30%; ExxonMobil 29%; PdVSA 33% and Mitsubisihi 8%.

One other project with a western interest is the Quiri Quiri gas field in which Repsol and PdVSA are partners, with gas being sold to Venezuela. 'This is a first,' said Turner.

## Off limits

The big question is: Does this cocktail of events mean Venezuela is off-limits for foreign investment, or is it a temporary aberration that, once domestic politics and in-house PdVSA politics have been sorted, will revert to oil business as usual?

**Jenmy Galvis (left), Milagros Gómez and Iris Avellaneda, pictured in front of the world's second largest coker at Jose are among Venezuela's first-ever female process technicians.**

An oil source close to PdVSA and Venezuela said: 'Ironically Chavez, a populist President, was indirectly moving to weaken PdVSA, a state entity. A weaker PdVSA would eventually require increased foreign investment to sustain and increase oil and gas production. Now things are blurred. Although European oil companies have adopted a pragmatic approach to Chavez's Government and are happy, Chavez is not as beholden to American companies as previous governments and it is worth noting all international credit rating agencies are adopting a wait and see line.

But many oil exporting countries are facing similar difficulties – Colombia has a civil war and Nigeria, Russia, Libya, Angola, Iran and Algeria have their own serious problems.'

In 2002, the source forecast that Venezuela's production will steady at 2.5mn b/d, but this 'does not include NGLs or condensates' and 'might increase in the third quarter if the US economy improves'. His prognosis: 'Except for the difficulties caused by political wrangling, Venezuela's oil sector should be alright. The oil price is good'. However, he points out that this does not minimize the country's lingering and complex difficulties. On 19 April 2002, 'Venezuelans commemorated their rebellion against the Spanish and at the celebration Chavez was mostly absent. This is highly unusual and likely points to the difficulties he is facing'.

On the minimum state participation of 51% of joint ventures he noted: 'Even before this legislation was enacted, PdVSA had the equivalent of a golden share in all ventures and veto power on all decisions. If you want to see a silver lining, there are now laws that clearly establish legality of foreign private capital in all segments of the Venezuelan petroleum industry and no apparent limit on what can now be offered to foreign investors. What is now on offer is a smaller slice of a bigger pie. They can now open up areas previously barred from foreign investment. For the last decade, PdVSA has kept the best for itself. For this reason it has a strong balance sheet.'

He added: 'Income tax rates for PdVSA's core areas have been lowered from 67% to 50% and it will be interesting to see if the company will be willing to share some core areas with foreign investors. The new royalty regime will cause problems for foreign investors, with increased royalty payments from the revenue stream, irrespective of profitability, getting earlier to the government.'

His main concern with the new hydrocarbon law is the fact that 'arbitration of potential contractual conflicts must now be resolved in Venezuelan courts' which 'could lead to further politisation and delays.'

## Key to the future

However, the key to the future is Ali Rodriguez, the new President of PdVSA. Rodriguez can make and change plans quicker because he is close

The Jose facility close to completion.

to Chavez. In the coming months it will emerge which way the company is being directed. 'If PdVSA continues to be capital constrained and must steadfastly comply with Opec quotas, production capacity will continue to decline, PdVSA's position will continue to weaken and it won't be long before it must seek foreign investment just to sustain its quota capacity. If PdVSA decides to increase production capacity to drive the economy and increase employment and stability then, although it must immediately seek foreign investment to fund increased activity, it would be negotiating from a position of greater strength.'

## Global economics

The importance of Venezuela in global oil-economics is undoubtedly its location close to the US, the world's largest consumer. There are several other Opec countries with much greater shut-in production capacity, but Venezuela's geographic location gives it a comparative advantage. Venezuela continues to be the third largest supplier to the US, producing 3.175mn b/d in 2000 according to recent BP statistics. Previous PdVSA President Guacaipuro Lameda complained that the government was opposed to his investment budget and limited PdVSA's output capacity – allegedly there was a production capacity loss of 500,000 b/d between 1999 and 2001.

Last year Venezuela contributed around 13% of US petroleum imports and typically 16% to 20%. Relevant issues are US proximity, lower cargo costs and security-of-supply.

## Stepping on the gas

An important characteristic of Venezuelan oil fields is their high annual average decline rate of 20%, meaning if sustained investment is not made to replace production capacity, shrinkage will occur. With this in mind, before the coup Chavez was trying to bring foreign investment into the gas play. Venezuelan proved gas reserves are reported to be 147tn cf. The new gas law of 1999 allows foreign participation and the recent income tax law lowered tax rates for non-associated gas from 67% to 34% and raised the royalty rate from 16.7% to 20%.

An oil source noted that Venezuela 'produces 6bn cf /d, all of which is consumed in Venezuela. It produces and consumes more gas than any other country in Latin America. In Venezuela gas is primarily used for re-injection in secondary recovery projects, as fuel gas for oil field operations and to meet domestic industry demands. Some 2bn cf/d is re-injected to increase recoverable reserves to maintain oil production.'

Venezuelan gas prices are government subsidised, with current gas prices ranging from 60 cents to $1/mn cf. At these low prices, sustaining gas development for consumption in the internal market is not an easy task without associated oil production. For many foreign investors, gas exports are a more economic option.

The North Paria Venezuelan LNG project is expected to be a joint venture association between PdVSA, ExxonMobil, Shell and Mitsubishi. The North Paria gas fields have 10tn cf of proved reserves. The partners have an option on this gas, which runs out this year. If the partners step aside, there are rumours other foreign investors are interested in acquiring the North Paria gas reserves. Venezuela LNG and its predecessor Cristobal Colon LNG have been on the drawing board since 1990.

A Venezuelan LNG project would be in direct competition with the existing LNG plants and the planned expansions in both Nigeria and Trinidad, as well as from a potential LNG plant sourced with Bolivian gas. Allegedly negotiations are in progress to improve Venezuelan LNG contract terms through accelerated depreciation, a sliding scale royalty and help with import tax for materials and supplies.

## New exploration campaign

On 6 February 2002 Chavez inaugurated a new offshore gas exploration campaign. PdVSA acquired a rig from Scotland capable of drilling several wells a year. The first prospect to drill is located northeast of the Orinoco Delta in the Plataforma Deltana area. A gas exploration budget of $375mn has been allocated, with the gas reserves potential put at over 30tn cf.

International consultants have reportedly advised PdVSA to create a gas hub in the vicinity of the Gulf of Paria to bring in gas from various offshore fields. Plataforma Deltana's gas potential is not proven, but the volume estimate is based on preliminary seismic interpretations and analogs of the geographical trend offshore southeast Trinidad. Parts of Plataforma, which lies adjacent to several big Trinidad gas discoveries, could be included in a 2003 licensing round. Expectation of associated NGLs and condensates could make an economic case.

## Refinery problems

The recent political fracas affected refinery production. In addition, the sector was having to cope with electrical problems at the PdVSA-operated Curacao refinery. However, the impact of a *force majeure* on refinery commitments was relatively small because of PdVSA's large inventory of crude oil stored in terminals throughout the Caribbean and most Venezuelan refineries are now back to normal operations. Venezuela's refinery capacity is currently 1.285mn b/d.

## Looking ahead

PdVSA's five-year expansion plan is ambitious. It involves expenditure of $45.3bn on hydrocarbons exploration up to 2006, with the aim of raising oil production capacity to 5.5mn b/d. The plan required PdVSA to contribute 47% with private investors – in other words western oil majors – to stump up a further $24bn.

The government and PdVSA need to strike a balance between the needs of the country and the company. It is now Chavez and Rodriguez's call. The next few months will clearly show how well the balance has been achieved. It will also establish whether Venezuelan capacity will expand, remain static or even decline.

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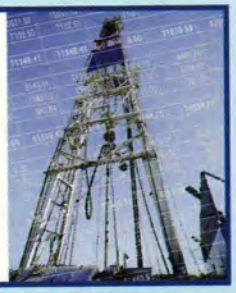

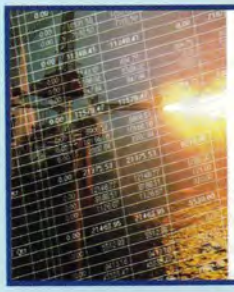

## Accounting for International Petroleum Contracts: Production Sharing and Risk Service Contracts and Joint Operating Agreements

This **three-day course** provides a comprehensive examination of accounting requirements associated with the major types of contracts entered into by oil and gas enterprises in carrying on international exploration and production activities. The terms of a typical production sharing contract are explained and the accounting procedure associated with PSC's are examined in detail. Accounting provisions that create controversies are given special attention.

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***Course Dates:***
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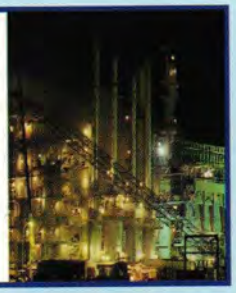
This well-established **three-day course** provides a concise and informed introduction to operations, from the search for oil and gas to the delivery of products to different customers. Participants will gain an appreciation of the principal activities in the international upstream and downstream petroleum industry and an understanding of how these inter-relate, as well as an awareness of the impact of external influences and the ways in which the industry is adapting to increase its competitiveness and to meet new challenges.



## Introduction to Petroleum Economics

This intensive, **three-day course** course concentrates on the structure of the oil industry, the geopolitics of oil and the workings of the principal markets.

It provides an informed introduction to the economic and commercial background and general trends of the oil industry, underpinning an understanding of oil and its markets, with an awareness of global and strategic issues.

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**24 - 26 June 2002**

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**1 - 5 July 2002**

***Course Venue:***
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## Fundamentals of Rock Physics

This **five-day course** has a proven track record in reaching engineers, geologists, petrophysicists and geophysicists. The course starts with the fundamentals of stress-strain, seismic wave propagation, fluid pvt behaviour, rock composition and structure and advances to the interactions among these topics. The course exposes the participant to the latest developments in the field of seismic rock physics and develops an appreciation of the limitations of seismic data inversion from fundamental principles of rock physics.

**For more information, see enclosed inserts or contact Lynda Thwaite at IP Training or visit: www.petroleum.co.uk**

**Tel: + 44 (0)20 7467 7154 Fax: + 44 (0)20 7255 1472 E-mail: lthwaite@petroleum.co.uk**

# Wood Mackenzie – Independent in more ways than one

***Chris Skrebowski*, Editor, *Petroleum Review*, recently travelled to Edinburgh to interview Wood Mackenzie management about its new corporate products and corporate strategy, nearly six months after a management buyout gave the company its independence.**

At a time when many companies in the energy sector are contracting, it comes as a pleasant surprise to hear that Wood Mackenzie plans to double its size by 2005. The aim is to grow revenues from the £30mn planned for 2002 to twice that level by 2005. Similarly, the workforce has already grown from the 190 at the end of 2001 to the current 213, with numbers expected to be between 350 and 400 by 2005.

The executives are also very proud of the way the buyout from Deutsche Bank AG was planned and implemented. According to Colin Quinney, their Head of Marketing, when their long-time Managing Director, Paul Gregory announced, on 21 December 2001, they were now 'Wood Mackenzie Ltd', everyone cheered. As well as being enthusiastic about working for an independent company, most of the staff actually opted to buy in and become shareholders in the company. All were given the same opportunity to buy, and around 80% of the employees are now shareholders.

The source of finance for the buyout, and the only other shareholder, is the Halifax Bank of Scotland. 'Although the staff shareholding is double that of the Halifax Bank of Scotland, the fact they have made a long-term commitment to the company shows their confidence in us and our plans,' notes Quinney.

## Positive outlook

One of the reasons the company was so positive about the buyout was that a labour intensive research and consultancy business did not easily fit with investment banking operations. This tended to mean head counts were capped or restricted, and that consultancy operations had to focus on the bank's clients. According to Steve Halliday, Executive Director, Energy, the company's independence means it is now free to leverage its reputation for high quality independent analysis by developing its strategic consulting services.

In fact the company has wasted little time in launching two new products. The first – CAT – was launched at the end of March, while the second – RADAR – is just about to come to market (for full details see box below).

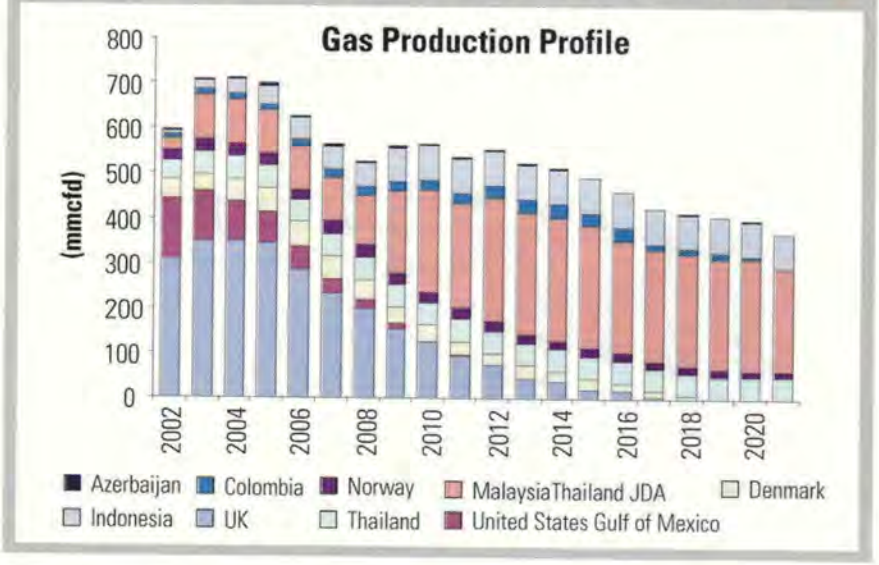
Halliday went on to note that the company had developed very fast over recent years. For example, the consultancy team was only established five years ago (1997) but had already reached the point where it accounted for 40% of turnover – a figure that was expected to rise further. The success of the consulting business is based upon a key differentiation factor – the in-depth knowledge of its research and consulting staff and its detailed information contained within its databases. 'Our detailed knowledge of the market,

## CAT and RADAR

Two new products have been launched by Wood Mackenzie this year. The first, which was launched in late March, is CAT – Corporate Analysis Tool. Delivered on a CD-ROM with quarterly updates, the service provides all the background data on the industry – global production by country and company, reserves, acreage, costs, rankings and valuations. Users are charged on the basis of the number of users. CAT provides all the necessary data for benchmarking and peer group analysis and review. According to the company, the new service is already doing well and attracting a lot of interest.

Even newer is RADAR – Research Analysis in-Depth Activity Report – which becomes available this month. Delivered online, the service provides detailed qualitative analysis of upstream and gas companies. Each company is subject to in-depth investigation, recording and valuing of its producing and exploration assets, valuations by country are also produced. Aimed at oil and gas companies and investment banks, the new service provides all the information necessary for company valuation and analysis in both the short and longer term.

Both the new services are notable for their high quality graphics presentations that aid analysis and provide insight into future developments.



the clients and the issues they are facing sets us apart from other consultants' said Halliday. The company now has full global reach both in terms of its research coverage and its physical presence. Although most of the employees continue to be based in the Edinburgh headquarters, the company now has four regional offices. The most recently opened (2000) is in Sydney and has two employees, in addition to Houston, London and Moscow.

Just as the company has developed in terms of its numbers and its reach, so too has the delivery of its products. From the first North Sea Report in 1973 until 1996 all of Wood Mackenzie's research reports were printed in the familiar A4 booklet format. Over the period the range expanded to cover the world and downstream coverage was added for all the main regions to compliment the well-established upstream coverage. In 1996, CD-ROM became the principal method for distributing the research. In 2000, delivery moved online with their new Energy Vision product and has been well received in this format, although the two hard copy reports continue to be printed.

## Global perspective

According to Halliday, the coverage is now fully global, featuring no less than 93 countries. The full value chain from the upstream sector via gas and power to the downstream refining and marketing, 19 sectors are covered, with different reports now being regularly published.

The progressive consolidation of the oil and gas industry means that companies are under pressure to improve margins and to benchmark their operations to global standards. For Wood Mackenzie these pressures meant they were being called to do more valuation and benchmarking work. Halliday explained that Wood Mackenzie was expanding its strategic consulting services and getting even closer to its customers. This was allowing it to develop more valuable relationships, which was more than compensating for the reducing number of quoted oil and gas companies.

His view was that the company was becoming increasingly proactive as it developed into a highly specialised consultant offering direct business support. He also noted that the company's reputation for impartial analysis and its independence meant that it was 'not afraid to tell it how it is' – an aspect that he believed customers greatly appreciated.

Looking to the broader picture, Halliday noted that the oil and gas industry was subject to cycles of consolidation. However, Wood Mackenzie was 'in it for the long haul' and had a clear 'energy industry focus'. Around 85% of its income came from the energy sector so the company would continue 'to respond to the energy marketplace'. Asked how he saw the sector developing, he noted that 'integration still works' so the present structure of the oil industry was likely to remain. However, there were limits to takeover as a strategy and he envisaged an expansion into a wider range of energy sources by the main players. He was confident that Wood Mackenzie would be able to expand its client base by a greater involvement with the national oil companies (NOCs). He also explained that an involvement with the Russian oil companies was becoming easier and this was another potential area of expansion.

However, Halliday stressed that the company would 'stick to its knitting' and continue to focus on its two existing business areas of energy and the life sciences. Its aim was to 'evolve with its clients'. As an example he noted that it now seemed likely that the oil and gas companies would move into renewables and develop into broad-based energy companies. Wood Mackenzie would aim to expand its data gathering and analysis in parallel as its customer base evolved.

## Complementary fit

Fiona Henshall, Executive Director, Marketing and Communications, explained that the company had already successfully evolved and had proved that it had a robust business model for data gathering, monitoring and in-depth analysis. The business model was well proven and could be applied to new areas such as utilities and telecoms if that proved commercially attractive.

Henshall noted that at the moment 15% of the company's turnover came from the life-sciences sector. She explained that although it might seem surprising, pharmaceuticals and energy were in fact a complimentary fit. Both the energy and the pharmaceutical industries were characterised by massive financial turnover and global operations. Both could earn high returns by taking large capital hungry risks. The failed drug or the one that could not be licensed were the equivalent of the dry holes or the taxed-to-death projects in the oil industry. Both industries were also experiencing consolidation in the form of mergers and takeovers. For the consultant/analyst the two industries posed surprisingly similar challenges.

Henshall's view was that she was very confident of significant growth in both energy and pharmaceutical sectors but she did concede that it was possible that over the next few years the pharmaceuticals work might grow faster than the energy work.

## The way ahead

Asked to sum up Wood Mackenzie's future development of the energy business he heads up Halliday simply noted that it aimed 'to deliver a strategy with substance'. He concluded on a note of gentle caution by observing that Wood MacKenzie had always succeeded by careful incremental development of the business and that although they were all very excited about future prospects and, most immediately by their two new products (see box piece), they would be 'treading carefully'.

### Time line for Wood Mackenzie

1844 – Edinburgh-based stockbroker.
1973 – Wood Mackenzie issues and sells first North Sea Report.
1977 – Crop protection and animal health services launched.
1981 – Land pharmaceuticals services launched.
1984 – First Far East Report produced.
1985 – Hill Samuel acquires Wood Mackenzie.
1986 – First North West Europe Service comes out.
1987 – The TSB Group acquires Hill Samuel.
1988 – Wood Mackenzie sold to Nat West Bank.
1988 – Paul Gregory becomes Managing Director.
1991, 2000 – Energy coverage expands to West Africa, North Africa, the Indian sub-continent, Latin America, Caucasus, Russia and Central Asia.
1995 – Biotechnology service launched.
1998 – Wood Mackenzie celebrates 25 years in business.
1998 – Bankers Trust acquires Wood Mackenzie.
2000 – Deutsche Bank acquires Bankers Trust.
2001 – Management buyout of Wood Mackenzie on 21 December.

**Media**
1973 – Paper copies
1996 – CD-ROMs
2000 – Online

**Key Figures**
*Chief Executive Officer:* Paul Gregory
*Executive Director, Energy:* Steve Halliday
*Executive Director, Marketing and Commmunications:* Fiona Henshall

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**www.woodmac.com**

# The next house of cards?

**On 1 May 2002 the Australian Government announced that it would not ratify the Kyoto Protocol on climate change, instead supporting the US view that such a treaty should include developing countries not just the industrialised world. The decision has thrust more uncertainties on the future of an already much watered-down treaty, writes *Maria Kielmas*.**

Australia's decision to not ratify the Kyoto Protocol came just one week after the United Nations' Intergovernmental Panel on Climate Change (IPCC) voted out its current head, Robert T Watson, and replaced him with Rajendra Pachauri, an engineer from India. This decision was met with a chorus of disapproval in Europe and widely seen as an attempt by the US to manipulate the world's most influential body on climate change. (Similar charges were levied when the US withdrew from the Kyoto Protocol last year, with Washington stating that the uncertainties in climate science and the costs to the US economy did not justify the Protocol.) However, Pachauri's appointment was supported overwhelmingly by developing countries that have been angered by the European Union's (EU) intransigent stance on climate change.

## Full speed ahead

Nevertheless, the EU, and the UK in particular, are moving at full speed to implement greenhouse gas emissions (GHG) reductions which are far more ambitious than those originally stipulated by the Kyoto Protocol when it was first signed in 1997.

GHG trading is one of the so-called flexibility mechanisms stipulated by Kyoto for such reductions. The idea is that a market-friendly scheme will provide more incentives to reduce emissions and energy consumption than a 'command and control' diktat from government.

Originally the Kyoto Protocol called for an overall reduction in GHG emissions by 5.2% from 1990 levels by 2008–2012. This target was modified in November 2001 to 2%. At this time, some initial rules for a framework agreement on international emissions trading were also drafted, granting a system of credits for countries with carbon sinks – such as forests – which absorb the GHG carbon dioxide ($CO_2$). The biggest share of these credits went to Russia, which was awarded 33mn tonnes of carbon.

The UK Government, which is keen to be seen as a pioneer in tackling climate change, intends to go beyond the targets set by Kyoto, let alone the modified goals. It plans to reduce GHGs by 12.5% of 1990 levels by 2008–2012 and $CO_2$ emissions by 20% over the period. This target was central to the government's launch of the first national GHG trading scheme in March 2002. This was essentially an auction to buy emissions allowances in exchange for £215mn in incentive money. Companies bidding into the scheme are obliged to make an absolute reduction in emissions in exchange for incentive money. Some 34 companies participated in the auction where prices for one tonne equivalent of $CO_2$ ($CO_2$eq) began at £100/t and ended at £53/t. (See *Petroleum Review*, May 2002 for more on BP's participation in the scheme. See also p8 this issue.)

The prices in the UK auction are not directly comparable to those in earlier individual GHG trading contracts – known as the pre-compliance market – the market underway before any national regulation came into force. The UK price roughly corresponds to the price of three tonnes of $CO_2$eq on the pre-compliance market minus a risk premium. This makes the UK market price correspond to £12.5/t $CO_2$eq pre-compliance. According to carbon broker CO2e.com, a division of Cantor Fitzgerald, $CO_2$eq prices on the pre-compliance market, 90% of which originates in North America, have ranged between $0.25 and $5/t.

Carbon market intermediaries believe that $CO_2$eq prices over the next three to five years could range between $10 and $18/t. This is a level sufficient to ensure a liquid market, regulations permitting. But it is far too low a price for both nuclear energy and renewable energy lobbyists who have been hoping that a new method of 'carbon accounting' in power plant design could improve their own project economics compared with those for fossil fuels. The lobbyists had been hoping for $CO_2$eq prices of anything between $25 and $100/t. Unsurprisingly, GHG emission trading has received a collective thumbs down from many environmentalist non-governmental organisations (NGOs).

While the UK scheme came online, joining a number of smaller schemes operating in the Netherlands and Denmark, the EU has been hammering out the framework of an EU-wide GHG trading scheme. Consultations began in March 2000 with a Commission Green Paper. The Commission did not plan to publish a directive until it had been fully debated, but various versions of the draft directive had circulated unofficially for most of last year. By mid-October, when the Commission finally published the draft directive, the most up-to-date version was available on the informal network via Japan.

## UK versus EU schemes

The UK and EU emissions trading schemes differ in a number of ways:

- The UK scheme is a voluntary one whereas the EU programme is mandatory.
- The UK scheme deals with the six GHGs ($CO_2$, methane, nitrous oxide ($NO_x$), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride), while the EU scheme deals only with $CO_2$.
- The UK scheme awards emissions allowances by auction; the EU scheme awards these free of charge and on the basis of past emissions – the concept known as 'grandfathering'.
- The UK scheme does not include the power industry, ostensibly because of efforts on the part of the British Government to protect the coal industry. However, the EU programme includes the power sector.

The EU Environment Commissioner Margot Wallström is adamant the EU should have a mandatory scheme, but this has been opposed most strongly by German industry. Both German and Finnish industry have reached voluntary agreements on the environment with their respective governments and prefer a voluntary EU-wide agreement.

The European electricity industry, under its Brussels-based lobby group Eurelectric, has conducted simulations of emissions trading programmes and concluded that without a fully liberalised market such schemes will exacerbate existing distortions in the energy market. The simulation showed that larger power generators with a mix of energy sources would shift production from coal and oil-based generation to gas-fired generation. The market share for nuclear power and hydro would remain almost unchanged while that for renewables would shift only mar-

ginally, which is quite counter to the Commission's plans to increase renewable's share in the EU energy mix. UK specialists believe that eventually the UK Government will have to give in to Brussels' view and make its own GHG trading scheme both mandatory and include the power sector in it.

The differences between the EU and UK have concerned André Marcu, Executive Director of the International Emissions Trading Association (IETA), a non-governmental grouping of players in the emissions markets, who thinks that it is important for the various national and international trading schemes to be compatible so that a real and liquid international system can emerge. One of the major imponderables will be the future policy of the US and whether that country would consider returning to the Kyoto Protocol.

## US return unlikely

However, Australia's recent decision not to ratify the Protocol makes a US return unlikely. That said, the White House underlined its commitment to tackling climate change issues in February 2002 with the launch of its Global Climate Change Initiative. This aims to cut GHG intensity by 18% over the next 10 years. GHG intensity is defined as the ratio of GHG emissions to economic output. The goal is to cut this from 183t/$GDPmn in 2002 to 151t/$GDPmn in 2012. The aim is to maintain economic growth while financing investments in cleaner energy. This is accompanied by a 'Clear Skies' plan to cut power plant emissions of sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$) and mercury emissions.

Success in the US market in reducing $SO_2$ and $NO_x$ emissions through a trading scheme has been one of the important drivers behind the GHG schemes. But the US schemes were restricted to one industry – power generation – and often in the same state, making abatement costs identifiable. Little analysis has been conducted on the abatement costs associated with GHGs, most of which are already in the atmosphere from many other sources than identifiable industry.

## Modelled scenarios

The GHG market is one which has been created by politics, NGOs, environmentalist activists and scientists, says André Fourçans, Professor of Economics at the École Superieure des Sciences Economiques et Commerciales (Essec), and who is writing a book on the economics of climate change. Yet there is no realistic estimate of the potential costs of implementation, verification and bureaucracy associated with creating a GHG market. The costs of implementing the Kyoto Protocol could be more expensive than any perceived benefits.

| Summary for Policymakers | Technical Summary |
|---|---|
| This report has been approved by IPCC member governments. | This report has been accepted by participants in IPCC Working Group I, but not approved line by line. This means it has not been subjected to line-by-line discussion and agreement. |
| Warm episodes of the El Niño –Southern Oscillation (see *Petroleum Review*, October 2001) ENSO have been more frequent, persistent and intense since the mid-1970s compared with the previous 100 years... Confidence in projections of changes in future frequency, amplitude and spatial pattern of El Niño events in the tropical Pacific is tempered by some shortcomings in how well El Niño is simulated in complex models. Current projections show little change or a small increase in amplitude for El Niño events over the next 100 years... Even with little or no change in El Niño amplitude, global warming is likely to lead to greater extremeness of drying and heavy rainfall and increase the risk of droughts and floods that occur with El Niño events in various regions.<br><br>[Note: There is no mention in this summary that modern observation of ENSO began only in the 1950s, or that it the largest natural climatic variation.]<br><br>No mention of clouds. | El Niño and North Atlantic Oscillation (NAO). Further progress is needed to depict these natural modes accurately. Because ENSO and NAO are key determinants in regional climate change and can possibly result in abrupt and counter intuitive changes, there has been an increase in uncertainty in those aspects of climate change that critically depend on regional changes. |
| | Clouds represent a significant source of potential error in climate simulations. The possibility that models underestimate systematically solar absorption in clouds remains a controversial matter. The sign of net cloud feedback is a matter of uncertainty. |

**Table 1: Contrasts between the IPCC Summary for Policymakers and its Technical Summary.**

In a series of modelled scenarios based on assumptions of the past and future behaviour of a limited number of variables, the IPCC has estimated that the earth's mean temperature could rise by 1–5°C over the next century, with a 50% margin of error. Policymakers and activist groups in the EU have usually taken the most extreme scenario as fact. Debate on the limitations and uncertainties of climate science has been stifled in the EU. For some activists who now work in the burgeoning private sector carbon market this is a good thing. One activist turned lawyer said that as European business and governments were united in the need for action on climate change this was an advantage for the EU.

However, the IPCC panel of scientists has included many that are sceptical about the hypothesis that GHGs from human activity cause climate change. Even those who try to model anthropogenic signals worry that the public is not properly informed about the uncertainties. One of the most heated battles has been in the publication of the IPCC reports that are available in three separate versions: a Summary for Policymakers and a Technical Summary, on the same subjects or sub-themes, available on the organisation's website (**www.ipcc.ch**) and a three-volume main body report only available for purchase. Scientists have charged that the same balance and uncertainties that appear in the technical reports do not appear in the Summary for

# EU stabilising greenhouse gas emissions

The European Union has delivered on its long-standing commitment to stabilise emissions of carbon dioxide ($CO_2$), the main greenhouse gas responsible for man-made global climate change, at their 1990 level by 2000, despite an emissions upturn in the final year of the period, reports the European Environment Agency (EEA).

Total $CO_2$ emissions for the 15 EU Member States were 0.5% lower in 2000 than 10 years earlier, according to the latest emissions inventory from the Agency. Less positive, however, is that EU emissions of $CO_2$ and other greenhouse gases rose between 1999 and 2000, the most recent year for which EU-wide data is available. $CO_2$ accounts for around 80% of the EU's total greenhouse gas emissions.

$CO_2$ emissions taken alone increased by 0.5% in 1999–2000, while emissions of $CO_2$ and the five other gases (methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride) controlled by the Kyoto Protocol together rose by 0.3%. Under the Kyoto Protocol the EU is required to cut its combined emissions of the six gases to 8% below their 1990 level by 2008–2012. The latest inventory shows that in 2000, total EU greenhouse gas emissions stood 3.5% below their 1990 level. In 1999, they had been 3.8% lower.

One of the main reasons for the overall emissions rise from 1999 to 2000 was a 2.4% increase in $CO_2$ emissions from electricity and heat production, due in part to an expansion of power generation from fossil fuels, especially coal, in the UK, the EU's second-largest emitter. Another reason was continued growth in greenhouse gas emissions in Greece, Spain, Ireland, Italy and Belgium.

The year-2000 figures mean that more than half of the EU countries are still heading towards overshooting their agreed share of the EU's greenhouse gas emissions target by a wide margin. This is the case for Austria, Belgium, Denmark, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. Spain is furthest away from keeping to its share of the EU target – its emissions in 2000 stood 33.7% higher than a decade earlier, more than double the 15% increase it is allowed between 1990 and 2008–2012. At the other end of the scale, Germany, the largest EU emitter, has achieved the greatest emissions cuts among the big Member States, recording a 19.1% decrease over the decade. This is not far off the 21% reduction from 1990 levels that Germany is required to show by 2008–2012.

Full details of the inventory can be found at **www.reports.eea.eu.int/technical_report_2002_75/en**

| Member State | Change 1999–2000 (%) | Change 1990–2000[1] (%) | Targets 2008–2012 under Kyoto Protocol and EU burden sharing [3] (%) | Distance-to-target indicator (DTI) (index points) | Evaluation of progress in 2000[4] |
|---|---|---|---|---|---|
| Austria | 0.0% | 2.7% | –13.0% | 9.2 | ☹ |
| Belgium | 0.5% | 6.3% | –7.5% | 10.0 | ☹ |
| Denmark[2] | –6.0% | –1.7% (–9.8%) | –21.0% | 8.8 (0.7) | ☹ (☹) |
| Finland | –2.9% | –4.1% | 0.0% | –4.1 | ☺ |
| France | –1.1% | –1.7% | 0.0% | –1.7 | ☺ |
| Germany | –0.2% | –19.1% | –21.0% | –8.6 | ☺ |
| Greece | 4.8% | 21.2% | 25.0% | 8.7 | ☹ |
| Ireland | 1.5% | 24.0% | 13.0% | 17.5 | ☹ |
| Italy | 0.7% | 3.9% | –6.5% | 7.2 | ☹ |
| Luxembourg | –0.6% | –45.1% | –28.0% | –31.1 | ☹ |
| Netherlands | –0.4% | 2.6% | –6.0% | 5.6 | ☹ |
| Portugal | –1.1% | 30.1% | 27.0% | 16.6 | ☹ |
| Spain | 4.1% | 33.7% | 15.0% | 26.2 | ☹ |
| Sweden | –1.6% | –1.9% | 4.0% | –3.9 | ☺ |
| UK | 0.4% | –12.6% | –12.5% | –6.3 | ☺ |
| **EU-15** | **0.3%** | **–3.5%** | **–8.0%** | **0.5** | ☹ |

(1) For the fluorinated gases, some Member States have selected a base year other than 1990, as allowed under the Protocol.

(2) For Denmark, data that reflect adjustments for electricity trade (import and export) in 1990 are given in brackets. This methodology is used by Denmark to monitor progress towards its national target under the EU 'burden sharing' (see Note 3) agreement. For the EU emissions total non-adjusted Danish data have been used.

(3) A 'burden sharing' agreement between EU governments lays down differentiated emissions limits for each Member State with the aim of ensuring that the EU meets its overall 8% reduction commitment under the Protocol. The limits are expressed in terms of percentages by which Member States must reduce, or in some cases may hold or increase, their emissions compared with the base year level (1990).

(4) The EEA's evaluation of progress to 2000 awards 'smileys' according to the distance-to-target indicator in 2000. The distance-to-target indicator (DTI) is a measure of the deviation of actual greenhouse gas emissions in 2000 from the linear target path between 1990 and the Kyoto Protocol target for 2008–2012, assuming that only domestic measures will be used.

☺ indicates a positive contribution to the EU trend – the negative distance-to-target indicator means that the Member State is below its linear target path.

☹ indicates a negative contribution to the EU trend – the positive distance-to-target indicator means that the Member State is above its linear target path.

Greenhouse gas emission trends and Kyoto Protocol targets for 2008–2012

Policymakers. Some examples from the reports on the scientific basis for climate change are shown in **Table 1**.

## Accountancy credits

While the scientific debate will continue, at least outside the EU, a more sensitive current issue is the treatment of GHG credits for accountancy purposes. IETA's Andre Marcu says the accountancy question is 'very delicate' with the memory of Enron and its balance sheet packed with 'virtual' assets still fresh in people's minds. A note published by management consultant Andersen in January this year recommended that companies should recognise material emissions allowances and underlying carbon exposures on the balance sheet, and report impacts on the profit and loss account. But assets cannot be offset against liabilities as the asset gives a company the right to emit while the liability represents an obligation to transfer economic value to the government. As yet there are no standard contracts or terms and conditions for emissions trade.

The UK trading scheme works under the concept of 'seller liability' which means that a counter-party buying an allowance will have a right to that credit even if the seller does not fulfil his obligations under a government emissions reduction scheme. But it is not clear how many of the pre-compliance market carbon and other emissions trades involve the buyer liability where the credit could be rescinded. Another imponderable is what will happen to the integrity of a national or international scheme should macroeconomic circumstances be such that the players cannot invest in the necessary plant and equipment to reduce emissions.

Despite these uncertainties, companies are flocking to Russia to invest in that country's inefficient energy sector in the hope that they can repatriate greenhouse credits. One of the strongest proponents of GHG trading, Elaine Clausen, President of the Pew Center for Climate Change in Arlington, Virginia, has expressed concern about the difficulties in verifying Russian claims for GHG credits. The Russian experience indicates that companies may be persuaded to invest in non-economic projects in those countries where they can obtain GHG credits, in the knowledge that those credits would act as a second income stream and introducing confusion between the physical assets and the 'hot air' assets of any project.

The taxation of this second income stream may become an irresistible source of funds for host governments, further debilitating physical project economics. Greenhouse gas trading may yet provide the next house of cards. ●



**Ken Field, former member of the IP ST-G-3 (Inorganic Analysis) Panel being awarded a Certificate of Appreciation by Bob Hooks (Chairman, ST-G), in recognition of his long service to the panel and his work in the field of Test Method Standardisation.**

# Norway tackles greenhouse gas emissions

**Norway views the entry into force of the Kyoto Protocol as a very important step to combat climate change and the government intends the country to be one of the first industrialised nations to ratify the protocol. Accordingly, on 22 March 2002 the government submitted a proposition on ratification to the Norwegian Parliament. At the same time, it presented a White Paper on Norwegian climate policy. State Secretary André Støylen, Ministry of the Environment, outlined this policy to journalists at a briefing in April...**

Norway's commitment under the Kyoto Protocol is a 1% increase in greenhouse gas (GHG) emissions compared to 1990 levels. However, under a 'business-as-usual' scenario, emissions are forecast to rise in the range of 18 to 26% above the 1990 base case by 2010 if no new measures are introduced.

The Norwegian emissions profile is 'special' compared to many other industrialised countries due to its composition of energy sources, industrial production and export. Renewable energy sources (primarily hydropower) supply 70% of stationary energy use and about half of the total energy use, including all electricity. The potential for GHG reductions in the energy sector is therefore limited, while the share of emissions from the petroleum sector (one-fourth of $CO_2$ emissions) and industrial processes (one-fifth) is considerably larger than in other industrialised countries. In 2000, carbon dioxide ($CO_2$) accounted for only 74% of the country's total greenhouse gas emissions.

The main policy instrument to reduce GHG emissions in Norway has been taxation. Norway has taxed $CO_2$ emissions since 1991. Today the $CO_2$ tax covers about 65% of the total $CO_2$ emissions – the main exemptions being the process industry and some energy related emissions from heavy industry. The overall tax level on fossil fuels is considerably higher than in most other countries, with the petroleum sector being levied at the highest tax level.

## Proactive climate policy

The previous Norwegian Government submitted a White Paper on climate policy in June 2001, the main elements of which are endorsed by the present government, including the proposal to introduce a broad-based emissions trading system linked to the system under the Kyoto Protocol from 2008. However, the climate policy targets set by the previous government for the period before 2008 were fairly low. The present government has therefore announced a proactive climate policy, proposing the implementation of new national measures to achieve 'demonstrable progress' by 2005, in accordance with the Kyoto Protocol.

We consider it to be in Norway's interest to reduce its own GHG emissions. By starting the adjustment process now, we will be in a better position to meet tougher restrictions on emissions later. We consider it important to provide a framework that will enable Norway to implement its climate-related commitments both in the Kyoto period and in later commitment periods. By means of the policy proposed in the March 2002 White Paper, the authorities will encourage the investments needed to make production and consumption less greenhouse gas-intensive.

## Quota-based emissions trading

The Norwegian Government proposes that a quota-based domestic emissions trading system for greenhouse gases should be established and made mandatory from 2005. The system is to apply to emissions of $CO_2$ and other greenhouse gases from entities that do not currently pay the $CO_2$ tax on most of their emissions. Energy-intensive and emissions-intensive industries will thus be obliged to surrender quotas equivalent to the quantity of greenhouse gases they emit that is not subject to a tax at present.

Photo courtesy of Statoil

**Statoil first began injecting $CO_2$ via the T platform into the Sleipner reservoir in 1996. The aim was to provide an environmentally acceptable route for the $CO_2$ removed from its sales gas stream (required to have a maximum $CO_2$ content by volume of 2.5%). In addition to avoiding $CO_2$ emissions to the atmosphere, injection into reservoirs can enhance liquids recovery rates.**

By introducing a domestic emissions trading system for emissions from sources that are not subject to the $CO_2$ tax wherever this is possible in practice, and at the same time continuing to levy the current $CO_2$ taxes, we will regulate almost all emission sources by means of climate policy instruments. As a result, Norway will have one of the world's most comprehensive regimes for the regulation of GHG emissions. Emissions of methane and nitrous oxides ($NO_x$) from the agricultural sector are the only major sources not subject to climate policy instruments – as in most other countries.

The main objective in introducing an emissions trading system at an early date is to stimulate further cost-effective action in Norway. However, the system must not include such strict requirements that enterprises are forced to close down due to excessive climate-related costs before 2008, if they would be profitable after paying the international quota price during the first commitment period under the Kyoto Protocol. We will take these concerns into consideration when the elements of the emissions trading system are finalised and presented to the Parliament in a proposition on the legal framework.

The overall ceiling for emissions quotas for each company is to be based on a reduction of 20% in emissions compared with their 1990 base level. The proposal includes adjustments of the emission ceiling if new entities are established or existing ones are expanded or closed down. In the period 2005–2007, the Norwegian Government proposes to issue quotas free of charge to those companies for which participation in the system is mandatory. In practice, these entities currently have unlimited quotas for which they do not have to pay. The government's proposal thus entails tighter control of emissions.

All companies that are required to join the emissions trading system will have an incentive to reduce their emissions. If the target is to bring about a 20% reduction in emissions, most of them will have to take steps to reduce their emissions, buy quotas in addition to those that are issued free of charge, or pay a penalty in the form of a fine if they fail to surrender the required volume of quotas. Some will be able to do so much to reduce emissions that they can sell quotas they do not need themselves. However, there will be restrictions on resale of some of the quotas, so that companies cannot sell all their quotas and close down their operations.

In the case of emission sources for which no specific person or company can be held responsible, or where it would be difficult and costly to assign responsibility, it is proposed to permit joint implementation at a national level within the emissions trading system. The government will also make it possible to give credit for quotas from abroad that are valid under the Kyoto Protocol. The government proposes to specify fines for failure to surrender a sufficient volume of quotas. The amount of such fines will be set in order to strike a balance between achieving the target of emission reductions in Norway and preventing unreasonably high costs for companies that are required to participate in the scheme prior to 2008.

It is Norway's intention to cooperate with other countries in order to develop an international emissions trading market. The Norwegian emissions trading system could be combined with systems in other countries.

The Norwegian government proposes to expand the emissions trading system to other sectors from 2008 onwards, so that it becomes the main policy instrument under the Kyoto Protocol. Hence, from 2008, GHG emissions are to be regulated by a broad-based domestic emissions trading system that will include as many sources of emissions as practicable, including the petroleum sector. From 2008 onwards these sources will no longer be levied $CO_2$ taxes. This broad-based system will be linked to an international emissions trading system.

## EU emissions trading

The European Union is in the process of drawing up a directive establishing a scheme for GHG emissions trading from 2005. The proposal for a directive is an important step towards making emissions trading a key policy instrument to combat climate change. However, the emissions trading scheme proposed by the European Commission (EC) does not meet Norway's needs. As a hydropower nation and a major producer and exporter of energy with large emissions from the petroleum sector, Norway

faces different challenges from most EU members.

The various EU Member States have somewhat differing interests with regards to emissions trading and it is therefore difficult to predict exactly what the system will be like when it is finalised. On this basis, Norway has chosen not to wait until the EU has finalised its emissions trading scheme. Our proposal takes into account the fact that Norway already levies a $CO_2$ tax on emissions from the offshore petroleum industry and the transport sector, and limits the quotas-based system to sectors where emissions have so far been unregulated.

We are making active efforts to influence the process that is now taking place in the EU. It is particularly important that countries that wish to do so can include other gases and other sources than those proposed under the EC system, and that they are allowed to implement comprehensive, broad-based emissions trading systems that allow unrestricted use of the Kyoto mechanisms from 2008.

## The petroleum sector

The petroleum industry on the Norwegian Continental Shelf is a major source of GHG emissions. In 2000 it accounted for about 20% of the total Norwegian GHG emissions. The main source of $CO_2$ emissions from the petroleum sector is the combustion of gas in turbines during energy production. Flaring of natural gas is also an important source.

It is expected that emissions will continue to rise until 2005 and then drop as a result of lower production and other factors. Continued efforts to improve the efficiency of power generation and make energy use more efficient are needed to curb the expected rise in emissions. We will therefore take steps to facilitate power supplies from land to offshore installations. Various means of doing this are to be evaluated by industry and government, including different ways of co-financing cables and the necessary infrastructure on shore. Further measures to reduce emissions from flaring on the Continental Shelf will also be evaluated, while the government will continue to levy the $CO_2$ tax on emissions from the petroleum industry until a broad-based domestic emissions trading system is introduced in 2008.

The government also proposed to strengthen research into the development of environmentally-friendly energy technology. Another target is to establish a framework that will make it possible to establish gas-fired power plants with $CO_2$ reduction technology.

## Other instruments and measures

The Norwegian Government considers that there is a need for other policy instruments to bring about reductions in emissions, in addition to the $CO_2$ tax and the emissions trading system. The recent White Paper therefore also presents other instruments and measures to encourage emission reductions.

One of the government's targets is to reduce the use of mineral oils for heating by 25% in the first commitment period under the Kyoto Protocol (2008–2012) compared with the average for the period 1996–2000. One step in this direction will be to draw up a strategy for conversion from oil-fired heating to new renewable energy sources. This will include measures to encourage greater exploitation of biomass and methane from the agricultural sector for energy purposes. It is also proposed to make much greater use of waste as a source of energy to replace fossil fuels than is the case today, thus reducing the quantity of biodegradable waste that is landfilled. A prohibition on all landfilling of biodegradable waste will be considered. The tax on final waste treatment will be reorganised and adapted to Norway's climate policy.


Photo: Jim Four

# Platinum prize winner

**The IP's International Platinum Award for the achievement with the most impact on setting new benchmarks for the oil and gas industry was awarded to UWG Group last November and was further testament to the company's innovative approach to developing cutting edge technologies for the growing market of well abandonment.**

Since winning the prestigious International Platinum Award last year, the UWG Group's SWAT (suspended well abandonment tool) has been instrumental in the successful completion of a well abandonment campaign for Amerada Hess. The project was the latest in a number of successful well abandonment campaigns carried out for a variety of operators in recent years, and involved the abandonment of four wells – one in the central North Sea, one in the northern North Sea and two West of Shetland.

The Amerada Hess campaign was carried out using a diver-assist SWAT system, which has since evolved. Significant enhancements and improvements in keeping with the company's planned development programme have resulted in a tool that will enable future campaigns to be carried out using a diverless system, which amongst other benefits offers enhanced safety and enables access to wells in deep water.

UWG's knowledge and expertise in well abandonment from a DSV contributed to the campaign's successful completion within schedule and within budget, despite the many challenges of mobilising during the winter in the hostile waters West of Shetland and in the northern North Sea.

Developed as a response to the growing need to abandon redundant wells in a safe, reliable, economic and environmentally sensitive manner, SWAT was specifically designed to enable the abandonment of previously suspended subsea wells without the use of a drilling rig. SWAT locks into the casing thus eliminating the need to be designed around a wide variety of wellhead configurations. It provides pressure control, if required, and facilitates perforating and cementing of the annuli and bore in a controlled manner.

Designed to comply with a double barrier isolation policy, an additional safety feature includes the ability to disconnect from a well whilst leaving the barriers in place. Work can be re-commenced either from the vessel used initially or a rig if required as a result of unforeseen well conditions.

SWAT can be deployed from a wide range of vessels enabling access to remote locations worldwide to permanently abandon suspended wells, without the use of divers or a drilling rig.

Paul Alcock, the Group Sales and Marketing Manager at UWG said: 'The UWG approach to rigless well abandonment and intervention falls in line with the Group's vision of testing both the commercial and technical boundaries of the industry today. SWAT enhances our ability to continue to deliver attractive and cost-effective abandonment and intervention solutions to our clients.'

Photos courtesy of Stolt Offshore

# Deepwater developments offshore West Africa

**The start of production from TotalFinaElf's $2.7bn Girassol field towards the end of 2001 was an important milestone for West Africa and also represented a number of technical 'firsts'. ExxonMobil's $3bn Kizomba A, the next deepwater project in Angola, will also be significant as the first deepwater field to be developed offshore West Africa with dry completions. One feature that these projects have in common, however, is the use of sophisticated fluid transfer systems, fabricated by local Angolan yards. *Jeff Crook* reports.**

Sonangol, the Angolan state oil company, announced first production from the Girassol field in Angolan block 17, on 4 December 2001. The field operator is TotalFinaElf E&P Angola (40%), together with co-venturers Esso Exploration Angola (20%), BP (16.67%), Statoil (13.33%) and Norsk Hydro (10%). The field is located in water depths of 1,350 metres, some 150 km offshore. Discovered in April 1996, the Girassol field was brought onstream just three and a half years after the decision to go-ahead with the development was taken.

## World's largest FPSO

Girassol has been developed by subsea wells connected to what is claimed to be the world's largest purpose-built floating production, storage and offloading (FPSO) unit, with oil exported by tankers from a loading buoy. The 343,000 dwt (deadweight tonnes) FPSO has capacity to store 2mn barrels of oil and process 200,000 b/d. In addition to processing, the 24,000-tonne topsides have facilities for gas compression, seawater injection and oil export. There are also utilities and living quarters for 140 workers, the largest crew complement of any FPSO so far built.

The Mar Profundo Girassol joint venture, a 50:50 partnership between Stolt Offshore and Bouygues Offshore, awarded two $150mn contracts to Hyundai Heavy Industries in South Korea for the construction of the FPSO. One contract covered the hull; the other was later awarded for the topsides fabrication. The massive FPSO left Korea on 30 March 2001 for its long voyage to the field site.

**Photos: Riser tower assembly line in Lobito, Angola**

## Subsea production system

At the time of production start-up, 11 wells were tied-back to the FPSO, of which eight were producers. Development drilling will, however, continue until 2003 – by which time a total of 39 subsea wells should be completed, of which 23 will be producers, 14 water injectors and two gas injectors. The subsea wells will be connected by 70 km of in-field pipelines to three massive riser towers.

The remotely operated MATIS subsea flowline connection system, developed by Stolt Offshore, was used for the first time in this water depth to make both horizontal and vertical connections. Standard API bolted flanges are remotely connected by MATIS – this system is said to provide superior flow assurance, mechanical and fatigue integrity and cost efficiencies over other connectors.

The use of riser towers was a novel feature of the project (see *Petroleum Review*, April 2000), but there were other innovative features such as the use of pipeline bundles – a 'first' for West Africa although the approach is well established in the North Sea. Alto Mar Girassol (AMG), a joint venture set up between Bouygues Offshore and Stolt Offshore, holds responsibility for the Girassol umbilicals and flowlines project. The joint venture placed two major fabrication contracts – one for the pipeline bundles and the other for the riser towers – with local Angolan yards.

The eight pipeline bundles fabricated for the first phase of the development ranged in length from 1,100 to 2,900 metres. Each bundle consists of a 30-inch diameter outer steel tube containing two 8-inch diameter production lines enclosed in syntactic foam. The syntactic foam was specially developed for the project to insulate the flowlines under high seabed pressure (130 bar at a water depth of 1,300 meters) and very low seabed temperatures (4°C).

Pipeline bundles are now used on a routine basis for projects in the North Sea, where the benefits of onshore pipeline fabrication have come to be much appreciated. A typical bundle will contain a number of insulated pipes and umbilicals within a protective steel tube. A pipeline bundle fabrication facility needs to have several kilometres of straight, level track for assembly of the bundle, with a sheltered bay for launching and for preparation for the tow. The fabrication site must also be

reasonably close to the offshore field, since bundles may be vulnerable to storm conditions during a very long tow.

## Angolan fabrication

The first eight bundles for the Girassol project were fabricated by Petromar at its Soyo base in Angola, where a 5-km long bundle fabrication facility has been established. This is currently the only yard of its type in Africa and one of the few in the world. It is thus thought to have promising prospects, particularly in view of the number of deepwater projects envisaged for the region. After fabrication, each Girassol bundle was transported by a 'bottom-tow' method over a distance of 220 km to the field site.

The riser towers were fabricated by Sonamet (a joint company formed between Stolt Offshore and Sonangol) at its new construction yard in Lobito, Angola. The riser system involves three towers, each of which receives fluids from the production system on the seabed and then transfers the fluids to the FPSO by flexible flowlines from a buoyancy chamber at the top of each tower.

Each riser tower consists of a 1,300 metre-long bundle of rigid, foam-insulated pipes, that is anchored to the seabed and is held in a near vertical position by its buoyancy chamber. The first tower was transported from the Sonamet yard to the deepwater location by a subsurface tow method during June 2001.

Four vessels from the Stolt Offshore fleet were involved in the transport and installation of the towers. On reaching the field location, the bottom of each tower was lowered to the sea floor in a carefully controlled operation. As soon as each tower was standing upright, it was secured to its anchored base.

These riser towers were designed to insulate the produced oil from the 4°C seabed conditions and thus inhibit hydrate and wax formation in the well stream. The insulation requirements were regarded as particularly demanding, due to the great length of the riser and cold seabed conditions. The temperature of the wellstream is expected to fall by 9°C as the fluids rise up the insulated lines in the riser tower.

Another significant innovation which was employed for Girassol was new technology for connection of the FPSO with the export-loading buoy. This is the first time that rigid flowlines have been used for this application, instead of more expensive flexible flowlines. Two 16-inch diameter, rigid flowlines provide the connection. Each of these 2,500 metre-long flowlines is suspended with a centrally-positioned buoy to create a W-shaped configuration. The flowlines fall to a depth of 745 metres, with the mid-point buoy at 340 metres.

Saibos Construções Maritimas, an equally-owned subsidiary of Bouygues Offshore and Saipem, successfully installed these two rigid export flowlines on behalf of the AMG joint venture.

The *Seaway Polaris* installed subsea components


A skilled Angolan workforce will play an increasingly important role on future deepwater projects

## Dry-trees for Kizomba

The concept for the Kizomba project, which got underway last August, is entirely different from Girassol. It is said to be the largest deepwater project in West Africa, with investment set to exceed $3bn, and will be the first deepwater project in Western Africa to use a dry-tree solution. The dry-tree approach overcomes one major drawback of subsea wells – namely the high cost of intervention, a cost that will become more significant as operators start to tackle more difficult deepwater fields.

The Kizomba A project, will bring 1bn barrels of oil reserves from the Hungo and Chocalho fields in Angola block 15 into production by 3Q2004. Sonangol is the concessionaire, with Esso Exploration Angola holding a 40% stake and acting as operator for co-venturers BP (26.67%), Agip (20 %) and Statoil (13.33%).

The Xmas trees will be located on a tension leg platform (TLP), with fluids being transferred to an FPSO. The processing capacity of the FPSO is 250,000 b/d and the storage capacity 2.2mn barrels. A 50:50 partnership between Grootint, a subsidiary of Heerema Fabrication Group, and ABB Lummus Global of Houston was awarded the contract for the wellhead platform.

The TLP construction project will be a major international undertaking, with design carried out by ABB at its Houston office, the hull being built by Daiwoo in South Korea, and the topsides being built and integrated with the hull in The Netherlands. When the platform is installed in 1,250 metres of water it will weigh more than 28,000 tonnes. The project is based around the four-legged Extended Tension Leg Platform (ETLP) concept developed by ABB Lummus Global.

Saibos CML was awarded a $230mn contract for the flowlines to be used to transfer fluids from the TLP to the FPSO, umbilicals to supply electric power from the FPSO to the TLP, a loading buoy, 15 anchors for the FPSO, and other similar project work.

The transfer of gas and injection water from the FPSO involves a new single line offset riser, whose concept derives from the riser towers used for the Girassol project. Insulation of production lines is achieved by two different systems. One system is a pipe-in-pipe approach, with VACTUB® insulation technology. This system was developed by Bouygues Offshore and consists of a rigid foam sealed in a plastic casing under vacuum. It is said to deliver unparalleled insulation efficiency for deep offshore applications.

The second solution is the Bundle RIser Tower (BRIT®), a riser based on the dual-line bundle technique that offers high-efficiency thermal insulation through a very stable kerosene gel or a phase change (liquid/solid) paraffin gel whose temperature performance is claimed to outstrip current requirements.

The insulation of production flowlines, together with the design of risers and other fluid transfer systems, has great significance for deepwater projects and is likely to be subject to extensive research and development for many years to come.

# Philippines to become world's largest geothermal producer

**Since the 1980s the Philippines has developed into the world's second largest producer of geothermal energy after the US. Currently, geothermal energy is the Philippines' largest indigenous energy resource and in 2001 accounted for about 26% of total electricity generation, well ahead of hydroelectric and local coal-fired power generation, reports *David Hayes*.**

Photos courtesy of David Hayes

Electricity distribution lines, Manila

Although natural gas is about to become the Philippines' largest indigenous energy resource, geothermal energy production will continue to grow. The recent streaming of Malampaya gas will steadily expand gas-fired power generation and lead to it exceeding geothermal generation by 2006. However, government plans call for geothermal energy to be developed and expanded further in the future. This will push the Philippines ahead of the US in terms of geothermal production, maintaining geothermal power as one of the nation's most important indigenous energy resources.

## Lead players

According to government figures the Philippines is currently the world's second largest producer of geothermal power with geothermal power plants totalling 1,931 MW of installed capacity compared with the US which operates 2,775 MW of geothermal generating capacity. Italy is the third largest producer with geothermal power plants totalling 785 MW installed capacity in service. Mexico follows close behind with geothermal stations totalling 755 MW, while the world's fifth largest geothermal generator is Indonesia with an installed capacity of 590 MW.

In 2000 the Philippines' geothermal power plants generated 11,626 GWh of electricity, 9.7% more than the 10,594 GWh generated in 1999. However, geothermal output is believed to have dropped by almost 14%, to about 9,950 GWh in 2001. Forecasts are for 8,940

GWh in 2002 as three new gas-fired power plants using Malampaya gas from the recently commissioned gas field increase power generation causing National Power Corporation (NPC) to reduce generation at some other plants.

However, following this two-year decline geothermal energy production is expected to begin growing again in the next year or two, depending on the Philippines' economic growth rate. According to government projections geothermal production could improve to 10,235 GWh in 2004, and could reach as much as 25,230 GWh by 2011 as more geothermal fields are brought onstream.

Geothermal energy can be found throughout the Philippines archipelago, particularly in the central Visayas region and on the main island of Luzon. Two companies dominate geothermal energy production – the state-run Philippines National Oil Corporation (PNOC) and Philippines Geothermal Inc (PGI), a subsidiary of the Union Oil Company (Unocal) of California.

Under the present regulations the Philippines Government owns all geothermal energy resources. Both PNOC and PGI have signed revenue sharing contracts with the government to develop the geothermal resources of the various fields where they operate.

PNOC and PGI sell steam to state-run NPC to operate steam turbine power plants under standard 25-year, take-or-pay contracts that can be renewed for 15 years at their expiry. Some of the steam is supplied to privately operated build, operate and transfer (BOT) power plants and other privately run stations that sell their electricity production to NPC.

The central Visayas region is the largest source of geothermal energy. Geothermal power plants totalling 945 MW of installed capacity have been built at Kananga on Leyte Island and at Valencia in the Negros Oriental area of Negros Island. At present PNOC supplies steam to all geothermal power plants in the Visayas region.

NPC owns the three Palinpinon power plants totalling 265 MW on Negros and the 40-MW Tongonan plant on Leyte Island. In addition, NPC buys electricity from two geothermal complexes on Leyte built under the corporation's private power development scheme. These are the 200-MW Leyte A station and the 440-MW Leyte B plant complexes, in which a number of foreign and local companies have invested in various steam turbine units.

Luzon is the second largest geothermal territory after the Visayas region, with plants totalling 835 MW installed capacity in service. PNOC supplies steam

**Palinpinon geothermal field, southern Negros, Philippines**

to NPC's Bac-Man I and Bac-Man II plants in Sorsogon that have a combined 130 MW installed capacity and the nearby 20-MW Bac-Man II-2 plant.

Elsewhere on Luzon PGI supplies steam to NPC's 275-MW Tiwi geothermal power complex as well as to the corporation's 410-MW Mak-Ban complex.

Geothermal power also is being tapped on Mindanao Island in the southern Philippines. PNOC supplies steam at the Mount Apo power plant complex totalling 108 MW installed capacity at Kidipawan in North Cotabato.

## NPC plans

NPC has developed its geothermal power programme using power plant equipment purchased from about six foreign manufacturers. In terms of installed capacity most of the geothermal power plants have been supplied by Mitsubishi, Toshiba and Fuji of Japan. Other power plant suppliers include Anzaldo of Italy, General Electric of the United States and Ormat of Israel.

Meanwhile, government plans to privatise NPC are due to take effect later this year as part of an overall restructuring of the Philippines' electricity industry. Plans call for NPC to divest its power transmission operations that will be run by an independent transmission company in the future, offering open access to its national transmission network.

NPC's power generation assets are due to be divided up into five or more generation company (genco) groupings that will then be offered for sale to private investors. Originally the government decided to split NPC's power plant assets into five gencos plus two other groupings containing part of the corporation's geothermal station assets. The rest of the geothermal stations were included in two of the gencos that were planned to cover several geographical areas.

Following various comments from potential investors and other interested parties the government has decided to reconsider the composition of each of the gencos. No details are available about the number of groupings planned, although some analysts believe the new proposed gencos may contain power plants using a single energy source rather than containing plants using various fuels as was previously planned.

## Clean energy programme

While privatising NPC is expected to give private investors greater influence in power development planning in future, the government is keen to see more geothermal energy developed in future to increase the Philippines' energy self reliance and to control energy imports. As a clean energy resource geothermal energy is making an important contribution to the government's clean energy programme that now includes the development of indigenous natural gas resources.

According to the government's long-term geothermal energy development programme, geothermal power plants totalling 990 MW of installed capacity will be built between 2004 and 2011. Most of the geothermal plants will be designed to generate between 20MW to 40MW each.

'Under the programme the govern-

ment plans to add 990 MW of geothermal capacity by 2011 to provide 2,921 MW of geothermal generating capacity,' commented a Department of Energy official. 'But the contribution of geothermal power to electricity generation will decrease as gas-fired generation grows from the Malampaya natural gas project.'

Already PNOC is developing geothermal reserves for NPC to build two 40-MW power plants at Bagos in Negros Occidental in the Visayas region and at Sorsogon on Luzon Island for commissioning in 2004. In addition, three plants ranging from 110 MW to 120 MW installed capacity are planned along with a larger 300-MW station on Leyte Island which is due to start up in 2011.

The new proposed geothermal power plant sites are scattered throughout the Philippines. New geothermal stations will be built at Kalinga (120 MW), Ifugao (120 MW), Bataan (40 MW) and Batangas (20 MW) on Luzon Island, while in the Visayas region sites for power stations ranging from 20 MW to 40 MW each have been identified on northern Negros Island, on the islands of Mindoro and Leyte, and at Tanawon on Albay Island. Elsewhere, in the southern Philippines, an 80-MW geothermal plant will be built at Zamboanga del Sur on Mindanao.

While the source of geothermal energy for each of the new stations already is known, exploration and production companies have not been selected to develop all the reserves. According to the Philippines' Department of Energy, PNOC will develop geothermal reserves capable of generating 630 MW of electricity, two-thirds of the planned new generating capacity. However, the government has still to decide which companies will develop geothermal reserves capable of generating steam to produce 360 MW of electricity that will be used to fuel power plants at five separate sites.

## New steam resources

PGI is one geothermal exploration company looking to develop new steam resources in the Philippines as the company already is exploiting all its existing licensed geothermal reserves. Other companies also are showing interest in beginning geothermal exploration. The Department of Energy is considering offering new investment incentives to increase the attractiveness of geothermal exploration.

'We are getting inquiries about geothermal prospects, but there have been no new applications to explore recently,' commented a Department official. 'We have non-exclusive geothermal exploration permits. Geothermal energy is different to coal and other underground fuels. Unlike coal or oil you cannot have boundaries or blocking systems for geothermal exploration.'

Until now most geothermal exploration permits that have been applied for in the Philippines have covered large areas. However, the size of area awarded for exploration can vary enormously, ranging anywhere from 700 hectares to 162,000 hectares. Once the boundaries of the geothermal resources are defined within the permit area, the exploration company can then relinquish the non-productive areas.

Geothermal exploration permits limit exploration companies to surface exploration activities only. No drilling is permitted under the permit operating conditions. Geothermal exploration permits covering the carrying out of a geophysical survey are issued on a six-month renewable basis. The actual time needed depends on the company's resources. Companies can renew a permit for a second six-month period depending on the Department of Energy's evaluation of the applicant's reasons. Companies wishing to drill are required to obtain a service contract from the Department of Energy.

'Once a company gets a service contract they can explore and develop geothermal resources in the licensed area,' the Department official said. 'There is a minimum drilling requirement under service contracts. These are issued for 25 years and are renewable for 15 years.'

Most exploration companies who are awarded service contracts normally drill three wells initially to delineate the geothermal resources in their licensed area. Wells are drilled to an average depth of between 2.5 km and 3 km.

Geothermal resources are scattered throughout the Philippines due to the large number of volcanic centres throughout the archipelago. Most geothermal resources lie in mountainous areas remote from the nation's population centres that are concentrated in lowland areas. 'We have already explored the whole country for geothermal prospects. We have calculated our estimated reserves at 4,700 MW,' the Department of Energy official said. 'In fact, the figure could be higher or lower depending on drilling results. The Department of Energy can only do geophysical studies, not drilling, as it has to be the investors who do the drilling.'

The Department expects 23 exploration wells to be drilled in 2002 as part of development work on new geothermal fields. The number of exploration wells is targeted to double to 46 by 2004. In 2011, when the current 10-year geothermal development programme ends, a total of eight exploration wells are expected to be drilled.

'Only PNOC and PGI are active. We are waiting for new developers,' the Department official said. 'We are trying to change the regulations, especially incentives, to attract to attract new investors.'

## Attracting new players

A number of ideas are being considered to attract new exploration companies to the geothermal sector, in particular from the US and Japan. Exploration rights are granted for six months under the current permit system and then returned to the government. The Department of Energy believes that investors would prefer having longer to explore and is considering amending regulations so that up to five renewal periods would be possible after the initial six-month exploration period expires.

Additional geothermal service contract incentives also are being considered. One proposal is to increase the service contract period. Currently issued for 25 years and renewable for 15 years, the government is considering issuing service contracts for 25 years with the option to renew them for a further 25-year period.

Financial incentives also are under consideration. Proposals include granting income tax holidays to exploration companies developing geothermal discoveries. The Department of Energy is also considering allowing a greater recovery of investment costs to increase investors' cash flow. This could include allowing exploration companies to offset profits from investment in one successful geothermal project against losses incurred in trying to develop another project.

Meanwhile, the Department of Energy is looking at other means of exploiting the Philippines' large geothermal resources. Studies are being launched to look at various possible industrial applications for harnessing geothermal energy, including the use of geothermal heat for drying crops and for the manufacture of salt.

Geothermal energy also could be used for the leisure industry including the use of geothermal energy in spa resorts. The Philippines already has a number of spa resort areas including Los Banos near Manila that offer hot baths and other thermal attractions. Most cater to local tourists at present. The possibility of developing geothermal energy for international class tourist resorts is also being considered.

# IP Autumn Lunch 2002

## *Tuesday 8 October*
## *Claridges Hotel, London, W1, UK*

**Speaker:** *Peter Sutherland*
*Non-Executive Chairman, BP plc*

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**Peter D Sutherland SC** has been non-executive Chairman of BP plc since 1997 and is has been Chairman and Managing Director of Goldman Sachs International since 1995. He currently serves on the Board of Directors of Investor AB, Telefonaktiebolaget LM Ericsson and the Royal Bank of Scotland Group plc. Prior to his current position, Sutherland served as Attorney General of Ireland (1981-1984); EC Commissioner responsible for Competition Policy (1985-1989); Chairman of Allied Irish Banks (1989-1993) and Director General of the World Trade Organisation, (1993-1995). Mr Sutherland has received numerous awards and has eleven honorary doctorates from universities in Europe and America.

# Deepwater and technology – main hopes for the future


**One of the reasons for the continuing success of the Offshore Technology Conference (OTC), held annually in Houston, is that the organisers provide sessions on the context in which the industry operates as well as planning parallel technical sessions. This year, nearly 50,000 individuals from 80 countries attended the event – an increase on last year of 4% – with just over 2,000 companies from 26 countries showing their wares to the international audience, writes *Philip Algar.***

It is difficult and potentially misleading to attempt to formulate an overall opinion of the state of the industry from those attending OTC. For example, the majority of those making the pilgrimage come from the US and are thus influenced by developments in the deep waters of the Gulf of Mexico or the Administration's efforts to open up the Arctic National Wildlife Refuge (ANWR). Furthermore, any overall impression must be based on comments heard by the attendee. Nevertheless, an overall theme is clear in some years. Recently, we have seen the advance and retreat of electronic commerce and the subsequent concentration on cost-cutting as well as optimism based on Gulf of Mexico finds.

## Key to the future

That said, 'Deep into the Future' – the title of this year's gathering – clearly indicated that this was to be the key to the future. Many papers concentrated on the technology that would facilitate this development and senior speakers opined that this journey into the unknown was comparable to the efforts made to conquer space.

Technology was also seen as one means of overcoming the impending shortage of skilled personnel. This was a topic touched on briefly at an OTC press conference some years ago and industry critics will wonder why the sector has failed to overcome a problem that was perceived as potentially serious back then. Now companies envisage experienced personnel, concentrated in one location, monitoring upstream developments around the world in real time and deciding what action must be taken. One view was that this might be a solution for the bigger companies, who, nevertheless, allegedly have fewer problems in retention and recruitment of personnel – but many smaller independent companies seem to be more worried about the future.

Another example of how technology could assist was provided by 'rigInsight', from oneoffshore. Its new web-based system provides oil companies and drilling contractors with global, comprehensive real-time tools and information on the 650-strong rig world fleet to facilitate speedy contracting and decision-making. Using the system saves many expert hours looking for an appropriate rig and discovering relevant data. rigInsight, a transparent system, allows users to compare day rates, operational capabilities and commercial terms, whilst contractors can differentiate and promote their assets.

Some years ago, when oil was consistently in the news, OTC was attended by many Secretaries of State and Ministers. Now, however, such dignitaries are conspicuous only by their absence. If this reflects a lack of interest in oil by politicians, some industry personnel will construe this favourably whilst others will wonder why such a crucially important sector, staging its prime event and providing a unique forum for discussion, fails to persuade Energy Ministers, especially of oil supply manufacturing countries, to leave home. The UK, for example, has failed to send a Minister for many years and this year was represented by Prince Andrew, The Duke of York, the Special Representative for International Trade and Investment, who visited British exhibitors and spoke at the government reception.

## Norway support

In contrast, Norway is always represented by the Minister of Petroleum and Energy and this year Einar Steensnaes addressed the traditional masochistically-early morning press briefing. He said that oil production this year could average 3.1mn b/d but he told *Petroleum Review* that a decision on whether to sustain the reduction of 150,000 b/d, designed to support Opec and prices until 30 June 2002, would be taken later in the quarter. Russia's excess production would be a factor in determining whether the curb would be continued, but the main issue was whether the market was stable.

He claimed that Norway now holds 12% of the West European gas market and that this share would rise. Oil production would peak in the next five years, but the country had the 'potential' for another 50 years of oil production together with 100 years for gas. The discovery rate last year was 60%. 'In

other words, prospects are looking quite good,' he commented.

One objective was to increase oil recovery from 44% to 50%, and to 75% for gas, but these targets implied the use of technology that is not yet available. Investment in the indigenous industry could average $7bn over the next five years, having peaked in 1998 at $9bn. Internationally, Norway hoped to increase its stake of only 1–3% of the $180bn global market to between 4% and 5%.

Steensnaes said that Norway's two main objectives were to enhance competitiveness at home, because the Continental Shelf must remain an attractive area for investment, and on a global basis. 'For oil and gas companies, as well as suppliers and contractors, it is no longer an option to confine operations to the home market.' He argued that the most important challenge was 'the quest for human capital... skilled labour and highly qualified academic resources are needed to exploit resources that are increasingly demanding to discover and produce. Intensified pressure to comply with financial requirements, ethical principles and environmental concerns call for the very best of human capital.'

## ExxonMobil view – remember depletion

Harry Longwell, the Executive Vice President of ExxonMobil, suggested that global demand for oil and gas would rise annually by 2% and 3%, respectively. This projection reflected the 'significant benefits of hydrocarbon energy, namely its comparatively low cost, its ease of use and its flexibility to enhance our lives in multiple applications.' Above all, oil and gas were essential in sustaining economic growth in the industrialised world and were the key to progress in nations working towards prosperity, he stated.

However, 'while demand increases, existing production declines... we expect that by 2010 about half the daily volume needed to meet projected demand is not on production today. This means industry may need to add some 80mn boe/d by 2010 to meet projected demand. The cost of doing so could reach $1tn, or about $100bn/y. That's substantially more than the industry is spending today.'

Longwell noted that most oil finds had been made in a lower-price environment than prevailed today and cycles of discovery showed little correlation with price over the long term. 'In recent times, however, the connection has grown closer.' Discovered volumes, over a long period of time, had not been closely related to price fluctuations and had been driven more by technology and geopolitical developments that improved access which would remain the most important factors in the future, he said. The sector could not control price but it could keep production costs low whilst developing new technology, which could be controlled, but it was becoming harder to find oil and gas. Furthermore, new supplies were located at increasing distances from consuming markets.

He predicted that the sector would rely increasingly on technological advances and said he regretted that the industry was perceived as old-economy and low tech. 'Another major element in our success will be making the most of corporate resources to lower costs and increase operational efficiency. Most recently that has taken the form of mergers. Exxon and Mobil did not merge to become bigger. We merged to become better. We wanted a broader portfolio of exploration and production prospects, optimisation of our downstream assets, synergies in our research and increased competitiveness through reduced costs.'

In meeting the major challenge, maintaining partnerships with governments would be important. He cited the opening or re-opening of large areas for exploration and reasonable tax and fiscal regimes. Industry had the resources to meet the global energy demand and technology would be crucial, he stated. Many future discoveries could come not just from new frontier areas but also from proven areas as 'evolving technology improves our ability to virtually "see" and distinguish the oil and gas before we drill.' However, he saw no potential challenges that would become so serious that world supplies would be threatened over an extended period.

## Here and there

Chairing an energy round table, Matt Simmons of Houston-based Simmons and Co maintained that little had been done to replace the ageing offshore infrastructure and later suggested that, whilst most attention in relation to oil demand was on India and China, the fast-growing population in the Middle East could be very significant. The Saudi population, for example, had grown from 6mn in 1970 to 22mn today, of whom 43% were under the age of 14. By 2010, the number could soar to 40mn. To provide adequate water supplies would require more energy, he stated.

Jean-Francois Giannesini, of the Institut Français du Pétrole, asked whether developing countries would advance as developed countries had done. He cited the direct move to mobile phones in some countries, which had avoided more conventional systems, and wondered if diesel engines would become very popular in developing countries. Many participants highlighted the changing role of the Middle East, as suppliers, with Asia.

Gert-Jan Kramer, of Fugro Worldwide, observed that offshore fields were not susceptible to political problems – as Angola had demonstrated. Conoco's Marianne Kah argued that fast depletion for a field was good for the company but Melanie Kenderline of the Gas Technology Institute believed that this was a 'disaster' in terms of public policy as it discouraged investment in the infrastructure.

## Key forum

OTC continues to perform its role as a key forum for new technology and new ideas for the offshore oil industry. If no clear message emerged from this year's OTC it was not for lack of new ideas. Doubtless next year it will provide more new ideas for the ever dynamic industry.

# Asia-Pacific countries form Asian Biofuel Council

Philippines coconut farmer prepares crop for market

Photo courtesy of David Hayes

**Leading vegetable oil producing countries in the Asia-Pacific region signed a Memorandum of Understanding (MOU) in Thailand earlier this year on the formation of an Asian Biofuel Council to promote cooperative partnerships among member countries to develop sustainable biofuel development programmes, writes *David Hayes*. Member countries are expected to meet annually to review progress in developing a biofuel industry spurred by vegetable oil producers seeking new markets for their products and the global move to using clean energy.**

The Formation of the Asian Biofuel Council follows government and private sector attempts in a number of countries to develop vegetable oil-based biofuels for various uses as a vehicle fuel and as a fuel for industrial oil-fired boilers and power stations. Although biofuel has not produced headline news, interest is growing in using vegetable oils for energy purposes as vegetable oil is considered a green fuel and reportedly creates less pollution than some traditional fuels.

Southeast Asia is a leading producer of vegetable oils. Malaysia, Indonesia and Thailand are major palm oil producers while the Philippines has a large coconut oil industry. Apart from Southeast Asian countries, other countries expected to join the Asian Biofuel Council include Australia, China, India and Papua New Guinea.

## Coconut/diesel blend

The Philippines is Southeast Asia's largest coconut producer with about 2.1mn tonnes of coconuts forecast to be produced in 2002. Coconuts are used to produce coconut milk, cooking oil and food ingredients including *noix de coco*, a popular dessert in many Asian countries. In addition, coconut oil is produced for the oleochemical industry that uses it to make pharmaceuticals, nutra-chemicals and beauty care products including soaps and detergents.

Recently, the Philippine Coconut Authority has started promoting coconut oil to blend with regular diesel fuel. The Council has installed a fuel pump at its Manila headquarters that dispenses regular diesel blended with 1% refined coconut oil. The trial programme is initially restricted to the supplying of vehicles belonging to the Department of Agriculture with biodiesel, but is expected to extend to other vehicles in future.

Blending coconut oil with diesel will create additional demand for coconut oil and support the Philippines' coconut farming industry that includes a large number of smallholder farmers. The Philippine Coconut Authority has calculated that using coconut oil as a 1% blend with diesel would create demand for an additional 70,000 tonnes of coconuts a year.

The Philippines also uses coconut oil for power generation. According to the Department of Energy power stations

totalling 50 MW installed capacity are fuelled by coconut oil blended with diesel derived from coconut biomass production. Other fuel uses for coconut oil also are being investigated.

## Palm oil potential

Palm oil also has the potential to be developed as a biofuel, although recent experience in Malaysia has highlighted the effect of price sensitivity in using palm oil as fuel.

In the early part of 2001 the Malaysian Government initiated a palm oil biofuel programme which eventually ran for about six months when crude palm oil (CPO) was used for power generation and as a fuel for industrial boilers. Although the programme has since ended, interest continues in using refined palm oil as a biofuel due to the various benefits it offers compared with using petroleum fuels.

In production terms, palm oil is the world's second largest vegetable oil after soybean oil, and is the fastest growing. Palm oil is the most traded vegetable oil, accounting for 40% of the global traded vegetable oil market.

Over the past decade, palm oil production has doubled to 23mn t/y. Malaysia produces almost half the world's total palm oil output, while Indonesia is another important producer.

Plans to use CPO as biofuel were drawn up by the Malaysian government at the start of 2001 in an attempt to reduce Malaysia's large palm oil stocks that had stayed above 1mn tonnes for the two previous years. By reducing the palm oil stockpile, the government planned to boost palm oil prices that had been depressed due to oversupply and intense competition from other vegetable oils including soyabean oil, rapeseed oil and sunflower oil.

Government plans called for about 500,000 tonnes of palm oil to be used for power generation and to fire industrial boilers to reduce the national palm oil stocks to 1mn tonnes from the previous high of about 1.4mn tonnes at the end of 2000. The reduction target set was equivalent to 5% of Malaysia's 10mn t/y of palm oil production.

Plans to use palm oil for power generation were announced early in April 2001 following agreement between the Ministry of Primary Industries, the Malaysian Palm Oil Board (MPOB) and Tenaga Nasional, the state-run power generation company. The CPO biofuel scheme was launched at Tenaga's Prai power station in Butterworth, Penang State, where the first shipment of 20,000 tonnes of CPO was shipped in April 2001. According to an MPOB official, CPO is first blended with either diesel or medium fuel oil to be used as a power plant fuel. Exact details have not been published but it is thought that CPO can be used as a substitute for about 5% of the normal fuel content of medium fuel oil or diesel.

Following the Minister of Primary Industries, Datuk Dr Abdullah Tahir's, announcement that between 20,000 to 50,000 tonnes of CPO was to be burned monthly, the target was lowered to 20,000 to 30,000 tonnes monthly when the Ministry realised that 80% of Peninsular Malaysia's electricity is produced by gas-fired power plants.

In fact, Prai power station is the only oil-fired power plant in Peninsular Malaysia designed to burn medium fuel oil. Tenaga used palm oil blended with medium fuel oil only for peak load power generation at Prai power station.

## Programme expansion

With Prai's CPO fuel requirement insufficient to reduce Malaysia's palm oil stockpile in the planned timescale, the government decided to extend the palm oil biofuel programme to power plants owned by Tenaga in the states of Sabah and Sarwak in East Malaysia. At the same time, the biofuel programme was expanded to include industrial customers such as glass factories, brick companies and cement plants.

Power plants in East Malaysia were chosen as a large number of these burn diesel fuel. According to government statistics there are about 70 electricity generating sets burning diesel fuel installed in Sabah and Sarawak, of which Tenaga owns about 80%. The power plants supply electricity to remote towns and villages that are not connected to main grid electricity supplies.

Trials were carried out at several power plants using CPO and processed palm oil, including palm olein that was blended together with diesel. Relatively inexpensive modifications had to be made before the power plant boilers could burn the new fuel mix. Although details have not been revealed, MPOB is thought to have funded the modifications.

While efforts to expand CPO consumption continued, palm oil prices began to rise and soon started to affect the availability of CPO supplies. Malaysia's CPO biofuel programme was launched when palm oil prices had sunk below M$700/t, just one-quarter of the record M$2,700/t price record in 1998. However, palm oil prices began to recover after the government launched the palm oil fuel programme and by August 2001 had reached about M$1,250/t, significantly above the M$725/t price level the government had agreed to pay palm oil producers to use CPO as biofuel.

Under the agreement with Tenaga and MPOB, the government recovered most of the purchase price paid to oil palm producers by selling palm oil to Tenaga at M$700/t. The additional M$25/t paid to oil palm producers was paid from the recently established Palm Oil Price Stabilisation Fund.

## Programme suspension

With palm oil prices rising, the government, MPOB and Tenaga agreed to suspend the palm oil fuel programme after Malaysia's palm oil stocks fell below the 1mn tonne target level and palm oil producers were no longer willing to sell palm oil at below open market prices. By then, an estimated 200 companies had used palm oil to fuel their factory boilers and many were satisfied with the results.

According to local press reports a pottery factory in Sungai Siput in Perak State, for example, had switched to burning 100% palm oil, partly because palm oil, unlike diesel, does not leave strong traces of sulfur in the pottery products. Other industrial companies used palm oil blended with diesel. A sheet metal producer was reported as saying that smoother looking zinc sheets can be produced when using palm oil compared with normal diesel fuel.

Malaysia's experience suggests the future use of palm oil as a biofuel will depend on open market palm oil price levels and the cost of burning palm oil compared with other fuels. Both Shell Malaysia Trading and Petronas, Malaysia's state-run oil and gas corporation, have expressed interest in marketing palm oil blended fuel due to its environmentally friendly qualities.

## Renewable energy

Meanwhile, Malaysia's oil palm industry could also play an important role in the government's renewable energy programme. As part of the national fuel diversification policy, renewable energy's contribution to total electricity supply has been targeted at 5% by 2005. With total electricity supply forecast at 15,000 MW by then, the renewable share amounts to 750 MW.

According to government estimates, biomass-fired power plants totalling between 500 MW and 600 MW installed electricity generating capacity already have been built by about 200 palm oil refining companies to burn palm oil waste. However, the electricity supply is used on site and is not fed into the national grid.

The government wants to see more palm oil mills, especially those operating near to Tenaga's national grid electricity transmission lines, expand their electricity generation capacity and connect their power stations to the national power grid. This will allow palm oil refiners to sell excess power production to Tenaga and ensure better use of their electricity output.

# Subsea prospects looking good

**Significant growth is expected in the subsea sector over the next six years, with 973 pending and probable subsea completions expected in this period. *Paul Hillegeist*, President of Quest Offshore Resources outlines the findings of the company's most recent survey of global deepwater prospects.***

Overall activity in the global oil and gas sector is buoyant, having returned to the healthy level of activity experienced prior to the post-1998 slowdown. Oil and gas market fundamentals are looking good and the medium to long-term market outlook is very positive. There are 2,511 identified pending, probable and possible subsea production wells forecast (base case) worldwide over the next six years. Some 18% of these subsea completions will be installed in North America, 30% in Africa/Mediterranean, 8% in the Asia-Pacific, 26% in the North Sea and 18% in Brazil (see **Figure 1**).

These subsea projects are in various stages of development (see **Table 1**), including 23% at the pending/construction stage, 11% bidding, 9% in detailed engineering, 16% at the front-end engineering design (FEED) stage, 16% of the wells probable, and 26% possible (indicating possible development in the future).

Quest Offshore estimates that there will be some 335 subsea completions installed this year worldwide, rising to 364 in 2003 and 372 in 2004 (base case). The Gulf of Mexico will account for about 18% of this activity, or 188 subsea completions, over the next three years. Last year, according to our survey of operators and suppliers, there were about 260 subsea trees installed globally.

## Contract awards

Several major contract awards for subsea production trees materialised in 2001, 307 in total. There are currently 571 trees pending construction for installation between 2002 and 2007 (including the 307 booked last year), plus 302 subsea trees bidding and 219 in the detailed engineering phase.

As illustrated in **Figure 2**, ABB, Cameron and FMC are the dominant suppliers of subsea production hardware to the worldwide market, followed by Kvaerner Oilfield Products (KOP) and Dril-Quip. Each of the manufacturers has strengths in specific geographical regions, however, with FMC Technologies possessing a significant majority of the Gulf of Mexico market (in the last 12 months). ABB, meanwhile, has a strong footing in the North Sea with a 37% market share (trees booked over the last 12 months) along with FMC (a very strong 32%) and Kvaerner (growing at 18%).

With respect to the burgeoning African market for subsea trees, Cameron has a favourable market position with a 55% share following on the heels of several significant ExxonMobil

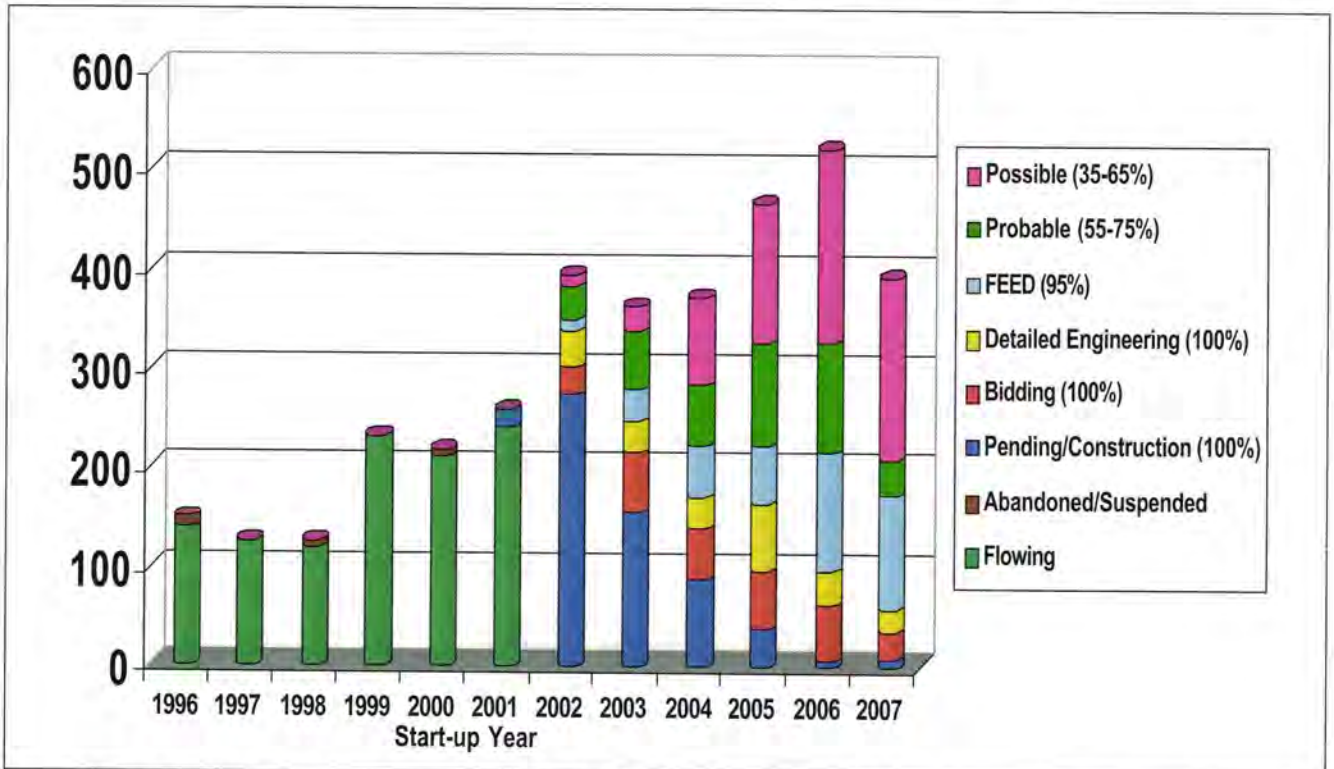



**Figure 1: Global subsea forecast (number of wells) – a total of 2,511 wells are expected to be drilled between 2002 and 2007.**
*Source: Quest Offshore Resources*

contracts, including Kizomba in Angola and Erha in Nigeria. With the award of Shell's deepwater Bonga trees offshore Nigeria in early 2001, ABB will supply about 34 trees into the market, or a 33% share of the 104 subsea trees booked for Africa during the last 12 months.

## Deepwater trends

The majority (65%) of identified subsea wells are in located in deep water. With respect to ultra-deepwater subsea production, the present share of subsea trees worldwide over 3,437 fsw (ft sea water) or 1,200 msw (meters sea water) is 39%. Of the remaining subsea wells forecast, 26% are planned for installation in between 1,650 fsw and 3,960 fsw (501–1,200 msw) and 35% in 0–1,650 fsw (0–500 msw).

## Gulf of Mexico

The Gulf of Mexico ranks second behind West Africa, with approximately one-third of the world's estimated deepwater reserves. The great success of deepwater production in the region is due in part to the technological advancements and reliability of subsea production systems.

Despite declining oil and gas prices, deepwater and ultra-deepwater drilling activity in the Gulf of Mexico has held up reasonably well. An analysis of Gulf of Mexico deepwater wells drilled (>1,000 ft) over the last two years from January–December reveals a 6% composite increase in activity (see **Table 2**). According to the US Minerals Management Service (MMS) and Quest Offshore estimates, there were 116 deepwater (>1,000 ft) wells drilled in 2001, compared with 109 deepwater wells in 2000. This seems modest, but is quite steady compared with the measured 9% decline in shallow water wells (under 800 ft) over the same period.

According to **Rigzone.com** there are presently eight to nine deepwater drillships under contract in the Gulf of Mexico, or a measured 50% increase over two years compared with five to six units working in 2000. The market for semi-submersibles has also held relatively steady at about 76% utilisation, with 30 to 32 semis under contract – up from an average 27 units working in 2000.

Ultra-deepwater Gulf of Mexico drilling activity (>3,000 fsw) experienced an extraordinary gain in 2001 with a 43% increase compared with 2000. Once these discoveries are commercialised, these projects will be candidates for stand-alone subsea development schemes or mixed with dry/wet tree floating production solutions.

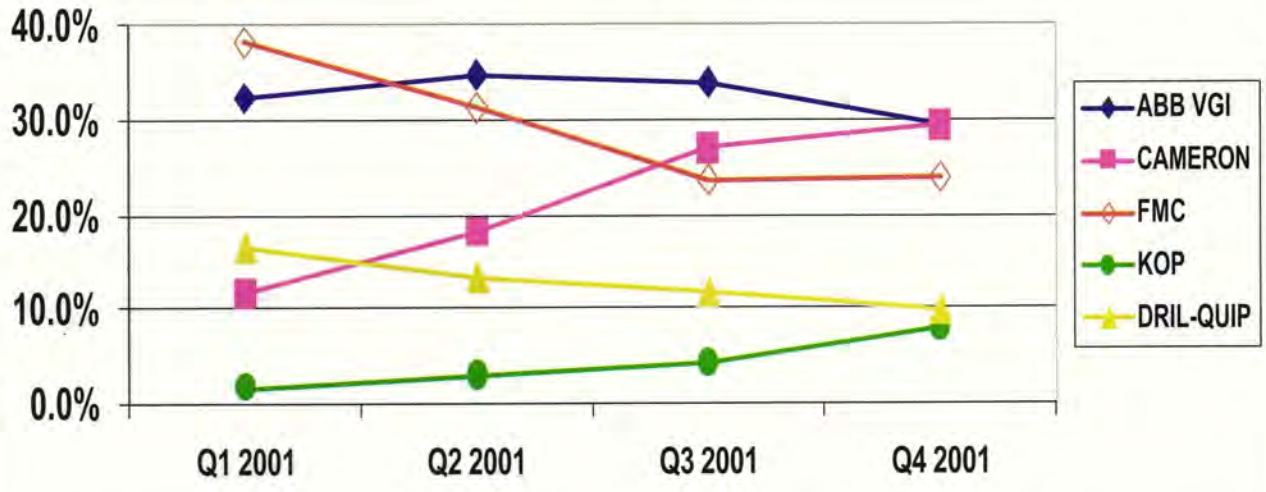
Statistics from Quest Offshore's Quest SUBSEA-DATA-BASE reveal a six-year forecast for 459 subsea production wells (trees/completions) in the Gulf of Mexico and Canadian Atlantic waters. This compares with a five-year average of just 22 subsea trees from 1999–2000, or 53 subsea trees in 2001 which was a robust year.

The market has strengthened, with several major contract awards for subsea production equipment in 2001 accelerating the pace of activity. A total of 58 subsea trees were booked in the Gulf of Mexico last year for installation during 2001 to 2005.

The North American market for subsea suppliers has grown from approximately $600mn over the last six years to an estimated $1.8bn during the next seven years. This market size denotes subsea hardware supply comprising trees, wellheads and controls and excludes costs for flowlines, umbilicals and offshore installation activities (see **Figure 3**).

## Project round-up

Noble Affiliates' (Samedan's) Lost Ark development located in Gulf of Mexico East Breaks blocks 420, 421, 464 in 2,750 fsw (920 msw) will connect to a platform 27 miles (45 km) away in East Breaks block 110. KOP seized the contract to supply an electro-hydraulic multiplex control system for the project. Platform equipment includes a hydraulic power




| CUMULATIVE WORLDWIDE TOTALS | | | | |
|---|---|---|---|---|
| | Q1 2001 | Q2 2001 | Q3 2001 | Q4 2001 |
| ABB VGI | 39 | 58 | 88 | 90 |
| CAMERON | 14 | 30 | 70 | 90 |
| DRIL-QUIP | 20 | 22 | 30 | 30 |
| FMC | 46 | 52 | 61 | 73 |
| KOP | 2 | 5 | 11 | 24 |
| TOTAL | 121 | 167 | 260 | 307 |

Figure 2: Global consolidated market share by booked date. *Source: Quest Offshore Resources*

unit to generate hydraulic pressure for operating the subsea tree valves, manifold valves and the SCSSVs; a master control station; an uninterruptible power supply; and a topside umbilical termination assembly. Subsea equipment includes a subsea umbilical termination assembly, flying leads and a subsea control module.

More recently, Samedan Oil inked a Letter of Intent (LOI) with Global Industries for the Lost Ark pipeline at East Breaks block 421. Project workscope comprises the installation of one 26-mile, 6-inch diameter rigid steel flowline. The 1,100-tonne umbilical (to be supplied by Coflexip Stena Offshore-Duco and incorporating both super duplex and carbon steel tubes, six in total) will be tied-back to a platform at East Breaks block 110 in 660–700 fsw, including saturation diving work and the installation of a new riser at the platform.

A record setting deepwater development presently underway in the Gulf of Mexico is TotalFinaElf's Canyon Express pipeline project. The workscope includes a single methanol distribution pipeline and the deepest installed flowlines in the region to date (two at 12-inch diameter), as well as the deepest electro-hydraulic umbilical in up to 7,200 fsw. KOP is designing, manufacturing and supplying the subsea controls and a single continuous length subsea umbilical. The Canyon Express pipeline system links Marathon Oil's Camden Hills prospect (in Mississippi Canyon block 348) to TotalFinaElf's Aconcagua prospect (in Mississippi Canyon block 305). It is further linked to BP's King's Peak development (in Mississippi Canyon block 217) and finally onwards to the Canyon Station at Main Pass 261 for termination on the Continental Shelf in 1,132 fsw.

Sonsub Clough Partnership's *MSV Maxita* (soon to be owned 100% by Saipem) is installing the primary Canyon Express 57-mile (91-km) super duplex umbilical as well as over 20 km of infield umbilicals. The umbilical system will control four subsea wells at the King's Peak field, three to four subsea wells at the Aconcagua field and two subsea wells at the Camden Hills field. Transocean Sedco Forex's *Discoverer Spirit* drillship will install and complete the 10 Canyon Express subsea wells. TotalFinaElf estimates completion costs at between $21mn and $30mn per well.

## Africa/Mediterranean

West Africa is certainly a bright spot for deepwater exploration and development around the globe. It ranks first in estimated deepwater reserves, with about a 38% share of deepwater reserves. West Africa also possesses the world's largest deepwater fields with an average deepwater field size ranking significantly above the rest, with Brazil a distant second and the Mediterranean a close third.

Quest Offshore forecasts a significant 735 subsea wells for Africa and the Mediterranean regions. This represents approximately 29% of the world market.

Bonga is the first deepwater development offshore Nigeria in 3,609 fsw (1,100 msw). The biggest contract of the project went to Amec in the UK – a $435mn contract to build the process system for the massive Bonga FPSO. The fabrication and assembly of the 225,000 b/d process deck, expected to weigh in at 17,000 tonnes, will be centered at Amec's Wallsend yard on Tyneside. The FPSO hull, designed for storage capacity of 2mn barrels of oil, is being fabricated by Samsung in South Korea and is due to arrive in the UK during Q32002.

Early last year, ABB seized a final $180mn contract for Bonga's subsea production hardware. Delivery of the equipment will begin in mid-2002 and carry on through 2009. As a result of the contract, ABB is building a $2mn subsea operations base at Onne in Nigeria. Shell International ordered 29 conventional deepwater trees plus the control system and five manifolds. An added bonus for ABB is supply of the control umbilicals, subcontracted to Kvaerner, and the gas lift risers. Single Buoy Moorings in the UK is executing the main contract for the mooring and installation of Shell's Bonga FPSO system.

Meanwhile, ExxonMobil is well under way with its $3.1bn deepwater

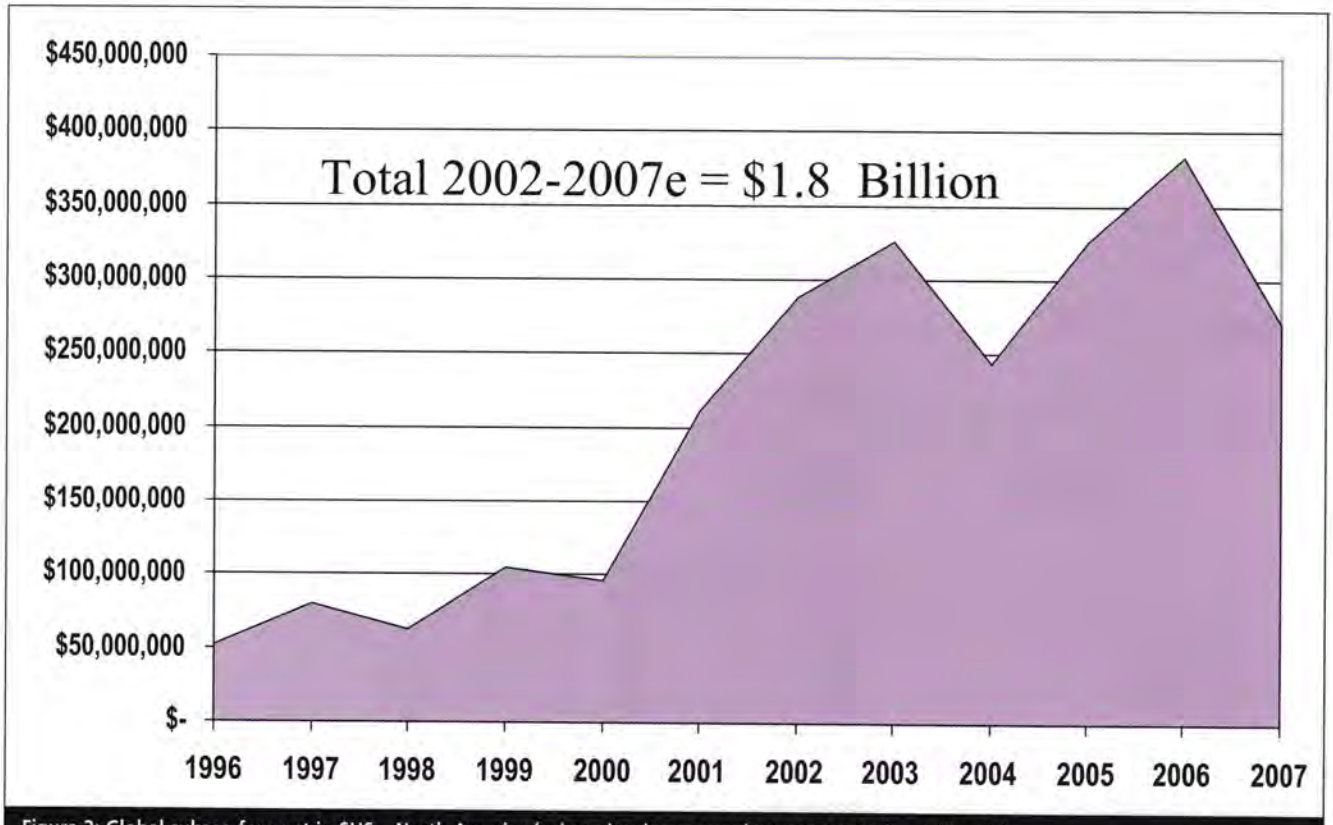



Figure 3: Global subsea forecast in $US – North America (subsea hardware supply: trees, controls, wellheads).
*Source: Quest Offshore Resources*

Kizomba A development offshore Angola in up to 4,022 fsw (1,219 msw). The development scheme for Kizomba Phase 1 incorporates a tension leg platform (TLP) plus FPSO, some 32 dry production wellheads, approximately 28 Cameron spool trees to be utilised for re-injection of the gas into the reservoir, and crude export to a surface buoy.

Elsewhere offshore Angola, BP recently issued pre-qualification documents for the engineering, procurement, installation and commissioning (EPIC) of umbilicals, flowlines and risers for its block 18 Greater Plutonio development in 1,300 msw. An FPSO and multiple subsea well development scheme is being evaluated for the multi-field development with KBR recently inking a FEED contact.

## UK North Sea

Quest Offshore forecasts 341 subsea wells in the UK sector of the North Sea. As a mature province, the region has become increasingly dependent on more numerous, but smaller, fields where subsea developments play a large role.

The UK Oil and Gas Directorate recently approved a further $244mn in development for the Madoes and Mirren fields, using a total of five new wells tied back through multi-phase pipelines into the existing central North Sea Eastern Trough Area Project (ETAP) infrastructure. The Shell-operated Madoes field in block 22/23b will be tapped with three horizontal subsea wells tied to a subsea manifold. Multi-phase production will be exported via a 12-mile (19-km) pipeline to the central processing facility within the ETAP complex, which is situated over the Marnock field. The BP-operated Mirren field in block 22/25 will use two horizontal subsea wells and export via a second subsea manifold and another multi-phase pipeline 7.5 miles (12 km) into the system. Oil and gas from the new fields will be exported via the Forties pipeline and the Central Area Transmission Systems (CATS). BP expects first production in early 2003.

Shell UK Exploration and Production is developing its Penguin field, located 3 miles (150 km) northeast of the Shetland Islands (see *Petroleum Review*, January 2002), with four horizontal wells at a cost of $333mn. Successful results from these wells will result in the drilling of up to five additional horizontal wells, increasing total investment to $507mn. The Penguins cluster comprises a group of five fields with reserves of oil, gas and condensate estimated at about 90mn boe.

## Norwegian North Sea

Some 311 subsea completions are forecast in the Norwegian sector of the North Sea from 2002 to 2007, or 12% of the worldwide total. The Norwegian Petroleum Directorate (NPD) sees 2002 investment reaching $5.9bn, of which spending on production wells will comprise around half of the total and investment in new facilities around 25%.

The NPD anticipates a 15% increase in overall spending in 2003 and 2004 to an estimated $6.7bn/y and sees average spending of $24.7bn during 2002–2005 (excluding investments in ongoing operations and exploration).

Investments for the most notable development targets include:

- Statoil's $4.5bn Snøhvit (Snow White) development, for which bids are imminent.
- Norsk Hydro's $2.8bn to $3.3bn Ormen Lange development, for which bids are expected to be called either late this year or in 2003.
- BP's $1.6bn Skarv development, for which bids are expected to be called in late 2002 or 2003.

In addition, a number of smaller oil and gas fields such as Svale, Norne expansion, Skirne and Byggve are expected to be developed during 2002 to 2005.

Partners in Norway's Barents Sea Snøhvit project submitted a Plan for Development and Operation (PDO) to authorities for approval early this year, following tax concessions by the Norwegian Finance Ministry. The workscope comprises pipelines, subsea production facilities, receiving facilities and a gas liquefaction plant. Field development work is slated to begin in the spring of 2002, with production to be brought onstream in 2006. Engineering, procurement and construction (EPC) contracts in the first phase of the $6bn Snøhvit LNG project are soon to be issued to fabrication contractors and subsea facilities suppliers.

| Status | No. | % of Total |
|---|---|---|
| Pending/construction | 571 | *23%* |
| Bidding | 285 | *11%* |
| Detailed/engineering | 219 | *9%* |
| FEED | 391 | *16%* |
| Probable | 402 | *16%* |
| Possible | 643 | *26%* |
| **Total** | **2,511** | |

**Table 1: Global forecast subsea completions (no. of wells) base case 2002 to 2007.**
*Source: Quest SUBSEA-DATA-BASE*

| Water depth | 2001 | 2002 | % Change |
|---|---|---|---|
| 1,000–3,000ft | 53 | 36 | *-32%* |
| Over 3000ft | 56 | 80 | *43%* |
| **Total** | **109** | **116** | *6%* |

**Table 2: Gulf of Mexico deepwater wells drilled January to December 2001.**
*Source: US MMS and Quest Offshore*

Design work for a newbuild steel barge, measuring at 492 ft x 164 ft x 30 ft, on which Snøhvit's LNG plant will be built is close to completion, and a contract for the construction of the barge is likely to be awarded by 1H2002. The $500mn-plus facility will accommodate up to 38,580 tonnes of topsides and produce up to 203bn cf/y of LNG. Phase one of the project will comprise eight subsea production wells and one carbon dioxide injection well. Drilling and completion of these wells will be carried out in 2004 and 2005, with production to start in 2006. A further eight subsea wells for the Askeladden field and five subsea wells for the Albatross field (part of the Snøhvit project) are intended for later phases. Requests for Quotes (RFQs) for the subsea facilities and 106-km, 27-inch diameter export pipeline are imminent, with contract awards anticipated in 2002 or early 2003.

Kvaerner Oilfield Products (KOP) received a Letter of Intent worth $110mn to provide equipment for ten subsea wells, production controls and support structures for the Statoil-operated Kristin field. The workscope includes the delivery of wellheads, valve-trees and subsea production control systems for ten wells plus four, four-slot wellhead templates. KOP in Houston will provide high-pressure components for the valve-trees, and Kvaerner in Aberdeen will build the control systems. The company will assemble the wells at its Tranby site outside Oslo, Norway while the templates will be built at Kvaerner's yard in Egersund, Norway, where it will also undertake integration testing of the wellhead equipment.

## Asia-Pacific

Quest Offshore forecasts 203 subsea completions during the next six years in the Asia-Pacific, led by 17 projects in Australia comprising 138 subsea trees, and nine projects in Indonesia comprising 72 subsea wells.

The most active operators in Austalia are: Woodside Petroleum, Western Australia Petroleum (Wapet) and BHP Billiton. Woodside plans to invest $2.54bn in growth projects by end-2005, including the Laverda/Enfield oil project offshore Western Australia by end-2002 and the Greater Sunrise gas project in the Timor Sea (see *Petroleum Review*, November/December 2001).

**For more information about Quest's report on deepwater prospects, contact*

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# The drilling engineer's role in quality control

**Selecting a matched drilling system can dramatically impact wellbore quality and total well construction efficiency, explains *Blaine Comeaux*, Senior Product Champion for Drilling Optimisation, Halliburton Sperry-Sun.**

The term 'hole quality' means different things to different people, but it generally relates to how easy or difficult it is to run pipe, tools and casing into or out of a wellbore. Possible mechanisms that might hinder a smooth tripping operation include ledges, washouts, tight spots and excessive doglegs. In their simplest terms, these problems relate to the true drift diameter of the well.

## Dealing with problems

The industry has suffered for years dealing with the problems of poor hole quality, including:

- casing strings stuck off bottom;
- difficulty getting wireline logging tools to bottom, which can lead to expensive pipe-conveyed logging runs;
- excessive time spent back-reaming to open-up and/or clean the hole; and
- poor quality logging data because of constantly changing borehole effect on sensors in a rugose hole (inconsistent diameter or a diameter that moves around the true centerline of the wellbore).

Other problems caused by poor hole quality, but that have not been as directly associated with it, include:

- excessive circulating time for hole cleaning in a rugose hole;
- more cuttings to remove due to back-reaming required to eliminate a spiraled hole;
- excessive drag on directional motor assemblies, which leads to greatly reduced rate of penetration (ROP) while sliding as compared with rotating;
- premature bit failure because of damaging lateral bit motion in oversized hole;
- premature measurement-while-drilling (MWD) and logging-while-drilling (LWD) tool failure as a result of vibration related to excessive bit motion;
- poor cement jobs because of inconsistent annular space around casing string; and
- poor gravel-pack jobs and early screen out (also due to inconsistent geometry).

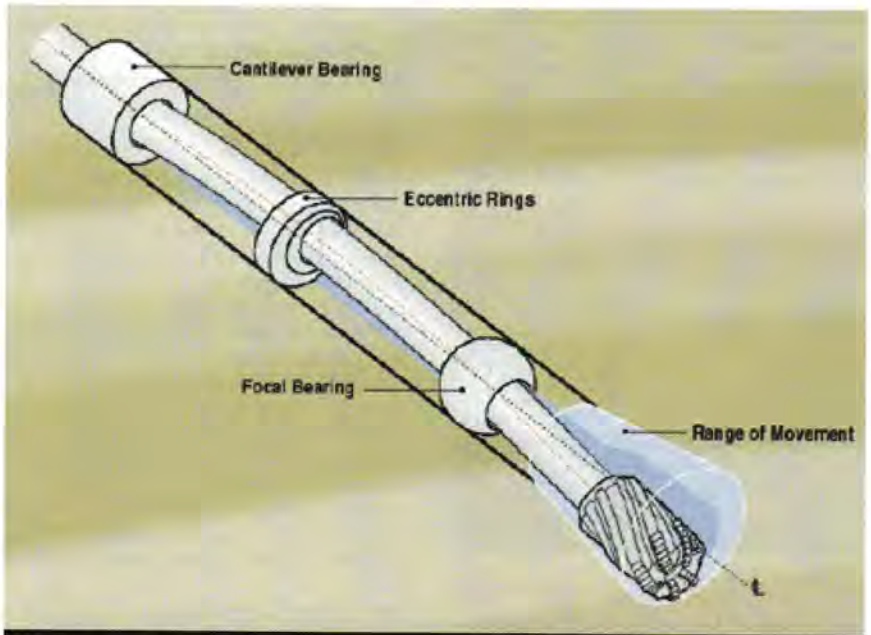


Figure 1: The Geo-Pilot™design concept involves deflection of a shaft between the bit and the drillstring. A non-rotating and high-side reference housing contains an elegant, compact and rugged bias unit (eccentric rings) to impart a controlled deflection to this shaft element, allowing for continuously variable (both in toolface and effective bend angle) steering. In other words, this concept allows (with rotating drillstring) the downhole adjusting of the direction to be drilled and the build rate desired.

## Mix or match?

Most of the wells drilled in the world suffer from some degree of spiraling, according to initial work in the North Sea and corroborating evidence from other parts of the world.[1] Spiraling is caused by several mechanisms, but one leading contributor is the use of short-gauge bits. A solution that has proven to drastically reduce or eliminate the tendency for the borehole to spiral is to consider the bit and the motor as an integral system. A matched drilling system can have a dramatic impact on the total well construction efficiency.

Extensive use of matched mud motor and bit systems in the North Sea has consistently reduced the number of applied formation valuation (AFE) days by 25% to 50% compared with conventional motor drilling (**Figure 1**). Entire intervals have been drilled with a single polycrystalline diamond compact (PDC) bit for the first time in many areas, successfully drilling through stringer formations that have always damaged PDC bits in previous runs. This has resulted in substantially reduced trip time and a lower overall bit cost.

Bits used in this matched system routinely complete the required drilling interval and are pulled in near-perfect condition – evidence that the bit was still cutting efficiently at the end of the run, resulting in the best possible ROP.

MWD and LWD failures have been significantly reduced overall and especially in tough high-vibration drilling areas (**Figure 2**). Time breakdowns

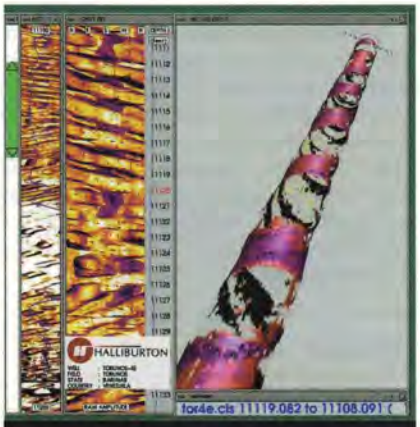


Figure 2: Spiral borehole as shown by the 2D (tracks 1 and 2) and 3D (track 3) images obtained from a wireline circumferential acoustic scanning tool (CAST™) in a well in Latin America. Note the spiral changed direction at a depth of 11,115 ft (3.388 metres) and had a pitch of 2 ft (0.61 metres).

show the percentage of drilling hours has increased while the percentage of circulating hours has been reduced by two-thirds, proving that hole cleaning is easier in a straight, high quality hole. Time breakdowns also show that overall trip time is reduced. In many cases, short trips have been reduced or eliminated completely because of the hole cleaning efficiency mentioned above. Also, fewer trips are required for bit replacement and downhole failures.

Logging tools have run to the bottom successfully in areas where wells with lower inclinations have proved difficult to log. This has eliminated the expense associated with pipe-conveyed logging operations. In addition, cement jobs have had a higher success rate, thus eliminating the rig time for squeeze operations.

## The bottom line

Reducing risk is an important part of a drilling engineer's job function. Evidence shows that by focusing on hole quality, risks are reduced in a multitude of drilling areas, thus resulting in a significant contribution to the bottom line. Paying attention to hole quality has been proven to reduce the risks and improve the overall economics of numerous drilling projects.

## Reference

1. Gaynor, T M, Chen, D C-K, Stuart, D and Comeaux, B. *Tortuosity vs Micro-Tortuosity – Why Little Things Mean a Lot*, SPE/IADC #67818. Presented at the SPE/IADC Drilling Conference in Amsterdam, The Netherlands, February 2001.

# Evaluation of the performance of compact provers

**This IP-sponsored Technical Development Project carried out by SGS Redwood looked at the performance of compact provers when they are employed to calibrate meters for demanding duties such as custody transfer and fiscal measurement.**

From within the measurement industry experience indicates that certain meters do not calibrate well using current compact provers. Experience shows that additional and unexpected costs have often been incurred by industry in resolving problems associated with the incorrect application of compact provers, and clearly the operating envelope of the compact prover needs to be established. This report describes a series of workshop tests designed to elucidate the problem, drawing conclusions from these tests and from data available from other sources.

Four different types of meter were each calibrated by at least two different methods during the workshop tests. Two positive displacement (PD) meters, a straight-bladed turbine meter, a helically bladed turbine meter and a Coriolis meter were calibrated on water using a bi-directional prover, a reference meter, a compact prover and a proving tank.

The PD meters could not be calibrated successfully with the compact prover when the meter's pulse generator was driven via its gear train. Connecting the pulse generator directly to the rotor shaft is likely to overcome this problem.

The turbine meter calibrations indicated the importance of matching the flow capacities of the meter and the compact prover. Poor repeatability may otherwise be experienced at low flow rates. Pulse interpolation can only be successful in overcoming this problem if the pulse spacing is consistent.

The Coriolis meter gave unacceptable results at high flow rates when calibrated with the compact prover. It may be possible to overcome this by adjusting the data integration period of the meter or by using a larger compact prover. A more reliable solution is to use the compact prover to calibrate a different type of meter that is then used a transfer standard to calibrate the Coriolis meter.

The report, together with information from other sources, will form the basis of an IP Petroleum Measurement guidance document.

Copies of the full report are held in the IP Library.

*For further information on this report or any aspect of the IP's Petroleum Measurement activities please contact, John Phipps, IP Technical Manager–Standards, on Tel: +44 (0)20 7467 7100 or e:* **jp@petroleum.co.uk**

# Petroleum Measurement Tables setting the standard

**John Phipps, IP Technical Manager–Standards reports on the latest revisions to the Petroleum Measurement Tables, the standard procedures adopted almost universally throughout the world for converting volumes of petroleum at one temperature to equivalent volumes at another temperature by means of computed volume correction factors (VCF).**

The Petroleum Measurement Tables were developed jointly by the American Petroleum Institute (API), the Institute of Petroleum (IP) and the America Society for Testing and Materials (ASTM). In 1980 the ASTM and API published the computer implementation procedures and the printed tables for temperatures of 60°F and 15°C. This was followed in 1988 with the IP publishing the computer implementation procedures for 20°C as Petroleum Measurement Paper No 3. **It is important to note that it is the computer implementation procedures and not the printed tables that are the standards.**

The tables are used by buyers and sellers in nearly all bulk custody transfers of petroleum and by national authorities in calculating taxes and duties on produced and marketed quantities. In recognition of this fact the Petroleum Measurement Tables for 60°F/15°C and 20°C have been adopted as international standards ISO 91-1 and ISO 91-2 respectively.

## Table revisions

By the 1990s, there was growing awareness amongst users and the organisations responsible for their development that the Petroleum Measurement Tables were not only falling behind modern technical practices and capabilities, but were also no longer matching the increasingly demanding requirements of the oil industry. It was therefore agreed that they would be revised and the following changes would be included in the revision:

- Extend the temperature range down to –50°C.
- Extend the density range to cover negative API gravities (from 0 API down to –10° API).
- Incorporate the 20°C tables (IP Petroleum Measurement Paper No 3).
- Change rounding of density in metric tables from 0.5 kg/m3 to 0.1 kg/m3 in order to improve discrimination.
- Incorporate a running decimal point in the implementation procedure and change rounding of the VCF output from the current four or five decimal digits (places), depending on whether the VCF is greater than or less than 1 respectively, to a consistent five decimal places.
- Remove the integer method.
- Replace the power series with an exponential function in line with modern computing methodology.
- Issue the tables in CD-ROM format.
- Rewrite Volume X: deleting Fortran; adding lubricating oils; incorporating items (a) to (g) above; and adding the products listed in item (l) below.
- Revise the implementation procedures, which remain 'the standard'.
- Develop and enhance the C-table routine, clarifying the methodology for obtaining alpha values.

  (l) Adding implementation procedures for ethylene, propylene, reformulated gasoline (RFG), natural gas liquids, MTBE (methyl tertiary butyl ether) as well as gasohol/RFG.

  (m) The use of the International Temperature Scale 1990.

In addition, at the request of US users who have extensive pipeline metering systems, the procedure would produce a combined temperature and pressure-related volume correction factor. However, the procedure also has the facility to generate a temperature-only VCF.

## Online implications

The introduction of these revised tables will have implications for companies that have computerised online measurement using flow meters, as their introduction will require modifications to the hardware and the introduction of new computer programmes.

In order to make allowances for the need to carry out these modifications over an acceptable time-scale, and to allow companies to continue to use the existing programmes provided that the measurement accuracy is the same as the new tables, a 'grandfather clause' was introduced into the tables. This will allow the changes, if they are to be made, to be carried out within two years of the publication of the new tables.

In order to ascertain if such a grandfather clause was acceptable to Her Majesty's Customs and Excise (HMC&E) a meeting was held at the Institute of Petroleum and presentations made to HMC&E representatives. Following discussion it was agreed that such a grandfather clause would be acceptable and HMC&E would prepare a 'Statement for Industry' to this effect – this statement is set out below:

**Mineral (Hydrocarbon) Oils – Standard Temperature Accounting**
This business brief is about changes in the way in which standard volumes will be calculated in the future.

**Background:**
The American Petroleum Institute (API) and the America Society for Testing and Materials (ASTM) in conjunction with the Institute of Petroleum (IP), are currently revising the tables used in the conversion of volumes at observed temperature to volumes at standard temperature.

**What will happen in the future?**
The API/ASTM/IP Petroleum Measurement Tables based on reference temperatures of 15°C and 60°F will shortly be amended, and a new standard issued. This will mean that any new 'calculators' (in essence computer software, or hardware, used to convert volumes, rather than the meter) will have to meet the new standard, within two years of the standard's publication.

The changes are such that 'calculators' that meet the current standard will be accepted by HM Customs and Excise as meeting the new standard. However, if you install any new calculators they must meet the new standard.

The alterations to the measurement tables will be incorporated into the re-write of Public Notice 179 (see IP Petroleum Measurement Paper Number 7).

It should be noted that the revision also includes the incorporation of Tables based on 20°C as the reference temperature, at present published as IP Petroleum Measurement Paper Number 3.

It is envisaged that eventually the new tables will be adopted by the International Organisation for Standardization (ISO) as a replacement for ISO 91-1 (15°C and 60°F tables) and ISO 91-2 (20°C tables).

For further information on the tables or any aspect of the IP's Petroleum Measurement activities, please contact John Phipps, IP Technical Manager–Standards, on Tel: +44 (0)20 7467 7100 or e: **jp@petroleum.co.uk**

# Guidelines for terminal induction training of road tanker drivers

The Institute of Petroleum's Distribution and Marketing Safety Committee has developed new *Guidelines for Terminal Induction Training of Road Tanker Drivers*. Their purpose is to harmonise the induction training received by road tanker drivers at each terminal from which they load product, so that a consistent message is delivered. The Guidelines also include a methodology for managing that training.

Presented within these new Guidelines, the induction training syllabus covers the relevant safety, health, environmental and operational aspects of loading petroleum products at terminal loading racks. It focuses on hazards, risks and control measures that need to be understood and applied by employers, employees and contractors to ensure safe operation. These Guidelines will also be of use to those delivering induction training in this area.

**ISBN 0 85293 361 4** **£30.00** **25% discount for IP Members**

# Vapour recovery hazards bulletin www.petroleum.co.uk/dmsc/

The advent of the new IP website means that deliverables from Technical committees are becoming accessible to more members of the Institute.

The first publication on the Distribution and Marketing Safety Committee (DMSC) section of the IP website at www.petroleum.co.uk/dmsc/ is a summary of some of the problems encountered with operation of stages 1a and 1b vapour recovery equipment and their solutions.

The interim guidance provided in the bulletin will be updated to account for further lessons learned from incidents, or procedural or technological developments that could improve the safe operation of stages VR equipment. Contributions from readers are welcome and should be forwarded to Mark Scanlon, IP Technical Departmen mscanlon@petroleum.co.uk

**ISBN 0 85293 363 0**

**The Vapour Recovery Hazards Bulletin is available free online at www.petroleum.co.uk/dmsc/ Hard copies are also available from Portland Customer Services for £10.00 (25% discount for IP Members).**

# Petroleum measurement manual part XV metering systems section 2 guide to gas metering systems

## Second edition

This section of the *Petroleum Measurement Manual* covers the specification, design, installation and operation of metering stations for high accuracy measurement of the bulk flow of gases in pipelines and process plants. First published in 1991, this second edition incorporates new technology and the latest standards.

The types of metering equipment described are intended for the measurement of natural hydrocarbon gases for the purposes of sales, custody transfer, taxation or the allocation of production in a multi-user pipeline. Such systems will be referred to in this guide as fiscal metering systems, implying a standard of accuracy that is the highest reasonably attainable in practice, taking into consideration the balance between cost and accuracy.

Compliance with this guide and the relevant standards to which it refers should assist approval, where appropriate, by the UK Government and other regulatory authorities but it does not guarantee or imply such approval.

This guide will also be of use in the design and specification of metering systems that are not required to meet fiscal standards of accuracy such as those used for plant operational purposes and equipment performance monitoring.

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# Specifications and qualification procedures for aviation fuel microfilters API/IP specification 1590

This publication describes specifications and qualification test procedures for microfilter elements of the disposable cartridge type and, separately, the manufacturing requirements for new vessels for use in aviation jet fuel handling systems. It relates only to elements nominally rated within the particle size 1,0 - 5,0 microns and operating in an out-to-in flow format.

This second edition has been prepared to align API and IP perspectives and clarify certain testing requirements. The test fuel chemistry has also been changed to align with the 5th edition of API/IP 1581 *Specification and qualification procedures for aviation jet fuel filter/separators.*

It will provide an essential reference for all those involved in the design, manufacture, supply and operation of microfilters used in jet fuel handling systems.

**ISBN 0 85293 330 4** **£52.00** **25% discount for IP Members**

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# NEWS Technology

## Time-saving two-in-one level device

*A new level device which is said to combine the simplicity of a magnetic level indicator with the leading edge technology of guided wave radar (GWR) has been developed by Magnetrol International. The Aurora level device provides users a clear local visual check on their level measurement without the need for an additional loop meter. 'It can even measure interface and level in a single unit,' states the company.*

*'The two technologies, although combined, operate completely independently to provide a total redundant solution, whereby one system runs continuously in parallel to the other. Neither system requires any calibration and only one pair of side/side process connections is required, resulting in reduced installation and maintenance costs.'*

*With a suitable float, Aurora is claimed to be capable of measuring liquid level and interface, the only condition being a specific gravity difference of only 0.1 kg/dm³ between the upper and lower fluid. The tool is reported to operate in a temperature range of between –150°C to +400°C, in pressures from vacuum to 345 bar. It is said to handle measuring ranges from 356 mm up to 5.7 metres.*

*The two-wire loop powered transmitter is available with HART/AMS protocol and ATEX intrinsically safe or explosion proof certification. It can be adapted with non-invasive secondary equipment such as bi-stable switches and/or reed chain transmitters.*

*Aurora is said to be particularly suited for operation on clean liquids, hydrocarbons and other water-based media with a dielectric of 1.4–100. Typical applications are in hydrocarbon processing, such as petrochemical, chemical, refining and offshore industries.*

*Tel: +44 (0)1444 871313*
*Fax: +44 (0)1444 871317*

## Accelerating UK take-up of LPG auto fuel

A new electronic device has been developed that is claimed could accelerate the take-up of LPG by motorists by making the fuel easier to find. Garage forecourts equipped with a special radio transmitter can connect with the drivers of LPG-fuelled vehicles via a small dashboard receiver – the LPG Finder.

Many drivers and fleet operators are attracted to LPG as an environmentally friendly and cost effective alternative to petrol or diesel, although it has been estimated that only 70,000 vehicles in the UK currently run on the fuel.

The fact that less than 10% of garage forecourts in the UK currently sell LPG is a major deterrent to many drivers who fear they will be unable to refill their vehicles, especially when away from their home base. The LPG Finder is a compact electronic device designed to attach to a vehicle's dashboard and powered from the cigarette lighter socket. When the vehicle is within some five miles of a transmitter-equipped LPG garage, the LPG Finder displays the garage name, location, telephone number and the current price per litre of LPG.

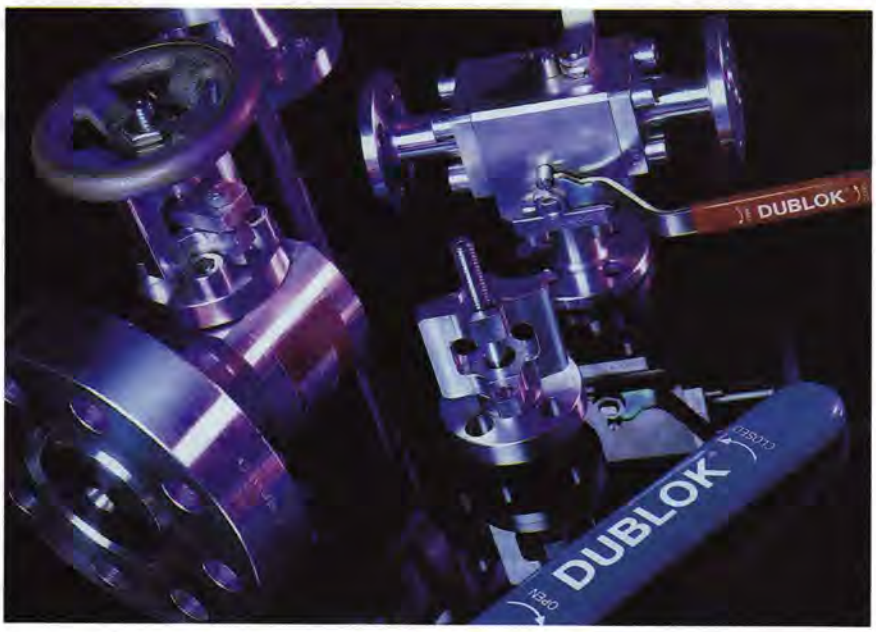
For further information about the system, expected to cost less than £100 for the motorist and £500 for the garage, e: **info@indlpg.co.uk**

## Wide valve portfolio targets petrochem/process sectors

Following the addition of the Dublok range of multi-valve assemblies to an already comprehensive portfolio of products and services, Sabre Instrument Valves claims to offer one of the most extensive ranges of instrument valves, manifolds, piping valves and instrumentation protection systems available to the petrochemical and process industries.

The Dublok range integrates multiple valves within a single, modular housing, saving space, weight and cost while reducing potential leak paths, states the company. The current range includes ball, needle, globe, gate and check valves with full or reduced bores, in single and double block-and-bleed configurations and with a wide variety of connection options.

Tel: +44 (0)161 925 4000
Fax: +44 (0)161 925 4001
e: **valves@sabreuk.com**



# Corrosion-resistant tube fittings

Reading-based tubular structures specialist Kee Klamp has introduced Kee Lite R – a new range of strong, lightweight and corrosion-resistant tube fitttings claimed to be ideal for use in platform, refinery and storage facility applications with high exposure to sea spray.

The fittings are manufactured from a high grade aluminium silicon magnesium alloy which is said to make them lighter than ordinary fittings and easier to quick-assemble. Integral Kee Koat II coated grub screws in each fitting are designed to lock the product safely and securely onto its respective tube, to deliver excellent slip load performance, states the manufacturer, and eliminating the need for time consuming welding or specialist installation skills while reducing structure assembly time and project costs.

The Kee Lite range is available to suit 42.4-mm and 48.3-mm tube gauges. The fittings can be powder coated in any RAL colour if required.

Tel: +44 (0)118 931 1022
Fax: +44 (0)118 931 1146
e: **sales@keeklamp.com**
**www.keeklamp.com**

# Shell to prove new fuel cell concept

**Shell Technology Norway (STN) recently unveiled plans to invest NKr100mn in a new 250-kW pilot power plant located adjacent to the Kollsnes industrial park that will prove the company's zero emission solid oxide fuel cell (ZESOF) concept. The fuel cell is to be built by Siemens Westinghouse. The plant will use gas from the Troll field as feedstock and is due to be commissioned in early 2004. It will produce power, heat and carbon dioxide ($CO_2$). The heat will be diverted to fish ponds at a nearby fish farm, with the $CO_2$ used to enhance the production of algae that is used in making food for the fish. The power produced will be delivered to customers at the industrial park.**

**According to STN's Odd Rune Hovdan, offshore fuel cells are ideally suited to replace existing, environmentally unfriendly offshore power production. They could be used in enhanced oil recovery projects by providing carbon dioxide ($CO_2$) for injection. In addition, they could utilise stranded gas in small discoveries and generate electricity from nearly depleted gas fields helping to postpone the need for abandonment. The main challenges will be to reduce weight and size.**

**Tel: +47 22 66 55 59**
**Fax: +47 22 66 55 29**
**e:** odd.hovdan@shell.no

# New treatment for downhole water blocking

*Water ingress has been a problem in the oil and gas extraction industries for many years. Various treatments have been used with varying degrees of success, from polyacrylamides with chrome cross-linkers to phenol formaldehyde resin treatments. However, University of Bradford spin-off company Advanced Gel Technology (AGT) has developed and successfully tested a new water-based hydrogel in Canadian oil fields to seal cracks in oil wells to prevent water seeping through.*

*The gel – for which AGT now has an international patent – is reported to have the ability to absorb virtually any liquid, such as hydrochloric acid or diesel, and is capable of supporting a variety of living cells and bacteria.*

*AGT has entered into a partnership with water blocking specialist Aqueolic of Alberta, Canada, under which AGT will share its technological expertise with Aqueolic's market knowledge and placement expertise. The result of this collaboration is a treatment called HYDRAGELseriesPT. The technology is based on a reaction between two copolymers to produce a unique hydrogel with a wide range of properties said to be quite novel to hydrogels. AGT's hydrogel is produced comprising approximately 97.5% water and can thicken to produce a substance that is reported to be many times stronger than other gels. The new compound is formed from two long elastic molecules – polymers – which form strong bonds to produce a 3D network. Both oil and water can be trapped within the pores to produce formulations offering a range of unique properties. Its consistency can be tailored to produce different properties of strength and consistency, whether thick, thin or sticky.*

*The two companies have worked together to develop a range of formulations to resolve sub-surface water problems in the oil and gas industry. The types of problem investigated include water coning, high permeability layers, fractures, poor primary cement and worm holes. In particular, attention has focused on resolving the problem of water seeping into oil and gas wells, and this application is now ready for the market, states AGT.*

*The gel's setting time can reportedly be controlled through formulation and it is claimed to be stable at temperatures up to 160°C and pressures of 5,000 psi. Its density can be controlled by mixing in controlled proportions of hydrocarbons to give the gel extra buoyancy – this ensures that formulations can be designed to ensure the gel sits on the interface of oil and water sub-surface. The gel is also reported to be ecologically and environmentally friendly, and is claimed to be between 100 and 1,000 times safer than other comparable chemicals.*

*Tel: +44 (0)1274 234721*
*Fax: +44 (0)1274 747455*
*e:* **deagland@bradford.ac.uk**

# NEWS Technology

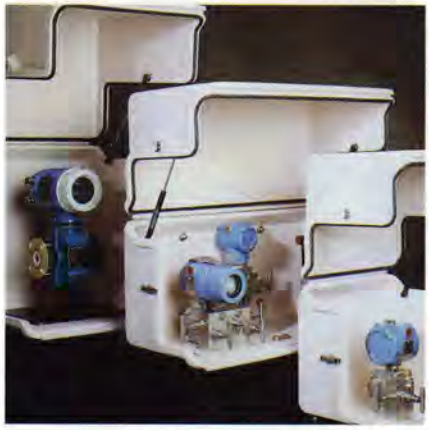
## Protecting process instrumentation

*In response to increasing industry investment in sophisticated process instrumentation, Sabre Instrument Valves has developed a comprehensive range of specialist enclosures designed to provide maximum on-site protection for sensitive measurement and communication equipment against the hazards of harsh environments and extreme weather conditions.*

*The enclosures are suitable for use with either back-mounted or base-mounted manifolds in two, three or five-valve configurations. Each comprises two matched mouldings in highly durable and fire-retardant GRP, joined by hinges and spring-adjusted toggle latches in stainless steel.*

*Gas-loaded prop stays ensure easy and safe opening, states the manufacturer, even in high winds, while an integral weatherproof seal, rated to IP66, is designed for full product lifespan service.*

*Available as individual ex-stock items, Sabre enclosures are also offered as the basis of complete factory-fitted packages which are fully customised to client specifications and include manifolds and free*



*issue transmitters. Supplied to site in 'ready-to-use' condition, with all process connections made from outside the enclosure, the packages cut down on the time and costs involved in both installation and testing, claims the company.*

*An anti-static enclosure range complying with BS5501 Part I is also available.*

*Tel: +44 (0)161 925 4000*
*Fax: +44 (0)161 925 4001*
*e:* **valves@sabreuk.com**

## Long-life IS oxygen transmitter

Panametrics is now offering a low-end trace-oxygen range as part of its O2X-1 intrinsically safe (IS) oxygen transmitter portfolio, as well as a lower cost Delrin material option for inert gas duty. The O2X-1 uses advanced galvanic fuel cell technology, combining accuracy with long sensor life, states the company. The compact two-wire loop power unit is said to be easily installed at the sampling point, even in tight spaces, and is unaffected by paramagnetic or hydrocarbon gases. Being compatible with acid gases, it is also reported to measure oxygen in carbon dioxide.

A linear 4-20mA output corresponds to one of four trace oxygen measurement ranges of 0 to 10, 100, 1,000 and 10,000 ppmv or a percentage range of 0 to 1, 10 or 25%. Range and callibration functions are selected via a three-button keypad.

The unit is weatherproof to IP66 and is IS certified to Cenelec requirements for Eex ia IIC T4 environments.

Tel: +44 (0)20 8643 5150
Fax: +44 (0)20 8643 4225
**www.panametrics.com**

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

## Pressure transmitters meet ATEX demands

**Basingstoke-based Gems Sensors has introduced the 22IS and 26IS intrinsically safe (IS) pressure transmitters to meet the demands of the new ATEX Directives which are to enter into force in June 2003. Based on the 2200 and 2600 Series, the units have EEx ia II BT4 certification and carry the ATEX II1G marking. This means the units can be used in area classifications 0, 1 and 2, as well as all dust and gas groups except acetylene and hydrogen. The units are also approved for use with both Zener safety barriers and isolation barriers.**

**The rugged units are claimed to provide the end user with a compact, lower cost option that can be directly fitted to pipework. 'This reduces installation costs, especially when compared to single-sided DP transmitters, which have to be remotely mounted and connected by small bore pipe work,' states the company. The transmitters have a pressure range of 1 to 400 bar and are designed for more than 100mn FS cycles.**

**Tel: +44 (0)1256 320244**
**Fax: +44 (0)1256 473680**

## Improving drilling practices

Halliburton Energy Services recently announced the commercialisation of its ADT™ applied drilling technology optimisation service. ADT comprises a suite of tools, software and services designed to reduce drilling trouble time and optimise drilling practices using critical data interpretation from a variety of downhole and surface sensors and specialised applications.

The service targets three areas of expertise, including wellbore integrity, hydraulics management and drillstring integrity.

Tel: +1 281 871 7532
e: **sperry-sun@halliburton.com**

# NEW Publications

## The Practice of British Geology 1750–1850

*Hugh Torrens (Available from BookPoint, Ashgate Publishing Direct Sales, 130 Milton Park, Abingdon, Oxon OX14 4SB, UK. Tel: +44 (0)1235 827730; Fax: +44 (0)1235 400454; e:* **orders@bookpoint.co.uk***) ISBN 0 86078 876 8. 372 pages. Price: £59.50.*

This collection of papers explores an area seldom considered by any historians – the contribution made by geological practitioners to the advance of mining in the growth period of the Industrial Revolution. The papers largely focus on the advantages of understanding the stratigraphical column in mineral prospecting, confining attention to the search for clays, limestone, ironstone and coal, which are found in stratified form. Prospecting for minerals occurring in veins is given only passing mention and there the author controversially assigns supremacy to other countries whose 'mining traditions were very much longer'. Other papers look at the development of the core drill and the failure of the British mining establishment to appreciate its advantages; the role of practical surveyors and miners with little or no formal training such as Arthur Aitkin whose mineralogical survey of Shropshire preceded and provided a basis for the better known work of Murchison; and the friction between the practical geologists and the 'gentlemen' of the Geological Society of London.

As in all collections in Ashgate Publishing's 'Variorum Series', the papers are published in their original language. While most are printed in English, one paper is in French and substantial sections of another are in Italian. This reflects the already international demand for such prospecting skills.

## A Century of Tankers

*John Newton (Intertanko, Baltic Exchange, 38 St Mary Axe, London EC3A 8BH, UK. Tel: +44 (0)20 7623 4311; Fax: +44 (0)20 7626 7078;* **www.intertanko.com***). 256 pages. Price (hardback): $45.00 (plus $10 p&p in UK, $15 to Europe $15 and $20 to the rest of the world).*

Written by a lawyer, *A Century of Tankers* encompasses social history, entrepreneurial endeavour, war, disaster at sea, facts and figures, and the technical development of the tanker, in a way that is interesting and informative, and a style that is easy to read. With numerous photographs, graphics and illustrative representations, the growth and technical changes in the tanker industry are shown. Newton covers the changes from sail to steam to diesel, the universal adoption of Sir Joseph Isherwood's patented 'bracketless' ship hull construction, and initial boom times to crisis at the end of the 1970s. It concludes with an account of a voyage on a modern tanker. This publication is interesting not only for historian and engineer, but also the casual reader.

*Brian Warshaw*

### IP Standard Methods for analysis and testing of petroleum and related products, and British Standard 2000 Parts, 2002

*Editor: John Phipps (Published by Institute of Petroleum, available from Portland Customer Services, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0)1206 796351; Fax:+44 (0)1206 799331; e: sales@portland-services.com). Hardback. Two-volume set. Price £395.00 (25% discount for IP members). Price includes a searchable CD-ROM of full text and artwork.*

A compilation of standards based on both traditional and modern instrumentation techniques, published annually. These standards are an essential part of any quality control regime. They are also necessary for national and international trading of petroleum and petroleum products. The 2002 edition contains 260 full methods and 16 proposed methods. Changes for the 2002 edition include 15 new full methods, two new proposed methods, five new European Standards, and two new International Standards. A number of test methods have significant changes and many have minor changes.

## Latest from the Library

**YOUR OFFICE AWAY FROM HOME**

### What can the IP Library do for you?

Some 15,000 queries are answered each year by IP Library & Information Service (LIS) staff. Over half of these are telephone queries, with e-mail enquiries accounting for a further 33% – a proportion that continues to rise at the expense of written and faxed information requests.

*There is a 50:50 split between queries from IP Members and non-members, ranging from school children and students to professors, engineers to managing directors, and consultants. We also take calls from hundreds of people wanting more information about working offshore.*

All aspects of the oil industry are covered by LIS, from exploration to petrol filling stations, history to forecasting, and technical to economic.

*The Library takes about 200 current periodical titles, although the stock ranges from items dating from as early as the mid-19th century to the present. Items are added all the time, including books sent to* Petroleum Review *for review.*

IP Members are allowed to borrow non-reference items. We also lend material to other libraries via the British Library System, for which we act as a back-up library as we hold some items that the British Library does not.

*We have four staff at present – three professional and one support. The professional staff will undertake quick queries for free and more extended research for a fee. They use the library stock, including CD-ROM databases such as* Petroleum Abstracts, *online sources such as* Reuters Business Briefing, *and the Internet. They are also responsible for obtaining the information for the annual* Petroleum Review Retail Marketing Survey.

All four LIS staff regularly update the databases on the IP website (**www.petroleum.co.uk**) – including Library Holdings; Addresses; *International Petroleum Abstracts*; and IP Test Methods. They are also responsible for maintaining the IP Consultants Database and the IP Corporate Directory. In addition, they maintain the 'Working Offshore' information held on the website, as well as the statistics, addresses and other useful information accessed via the IP Statistics Service.

*The Secretariat for the Information for Energy Group (IFEG) is also provided by the LIS, and arranges several events each year. A separate section of the website is maintained for the group, and an IFEG Member's Directory produced each year in hard copy, which is continuously updated on the web.*

### Don't delay, call today!

Why not contact the IP Library & Information Service to find out more about what we can do for you?

You can call us on Tel: +44 (0)20 7467 7111/3/4/5; Fax: +44 (0)20 7255 1472 or e: **lis@petroleum.co.uk**

Alternatively, visit our website at **www.petroleum.co.uk**

# Membership News

## NEW MEMBERS

Ms N Al Omar, Kuwait Petroleum Corporation
Ms W M Beasley, Heil Trailer International Ltd
Mr J G Burgess, Banchory
Ms H Cross, PriceWaterhouseCoopers
Mr D Francis, UFiP
Mr J Glesinger, Peterborough
Mr E Hagerty, Deloitte Consulting
Mr K A Hall, Nantwick
Dr A Huszer, MOL RT Danube Refinery
Ms A Jaja, London
Mr G Kirchgessner, Switzerland
Ms P Labella, Accenture
Dr G H Long, Swindon
Mr D MacKay, AUPEC Limited
Ms S Marshall, TTE Management & Technical Training
Mr C McGuire, County Wicklow
Mr W Mitchell, Grimsby
Mr J E Ngidari, Kenya
Mr I Nweze, David & Goliath Oil & Exploration
Mr S G Oddie, Gemini Advisors
Mr W Rankine, Citgo Petroleum Corporation
Mr K Sletten, Statoil
Mr M I Snobar, Saudi Petroleum Overseas Ltd
Mr D Stump, Deloitte Consulting
Mr T Washington, OSCE
Mr C J Watkinson, Corrocoat Ltd
Mr T C H Whatley, Chalgrove
Mr P Wulff, Veba Oel Ag

## STUDENTS

Mr F Animashaun, University of Dundee
Mr A D Buchan, Heriot-Watt University
Mr E T Etuk, London
Mr R F Farrell, Imperial College London
Ms T Lukanmbi, University of Dundee
Mr I M Parvez, University of Newcastle
Ms A Waziri, Crawley
Mr T Zachos, London

## DEATHS

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

| | Born |
|---|---|
| Mr W Bentley | 1916 |
| A B Cameron | 1911 |
| Mr D J Emery | 1913 |
| Mr H Hoog | 1911 |
| Mr T K Morris | 1945 |
| Mr B W Pace | 1930 |

**The IP regrets to announce the death of Mark Ingram, Editor, *UK Offshore Review*. He passed away peacefully in his sleep on 13 April after a short illness.**

IP THE INSTITUTE OF PETROLEUM

**Midlands Branch**
Lunchtime Meeting

**Thursday 20 June 2002**
**Worcester Rugby Club,**
**Sixways, Worcester WR3 8ZE**
**12.15pm bar for Lunch at 13.00pm**

Presentations: **What's Happening To Waste Oil?**
*by Roger Creswell, The UK Oil Recycling Association, and Chris Williamson, Petrus Oils Ltd.*

Cost: £12.00 per person
To reserve a place please contact: Margaret Ward, Midland Branch Secretary, Institute of Petroleum c/o Mike Ward Associates. The Rodgelands, Bank Lane, Abberley, Worcester, Worcestershire WR6 6BQ, UK.

Tel: +44 (0)1299 896654 Fax: +44 (0)1299 896955
e: **margaretward@mikewardassociates.co.uk**

Full details of this meeting and other events are on the Institute of Petroleum website at
**www.petroleum.co.uk**

IAEE

# BIEE

**International Association for Energy Economics**
**25th Annual World Conference 26–29 June 2002**

***Innovation and Maturity in Energy Markets: Experience and Prospects***

British Institute of Energy Economics &
University of Aberdeen
Aberdeen Exhibition & Conference Centre

**Role of Government – Natural Gas – Oil Industry – Environment IT and The Energy Sector – Renewable Energy**

Speakers include: **Lord Lawson, President BIEE; Vicky Bailey, Asst. Sec. of State US DOE Brian Wilson, UK Energy Minister; Malcolm Brinded, Group MD, Royal Dutch Shell**

Registration on the special conference website:
**www.abdn.ac.uk/iaee**
Registration forms from Fiona Flockhart, IAEE Conference Secretariat, Rm 104, University of Aberdeen, Regent Walk, Aberdeen AB24 3FX, UK
e: **f.j.flockhart@abdn.ac.uk** Fax: +44 (0)1224 272576

**ENTRIES NOW WELCOME FOR IP AWARDS 2002!**

*For more information contact*
Laura Viscione
Tel: +44 (0)20 7467 7174
e: **lviscione@petroleum.co.uk**
*or visit*
**www.ipawards.com**

# EVENTS Forthcoming

## JUNE 2002

**5-6** **Madrid**
*World Drilling Conference*
Details: International Association of Drilling Contractors
Tel: +44 (0)1224 877977
Fax: +44 (0) 875600
e: **webmaster@iadc.org.**
**www.iadc.org**

**10-11** **Surrey, UK**
*The Future of Gulf Oil: Geopolitcal and Economic Determinants*
Details: Centre for Global Energy Studies
Tel: +44 (0)20 7235 4334
Fax: +44 (0)20 7235 4338
e: **marketing@cges.co.uk**
**www.cges.co.uk**

**10-12** **Oxford, UK**
*Principles of the International Upstream Business*
Details: Oxford Princeton Programme
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474
e: **info@oxfordprinceton.com**
**www.oxfordprinceton.com**

**10-12** **Spain**
*ERTC Computing Conference*
Details: Global Technology Forum
Tel: +44 (0)1737 365101
Fax: +44 (0)1737 365100
e: **events@gtforum.com**
**www.gtforum.com**

**10-12** **Malaysia**
*The 7th Annual Asia Oil & Gas Conference: Surviving the Global Economic Uncertainties*
Details: Petronas
Tel: +6 03 206 5000
Fax: +6 03 206 5050 /55
e: **info@petronas.com.my**
**www.petronas.com.my**

**10-21** **Switzerland**
*International Tax Law*
Details: Robert Kennedy University
Tel: +41 1 308 3908
Fax: +41 1 308 3512
e: **admission@college.ch**
**www.college.ch**

**11-12** **Canada**
*Fundamentals of Reservoir Engineering*
Details: PEICE Petroleum Institute for Continuing Education
Tel: +1 403 284 1250
Fax: +1 403 685 4621
e: **domenic@peice.com**
**www.peice.com**

**11-12** **Canada**
*Advanced Maintenance Management Techniques*
Details: PEICE Petroleum Institute for Continuing Education
Tel: +1 403 284 1250
Fax: +1 403 685 4621
e: **domenic@peice.com**
**www.peice.com**

**11-13** **Belgium**
*TOC2002 Europe*
Details: Informa Maritime & Transport
Tel: +44 (0)20 7553 1439
Fax: +44 (0)20 7553 1820
**www.informa.com**

**12** **Canada**
*Natural Gas Measurement*
Details: PEICE Petroleum Institute for Continuing Education
Tel: +1 403 284 1250
Fax: +1 403 685 4621
e: **domenic@peice.com**
**www.peice.com**

**12-13** **Belgium**
*Electricity in Europe 2002*
Details: ICBI
Tel: +44 (0)20 7915 5103
Fax: +44 (0)20 7915 5101
e: **icbi_registration@icbi.co.uk**
**www.icbi-uk.com**

**13** **Canada**
*Natural Gas Dehydration and Dewpoint Control*
Details: PEICE Petroleum Institute for Continuing Education
Tel: +1 403 284 1250
Fax: +1 403 685 4621
e: **domenic@peice.com**
**www.peice.com**

**13-14** **Paris**
*Subsea Controls and Data Acquisition*
Details: Society For Underwater Technology
Tel: +44 (0)1224 823637
Fax: +44 (0)1224 820236
e: **jeansut@sstg.demon.co.uk**
**www.sut.org.uk**

**17-21** **Boston**
*Outlook for Oil, Gas and Power – An IHRDC Executive Forum*
Details: International Human Resources Development Corporation IHRDC
Tel: +1 617 536 0202
Fax: +1 617 536 4396
e: **mgmt.programs@ihrdc.com**
**www.ihrdc.com**

**18-19** **Canada**
*Introduction the Petroleum Refinery Processing*
Details: PEICE Petroleum Institute for Continuing Education
Tel: +1 403 284 1250
Fax: +1 403 685 4621
e: **domenic@peice.com**
**www.peice.com**

**18-20** **France**
*Ultra Deep Engineering and Technology: UDET*
Details: PennWell Petroleum Group
Tel: +44 (0)1992 656653
Fax: +44 (0)1992 656735

**18** **Leatherhead, UK**
*Auditing in UKAS Accredited Laboratories*
Details: ERA Technology
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: **info@era.co.uk**
**www.era.co.uk**

**19-20** **Leatherhead**
*Power Cable Asset Management*
Details: ERA Technology
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: **info@era.co.uk**
**www.era.co.uk**

**23 June-5 July** **Paris**
*Oil and Gas Management – Executive Session*
Details: ENSPM Formation Industrie
Tel: +33 1 47 52 72 93
Fax: +33 1 47 52 71 09
e: **josee.foucault@enspmfi.com**
**www.ifp.fr/enspmfi**

**25-26** **Leatherhead**
*Gas Turbine Hot Section Assessment and Life Management*
Details: ERA Technology Ltd
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: **info@era.co.uk**
**www.era.co.uk**

**25-26** **Leatherhead**
*Vehicle Electronic Systems Conference*
Details: ERA Technology Ltd
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: **info@era.co.uk**
**www.era.co.uk**

**27** **Leatherhead**
*Heat Recovery Steam Generators Assessment for Flexible Operation*
Details: ERA Technology Ltd
Tel: +44 (0)1372 367117
Fax: +44 (0)1372 377927
e: **info@era.co.uk**
**www.era.co.uk**

# MOVES People

**Keith E Batchelor** has been promoted to Executive Vice President, International Sales & Marketing of Foster Wheeler Energy Ltd (FWEL). He succeeds Gianni Bachiddu who retired in April after 28 years with the company. Batchelor will be replaced as Divisional Director, responsible for Sales & Marketing by **Stephen Culshaw**. FWEL has also appointed **Mohamed Nanji** as Vice President, Sales and Marketing for Asia-Pacific. He replaces **Rahul Nandi** who retires this year. Mohamed will be based in the Singapore office and will report to Keith Batchelor.

**Keiron Ferguson** is joining Entergy-Koch Trading Europe (EKT) as Senior Vice President, European, of Origination. Ferguson, formerly of Centrica, will be based in London and will report to **Uday Narang**, Managing Director of EKT Europe.

Calpine Thursday has appointed **Bill Berilgen** President of its Calpine Natural Gas subsidiary. Berilgen was formerly President of Sheridan Energy until its acquisition by Calpine in 1999, and has since managed as Senior Vice President.

Norwegian state-owned oil and gas company Statoil has appointed **Leif Terje Løddesøl** as Chairman with effect from July this year. He will replace **Ole Lund** who has completed his two-year stint.

Following Helix Well Technologies acquisition of Reservoir Development Services (RDS), a number of key management appointments have been announced: **Peter Leach**, formerly Managing Director of RDS, has been appointed Helix RDS Regional Director, Europe. He will be based in Aberdeen. **Roy Hartley**, formerly Helix Well Technologies Regional Director for Australia and Asia, has been appointed to serve as Director, London; **John Harris**, formerly Commercial Director of RDS, takes over from **Roy Hartley** as Regional Director of Australia and Asia based in Kuala Lumpur, Malaysia.

**Mary Tyler** has been appointed Vice President of Strategic Development at Portum. Tyler previously spent 12 years with Accenture and is a member of the international management team reporting directly to the Board. Her responsibilities will include forming global alliances and partnerships, and further building the company's sales channels as well as taking over the current UK country manager position.

**John Augustine** has joined Paragon Engineering Services, Inc of Houston as Senior Vice President to serve as one of the country's top executives. He will report to Paragon President **James R Gattis, PE**.

**Ellen Summer** has joined Schlumberger, succeeding **James Gunderson** as Secretary and General Counsel, and **Jean-Marc Perraud** has replaced **Jack Liu** as Executive Vice President and Chief Financial Officer.

*Software consultant and development company Digital Steps has appointed **Dr Larry Farmer** as non-Executive Director. Farmer retired as Chief Executive Officer of Halliburton Brown & Root at the end of last year after 25 years with the company.*

*Jeremy Clarke has been appointed Retail Marketing Manager of Murco Petroleum. Clarke has recently returned to the UK following a 16-month secondment to Murco's parent company Murphy Oil Corporation in the US. In his new role, Clarke will be responsible for both the company and dealer networks as well as overseeing all future retail acquisitions and developments.*

**Richard E Stern**, a chemist for El Paso Corp, has been named the new chairman of ASTM Committee DO3 on Gaseous Fuels. He was recently been Vice Chairman of the 60-member committee.

WS Atkins has appointed two non-Executive Directors to the Board with effect from 14 May 2002. They are: **Christopher Kemball**, most recently Vice Chairman of Hawkpoint Partners and **Paul Marsh**, a chartered accountant, is presently the Chief Operating Officer for TXU, (formerly known as Texas Instruments), Europe and Chairman of the National Electricity Pensions Body, EPTL. **Roger Umney**, a non-Executive Director since the formation of WS Atkins plc in 1987, will retire at the forthcoming AGM.

**Dr Roger Cairns**, FInstPet, has been appointed to the supervisory board of Parisian-based Technip-Coflexip.

*Charles Carr has been appointed as Director of Marketing and Communications at Wincanton plc. Carr joins the company from BAE Systems where he was Director of Campaign Communications. He will report directly to Chief Executive **Chas Lawrence**.*

**Jean-Pierre Poyet** has joined Geoservices SA as Technical Director and head of research at their Paris headquarters. Poyet joins the company from Schlumberger where he held a variety of positions over a 17-year period. His most recent positions were as Technical Manager for Wireline and Testing for the Middle East, based in Dubai, and Marketing Manager for nuclear products based in Princeton, US.

Following the merger between McKinnon & Clarke and GfE Netherlands, McKinnon & Clarke has appointed **Ben van Bemmel** to its Board of Directors with immediate effect.

**Trevor Smallwood**, the former Executive Chairman of FirstGroup, has become Chairman of Bristol-based data providers and analysts Catalist.

Enterprise Oil has announced that **Keith Henry**, after completing two three-year terms as non-Executive Director, will not seek re-election to the Board at this year's AGM. Henry has decided to leave the Board in order to devote more time to his role as Group Executive Vice President and Chief Executive Officer of Kvaerner E&C's engineering and construction business. He has been a member of the company's board since 1996.

# Introductory Courses on the Operations and Economics of the Oil and Gas Industry

**These two courses are particularly valuable for those employed by financial, commercial, legal, insurance, governmental or advisory organisations who require an informed introduction to the economic and commercial background and general trends of the oil industry. It will also benefit those new to the industry, including graduate trainees, who require a concise introduction to the industry and participants from within the industry who require a broader perspective of the oil and gas industry's activities and the economic factors affecting its development.**

## Introduction to Oil Industry Operations

**Course Provider**

IP THE INSTITUTE OF PETROLEUM

***Course Dates:***
**19 - 21 June 2002**

***Course Venue:***
**Institute of Petroleum, London**

***Registration Fee:***
**IP Member: £1300 (£1527.50 inc VAT)**
**Non-Member: £1500 (£1762.50 inc VAT)**

This well-established course provides a concise and informed introduction to operations, from the search for oil and gas to the delivery of products to different customers. Participants will gain an appreciation of the principal activities in the international upstream and downstream petroleum industry and an understanding of how these inter-relate, as well as an awareness of the impact of external influences and the ways in which the industry is adapting to increase its competitiveness and to meet new challenges.

This **Three-Day Course** Will Cover:

- Changing Perspectives in the International Oil Industry
- Exploration for Oil and Gas
- Basic Concepts of Drilling
- Petroleum Production
- Field Development
- Crude Oil and Characteristics of Supply
- Oil Trading and Supply Operations
- Marine Transportation
- Basic Processes of Refining
- Refinery Optimisation
- Logistics and Distribution
- Marketing / Retail Marketing
- Natural Gas
- Issues of the Day

## Introduction to Petroleum Economics

**Course Provider**

IP THE INSTITUTE OF PETROLEUM

***Course Dates:***
**24 - 26 June 2002**

***Course Venue:***
**Institute of Petroleum, London**

***Registration Fee:***
**IP Member: £1300 (£1527.50 inc VAT)**
**Non-Member: £1500 (£1762.50 inc VAT)**

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

**THE GEOPOLITICS OF OIL**

- Eastern Europe and the Former Soviet Union
- America
- Asia - Economic and Business Environment
- OPEC and the Middle East
- North Sea Basin

**THE OIL MARKETS**

- Crude Oil Markets
- Product Markets
- Oil Futures' Market
- Oil Supply and Price - The Outlook

**THE ECONOMIC STRUCTURE OF THE OIL INDUSTRY**

- An Overview of Petroleum Economics
- The Economics of Exploration
- Upstream Economics
- Downstream Economics

**A special combined registration fee is offered at a reduced rate for delegates attending both of these courses.**
**Combined Fee: IP Member: £2300 (£2702.50 inc VAT) Non-Member: £2700 (£3172.50 inc VAT)**

**For more information, see enclosed inserts or contact Lynda Thwaite at IP Training or visit: www.petroleum.co.uk**

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