PETROLEUM REVIEW

THE INSTITUTE OF PETROLEUM

NOVEMBER 1997

Asia–Pacific
Dash for gas drives development

Mozambique
Gas helps rebuild economy

Oil Supply
China and US to vie for Middle East oil?

UK Gasoline
No leaded fuel after 2000

We wouldn't be here if life were fair

Life can be so unfair. Everything seems to be jogging along reasonably well and suddenly disaster strikes. It could hit any of us at any time.

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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

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

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

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Front Cover: Testing the prolific Sangu field discovery in the Bay of Bengal: *courtesy Cairn Energy*

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

NEWS Upstream

Interesting times for Asia-Pacific region

The Asia-Pacific region is most widely known for its rapid economic growth and its 'Tiger' economies. The recent devaluations of a number of the region's major currencies are a real setback as are the forest fires that have polluted the region.

However, few believe that these will be more than a temporary setback to what is currently the most economically dynamic area of the world.

This month our main feature is the Asia-Pacific region and the new oil and gas developments that will fuel its economic growth. For reasons of space we have had to leave detailed consideration of oil and gas developments in Japan and Australia until the next issue (December).

Examination of the region's key oil and gas statistics (see table on pages 502 and 503) clearly shows there are problems if the region is to get all the hydrocarbons it is likely to require.

Oil supply appears to present the greatest challenge. The region has just 4.1% of the world's oil reserves but accounts for 10.8% of world production with an output growth rate that is 31% above the world average. The region accounts for 26.9% of global oil consumption with a growth rate that is 83% above the world average. Recent oil discovery rates have been extremely low and current new oil developments in the region involve just 2.9bn barrels (equivalent to one-and-a-half Brent fields) according to the Edinburgh-based consultants Wood Mackenzie in their latest survey (see page 506) of new oil and gas field projects in the region.

For gas the position is much better. Consumption at 10.7% of the world total is broadly in line with the region's 10.2% of world production. However, with consumption growing at a rate 55.1% above the world average and reserves at 6.4% of the world mean the position is not totally comfortable. In contrast to oil, however, Wood Mackenzie's project survey shows 66tn cf of gas reserves under development among the 54 likely development projects in the Asia-Pacific region (excluding Australasia) of which 30 are already underway.

These gas reserves under development are massive, equivalent to the the proven reserves of Canada or Mexico or Uzbekistan. A move to increase the usage of gas is clearly already underway and is likely to pick up momentum as developments start marketing their output.

The oil reserves, (or more accurately as much of it is condensates), the liquids reserves under development in the region in contrast are very small, more than the original reserves in the Forties field in the UK North Sea but less than the original reserves of Ekofisk in the Norwegian sector.

For a region that is consuming oil at 18.6mn b/d or 6.8bn b/y, 2.9bn barrels of reserves is equivalent to just five months' consumption. Reserves of this magnitude are unlikely to support a peak production rate of more than 500 to 600,000 b/d even if all the developments peaked together.

There is clearly going to be a significant growth in oil imports from the key supply area – the Middle East – currently the only area that has under-utilized capacity.

An article on page 516 suggests that China will be in active competition for Middle East oil supplies. One needs to be very optimistic about future exploration success to disagree with the conclusion. Our analysis of the Asia-Pacific region suggests that much of it will increasingly be looking to the Middle East for incremental oil supplies.

Chris Skrebowski

Fast-track plans for Gadwall oilfield

A new oilfield – Gadwall – discovered at the end of 1996 in central North Sea block 21/19 has been earmarked for early development by operator Shell Expro and coventurers Esso and Total Oil Marine due to its location close to the existing Mallard and Kittiwake field facilities. The Shell Expro-operated Mallard field is currently being developed as a subsea completion tied back to the existing Shell/Esso owned Kittiwake platform by a 15-km pipeline system and is due to come onstream next month.

Envisaged as another subsea completion, the initial development of the new Gadwall field is expected to require one producer – the 21/19-6 discovery well which has been suspended for development use – and one water injector. Oil evacuation is likely to be via the Mallard/Kittiwake pipeline where provision to tie in possible future developments have already been made. First oil could flow in 1999, depending on pipeline ullage availability, says Shell Expro.

Equity shares for Gadwall are Shell 38.1%, Esso 38.1%, and Total 23.8%.

In Brief

Arco and China National Offshore Oil *Corporation (CNOOC) have signed a cooperation agreement for the development of the Ledong natural gas fields in the South China Sea.*

Mitsubishi Corporation of Japan and *Exxon are reported to have jointly acquired concessions in four natural gas fields offshore Malaysia. A joint exploration programme will begin later this year.*

Premier Oil reports that the Gajah *Puteri-2 well in Natuna Sea block A offshore Indonesia has tested at 35mn cf/d of gas and 1,406 b/d of condensate. The well has been suspended as a potential future gas producer.*

PTT Exploration and Production of *Thailand is reported to have found gas with its first wildcat well drilling in the Mali prospect in block B17 in the Thailand-Malaysia Joint Development Area. The well flowed at a rate of 10mn cf/d and 688 b/d of condensate.*

China National Offshore Oil *Corporation (CNOOC) and Primeline Petroleum Corporation (PPC) have discovered natural gas and associated condensate in block 32/32 in the southern part of the East China Sea. The Vicky-1 well tested at a maximum rate of 9.86mn cf/d of natural gas and 117 b/d of condensate.*

Shell UK Exploration and Production *has brought the central North Sea Kingfisher field onstream some four weeks ahead of schedule. Production is expected to peak at 37,000 b/d of oil and 160mn cf/d of gas.*

Two new gas deposits holding an *estimated 3.5tn cf of sour gas reserves are reported to have been discovered in the Qatif region of eastern Saudi Arabia.*

Chevron has made a crude oil *discovery in the Pearl River Mouth Basin of the South China Sea. The Huizhou 26-2-1 discovery well tested at a combined rate of 7,566 b/d.*

BG plc, through its wholly-owned *subsidiary BG Exploration & Production, has entered into an agreement to sell its interests in the East Irish Sea for £98.5mn ($157.6mn) to Burlington Resources of Houston, Texas. The transaction covers 14 blocks – 10 of which are operated by BG – containing seven undeveloped gas discoveries with estimated recoverable reserves exceeding 700bn cf.*

NEWS Upstream

Total defies threat of US sanctions

A consortium including Total (40%), Gazprom (30%) and Petronas (30%) has entered into a contract with the National Iranian Oil Company (NIOC) to develop part of the giant South Pars gas field which lies in Iranian waters near the Qatar maritime border at depths of 70 metres. The field has reserves estimated at around 300tn cf. Production of gas and condensates is scheduled to begin in the second half of 2001.

Under the terms of the agreement, Total will be responsible for the delineation work, the development and the simultaneous production start-up of two phases of 1bn cf of gas per day each and the extraction of associated condensate. NIOC will take over as production operator one year after the $2bn-project comes onstream.

Total decided to go ahead with the project despite the possibility of sanctions by the US government under its Iran-Libya Sanctions Act (also known as the D'Amato Act). The Act, which was passed last year, provides for sanctions on foreign companies investing more than $20mn in energy projects in Iran or Libya.

However, if the US finds that Total is in breach of the legislation, it is unlikely that sanctions would have much of an impact on the French oil company which has only a small presence in the US.

Njord produces oil in record time

The Njord oilfield in blocks 6407/7 and 6407/10 on Haltenbanken in the Norwegian North Sea has come onstream. The Nkr5.4bn project has been completed in just 30 months as planned, the fastest execution time for a project of this size on the Norwegian continental shelf, according to operator Norsk Hydro.

The field development comprises a semi-submersible drilling, accommodation and production platform, Njord A, and a permanently anchored storage vessel, *Njord B*, located 2.5 km to the east. The storage vessel can be remotely controlled from Njord A and can be unmanned except during loading and maintenance.

Recoverable reserves are estimated at 32mn cm of oil and between six to 10bn cm of gas. A plateau production of 70,000 b/d is expected to be reached in spring 1998. Associated gas will initially be reinjected into the reservoir.

Partners in the field are: Norsk Hydro (operator) 22.5%, Statoil 20%, SDØE 30%, Mobil 20% and PetroCanada 7.5%.

Armada onstream

The £430-mn Armada development in the central North Sea has come onstream on time and some £107mn below budget.

The Armada fields – Fleming, Drake and Hawkins — hold 1.2tn cf of recoverable gas and 70mn barrels of condensate and natural gas liquids, and are expected to have a field life of between 20 and 25 years.

Gas and condensate are separated offshore before being piped to the nearby Amoco-operated Everest riser platform for export. Peak gas production of 450mn cf/d will be transported through the Central Area Transmission System to Teesside. Up to 26,000 b/d of condensate will be exported through the Forties pipeline system to Cruden Bay in Scotland, and pumped to Grangemouth for processing.

Partners in the project are: BG Exploration and Production (operator) 45.27% Amoco 18.20%, Fina 12.53%, Phillips Petroleum 11.45%, Yorkshire Electricity 6.97% and Agip 5.58%.

BG aims to be the lowest cost producer in the North Sea with an opex target of under $3/boe.

Premier takes control of Myanmar interest

UK independent Premier Oil has acquired an additional 6.6% in the Yetagun gas field in Myanmar, and assumed operatorship from Texaco, by exercising preemptive rights to acquire 100% of Texaco's 42.9% interest in the project. It purchased the equity stake for $260mn under arrangements involving the immediate re-sale of part of the interest to Malaysian state oil company Petronas.

Post change holdings are: Premier 32.3% (operator), Petronas 36.4%, Nippon 17.2% and PTTEP 14.2%.

Yetagun lies in the Gulf of Martaban and has proven and probable reserves estimated at 1.8tn cf of gas and 48mn barrels of condensate. Production is expected to commence in late 1999 at an initial rate of 200mn cf/d for a period of 15 years.

Premier and Petronas have also entered into a Memorandum of Cooperation under which they will pursue other potential upstream and downstream opportunities in Asia, focusing in particular on Malaysia, Myanmar, Indonesia and Australia.

In Brief

Apache Corporation is to pay Mobil *some $310mn for the oil and gas properties and gathering, transportation and marketing facilities owned by its Ampolex subsidiary in Australia.*

China National Oil and Gas Exploration *and Development Corporation, and Apache, report that the C-4 wildcat well in the Zhao Dong block in Bohai Bay, China, has tested at a combined rate of 15,359 b/d of oil and 6,107mn cf/d of associated gas. Apache is reported to have said that the discovery should rank among the top world discoveries of 1997 in terms of daily volumes. Commercial production is expected to begin in late 1999 or early 2000.*

Kazakhstan and state-owned Turkish *company Turkiye Petrolleri are reported to have signed a $750-mn agreement covering exploration and development of Turkey's onshore oil reserves near the Caspian Sea.*

Union Texas Petroleum Holdings has *purchased a 25% interest in the Borj El Khadra block in the Ghadames Basin, Tunisia, from Phillips Petroleum for an undisclosed sum. Phillips retains 25%, and operatorship of, the block. Lasmo holds the remaining 50%.*

Amoco is reported to have discovered *a 600bn cf natural gas field offshore Trinidad and Tobago. The Renegade field is located some 44 miles southeast of Galeota Point.*

China is reported to have finalized a *$878-mn plan to develop the Qinhuangdao 32-6 and Nanbao 35-2 oilfields in the Bohai Sea. Combined field reserves are estimated at 200mn tonnes. Production is scheduled to begin in 2003.*

Stickmap, a Denver-based company, *plans to create an international clearing house for seismic data on the Internet. The company is currently offering over 70,000 lines of seismic data representing over one million survey miles on its site, which can be found at @stickmap.com.*

Statoil and Gazprom are to jointly *explore the Medynskayamore field in the Pechora Sea. The cooperative agreement also covers studies of possible project development.*

The RD-2X well in the Rong Doi gas *field on block 11-2 in the Nam Con Son basin, Vietnam, is reported to have tested at 26.6bn cf of natural gas and 960 barrels of condensate per day.*

Natuna gas to be piped to Singapore

The West Natuna Group – a consortium of production sharing contractors (PSCs) Premier Oil Natuna Sea, Conoco Indonesia and Clyde Petroleum Indonesia, operating on behalf of Pertamina, Indonesia's national oil company – is planning to transport gas from the west Natuna Sea to Singapore, reports Woking-based Woodhill Engineering Consultants. The project is currently progressing through the design cost estimation and commercial negotiation stages. At present, associated gas from oil production in the region is flared due to the lack of a gas export system.

The preferred option for a new pipeline system involves a 600-km trunkline linking Premier's Anoa field to Singapore. Subsea tie-ins will be used to gather gas from Clyde fields, such as Kakap, and Conoco fields, including Belida.

The target date for delivery of first gas is 2000. Gas will be landed in the south of Singapore on an area which is part of a $5bn landfill and development project which will join several small islands. The gas will be used for power generation and as petrochemical feedstock.

Each PSC will be responsible for processing gas to meet pipeline and sales specifications.

Liquids and condensibles will be removed from the gas to enable the pipeline to operate dry. This reduces the pipeline diameter and the space requirements for the reception terminal in Singapore, states Woodhill.

Premier Oil is responsible for three phases of the Anoa part of the project:

- Phase 1 is the retrofit installation of injection, compression and associated facilities for gas conservation on to the Anoa platform in Natuna block A by 1998. The injected gas will enhance oil production until such time as it is required for gas export to Singapore.
- Phase 2 comprises the installation of gas processing and the use of the injection compressor for gas export in the year 2000.
- Phase 3 will see the development of additional reserves in the period beyond 2003 to maintain target production rates.

A key feature of the Anoa work being undertaken in Phase 1 has been the optimization of the surface facilities, particularly compression, using lifecycle modelling. 'The interface between reservoir performance and equipment requirements has been eliminated by the use of our proprietary software,' says Woodhill.

'The dynamic linking of all the system components (reservoirs, gathering networks, compression, processing, third party tie-ins, pipeline, point of sale contractual requirements, etc) has enabled the size and weight of key equipment items to be reduced.

'The lower space and weight for smaller field equipment has increased the options for project implementation at reduced cost. The increased understanding of overall system performance also enables better evaluation of future potential and higher confidence in the decision-making process. This is important for high cost infrastructure projects and pipelines where the commitment to the line diameter is a key decision.'

Anoa platform

In Brief

Shell, Mobil, Unocal, Amoco, Exxon, *Agip, Japan National Oil Corporation, Turkish Petroleum and the Iranian oil ministry are reported to have purchased seismic data on the Turkmen part of the Caspian Sea shelf and may take part in the tender for the right to explore and develop oil and gas in 11 blocks in the region.*

Nigeria has exported its first liquefied *petroleum gas (LPG) cargo produced by the Escravos Gas Project, a joint venture of Chevron and the Nigerian National Petroleum Corporation.*

Petrobras of Brazil has started *producing oil from the Barracuda and Caratinga oilfields located in the Campos Basin 80 km off the coast of Rio de Janeiro. Some 45,000 barrels of oil a day and 400,000 cm of gas a day are being produced from 11 oil wells during the initial phase of production. The two fields have joint reserves of 1bn barrels of oil and 15bn cm of natural gas.*

Socar of Azerbaijan and Italy's Agip are *reported to have signed a cooperation and production sharing agreement covering the Aras-Deniz, Kyurdashi and Kilgan-Deniz hydrocarbon deposits on the Caspian Sea shelf.*

Apache Corporation has announced *that its Beni Suef-1X exploration well on the East Beni Suef Concession in Egypt's Western Desert has flowed at 5,200 b/d. Meanwhile, Amoco and International Egyptian Operating Company are reported to have discovered oil offshore the Nile Delta. The Ha'py No 2 well tested at 23mn cf/d of gas and 88 b/d of condensate.*

Details of plans for the privatization *of Rosneft have been announced. Some 96% of the Russian oil company is to be sold off – 63% in special cash auctions and a further 33% in a commercial tender.*

Saga Petroleum has announced that *the Kristin and Lavrans gas and condensate fields in the Haltenbanken area offshore Norway are to be developed by a tension leg platform (TLP). Lavrans' subsea wells will be tied into the Kristin TLP.*

Chinese Petroleum Corporation is *reported to have begun exploring the Peudada oilfield offshore Sumatra Island, Indonesia. CPC holds a 65% stake in the project, with Treasure Bay Enterprise of Indonesia holding the remaining 35%.*

NEWS Upstream

Occidental trebles US oil reserves

Occidental Petroleum is to acquire the US Government's 78% interest in the Elk Hills field in California, for some $3.65bn. The addition of the field's estimated reserves of 670mn barrels of oil and 1.9tn cf of natural gas will triple Occidental's year-end 1996 US oil reserves and more than double its US natural gas reserves.

Occidental reports that the Elk Hills acquisition will immediately increase its net domestic production by 46,000 b/d and 92mn cf/d of gas. This increase in production has the effect of almost doubling Occidental's current domestic oil production and increasing current domestic gas production by about 20%. The company plans to expand its share of the Elk Hills net production to over 80,000 b/d and 300mn cf/d.

Occidental is also to divest of MidCon Corp, its US natural gas pipeline subsidiary, by early 1998. Some $3bn is expected to be raised from the sale – of which $1bn will be used to repurchase some 40 million shares of Occidental's common stock. The remaining $2bn will partially fund the acquisition of the Elk Hills field, which will be funded in the interim by a short-term debt. The remaining monies required for the field acquisition will be raised from the sale of other non-strategic assets, reports the company.

Sedgwick onstream

First oil has been produced from the Sedgwick/West Brae joint development located in blocks 16/6a north and 16/7a in the North Sea. Production is expected to peak at 27,000 b/d with rates averaging 22,500 b/d in 1998.

The fields are being jointly developed by a single Sedgwick production well tied back 2.3 km to the West Brae subsea manifold. Commingled flow is piped to the Brae A platform for processing and onward transportation through the Brae and Forties pipeline systems.

Quadrant 9 sales

The Beryl field consortium – comprising Mobil, Enterprise, Amerada Hess and OMV – is to acquire all of Conoco's assets in UKCS Quadrant 9 in the North Sea. The deal gives the consortium interests in three near term developments – Buckland, Sorby and Maclure – in acreage adjacent to its Beryl field, together with further exploration potential in UKCS blocks 9/18a, 9/19, 9/14c and 9/15b. First production from the three developments is expected at the turn of the century with gross rates of 9,500 boe/d rising to 70,000 boe/d within a year.

Possible new hub for UK central North Sea fields

Amoco and co-venturer Amerada Hess have made a new North Sea oil discovery in block 30/11b some 257 km off the Scottish coast. Provisionally named Appleton Beta, the discovery includes associated gas and could provide a new hub for oil and gas fields in the central North Sea, states Amoco, which holds a 51.54% stake in the project.

The oil is reported to be of 'exceptionally high quality and very light' with 'encouraging' flow rates of 6,329 b/d of oil and 13.4mn cf/d of gas.

The field lies in a high temperature/high pressure area and is close to several possible new developments including the Amoco-operated Halley field. A 'central area project team' has been established which, under the leadership of Richard Bozanich, previously Amoco's Southern Area Exploration Manager, will look at possible development options including the development of Appleton as a central hub. The team will also oversee appraisal drilling which is due to start before the end of 1997. The precise number of appraisal wells to be drilled has yet to be decided.

Appleton is the third discovery made by Amoco and its partners in the UK North Sea within the past 12 months. Last year, the company confirmed the commerciality of the Halley oilfield in the central North Sea before discovering oil in the Wood field further north.

'These discoveries confirm our belief that there are valuable North Sea oil and gas reserves still to be tapped, provided the UK economic and fiscal regime remains attractive for continued investment,' comments Amoco Exploration's Managing Director, Clive Fowler.

Indeed, just last month, Amoco and its co-venturers confirmed their own commitment to the area by announcing a £100-mn plus drilling programme to recover additional reserves and sustain production from existing fields. The programme is scheduled to begin in late 1998 when the first of two newbuild jack-up drilling rigs is due to start development drilling in the Amoco-operated Arbroath field, 241 km east of Aberdeen.

In Brief

Total has signed a new production *sharing contract with Pertamina of Indonesia for the North Sokang Block which lies northeast of Natuna Island in the South China Sea.*

Despite promising test results from *the Compae #1 well in the Maracas Association Contract Area in Colombia and encouraging indications while drilling the Santi #1 well in the Los Toches Association Contract area, Petrolex has decided to suspend all further operations in the country pending a full review of its overall security requirements.*

Lasmo has increased its acreage *holdings in Pakistan with the award of three new exploration concessions. The company will initially hold, as operator, a 95% working interest in the Pab and Offshore Indus A and B blocks, the remainder held by the Government of Pakistan. The blocks are covered by Pakistan Zone 1 fiscal terms which give the government the right to increase its equity to 15%.*

Indonesian state-owned oil company *Pertamina is reported to have signed seven production sharing contracts for oil and gas exploration and production over the next 30 years with Unocal Sesulu, Canadian Petroleum Manna, Total East Natuna, Gulf Resources, Premier Oil and Seafield Resources, Saba Petroleum and PT Telaga Binjai Energi.*

A consortium led by Perez Companc of *Argentina is reported to have obtained the operating licence for the Mata oilfield in eastern Venezuela. Field reserves are estimated at more than 142mn barrels of oil.*

BP Exploration, Alaska Inc reports that *it has begun a drilling programme at the Badami field offshore Alaska's northern coast. Field reserves are estimated at 120mn barrels. First oil is expected in late 1998.*

Premier Oil and Boral are to *jointly appraise the Yolla gas condensate field in the Bass Basin offshore Tasmania. Reserves are believed to be in excess of 500 bn cf of gas. Premier is to invest some $11mn in the project.*

The Bunga Kekwa oilfield, offshore *Malaysia's southern coast, has come onstream and is producing around 16,000 b/d.*

NEWS Downstream

New look for Far East forecourts

MTA Design has completed a number of corporate image redesigns for Far East petrol retailers, including the development of a new retail identity for Thailand's principal oil company, Thai Oil, based on the operation's existing Rhinoceros branding.

The re-imaging of Thai Oil not only involved the creation of a new logo featuring an abstraction of the Rhino horns to form, in MTA Design's words, 'a powerful and dynamic modern symbol which also evokes the energy flame of the refinery', but also new corporate and retail signage for the company's filling stations, ancillary offers, promotional items and advertising hoardings as well as new liveries for its fleet of road tankers and ships.

The new look was unveiled at a service station on one of the major highways into Bangkok (above).

The London-based design consultant also undertook a re-imaging of Petronas' Malaysian network of service stations in a bid to 'strengthen' the state-owned oil company's branding. This included the redesign of every aspect of the forecourt, including canopy, pole signs, pump spreaders and other signage.

Bold versions of the corporate green and white were selected together with a complementary splash of rubine red. A new 'Mesra' C-Store identity was also created (below). Mesra, which means warm and friendly in Malay, was 'chosen to reflect the provision of customer value in a hassle-free environment'.

New signage and interior elements were developed for the forecourt shops as part of the Mesra concept. The shops also feature a number of convenience services, including mini post offices, ATM machines, photocopying and laundry facilities, with a choice of payment by cash or credit cards.

In Brief

Fortune Oil is extending its service *station activities in northern China through its recently acquired 60% interest in subsidiary Wealthy Come Limited which has entered into a cooperative joint venture with Chinese petrol station operator Tongzhou Retail Station. The remaining 40% interest in Wealthy Come is owned by Reunification Enterprise, a Hong Kong-based investment company.*

Repsol of Spain has created a new *brand name, Repsol Gas, in order to promote and improve the domestic distribution of propane gas in its various forms. It currently delivers some 625,000 tonnes per year of propane to 55,000 propane tank owners.*

OMV is to acquire a 10% stake in the *Pakistani pipeline company Parco. Parco owns and operates a 1,215-km petroleum product pipeline, with a designed capacity of 6mn t/y, linking Karachi to Mahmood Kot in central Pakistan and north to Lahore.*

Texaco has purchased 19 of Conoco's *Jet-branded service stations in the UK in exchange for the straight asset swap of five Texaco sites.*

Shell and Austrian company Avanti *are to form a 50:50 petrol retailing joint venture effective from 1998. Some 70 of Shell's Austrian service stations will be combined with Avanti's 82-strong network. Plans are to extend the alliance to Hungary, the Czech Republic, Slovakia and Romania, where Avanti already has a strong presence.*

Calor Gas has sold 33.3% of its 50% *stake in Calortex, its UK domestic gas joint venture with Texaco, to Dutch company Nuon for some £10mn.*

Mobil is reported to be planning to *re-enter the South African market some eight years after withdrawing from the country. Mobil Oil South Africa will market a range of automotive, industrial, aviation and marine lubricants. It is understood that the company has no immediate plans to establish a service station network in the country.*

It has been reported that Hungarian *oil and gas company Mol has signed a gas supply agreement with Ruhrgas of Germany. Gas delivery will begin on 1 January 1998. Some 100mn cm/y of gas will be initially supplied, rising to 950mn cm/y by 2012 when the contract completes.*

NEWS Downstream

WEC calls for realistic CO_2 reduction targets

The World Energy Council (WEC), the global non-governmental energy policy forum, has called for 'greater realism' in the proposals for targets and timetables for carbon dioxide emissions reduction due for agreement at the Kyoto Climate Convention Conference to be held in Kyoto, Japan, in December 1997.

In WEC's view, targets for cutting industrialized countries' greenhouse gas emissions by 25% by 2005, or even 15% by 2010, as proposed for agreement at Kyoto, are not feasible in the light of the rapid rise in emissions in the 1990s and their current levels in most industrialized countries. Even a 5% cut from 1990 levels by 2010 is 'probably infeasible' for such countries as the US, Canada, Australia, Japan and Norway, states the forum.

WEC has also called for the immediate adoption, on a worldwide basis, of 'precautionary' measures to curb greenhouse gas emissions. Such measures include raising energy efficiency, encouraging energy conservation, moving to full-cost energy pricing, phasing out energy subsidies and accelerating the development and diffusion of non-fossil fuels.

The forum also states that concrete steps need to be taken towards the inclusion of the developing countries in measures agreed at the conference, albeit recognizing that action may be implemented by stages.

Snapshot of September fuel prices in the UK

UK petrol prices rose once more in September according to the latest Allstar monthly fuel report from Swindon-based PHH Vehicle Management Services.

The price rise is attributed to the continuing process of oil companies improving their margins as they emerge from the bitter 18-month price war and attempt to return to profitability. The situation has been compounded by a rise in the price of crude oil and a weakening of the pound against the dollar.

PHH predicts that fuel prices will continue to increase over the next few months.

	Pence per litre
Diesel	
Lowest: Glasgow	62.86
Highest: Inverness	67.03
National average	64.86
Unleaded petrol	
Lowest: Edinburgh	63.27
Highest: Aberystwyth	67.10
National average	65.02
Four-star petrol	
Lowest: Swansea	68.01
Highest: Aberystwyth	72.64
National average	70.21

Source: *PHH Allstar Fuel Report*

Ofgas acts to curb misleading sales

UK gas industry watchdog has published a proposed licence condition on marketing in a bid to root out misleading sales practices in the expanding UK domestic gas market.

If adopted, it would mean that licensed gas companies could be penalized by Ofgas if their sales personnel gave misleading or deliberately inaccurate information to prospective customers.

The proposed licence condition will only apply to the domestic market, and needs the agreement of 90% of all holders of gas supply licences – by number and by volume – before it can be included in the supply licence.

The marketing condition, which is published as a consultation paper, suggests that licence holders regulate themselves by keeping a record of marketing complaints and submitting these to Ofgas for publication – initially at three-monthly intervals.

The proposed licence condition would include the following:

- Selection and training of sales staff who are in direct contact with domestic customers.
- An audit of sales activity – a customer signing a contract following a sales visit or telephone call would be contacted within 14 days by someone else from the company to ensure the customer is content with the sales approach and aware he or she has signed a contract.
- Where a sale took place two months or more before a customer is due to change supplier, the company maintains contact with the customer and informs them of progress.
- A ban on using agents who seek payment in advance for arranging a supply of gas.
- Schemes for paying compensation.

In Brief

UK gas industry watchdog Ofgas and *BG plc have agreed on a new pricing regime for UK gas transport charges. Under the terms of the agreement there will be a one-off reduction of 25% in 1997/98 in the prices charged to gas suppliers by Transco, the BG company that owns the gas pipeline network in the UK.*

Centrica has agreed a number of *contracts for gas deliveries to the Netherlands through the UK-Continent Interconnector pipeline. Under the agreements, Centrica, through its subsidiary British Gas Trading, is to sell some 0.7bn cmly of gas to EnTrade – a trading joint venture between Dutch companies PNEM and MEGA – and DELTA over a period of eight years. Deliveries will begin in October 1998 following commissioning of the pipeline.*

Bulgaria is reported to have agreed a *10-year natural gas delivery contract with Gazprom of Russia. Under the terms of the agreement, some 6bn cm of gas will be delivered in 1998. The deal also covers the expansion of a pipeline in Bulgaria which carries Russian gas to Turkey.*

BP is reported to be planning to open *at least 21 new service stations in the Czech Republic by the year 2000.*

Shell has announced that it is to cut *some 3,000 jobs over the next two to three years as part of a restructuring of its European retail business.*

It has been reported that the Indian *state of Gujarat is looking to purchase some 7.5mn t/y of LNG on a long-term basis from Oman and Qatar. No details have been released regarding contract negotiations.*

Mitsubishi Corporation and Mitusi & *Co are to form a joint venture to import some 7mn tonnes of LNG per year from Alaska's North Slope oil and gas fields from 2007. The project will involve the construction of a new 1,300-km pipeline linking the fields to Valdez harbour. It is reported that the two companies are to invest some Y100bn in the project and will acquire a more than 10% stake in the fields.*

Kazakhstan and China are reported to *have signed a $9.5bn general agreement covering oil and gas development in western Kazakhstan and the Aktyubinsk region. The deal also covers the construction of a 3,000-km oil pipeline linking the two countries and a 250-km oil pipeline linking Turkmenistan to Iran.*

NEWS Downstream

French supermarkets form own fuel retail body

The French supermarket chains have broken away from France's independent fuel retailers association, Fédération Française de Petroliers Independants (FFPI), to set up their own professional body.

France's major retailers, with the exception of the Leclerc chain, have formed the Union des Importateurs Independants Petroliers (UIIP), claiming a 30% share of the petrol market and 18% for diesel.

'The supermarkets' membership of the FFPI had become a growing source of tension and forming our own association will give us a freer hand in better serving customers,' said UIIP President Guy Villelegier.

The supermarkets' decision was received with 'a mixture of regret and relief,' said FFPI President Guy Dutreuilh, adding: 'Over a period of 10 years, the independent retailers and the supermarkets did present a united front in defending their interests on upstream issues, such as stock reserves, but downstream conflicts emerged, the central purchasing of supplies being one example. The supermarkets' diversification into domestic oil heating in the past year, a traditional preserve of the independent distributors, was the last straw.'

On top of this, small service station operators have increasingly pointed the finger at the supermarkets for the current *malaise* in the sector, in particular, accusing their loss-leader tactics on pricing as being the principal cause of the distribution network's demise in France.

Each category of fuel retailer – refinery groups, independents and supermarkets – now has its own representative body and a clarified lobbying structure which could serve to break a deadlock which has lasted several months on the granting of a public aid package to struggling retailers.

This aid had been frozen following complaints from a small retailers federation which took exception to the supermarkets, via its membership of the FFPI, having a say in the allocation of subsidies.

Study of UK domestic gas industry

John Battle, UK Minister for Science, Energy and Industry, has announced the commissioning of a study into the competitiveness of the UK downstream gas industry. The study – to be coordinated by the Department of Trade and Industry with assistance from the Society of British Gas Industries and the Gas Forum – will look at how the changes in the market over recent years have affected gas suppliers, shippers, transporters and the suppliers of goods and services. It will also assess the issues directly impacting this sector, including the macroeconomy, labour market, availability of finance for business, competition, physical infrastructure, education and training, and inward and outward investment.

The study is expected to start during the next two months and will take four months to complete. Once the results have been assessed, an action plan will be set out to develop the industry's competitiveness and address any deficiencies brought to light.

Battle has also called for the UK gas industry to find ways to bring down the costs of manufacturing, installation and operation of pre-payment gas meters and to look at alternative ways to meet customers' needs.

'I am concerned at the price differentials which are opening up to the disadvantage of pre-payment customers in the gas market,' he said. 'These differentials can be put down to the high costs of the current system and associated poor administrative procedures. Gas is not a luxury and I want to see the industry giving this issue real priority.'

Shell acquires Gulf's downstream assets

Chevron has agreed to sell the marketing interests of its wholly owned subsidiary Gulf Oil (Great Britain) to Shell UK as part of its strategy to withdraw from the UK downstream oil business.

The deal covers Gulf's 450-strong UK service station network and three fuels terminals at Cardiff, West Bromwich and Ellesmere Port as well as its lubricants and commercial fuels business. The sale is expected to complete in the fourth quarter of 1997.

In a separate transaction last month, Gulf signed an agreement with Texaco to sell its 50% interest in the jointly owned Pembroke Cracking Company (PCC) which operates a 90,000 b/d catalytic cracking facility at Texaco's Pembroke refinery in Wales. The sale of PCC, which is subject to the sale of Gulf Oil to Shell, is also expected to complete by the end of 1997.

Chevron plans to shut down Gulf's 115,000 b/d refinery located near Milford Haven, Wales, and will offer Gulf's Cheltenham headquarters building for sale later this year. The company has also announced that it plans to sell the Gulf trademark in the UK and Ireland to Gulf Canada Resources. It will licence the trademark to Shell while it rebrands the retail and distributor network and lubricants business.

In Brief

Russia is reported to be planning to sell *34% of Eastern Oil Company in an auction this month as part of the country's privatization programme. It has yet to be decided if foreign companies will be allowed to participate in the auction process. The government is also to sell off almost 49% of Tyumen Oil Company.*

Shell Oil is to acquire Gulf Coast-based *Tejas Gas Corp for $1.45bn. The company will pay $61.50 per share for Tejas stock and assume $900mn in debt and preferred stock.*

BP is reported to be planning to open *up some 60 service stations in the region around Moscow by the end of the year 2000 as part of a $150-mn expansion of its petrol retailing activities in Russia.*

Shell is reported to have acquired *Argentinian bottled gas company AutoGas for $73.5mn as part of a $1-bn investment programme in the country over the next five years.*

It has been reported that Dutch *company Eurodek Copenhagen has opened the first stage of its new oil terminal at the port of Muuga in Estonia. The new facility will handle some 300,000 tly of Russian chemical and oil products to Western Europe.*

Enron International has received *approval from the Indian Government to construct and operate a $500-mn LNG processing plant in the Indian state of Maharashtra. The gas will be supplied to its Indian affiliate, Dabhol Power.*

Ramco Energy has abandoned its *£54-mn bid for JKX Oil & Gas following stiff opposition from Ukrgazprom and National Petroleum of Ukraine which hold a 21.6% share in the company.*

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Brent Spar – the final furlong

Shell UK Exploration and Production (Shell Expro) published last month an independent assessment of the final list of proposed solutions for the disposal of the Brent Spar storage and offloading buoy, currently moored in Erfjord in Norway. The study, which was carried out by Det Norske Veritas (DNV), indicated 'no clear winner' out of the nine proposals under consideration.

According to Shell, the assessment and the dialogue to follow mark the last stages of the project launched two years ago to start all over again in finding a solution to the Spar disposal problem. Shell had to shelve its plan to dump the structure in the deep waters of the Atlantic following heated protest from environmental activists.

Six contractors submitted detailed proposals to Shell Expro in June 1997. The proposals are outlined as follows:

- Amec Civil Engineering proposes taking cleaned 'slices' of the Spar's hull from another contractor and reusing them to help build a coastal defence barrier against sea erosion in Norfolk in southeast England. Estimated total cost of project: £32.8mn, including £14mn for another contractor to raise the Spar and supply the cleaned slices.
- Brown & Root Energy Services proposes up-ending the Spar at its mooring in Norway using compressed gas, then towing it across the North Sea to a yard at Nigg in Scotland for scrapping onshore. Contractor's price: £48mn.
- Kvaerner Seaway Spar Alliance (KSSA), formerly Kvaerner Stolt Seaway Alliance, proposes two lifting methods. After towing the Spar to a yard in Norway it would either raise the structure vertically using compressed gas, or raise and rotate it to the horizontal, then either scrap it onshore or reuse sections of the hull in a fish farm, with the topsides becoming a land-based training centre. Contractor's price: £17.6mn vertical option; £11.4mn horizontal option.
- McAlpine Doris Able proposes up-ending the Spar using compressed gas, towing it to a dry dock in the northeast of England and reusing much of the hull to build a quay wall at the dock itself. Contractor's price: £19.6mn.
- Thyssen-Aker proposes partly raising the Spar using compressed air, then towing it to a yard in Norway where it would be fully raised up with jacked cables before scrapping onshore. Contractor's price: £21.3mn.
- Wood-GMC proposes raising the Spar vertically at its present location using jacked cables, then cutting the hull into 'rings' and reusing these to extend a quayside in Norway. The topsides would be scapped onshore. Contractor's price £21.5mn.
- The final option, and the one originally proposed by Shell and approved by the UK Government in 1995, is deepwater disposal. The plan has been adjusted for the Spar being towed from its mooring in Norway, rather than from the Brent field, to a UK deepwater disposal site. Price: £4.7mn.

Balanced assessment

DNV assessed each proposal on the basis of technical risk, safety risk and environmental effects, and verified the contractors' prices. Each aspect was looked at in turn and the proposals balanced against one another by parameter. No overall ranking indicating a preferred solution was put forward.

The proposals from Brown & Root and Wood-GMC, together with the deep sea disposal option, were deemed to be the most technically feasible projects based on assessment of confidence in the approach proposed and the risk involved.

The safety assessment included a calculation of potential loss of life (PLL) values based on historical data for fatalities in similar types of work. The deep sea disposal option came out 'top' in this category with the lowest level of estimated PLL while the proposal from Amec had the highest.

Comparisons of energy consumption for carrying out the various proposals showed that the proposals from both Brown & Root and Amec had an energy requirement more than twice that of the other proposals, the differences between the other solutions being 'insignificant'.

A net energy balance, considering the balance between energy consumption and energy savings from Spar reuse/recycling, was also carried out. This showed that all the proposals, with the exception of deep sea disposal, demonstrated a net energy saving.

Emissions to air were also assessed and the net emission balance showed that the proposals from Kvaerner and Thyssen-Aker were significantly better than the others as far as carbon dioxide emissions were concerned. Brown & Root's proposal and the deep sea disposal option were worse than the other proposals for nitrous oxides while the proposals from Amec and McAlpine Doris, together with deep sea disposal, were the worst for sulfur oxide emissions.

All the proposals, bar that from Thyssen-Aker, were deemed to have a moderate to minor 'ecological severity of consequence'. Thyssen-Aker's proposal had a high rating as its plan called for disposal of marine growth in an area already suffering from a high loading of such matter.

The full DNV report is available on the DNV website: http://www.dnv.com. The DNV website can also be accessed via a hot-link from Shell's Brent Spar website which can be found at: http://www.shellexpro.brentspar.com. This can be accessed via the IP web site at http://www.petroleum.co.uk/petroleum/.

Speaking in London on 13 October, Heinz Rothermund, Managing Director, Shell Expro, said that all the key facts and figures about the Spar were now in the public domain. He also stated that deep sea disposal, which was still the option currently approved by the UK Government, remained the 'benchmark' for comparison of the contractors' proposals.

Eric Faulds, Shell Expro Decommissioning Manager, explained that the technical feasibility of each proposal would be assessed first in the process of finding the best practicable environmental option to put forward to the UK Government. 'A key concern is the stress levels the Spar would have to withstand in some of the proposals,' he said. Safety, environmental impacts and costs would be balanced next, once technical feasibility had been established as 'acceptable'.

Shell also announced that DNV's findings were to be discussed in a final round of dialogue over the course of October 1997, with meetings scheduled in London, Copenhagen, Rotterdam and Hamburg, before the company defines its preferred option to take to the UK Government around the end of 1997. Shell anticipates that the government will then instruct it to carry out formal consultations before calling for a final abandonment plan.

Dash for gas across region

The most notable feature of the Asia-Pacific region is not its similarities but its differences. Countries range from major oil exporters such as Indonesia, and on a smaller scale Malaysia, to major importers without oil production such as Japan and South Korea. It also includes countries that have significant indigenous oil production but even larger demand such as India and China.

A similar spread is seen for gas production and consumption. There are major gas exporters, primarily of liquefied natural gas (LNG), such as Indonesia, Malaysia, Brunei and Australia, but for the rest of the region gas consumption is largely determined by production capacity. The only exceptions to this being China and some minor producers where production actually exceeds consumption, either because of lack of delivery infrastructure or because the production is economically inaccessible, an example being associated gas in offshore fields.

However, despite the lack of gas delivery infrastructure throughout the region, overall gas demand growth at 7.5% was well ahead of regional oil demand growth at 4.4%. Although gas demand growth has shown wide swings over the last 10 years, regional gas demand growth has easily outpaced the demand growth for oil. This in turn has led to a slow but steady increase in the importance of gas in the region's energy mix.

One cohesive feature of the region is that, with the notable exception of Japan and the partial exception of Australasia, economic growth rates have been exceptionally vigorous and typically in the 7 to 9% per year range. The recent currency upheavals in the region and the economic impact of the forest fires in Indonesia are both seen as likely to depress economic growth in the region.

Although it is far too early to gauge the amount growth will be reduced, and whether any growth reduction will be sustained, there have already been major devaluations of the Thai baht, the Malaysian ringgit, the Philippino peso and the Indonesian rupiah which are likely to impact negatively on both national and regional growth rates.

The devaluations are currently so large, with currency values in mid-October between 25% and 40% below their levels in early August, that both Thailand and Indonesia have already called on the International Monetary Fund (IMF) for assistance.

The likely conditions that would be attached to IMF loans and currency support operations are already being seen as positive pressures to improve the quality of financial and government administration in the region. In short the optimists are arguing that the present upheavals will lead to better administration and more sustainable growth once the initial hiccup is overcome.

Already a number of capital projects in the region have been cancelled or delayed in reaction to the increased cost of imports and the increased cost

Country	Oil Res. bn b	R/P ratio Years	Oil Prodn. '000 b/d	'95-96 Δ %	Oil Cons. '000 b/d	'95-96 Δ %	Gas Res. tn cm	R/P Ratio Years	Gas Prodn. bn cm
Australia	1.8	8.5	615	6.1	785	1.1	0.55	18.5	29.8
Bangladesh	—	—	—	—	50	3.9	0.29	38.2	7.5
Brunei	1.4	2	165	-5.3	—	—	0.4	34.5	11.6
China	24	20.7	3,170	6.4	3,615	7.3	1.17	58.8	19.9
India	4.3	16.5	745	-5.9	1,630	7.9	0.69	33.5	20.4
Indonesia	5	8.6	1,640	4.5	900	9.4	2.05	30.8	66.5
Japan	—	—	—	—	5,830	0.5	—	—	—
Malaysia	4	15.4	725	0.3	395	3.4	2.27	64.2	35.4
Myanmar	—	—	—	—	—	—	—	—	—
New Zealand	—	—	—	—	125	2.5	—	—	—
Papua New Guinea	0.3	7.1	105	6.3	—	—	—	—	—
Pakistan	—	—	—	—	340	13.6	0.62	41	15.2
Philippines	—	—	—	—	360	4.4	—	—	—
Singapore	—	—	—	—	510	-1.1	—	—	—
South Korea	—	—	—	—	2,145	6.9	—	—	—
Taiwan	—	—	—	—	725	-0.3	—	—	—
Thailand	—	—	—	—	785	9.4	0.2	18	11.2
Vietnam	0.6	9.7	170	12.7	—	—	0.14	100+	—
Other[a]	1	13.1	225	2.5	480	7.1	0.69	73.5	9.90
Total Asia-Pacific	42.4	15.7	7,560	3.8	18,675	4.4	9.11	40.1	227.4
Total World	1,036.9	42.2	69,685	2.9	69,545	2.4	141.33	62.2	2,231.4
Asia-Pacific as % of world	4.1	—	10.8	1.31	26.9	183.3	6.4	—	10.2

Source: BP Statistical Review 1997, *interpreted by* Petroleum Review

[a] Totals for countries not individually itemized

ASIA-PACIFIC Production, Consumption and Refinery Capacity

of servicing foreign loans. Malaysia is reported to be encouraging an increase in oil output for balance of payments reasons in an apparent reversal of its earlier policy of production restraint.

Over recent years, oil and gas demand growth rates have been well below economic growth rates showing the degree to which regional energy growth has become decoupled from economic growth even in an area where industry and particularly heavy industry form major parts of the economy.

The hydrocarbon reserves of the area clearly show why gas is currently being expanded relative to oil. As a general rule, for oil, a reserves/production ratio (R/P) of under 10 years implies that production levels are likely to be reserves constrained while one of 10 to 15 years would be regarded as commercially comfortable for sustaining production levels. Ratios above 15 years would normally be regarded as implying that production rates could be expanded safely and sustainably.

For gas supplies the ratios would probably need to be a few years greater in each category to take account of the lower energy concentration of gas which in turn means that the delivery infrastructure needed is rather more inflexible than that for oil. In the particular case of a gas liquefaction plant to support LNG exports the normal rule of thumb is that proved reserves capable of providing at least 20 years of supply are needed to justify a project. In the case of Brunei the government has a policy of constraining production to conserve reserves.

On the basis of these indicative rules, oil reserves in Australia, Indonesia, Papua New Guinea and even Vietnam look uncomfortably low while Brunei and China could probably expand production.

The case of Indonesia illustrates one of the main problems in reserves or R/P ratio comparisons – the financial environment in which companies operate. Indonesia has a large number of petroliferous basins many of which are only lightly explored. Fields are typically fairly small with low recovery ratios. Historically the Indonesian authorities have levied some of the world's highest rates of tax on oil exploration and production which has tended to discourage exploration activity. However, development activity in Indonesia continues at reasonable levels (see table of new developments on pages 506 and 507) suggesting that the tax rates are not a major deterrent to the companies.

Indonesian oil and liquids production at 1.64mn b/d is at record levels but the volumes available for export are shrinking rapidly in the face of indigenous demand which has soared from 465,000 b/d in 1986 to over 900,000 b/d in 1996. If this rate of demand growth continues, Indonesia will cease to be a net exporter around 2003 or 2004.

Regional oil supply is likely to be an increasing problem in an area which produces around 7.6mn b/d but consumes around 18.7mn b/d. The only largescale net exporters in the region are Indonesia and Malaysia. Both countries will have progressively less to export as their expansion potential is limited (at least in the short term) and internal demand is growing fast. The smaller exporters such as Vietnam, Brunei and Papua New Guinea have a number of interesting projects but their overall potential, in the context of regional demand, appears fairly limited.

In addition to the region's two traditional largescale oil importers – Japan and South Korea – and a number of smaller economies including Pakistan, the Philippines and Thailand have expanded their oil imports in recent years to fuel their rapid economic growth.

China first became a net oil importer in 1993 but by 1996 was only meeting 87% of its requirements from indigenous sources. Despite the vigorous growth of production offshore China, the steady production declines in some of the older onshore producing areas means that Chinese oil imports are likely to keep rising.

Australia, despite the rapid expansion of production from the Carnavon basin on the North West Shelf, is experiencing declining production from the long-established Bass Strait fields and imports are now rising.

Australian production currently covers around 78% of the country's requirements unlike India where indigenous production now covers only 45% in the face of rapidly expanding demand. The Indian authorities' recent decision to open the country to exploration and production on favourable terms reflects their desperate need for additional production (*Petroleum Review*, September 1997, p416).

India's subcontinent neighbour, Pakistan, has virtually no indigenous oil production but is experiencing one of the region's fastest rates of oil demand growth and as a consequence imports are rising fast.

Asia-Pacific refining capacity is currently around 17.6mn b/d, but the area remains a net importer of products to meet a demand of nearly 18.7 mn b/d. The recent rapid expansion of South Korean capacity and the growth in Indian and Chinese capacity have not been enough to free the area from product import dependence, primarily from the the Middle East.

The overall conclusion is that, despite a likely slowing of economic growth, the region will continue to be one of the most dynamic areas for oil, gas and refinery investment as incremental production or refining capacity can be easily absorbed with little risk of over supply in the short term.

The following pages review the principal new developments and projects in the region. For reasons of space, developments in Australasia will be covered in the December issue.

Country	'95-96 Δ %	Gas Cons. bn cm	'95-96 Δ %	Ref. Cap. '000 b/d	1995-96 %
Australia	0.1	19.1	–2.1	805	2.7
Bangladesh	1.9	7.5	1.9	—	—
Brunei	0.2	—	—	—	—
China	13.1	17.7	0	4,225	5.3
India	8.6	21.7	10.4	1,210	6.8
Indonesia	3.8	30.2	–1.4	890	0
Japan	—	66.1	8.1	4,990	–2.2
Malaysia	22.4	16.2	11.8	—	—
Myanmar	—	—	—	—	—
New Zealand	—	4.7	12	—	—
Papua New Guinea	—	—	—	—	—
Pakistan	8.1	15.2	8.1	—	—
Philippines	—	0.1	66.7	—	—
Singapore	—	1.5	0	1,245	–2.2
South Korea	—	13.5	32.1	1,815	11
Taiwan	—	4.5	4.4	—	—
Thailand	11.7	11.2	11.8	—	—
Vietnam	—	—	—	—	—
Other[a]	8.1	5.4	59	2,415	12.1
Total Asia-Pacific	7.6	234.5	7.5	17,595	5
Total World	4.9	2,190.6	4.7	77,870	1.3
Asia-Pacific as % of world	155.1	10.7	159.6	22.6	—

Source: BP Statistical Review 1997, *interpreted by* Petroleum Review
[a] Totals for countries not individually itemized

ASIA-PACIFIC Production, Consumption and Refinery Capacity

Bangladesh

Bangladesh's principal asset is its large gas resources which provide over 60% of the country's total commercial energy supplies. Most gas discoveries in the past, with the exception of the Kutubidia offshore field, have been in the eastern part of the country.

Unocal and the Bangladesh Government recently signed a preliminary agreement to develop the Shahbazpour gas field in the south of the country. Further agreements are expected to be signed with Unocal and other international oil and gas companies in the future as part of a programme to develop an integrated network of pipelines and power plants in the country. Unocal is expected to invest some $700mn in Bangladesh over the next two years.

The offshore Sangu gas field is nearing completion and is due onstream in May 1998. Cairn Energy and Shell are investing some $200mn to $250mn developing the field. This includes the construction of a 530-km subsea pipeline linking Sangu to a new gas terminal being built in Calcutta, India.

Some 20 multinational oil and gas companies expressed an interest in securing exploration and production rights in the recent second round of bidding for Bangladesh's remaining 15 blocks. Eight other blocks have already been awarded to four US companies. Negotiations regarding award of licenses for the remaining blocks are expected to begin shortly.

Foreign interest in Bangladesh's power generation sector has picked up this past year following a number of new gas finds. In June it was reported that the country had signed some $400mn worth of contracts to set up three barge-mounted power plants as part of larger multi-billion-dollar investment plans being proposed by international energy companies. A number of fixed power plants have also been proposed, including a 300-MW power plant near the Shahbazpur gas field. (See also article on page 514.)

Brunei

Exploration activity in Brunei has declined over the past few years as the country's sole producing company Brunei Shell Petroleum has focused on the development of existing fields rather than on exploration drilling.

Output from the more mature fields in the country is also on the decline. Industry analysts forecast that the development of the offshore Maharaja Lela gas field in 1999, together with the probable development of the offshore Selangkir gas field that same year and BSP's unitized portion of the onshore Asam Paya oil and gas prospect (block SK14, Sarawak, Brunei) in 2000, will help maintain production at current levels until the turn of the century.

More recently, attention has turned to the hydrocarbon potential of the deeper turbidite plays offshore Brunei.

The government is reported to have considered the introduction of a production sharing contract regime in a bid to encourage foreign investment – in particular in exploration of the 'riskier' Baram Delta – although no concrete plans have been revealed so far. Jasra-Fletcher Challenge Energy recently targeted this area with its Perdana Deep-1 well which was drilled to a measured depth of 3,815 metres.

Foreign investors are also being encouraged to participate in developing independent power production (IPP) projects in Brunei. One $8-mn plan comprises the construction of three gas turbines at Gadong (just outside the capital city of Bandar Seri Begawan), feeders to the proposed substations, two gas turbines at Lumut (near the existing LNG export terminal), and a new power plant in the district of Tuttong Putting.

China

Although China recorded a marginal year-on-year increase in liquids production in 1996 of 3% to 3.1mn b/d, production is expected to decline to around 2.6mn b/d by the turn of the century. As can be seen from the accompanying table, while some new offshore oilfields are to be developed over the next few years, their reserves are modest.

In contrast, gas production is at an all-time high, averaging 1.6bn cf/d in 1996. This upward trend looks set to continue with the commissioning of the Yacheng 13-1 gas field in the South China Sea and the development of the offshore Dongfang 1-1 field in the Beibu Gulf west of Hainan Island and the onshore Shaan-Gan-Ning field in the Ordos Basin in north China, together with a World Bank-aided project to rehabilitate the onshore gas fields of the Sichuan Basin in central China. The latter project is just one example of the country's onshore basin development strategy which is currently centred on the maintenance and rehabilitation of existing production from the country's large northeastern fields through the use of water injection and other enhanced oil recovery techniques.

A number of new offshore discoveries have been made this year. One of the most significant was that reported by China National Oil and Gas Exploration and Development Corporation and Apache last month. Their C-4 wildcat well in the Zhao Dong block in Bohai Bay tested at a combined rate of 15,359 b/d of oil and 6,107mn cf/d of associated gas. Apache is reported to have said that the discovery should rank among the top world discoveries of 1997 in terms of daily volumes. Commercial production is expected to begin in late 1999 or early 2000.

Several new pipelines are planned to bring China's increasing volumes of gas to market, including a 3,400-km line linking the remote Tarim Basin in west China to the east of the country. A new 3,000-km pipeline linking China and Kazakhstan is also reported to be on the drawing board following the recent signing of a $9.5-bn general agreement between the Chinese and the Kazakh authorities covering oil and gas development in western Kazakhstan and the Aktyubinsk region. (See also article page 516.)

India

India has had limited success in attracting international oil and gas companies to participate in exploration and the development of its hydrocarbon resources in the past and has had to improve terms and bidding procedures for foreign companies to take up exploration rights. Interest in the region may rise following reports that huge hydrocarbon reserves have been detected in the Kerala-Konkan deep water basin offshore western India.

In the meantime, domestic demand for oil and natural gas has been growing more rapidly than production creating an increasing dependence on imports. In order to handle rising import volumes the government has approved the development of new LNG terminals at Pipapav, Hazira, Mangalore, Cochin and Ennore.

Foreign interest has focused on downstream opportunities in India over the past year. Recent developments include reports that Reliance Petroleum has been granted a $300-mn loan that will help finance the construction of a $2.4-bn refinery project and Enron International has been granted permission to construct and operate a $500-mn LNG processing plant in the state of Maharashtra. The gas will be supplied

Photo courtesy of Cairn Energy

to Enron's Indian affiliate Dabhol Power.

New power projects at Aligarh and Kosikalan in Uttar Pradesh, Haldia in West Bengal, Panipat in Haryana, Savli in Gujarat and Ennore in Tamil Nadu are also planned, as are two grass-root refineries, one on the east coast at Paradip and the other at Nagapattinam in the southern Tamil Nadu state.

Indonesia

While the accompanying table is not meant to be an exhaustive listing of new field developments, it clearly indicates that the emphasis in Indonesia is on gas with all but three of the 17 new projects listed (some 82% of new resources) being gas fields. Such focused development is not surprising as Indonesia is the largest marketer of LNG in the world with a 50% market share in the Asia-Pacific region.

It is important to note that the giant Natuna gas field is excluded from the tabulation. It has been classed as a 'possible' development, unlikely to receive development approval in the next few years given the considerable uncertainties that exist in relation to markets and sales price for the gas. The field has estimated in place reserves of 222tn cf, of which some 46tn cf is believed to be recoverable. (See also article page 496.)

Current exploration and development projects centre on- and offshore Sumatra, offshore Java, in the Natuna Sea and in East Kalimantan.

A number of significant offshore discoveries have been announced in recent months, including Arco's report of proved and probable reserves in excess of 12tn cf of natural gas in Irian Jaya in eastern Indonesia. The Tangguh discovery, located on the Weriagar and Berau blocks, ranks as one of the largest natural gas discoveries in the world, states the company. A further 6.5tn cf of possible reserves may also be in place according to Dallas-based independent petroleum engineering consulting firm DeGolyer & MacNaughton.

Development plans for Tangguh call for LNG production to begin in time for anticipated increases in market demand in 2003 and, with the Berau Bay region emerging as a major new gas basin, Arco plans continued exploration drilling to assess the ultimate potential of the area.

Malaysia

According to Wood Mackenzie, Malaysia's exploration sector remains 'in the doldrums' despite recent progress made on the MLNG Tiga project, the first phase of development of the Bunga Kekwa oilfield earlier this year and the commissioning of EPMI's Lawit gas field (which is reported to be capable of supplying about one-third of Peninsular Malaysia's gas requirements) located 240 km offshore Terengganu.

Exploration drilling activity has continued to decline. Fewer discoveries have been made in recent years and those new reserves that have been pinpointed are of a much smaller size than those found in the past. State-owned Petronas has introduced new fiscal terms in a bid to promote the effective exploitation of such marginal fields. In addition, the country's exploration acreage has been reblocked and companies new to the country invited to participate in bidding for licences as part of a drive to rejuvenate Malaysia's mature oil and gas industry.

Looking downstream, a number of new petrochemical plants are planned over the next few years. These include a new $700-mn complex in Gebeng, Kuantan to be jointly run by Petronas and German petrochemical company BASF. Petronas has also announced plans to borrow at least $1.5bn in 1998 to fund a number of new plants on the east coast.

Malaysia has also signed a deal with Japan Petroleum to supply 500,000mn tonnes of LNG per year for the next 20

years from its newest LNG plant in Bintulu, east Malaysia. The MNLG Tiga facility, the third in the country, is due onstream early in 2001. Gas will be delivered from August 2001 – shipped via tanker to a gas receiving terminal at Niigata, Japan. Similar deals are expected from gas buyers in Japan, Taiwan, Korea and India over coming months.

Malaysia–Thailand Joint Development Area

Two production sharing contracts in the Malaysia–Thailand JDA were signed in April 1994 after 22 years of negotiation. Since signing of the contracts, exploration activity has met with huge success. The Triton-Carigali joint venture, CTOC, has made a major commercial discovery with Cakerawala in block A-18. Four other discoveries – Suriya, Bulan, Burmi and Senja – have yet to be fully appraised. Negotiations for a sales agreement for Cakerawala gas are expected to be ratified shortly. Development of the field is expected to stimulate commercialization of other discoveries in the JDA.

The Carigali-PTTEPI Operating Company joint venture also made significant discoveries in block B-17, one of which – Muda – has been appraised. The Tapi, Jengka and Amarit discoveries in the block are to be further evaluated in coming months.

Thailand and Malaysia reached a basic agreement last month to jointly invest in a Trans-Thailand-Malaysia Gas Pipeline System that will deliver natural gas from the JDA. Gas will be delivered via a new 300-km long pipeline linking the JDA gas fields to an onshore landing point at Songkhla and then on to the north Malaysian state of Perlis. First gas deliveries are expected in 2000. The Petroleum Authority of Thailand (PTT) and Petronas of Malaysia have agreed to buy JDA gas at an initial rate of 600mn cf/d by the end of 2000 at an initial base price of $2.30 per million British thermal units (Btu).

Myanmar/Burma

Interest in Myanmar's oil and gas sector continues despite the economic sanctions imposed by the US Government in protest at the country's military rule.

A significant number of new licensing awards have been made in the past year, many of which have centred on the onshore Central Basin.

The two most important current developments in Myanmar are the offshore Yadana and Yetagun gas fields in the Gulf of Martaban, which are due onstream in 1998 and 2000 respectively. (See also article on page 512.) Some 80% of Yadana's output will be exported to nearby Thailand. Yetagun production is also to be piped to Thailand.

The proximity of the recent Badamyar and Sein discoveries to the Yadana facilities means that associated development of these resources could be relatively straightforward. However, because Yadana is capable of producing in excess of its daily contracted quantity, development of the two discoveries may well be delayed until well into the next century.

Pakistan

Pakistan is a gas-prone country with proven reserves estimated in spring 1996 at around 600bn cm and total potential reserves assessed at 5.7tn cm. The substantial reserves of the Bhit gas field were recently confirmed with Lasmo's Bhit-2 exploration well in the Kirthar concession in Western Sindh which tested at a cumulative rate of 17.7mn cf/d. Development options for the field are currently being discussed.

Other future developments include OMV's Miano gas field in the Sind province and the Sara field in East Badin

Country/Field	Operator	Oil or Gas output	Start-up date	Oil Res. (mn b)	Gas Res. (bn cf)	Capex ($mn)	Production system
BRUNEI							
*Asam Paya**	BSP	oil	2000	20	25	80	onshore
Maharaja Lela	Jasra-Elf Aquitaine	gas	1999	28	672	240	platform
Selangkir	BSP	gas	1999	–	300	50	platform
Sub Total				**48**	**997**	**370**	
CHINA							
Boxi area	Bohai Oil Corp	oil	1997	54	–	300	platform, floater
Dongfang1-1	Nanhai West Oil Corp	gas	1999	–	3,000	700	platform
Jinzhou 9-3	Bohai Oil Corp	oil	1997	28	10	100	platform
Lufeng 22-1	Statoil	oil	1997	35	–	200	subsea, floater
Ping Hu	Shanghai Petroleum	gas	1999	30	300	565	platform
Suizhong 36-1 (FFD)	Bohai Oil Corp	oil	2000	250	–	1,000	platform, floater
Wei 12-1	Nanhai West	oil	1999	90	–	360	platform
Zhao Dong	Apache	oil	1999	15	–	30	platform
Sub Total				**502**	**3,310**	**3,255**	
INDONESIA							
BD	Mobil	gas	1999	20	437	310	platform
Corridor Block Gas Dev*	Gulf Canada	gas	1998	–	2,000	522	onshore
Kaji/Semboga/Sembada*	Exspan	oil	1997	30	–	75	onshore
Kampung Baru*	Energy Equity/Tenneco	gas	1997	–	348	20	onshore
Mudi*	Santa Fe	oil	1997	50	–	90	onshore
North Geragai*	Santa Fe	oil	1997	40	–	90	onshore
*North Sumatra Block A**	GulfCanada	gas	2000	–	420	240	onshore
North Tunu	Total	gas	1997	20	1,000	400	platform
NSO 'A' field	Mobil	gas	1999	–	1,240	500	platform
Nubi	Total	gas	2001	50	800	200	platform
Pase A*	Mobil	gas	1998	–	120	53	onshore
Peciko	Total	gas	2001	100	5,600	1,250	platform
Sirasun/Terang	Arco	gas	2001+	–	1,500	500	subsea
Sisi	Total	gas	2001+	50	700	200	platform
*Weriagar Deep**	Arco	gas	2003	50	11,000	1,750	onshore, platform
West Natuna Gas Project	Conoco/Premier/ Gulf Canada	gas	2000	–	2,000	1,100	platform
Wunut*	Lapindo	gas	1998	–	105	30	onshore
Sub Total				**4102**	**7,270**	**7,330**	
MALAYSIA							
Belumut	EPMI	oil	2003	40	–	200	platform
Bintang	EPMI	gas	2000+	25	1,500	800	platform
Kinabalu	Sabah Shell	gas	1998	180	2,000	350	platform

Malaysia continued opposite

Key: * – onshore; italicized text – probable development; EPS – early production system; FFD – full field development
Source: Wood Mackenzie, South East Asia Report – Upstream Oil & Gas

Current and Planned Field Developments in the Asia-Pacific Region

Extension block B. Gas from the latter will be delivered to the GUDDU Power Station replacing imported liquid fuel.

The government recently signed a deal with US oil company Unocal and Turkmenistan covering the construction of a $2-bn gas pipeline to receive Turkmen gas via Afghanistan. The 1,464-km pipeline will link the Dauletabad gas field in southeast Turkmenistan to Multan. Gas is expected to start flowing by 2001.

Pakistan was scheduled to announce a new petroleum policy designed to attract foreign investment in oil and gas exploration, and refining, as *Petroleum Review* went to press. Incentives are expected to include rebates and cuts in customs duty and taxes to facilitate the higher initial investment required in such projects.

Philippines

The Philippines has experienced little development activity in recent years and is continuing to suffer a lack of exploration success, reports Wood Mackenzie. West Linapacan A, shut-in in January 1996, was the only oilfield to be developed since the small North Matinloc oilfield came onstream in 1988.

There are currently no new fields under development and only a single probable development – Malampaya-Camago – which lies offshore northwest Palawan. The project made significant progress earlier this year with the signing of a Memorandum of Understanding covering gas supply to National Power Corporation and First Gas Holdings for a period of some 20 years. Gas will be piped to Luzon, where it will be used in National Power's planned 3,000-MW gas-fired power station and First Gas Holdings' 990-MW combined-cycle, gas-turbine power station at Batangas.

Country/Field	Operator	Oil or Gas output	Start-up date	Oil Res. (mn b)	Gas Res. (bn cf)	Capex ($mn)	Production system
MALAYSIA continued							
Larut Area	EPMI	oil	2001	75	–	375	platform
Lawang/Langat	EPMI	oil	2003	40	–	200	platform
MAS fields	Petronas Carigali	oil	1998	50	–	175	floater
PM3	FFDIPC	gas	1999	100	1,100	475	platform, floater
Resak	Petronas Carigali	gas	1999	15	1,500	650	platform
SK8 fields	Occidental	gas	2001	80	5,200	720	platform
SK10 fields	Nippon Oil	gas	2001	65	1,300	440	platform, subsea
Yong/Raya	EPMI	oil	1998	40	–	125	platform
Sub Total				**710**	**12,600**	**4,510**	
MALAYSIA–THAILAND JDA							
Cakerawala	CTOC	gas	2001	25	2,000	750	platform
Sub Total				**25**	**2,000**	**750**	
MYANMAR							
Yadana	Total	gas	1998	–	6,600	1,100	platform
Yetagun	Premier	gas	2000	44	1,400	610	platform, subsea
Sub Total				**44**	**8,000**	**1,710**	
PHILIPPINES							
Malampaya	RD/Shell	gas	2002	150	3,100	1,800	platform, floater, subsea
Sub Total				**150**	**3,100**	**1,800**	
THAILAND							
Benchamas	Pogo	gas	1999	38	320	190	platform
Pailin	Unocal	gas	1999	35	1,500	1,250	platform
Pakarang	Unocal	gas	1999	2	67	100	platform
Plamuk	Unocal	gas	1998	1	50	35	platform
Ton Sak	Total	gas	1998	9	500	120	platform
Trat	Unocal	gas	1998	20	500	100	platform
Sub Total				**105**	**2,937**	**1,795**	
VIETNAM							
Lan Tay/Lan Do	BP/Statoil	gas	2000	10	2,000	870	platform
Rang Dong(EPS/FFD)	JVPC	oil	1998 (EPS)	325	200	1,070	platform, floater
Ruby (EPS/FFD)	Petronas Carigali	oil/gas	1998 (EPS)	200	500	400	platform, floater
Sub Total				**535**	**2,700**	**2,340**	
ZONE OF COOPERATION							
Bayu/Undan	BHP/Phillips	gas	2002	360	3,400	1,570	platform
Elang/Kakatua	BHP	oil	1998	29	–	101	floater
Sub Total				**389**	**3,400**	**1,671**	
GRAND TOTAL				**2,918**	**66,314**	**25,531**	

Key: * – onshore; italicized text – probable development; EPS – early production system; FFD – full field development
Source: Wood Mackenzie, South East Asia Report – Upstream Oil & Gas

Current and Planned Field Developments in the Asia-Pacific Region

South Korea

South Korea has very limited natural gas reserves in the Dolphin field offshore Ulsan. GDP has grown rapidly in the past decade and electricity and gas consumption have significantly increased as a result.

The South Korean Ministry of Trade, Industry and Energy forecasts that domestic electric power demand will grow to 67.51mn kW in 2010, up 1.87mn kW from its 1995 prediction. Plans are underway to construct a number of new power plants to generate an additional 3mn kW between 1999 and 2003. Output from LNG plants is to be lowered in a bid to reduce the country's trade deficit by $347mn per year. Production from nuclear, coal and hydro-electric power plants is to be increased.

The government is also reported to be planning to double the capacity of its Yongwol thermal power plant in Kangwon Province to 200,000 kW in order to take advantage of the country's coal resources and further improve the trade deficit.

The South Korean Ministry of Trade, Industry and Energy announced last month that it plans to reduce the country's oil demand by 12% by 2006 in a bid to lower its oil dependency rate from 60% to 49%. Natural gas and LPG imports will rise accordingly. The Ministry also plans to abolish regulations on entry and foreign investment in the oil refining sector and to push for the construction of a natural gas pipeline system in north-east Asia. The country is also reported to be considering a number of joint venture oil, gas, electricity and coal projects with North Korea in preparation for Korean unification.

Taiwan

Taiwan has only small indigenous energy reserves and is highly dependent on imports for its energy supplies.

Plans to build the country's first

private LNG import terminal at Taoyuan in northern Taiwan were announced last month following the government's decision to liberalize gas imports and its power sector. Taiwanese company Tuntex plans to invest some $3.2bn in the terminal which, if approved, is expected to handle some 6mn t/y of gas imports. (See also article on page 509.)

Thailand

Fewer new fields have come forward for development in Thailand in recent years and as domestic production can no longer meet demand, the country is increasingly looking to imports to help maintain and increase its natural gas supply base.

Six new field developments are identified in the accompanying table – all of which are gas projects.

The Tantawan field produced first oil early in 1997. In November 1997 the field's new nine-well Tantawan C platform came onstream bringing gross crude and condensate production from all three platforms from 4,000 b/d in August 1997 to 8,200 b/d. Natural gas production was maintained at levels in excess of 90mn cf/d.

Tantawan crude and condensate is stored in a floating, production, storage and offloading (FPSO) vessel and is to be sold every two to three months on the international spot market at world oil prices.

Natural gas sales prices, which reached $2.16 per thousand cubic feet at 26 baht to the US dollar in June 1997, dropped to approximately $2 per million cubic feet at September's current exchange rate of approximately 35 baht per US dollar. This followed the Thai Government implementing a new managed-float currency regime on 2 July 1997 allowing the baht to depreciate in line with market conditions in an effort to stabilize the country's economy. A number of companies shelved plans to construct new petrochemical plants following the surprise flotation, stating that such projects were no longer feasible in the economic climate at that time. However, interest appears to have picked up more recently. For example, German engineering companies Krupp Uhde and Thyssen Rheinstahl Technik are reported to be close to securing a contract from Songkhla Petroleum & Chemical Company for the construction of an integrated 150,000 b/d oil refinery, a petrochemical complex and a 150-MW power station in Songkhla in southern Thailand.

Drilling in the Sangu field in the Bay of Bengal. *Photo courtesy of Cairn Energy*

Vietnam

Vietnam has four fields currently in production: PetroVietnam and Zarubejineft's Bach Ho oilfield (which has an exploitation capacity of 150,000 b/d and is said to be one of the largest reserves in southeast Asia), Petronas Carigali's Dai Hung field, Vietsovpetro's Rong field and the Bunga Kekwa oilfield – all of which are located off the southeast coast.

Nine basins with hydrocarbon potential have been discovered to date. Much exploration and development activity over the next decade is expected to centre on the four most prospective – the Red River basin in the north, the Malay Tho Chu basin to the southwest and the Mekong and Con Son basins in the south.

Development of the BP/Statoil Alliance's South Con Son gas project is reported to be making steady progress and it seems likely that other gas discoveries in the adjacent area may well be tied in to the project at a later stage.

The Rang Dong oilfield is to be brought onstream in mid-1998 via an early production system (EPS) in the short term followed by a phased full field development after production experience is gained. Like Rang Dong, the Ruby oil/gas field too may be brought onstream in 1998 initially using an EPS prior to full development. The other probable development in Vietnam in the next few years – the Lan Tay/Lan Do gas project – may come onstream in 2000. Development, however, is very much dependent upon securing a market and a reasonable price for the gas produced.

Looking downstream, Total and its Vietnamese partner Tradmexico have been authorized by the country's Ministry of Planning and Investments to create a joint venture to import, store and market LPG in Vietnam. The government has also invited tenders for the construction of an integrated gas-fired power plant and urea fertilizer project in the south of the country. Gas for the project will be sourced from the South Con Son project.

Power generation growth to triple LNG use

Taiwan's LNG consumption is planned to rise more than threefold over the next four years as medium-term plans to develop power generation facilities increasingly rely on gas-fired combined-cycle stations to avoid the threat of power shortages. State-run Taiwan Power Company (Taipower) expects its LNG consumption to rise from 1.1mn tonnes in 1996 to 3.4mn tonnes in the year 2000. By then the first of several gas-fired private power stations is expected to enter service, further increasing Taiwan's total LNG requirement for power generation, reports *David Hayes*.

In preparation for the large increase in LNG consumption, the Taiwan Government has approved plans for a major expansion of Yung An LNG receiving terminal, Taiwan's sole LNG import facility. The recently launched Phase Three programme calls for NT$27bn to be invested in expanding Yung An terminal from its recently completed Phase Two capacity of 4.5mn t/y to 7.75mn t/y of LNG when the expansion programme is completed in 1999. Apart from expanding LNG handling and storage facilities, the project includes building a submarine gas pipeline from Yung An up the west coast to supply gas to four power stations in northern Taiwan and increase city gas supplies to the Taipei area.

Taiwan's state-run Chinese Petroleum Corporation (CPC) is in charge of the Yung An expansion scheme and the north-south submarine pipeline project. CPC has appointed CTCI Corporation and its partner Tenneco Energy to design the offshore pipeline along with related LNG handling and storage facilities. The design stage is due for completion this year so that construction can begin early in 1998.

Completion of the 306-km undersea pipeline which runs from Yung An terminal to landfall at Tungshiao has been set for March 1999. This will allow gas supplies to begin in mid-1999 to Changsheng power station which is expected to be one of the first Independent Power Producer (IPP) power plants to start up in Taiwan. The Changsheng plant is located near to Taipower's Tungshiao power plant which is planned to convert to gas-firing after the pipeline is built.

Changsheng power station is being built by a joint venture consortium led by the Chan I Group, a construction and property development company. The consortium, which includes CPC and several banks, is planning to install two 450-MW gas-fired combined-cycle units at Changsheng for commissioning in June 1999.

Government support for CPC's large LNG import expansion scheme followed a series of studies looking into the most economical method of increasing gas supplies to the north and central areas of Taiwan as well as southern areas near the existing Yung An terminal site. CPC's expansion scheme will increase Taiwan's LNG import programme by about 3mn t/y to reach about 6mn t/y at the end of the century. Apart from expanding gas-fired power generation, the programme will also boost sales of city gas and industry's use of gas.

Taipower is Taiwan's largest user of LNG consuming about two-thirds of all imported LNG. According to the company's fuel requirement forecasts, LNG consumption will almost double in 1997 to reach 2mn t/y. In 1998 Taipower expects to burn 2.4 mn tonnes of LNG, rising to 3mn tonnes in 1999 and then growing to 3.4mn tonnes in 2000. By then four Taipower stations and one private power plant will burn LNG. The stations will be Hsinta, Talin and Nanpu in the south and Tungshiao station in the north along with the nearby Changsheng IPP power plant.

While Taipower's LNG consumption is forecast to increase roughly three-fold, electricity generation from the utility's gas-fired power stations will grow from 5,757 GWh, or 4.6% of total generation in 1996, to 24,932 GWh in 2000 when LNG-fired stations will account for 16.4% of Taipower's total electricity generation. By then LNG will have become the company's third most important fuel source after coal and nuclear energy.

Taipower's LNG requirements will continue to grow strongly in the early years of the next century. By 2006 the company forecasts it will need an additional 1.9mn t/y of LNG taking its total annual LNG consumption to 5.3mn tonnes. Taipower's LNG-fired power stations are forecast to generate 38,434 GWh by 2006 or 19.4% of the utility's total power output.

Taipower would prefer to expand its coal-fired and nuclear energy capacity. The reason the company is looking to develop large-scale gas-fired power generation in northern Taiwan is that gas-fuelled stations pose fewer plan-

ning problems than coal-burning ones. To meet the planned increase in power plant gas fuel requirement state-run CPC originally planned to build a second LNG import terminal in the north to improve security of supply to the region and serve nearby power plants.

At the end of 1993 CPC completed a feasibility study of four potential sites capable of handling 4.5mn to 6mn t/y of LNG. However, the results of the study suggested that building a new terminal would be far more costly than originally expected and that a more economical solution would be to expand Yung An terminal and build a second transmission pipeline to northern Taiwan to supply the various proposed power plant customers.

Since then the proposed submarine pipeline route has changed, partly due to government plans to allow two private gas-fired stations to be built at Changsheng in northern Taiwan and Hsinta in the south. Originally it was planned that the submarine pipeline would run for about 370 km offshore up the west coast from Yung An terminal to Taipower's proposed Tatan power plant site which coincidentally had been one of the sites proposed for a second LNG terminal.

While Taipower still plans to build Tatan gas-fired station, the submarine pipeline will come ashore at Tungshiao in Miaoli County, one of Taiwan's major gas producing regions, but where indigenous reserves are running out. The pipeline will then be built overland to Taoyuan County near Taipei, where the privately owned Changsheng power plant is being built. The pipeline will continue overland to Tatan power station, which will become one of Taipower's largest stations when completed.

Taipower plans to install 12 combined-cycle units at Tatan totalling 4,384 MW installed capacity. The units will be started up over a four-year period from 2001 to 2005. Tatan will eventually need 1.9mn t/y of LNG when the power plant operates at full capacity.

'The submarine pipeline from Yung An terminal will land at our 1,600-MW Tungshiao power plant where we are burning residual oil to fuel five 320-MW combined-cycle plants', a Taipower spokesperson said. 'To meet environmental regulations we are going to convert this plant to gas-fired generation including our number six 320-MW unit which is under construction for commissioning to begin in 1998.'

Tungshiao station will burn gas for intermediate power generation. CPC plans to use nearby caverns and its old depleted onshore gas fields in Miaoli for gas storage purposes. The caverns are under study to see how much gas they can store.

Work was completed last year on

Taiwan – gas plans

three additional storage tanks to expand the Yung An LNG terminal to receive Malaysian LNG. Facilities at the terminal, which is located on a 74 hectare site about 30 km north of Kaohsiung, include six 100,000 kilolitre storage tanks capable of handling up to 4.5mn t/y of LNG.

Completion of Yung An Phase Two was timed to coincide with the completion of gas-fired combined-cycle unit number one at Hsinta power station which will become an important customer for Malaysian LNG under CPC's second long-term LNG contract. When fully completed Hsinta power station will consist of five gas-fired combined-cycle units totalling 2,209 MW installed capacity. The first 442-MW unit started up in mid-1996. The last will be commissioned by the end of 1998.

Yung An terminal is to be expanded to handle 9mn t/y eventually, the Taipower spokesperson said, CPC is talking to Malaysia, Indonesia, Qatar, Yemen, Australia and Alaska about LNG requirements. CPC needs two more long-term contracts. Taipower is not involved in these discussions.

At present CPC is responsible for Taiwan's domestic gas production and LNG imports. The corporation supplies large customers direct while piped gas distribution is handled by 22 city gas companies. Imported LNG accounts for about 85% of Taiwan's gas supplies while local onshore and offshore production makes up the remaining 15% share.

In 1996 Taiwan imported about 2.3mn tonnes of LNG of which 1.5mn tonnes was bought under a long-term contract from Indonesia. Most of the additional imports came from Malaysia under CPC's second long-term contract which started last year. The contract with Malaysia is for 2.25mn tonnes for 20 years. CPC is due to lift the full contracted volume in the third or fourth year

Last year LNG imports rose by 15% compared with the 1.95mn tonnes imported in 1995. The rise was due to Taipower's increased gas requirement for power generation. Of the 2.3mn tonnes of LNG imported in 1996 Taipower purchased 1.11mn tonnes while CPC's Kaohsiung oil refinery used about 600,000 tonnes as a replacement for oil. City gas companies took the remaining 590,000 tonnes.

Meanwhile, Taiwan's domestic gas production is believed to be equivalent to about 600,000 t/y at present though reserves are running out. About two-thirds is produced onshore in northern Taiwan while the remainder is

produced offshore by the CBK field off northwest Taiwan. Most of the domestic gas is supplied to state-owned Taiwan Fertilizer Company at below market prices as part of government policy to provide farmers with low-cost fertilizer. The rest is supplied to industrial customers, many being small enterprises located near the onshore gas fields.

At present most of Taipower's gas requirements are delivered to Talin power station in southern Taiwan. Talin Number Five unit, the first Taipower unit to burn gas, burns 500,000 t/y a year while the more recently commissioned Talin Number Six unit uses a similar volume.

Gas use for power generation is increasing with the start up of two new power plants at Hsinta and Nanpu, both close to Yung An terminal. Nanpu power plant consists of three combined-cycle units totalling 512 MW. The first Nanpu unit started up in 1995 burning diesel oil while work was completed constructing a 12-km gas pipeline linking Yung An terminal with the Nanpu plant. The pipeline was completed in March 1996 and the first gas supplies began mid-year.

Hsinta power plant is designed to burn LNG only, the Taipower spokesperson said. The number five and six units at Talin plus all units at Nanpu are designed for dual-firing using either gas or diesel or a combination of the two. Talin is a baseload power station while Hsinta and Nanpu are designed for peak and intermediate load generation.

Plans call for Nanpu to expand in future with the installation of a larger combined-cycle unit of 220 MW which is due to enter service in 1999. This project is at the planning stage and will increase the Nanpu station to 732 MW once the scheme is completed.

Apart from the Nanpu expansion, a planned private gas-fired power plant scheme in southern Taiwan will provide the Yung An terminal with another customer in future. Currently a joint venture of Taiwan's San Fu Enterprises with Destec of Texas is planning to build Chiahui combined-cycle station in Chiayi County. The 450-MW plant will consist of two units, one 250 MW the other 200 MW. CPC will supply gas from an offtake point along its existing high pressure gas transmission pipeline. Commissioning is being planned for 2001.

Meanwhile, government plans to increase the natural gas share of primary energy consumption from about 3% at present to about 10% by 2010 will involve a further increase in LNG imports early next century. With CPC planning to expand Yung An terminal further to handle 9mn t/y, Taiwan will need to build a second import facility quite soon to provide security of supply should any problems occur at Yung An.

With the government now favouring greater private sector involvement in the energy industry, it is possible that a second LNG terminal may be built and run by a private consortium. Recently Taiwan's Tuntex Distinct Corporation applied to the energy ministry for approval to build a US$2bn LNG terminal in Tatan in northern Taiwan, the site of CPCs previously proposed northern terminal.

Tuntex would hold the majority stake but has indicated it may involve partners in the project. Taiwan's press has speculated that Taipower and CPC might each take shareholdings of 10% to 20% in the terminal. Taipower will be the terminal's major customer using about 85% of planned annual capacity.

The terminal would be built in three phases to handle 6mn tonnes of LNG a year eventually. According to Tuntex's proposal, phase one capable of handling 2mn t/y will be completed in 2002, with phase two expanding the facility capacity to 3mn t/y and due for completion in 2003. Phase three would boost the terminal to its full 6mn t/y capacity on completion in 2007.

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Gas projects lead Myanmar out of isolation

Despite US and European dislike of the Myanmar Government controversial projects are proceeding on schedule to develop and export to Thailand major discoveries of natural gas in the Andaman Sea offshore Myanmar (historic Burma). Two US oil companies have recently pulled out but others have stepped in to take over their concessions, reports *Fred Thackeray*.

So far two principal natural gas export projects are in hand for early realization under firm contracts with Thailand's government-owned Petroleum Authority of Thailand (PTT). First will be the start of gas deliveries in 1998 from the Yadana field, following planned completion of the necessary pipelines by mid-year. Second will be the start of gas deliveries in 2000 from the Yetagun field.

The Yadana field is operated by Total in partnership with Unocal, government-owned Myanmar Oil & Gas Enterprise (MOGE) and PTT. Unocal, and since 1993 Total, head consortia which produce most of Thailand's gas supplies from the Gulf of Thailand. In 1996, their aggregate production there exceeded 1bn cf/d. The addition of Yadana supplies will increase the aggregate contribution of their consortia by some 50% to more than 1.5bn cf/d. By 2001, the Unocal and Total-led consortia will be producing in the Gulf of Thailand and in the Andaman Sea a total of more than 2.5bn cf/d according to forecasts made by Thailand's National Energy Policy Office (NEPO).

The new Yadana field, located in the Gulf of Martaban off the Andaman Sea, lies at a pipeline distance of some 250 km south of Yangon (Rangoon). Its proved reserves have been estimated by DeGolyer & MacNaughton at 5.7tn cf. Under a 30-year contract signed in February 1995, it will start deliveries next year to PTT at Ban-I-Thong on the Myanmar/Thai border at an average rate of 525mn cf/d with 87% load factor.

The pipelines from Yadana will comprise a 346-km, 36-inch submarine line, a 63-km continuation over Myanmar territory to the Thai border and a 260-km, 42-inch line (to also transport Yetagun gas) from there to Ratchaburi to the west of Bangkok (see map). The section crossing Myanmar had been threatened by guerrilla activity of the Karen National Union but intensive military activity appears to

have established control and the whole system is now completed as far as the Thai border. Within Thailand, pipeline construction was delayed by environmental objections; but these were overruled by government edict and PTT claims that the line will be completed to meet the onstream date in mid-1998.

PTT is anxious that the line should be completed on schedule since the contract with the Total group is take-or-pay with a basis price at the Thai border of $3mn Btu. At the exchange rate ruling before the baht was floated on 2 July this price was equivalent to around 75 baht/mn Btu. Depending on the details of the escalation provisions in the contract, however, it may now have been increased to over 100 baht. The Thai currency moved to an initial low of baht 32.7:$ on 19 August but the depreciation then continued reaching baht 36.5:$ on 2 October.

The gas will go to a new 4,600-MW combined-cycle gas-turbine (CCGT) plant under construction at Ratchaburi for government-owned Electricity Generation Authority of Thailand (EGAT). EGAT, in order to ensure against interruption of supplies from Myanmar, has built diesel storage at Ratchaburi and an oil supply line from the coast. PTT's contract to supply gas to the Ratchaburi power plant incorporates an obligation to supply diesel at market price if this should become necessary. If substitution of diesel for natural gas were to occur this would result in a sharp increase in the Ratchaburi plant's operating costs. A rough indication of the significance of this is that even at the escalated figure of over 100 baht/mn Btu mentioned above, the gas price at the border would still be equivalent to only about half the average ex-refinery price of just over 7.2 baht /litre for diesel (LSD) in Thailand in 1996.

Yadana to meet future growth

Anticipating that they will be able to supply more gas from their Myanmar concessions in future, the partners in the Yadana field have reserved the whole of their pipeline's potential capacity of 900mn cf/d (i.e. another 350 to 400mn cf/d) for their own use and refused to share it with the Yetagun project. This policy has appeared justified as exploration has progressed.

To date only a small increase of proved reserves by 0.7tn cf has been announced to 6.4tn cf. This results from estimates for new discoveries in 1996 at Badamyar and Sein, two fields south of Yadana. But the Myanmar Government, optimistic as such governments usually are, has spoken of recoverable reserves as high as 9.6tn cf. The opinion of Total and Unocal about the area as a whole is perhaps best indicated by the fact that they acquired in January against a signature bonus of over $5mn, additional rights in a neighbouring concession block. Their respective shares in the new block (M8) are 52.5% for operator Total and 47.5% for Unocal. There is an option for MOGE to acquire 15% interest in future, reducing the other companies' interests pro-rata.

Yetagun gas soon

Myanmar's second major gas discovery in the Andaman Sea is at Yetagun, some 270 km south of Yadana. Published estimates by DeGolyer & MacNaughton put the recoverable gas reserves at 1.4tn cf, coupled with 5.2mn barrels of condensate. Those close to the project, however, say the recoverable gas is now thought to be in the range of 3tn to 5tn cf. It has a high calorific value of 1,150 Btu/cf, contrasting with Yadana gas, which has a significant nitrogen content, and an average calorific value of about 730 to 750 Btu. When Yetagun gas reaches the Thai border at Ban-I-Thong it will be mixed by PTT with the Yadana gas for onward transmission to Ratchaburi.

The Yetagun contract with PTT, signed earlier this year, is for an initial 200mn cfd, starting in 2000. But based on the higher reserves estimates of 3tn to 5tn cf, production of 400mn cf/d would be feasible. The PTT contract is a 30-year agreement, believed to be at the same base price of $3mn Btu. Deliveries will be made through a 170-km, 30-inch pipeline of which approximately 100 km will be offshore and 70 km, across Myanmar territory, onshore.

In late September 1997, Premier Oil of the UK increased its stake and took over the operatorship of the Yetagun concession from Texaco at the same time as selling a major stake to Petronas, the Malaysian state-owned oil company. Premier Oil exercised its pre-emptive rights to acquire 100% of Texaco's stake in the project for $260mn, increasing its own stake by 6.6% and selling the balance to Petronas for an undisclosed sum. The effective withdrawal of Texaco from the project is widely seen as the result of US investment sanctions against Myanmar and the associated consumer boycotts against Texaco in the US, although Texaco claims it is the result of an asset review.

The latest shareholdings are (earlier holdings in brackets):

- Premier Oil (operator) 32.3% (25.8%)
- Texaco (operator) 0.0% (42.9%)
- Petronas 36.4% (0.0%)
- Nippon Oil 17.2%(17.2%)
- PTTEP 14.2%(14.2%)

Arco also is believed to have made a significant gas discovery in a well designated Shwe Pyi Htay-1 in block M9. But under similar pressures to Texaco it is already bailing out from Myanmar in an unannounced agreement which it has made with Petronas. The plan is to swap its Myanmar concessions in blocks M9 and M7 for Petronas' rights in the JDA (Joint Development Area) between Malaysia and Thailand where large gas finds are under development.

MOGE itself claims to have proved gas of 1.7tn cf offshore in a block designated M3; and other companies too are exploring hopefully in Myanmar both in the Andaman Sea and onshore.

There is also a project which is moving slowly forward for the Yadana field to supply 125mn cf/d by a 250-km partly submarine pipeline to a location near Yangon. This is proposed to supply a 200-MW power plant and a 600,000 t/y fertilizer plant. A feasibility study for the project has been carried out by Mitsui under an agreement signed in August 1995. Subsequently a Memorandum of Understanding (MOU) to proceed with the project was signed in April 1996 between the government and Total, Unocal and Mitsui. Since that time, however, no more has been heard of the proposal.

Golden Causeway

A major new project has recently emerged which could significantly further advance the collaboration between Myanmar and its close neighbour, Thailand. This would call for participation by the Yetagun shareholders in another pipeline to supply gas to Bokpjin in southern Myanmar (see map).

Preliminary discussions of this project were held between the Myanmar and Thai governments earlier this year and PTT has been assigned by Thailand's Ministry of Industry to undertake a feasibility study of a proposal to build road and rail connections – the Golden Causeway – across the isthmus to link a deep-sea port in Thailand with Myanmar's undeveloped south.

Commercial factors

Despite US and European opposition to investments in selected countries with political regimes that are seen as undesirable, it is likely that commercial pressures and the distinctive Asian socio-political climate will facilitate investment in Myanmar given the region's rapid economic development. It is striking that Unocal – the operator of Yadana – has taken no steps to divest itself of its Myanmar interest. Unocal has recently publicly committed itself to becoming, in effect, an Asian company with a second corporate HQ in Kuala Lumpur and two-thirds of its prospective investments in Asia.

Massive reserves to spark investment boom?

Bangladesh has largely been ignored amid the euphoria surrounding upstream opportunities in the more fashionable markets of Central Asia and India. Once considered the 'basket case' of South Asia, international oil companies were content to ignore a country synonymous with floods, famine and grinding poverty. But now, still desperately poor, Bangladesh could at last break the vicious cycle that has dominated its brief history since independence from Pakistan in 1971. The reason is simple: industry analysts believe Bangladesh is 'floating on gas', much of it offshore the Ganges delta in Bay of Bengal, writes *Deepak Mehta.*

Exactly how much gas there is in Bangladesh is an open question. It has 10.2tn cf of proven reserves, putting it on a par with countries like Colombia and Trinidad and Tobago. Putting a figure on its estimated reserves is a much harder proposition. The state oil company, Petrobangla, reckons Bangladesh has around 30tn cf of reserves. The country's Energy Minister, Nooruddin Khan, is keen to tell foreign oil companies there are reserves of 50tn to 80tn cf. If true, this could put Bangladesh in the same league as Indonesia, Mexico and Uzbekistan.

International oil companies with access to the latest data refuse to divulge their most recent estimates of gas reserves for fear of compromising their bids in Bangladesh's Second Licensing Round, currently underway. Whatever the figure, international interest in Bangladesh is picking up fast. To date, there are just four upstream operators in Bangladesh: Britain's Cairn Energy, Occidental, United Meridien and the Oakland/Rexwood partnership.

There could soon be a raft of others. Bangladeshi authorities are keenly aware they are sitting on billions of dollars in potential gas revenues, and have lost no time in carving the country up into 23 exploration blocks, both onshore and offshore. Eight have already been snapped up in previous licensing rounds, but 15 remain.

Interest has been intense. On 15 July this year, four months after the licensing round kicked off with promotional seminars in London and Houston, 21 companies (including Total, Mobil, Unocal, Texaco, Enron, Chevron, and the exploration arm of the state company, Petrobangla) put in a total of 37 bids for 12 of the 15 blocks on offer. Bangladeshi officials described the response as 'overwhelming' and 'beyond expectation'. From an ignored backwater, their country had overnight become the hottest gas play in South Asia.

Excitement at gas prospects in Bangladesh hit the headlines in January 1996 when the previously little known Edinburgh oil independent, Cairn Energy, struck gas in the Sangu field a few hundred kilometres off the coast of south eastern Bangladesh, near the port city of Chittagong. The news sent Cairn's London share price rocketing to dizzying heights, and refocused international interest on Bangladesh as a country with potential. Cairn's four-year gamble in Bangladesh had paid off. Sangu field development plans compiled jointly by Cairn Energy and Petrobangla confirm that it has 848bn cf of recoverable reserves. Analysts think the figure could be much higher.

Cairn expects commercial production at Sangu to begin in April 1998, after appraisal drilling is complete. In September this year, Cairn announced newly discovered gas at one of its Sangu wells which tested a rate of 45mn cf/d. In addition to Sangu, Cairn also has rights to the Semutang and Kutubidia oilfields, which Petrobangla says have estimated recoverable reserves of 98 and 468 bn cf respectively. Bangladeshi officials say they will be buying 160mn cf/d of gas from Cairn from April next year.

Cairn's success in Bangladesh has encouraged other companies to look again at the country. Not one to miss an opportunity, Shell said it was 'impressed by Cairn's enterprise' in Bangladesh and promptly announced it was tying up with the Scottish operator for a piece of the action. In the 1960s Shell was one of the first companies to enter Bangladesh when it was still called East Pakistan. Shell left Bangladesh soon after, citing local difficulties. The company maintains a huge database on Bangladesh's hydrocarbon reserves, dating from its activities there. Today Shell has a 25% stake in Cairn's entire Bangladesh operation, and the two companies are bidding jointly for new Bangladeshi acreage – with Cairn as operator. The Cairn/Shell joint venture is the largest bidder in the round with an offer to take up six blocks.

Keenest interest has focused on the fate of blocks 9 and 10 which received seven and six bids respectively. An indication of the prospectivity of block 9 is a decision by US giant Chevron to make block 9 its sole bid in the round. Interest in block 10 intensified following the discovery of gas at the Shahbazpur gas field which lies within its boundaries. Shahbazpur was discovered by Petrobangla in 1995, and has recoverable gas reserves of 400bn cf.

On 15 September Unocal's Bangladeshi subsidiary, Unocal Bangladesh, initiated a production sharing contract (PSC) with Petrobangla, finalizing the terms for development of Shahbazpur. The PSC still needs to be signed by the Bangladesh Ministry of Energy, but the company says it is confi-

dent development at Shahbazpur and construction of a related pipeline and power plant can begin by early 1998.

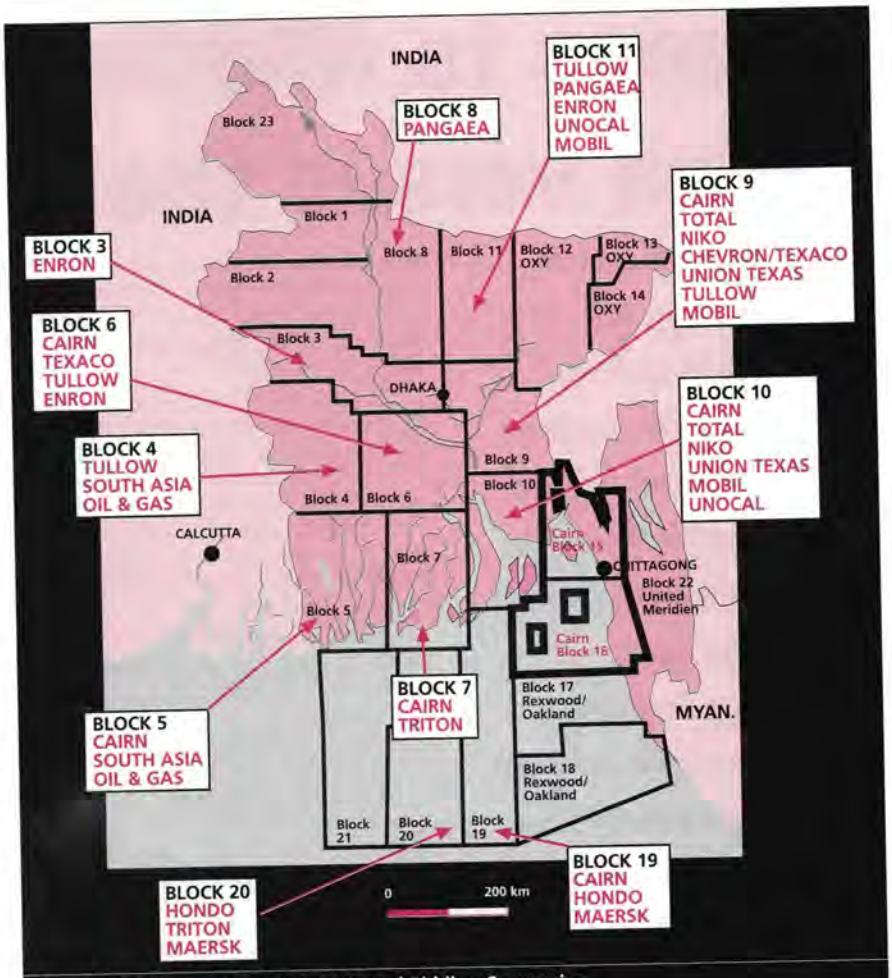
Unocal is now bidding for the rest of block 10, along with Cairn/Shell, Total, Niko Resources, Union Texas, and Mobil. Unlike the other contenders, Unocal is believed to have received a Letter Of Intent from the government of Bangladesh, promising it block 10 on condition its bid matches the highest bidder in the round. Shell has reportedly protested against this development.

Key to Bangladesh's decision to open up its E&P sector to massive outside investment is a need to radically improve a situation where just seven of its 19 developed fields are producing gas. Today the country produces just 670mn cf/d – less than half national requirements. By the year 2000 Bangladesh's demand for gas is expected to be around 1,500mn cf/d – a shortfall of some 800mn cf/d. Most gas in Bangladesh is currently produced by Petrobangla subsidiaries. The country produces no oil, though it does have an oilfield.

Like Unocal, Shell has also offered Bangladesh the carrot of 'integrated energy projects', combining field development with downstream power and related pipeline facilities. Lack of infrastructure is a chronic problem in Bangladesh, more so than in neighbouring India or Pakistan. Bangladeshi officials, however, are confident that money for infrastructure will cascade in as a by-product of the coming gas boom. Tawfiq-e-Elahi Chowdhury, Energy Secretary, says he expects oil companies to invest on average $500mn per annum in Bangladesh from next year onwards.

The power sector is expected to benefit most. Possibilities for inward investment in gas-fired power plants are limitless. 'Bangladeshis need power, they're desperately short of power', said one executive closely involved in the bid round, 'around 80 to 85% of Bangladeshi households don't have electricity'. Bangladesh currently has an installed capacity of 2,563 MW, all government owned and operated. With a population of 120 million Bangladesh's per capita power generation is one of the lowest in the world.

To address its chronic power deficit Bangladeshi officials have announced investments worth $2bn which are expected to double the country's power generating capacity over the next five years. All new plants will be gas-fired. In addition to Unocal's proposed 300-MW plant near the Shahbazpur field, the government has opened negotiations with Japan's Marubeni, the Swiss-Swedish ABB, and the UK's Midland Power for a further three power plants with a combined capacity of 800 MW. Three barge-mounted plants with a capacity of 100 MW each are also planned.



Bangladesh Licence Map: Second Round Bidding Companies

Massive investment is also expected in the pipeline sector, where capacity is insufficient to cope with the expected deluge of gas. Particularly pressing is the need for an adequate pipeline distribution system from the north-eastern gas fields near Sylhet, operated by Occidental, to the industrial users in the south and centre of the country. Occidental, also, plans to begin commercial production in April next year. The World Bank has already committed $120mn as the major component of a $170mn project to construct a major pipeline from Ashuganj to Bakhrabad.

One company ideally placed to take advantage of the expected surge in demand for gas exploration services is the Dhaka-based company, Gasim. Surprisingly for a Bangladeshi company, Gasim has an impressive Internet web site which lists pipeline construction among its list of specialist areas. Gasim has completed over 45 pipeline projects with 18 different clients, including Spie-Capag of France, and Italmontaggi of Singapore. It also lists a range of general services available to foreign exploration and service companies entering Bangladesh. These include project feasibility studies, site selection, and a comprehensive consulting service in energy exploration and development.

Oil executives familiar with South Asia are quick to praise the professionalism of Bangladesh's work force. 'In India you have red tape, in Pakistan you have corruption, in Bangladesh there's none of that,' said one industry source. 'In Pakistan you have the feudal system, in India you have the caste system, Bangladesh is constrained by neither', he added.

By far the biggest attraction to gas exploration and production in Bangladesh is the proximity of a huge market next door – India. Oil companies operating in Bangladesh concede that their first priority is to service the domestic market but are convinced that long-term prospects lie in selling their gas to India where demand will continue to outstrip supply well into the next century.

Unfortunately plans to facilitate the delivery of gas to India by laying a pipeline to Calcutta from Chittagong remain hostage to the temperamental relationship between Bangladesh and its giant neighbour. Logic – and a quick look at a map – suggest the need for such a pipeline is obvious. Eventual implementation, however, will depend more on politics than economies of scale.

Access to Middle East oil – China versus the US?

Middle East oil is once again asserting its position as a strategic commodity both because of its role as the fuel for economic growth in the world and because access to it is once again becoming intimately intertwined with national security and power. So a new US-versus-China scenario begins to emerge which links global oil security to oil geopolitics in the Gulf and the Asia-Pacific regions. The question is, writes *Dr Mamdouh G Salameh*, can these two issues be reconciled?

By the start of the 21st century, two very powerful geopolitical factors will determine whether the quest for Middle East oil (mainly Gulf oil) could enhance global oil security and, therefore, usher in a period of growth and interdependence in the global economy, or could lead to the collapse of the new political order in the Gulf and also lead to instability and conflict in the Asia-Pacific region. The two factors are the growing dependence of the US on Middle East oil and China's growing thirst for oil and its increasingly likely dependence on oil from the region.

With the end of the Cold War, the Gulf region has become more important for the US national interest and the world at large. Not only does the region contain 65% of the world's proven crude oil reserves, but there is also a growing global and US dependence on Gulf oil.

In 1996, more than 38% of the industrialized world's oil was supplied by the Gulf. And also in 1996, the US imported 51% of its oil needs, more than half of which came from the Gulf. Should current trends hold, the world's dependence on Gulf oil will increase to a projected 40% of the world's oil needs in 2000 and 48% in 2010. One new development will be China's projected growing dependence on oil from the region with economic and geopolitical consequences.[1]

Victories in both the Cold War and the Gulf War have helped the US and the other Group of Seven (G-7) states gain a substantial degree of oil security. Without revolutionary changes inside the Gulf Cooperation Council (GCC) states, especially Saudi Arabia, there is very little prospect that Gulf oil will be withheld from international markets in the near future.[2]

Oil and security

Oil and security head the list of US national interests in the Gulf and the two are obviously interconnected. Broadly what is meant by security is the maintenance of a political order conducive to US access to the region's energy, markets and communication routes and protection of related US investments and assets.[3]

The US is the biggest consumer of oil in the world, accounting for 25% of current world production, or just over 18mn b/d, while itself producing only about 12%, or 8.3mn b/d. A steadily declining crude oil production in the US coupled with fast depletion of reserves and steeply rising costs of finding and developing new oilfields have combined to create a major oil deficit in the country's oil balance forcing it to become increasingly dependent on oil imports, particularly from the Gulf, and this dependence is set to increase.[4]

In 1996, the US imported 51% of its oil needs, or 9.4mn b/d, over half of which came from the Gulf. By 2000, the US could be importing 66% of its oil needs, or 12.95mn b/d, three-quarters of which will also come from the Gulf (see **Table 1**).

It is not in the US national interest, or the interest of the region and the world, for the Gulf region to be dominated by either Iran or Iraq. Therefore, the primary long-term US objective is to preclude such a development. The US has been pursuing this objective by a policy of 'dual containment' which aims to isolate both Iraq and Iran simultaneously. As a result, Washington has increased its stake in maintaining friendly relations with the member states of the GCC. Their defence is now principally a US responsibility and they are pumping more oil for the benefit of the US economy. In effect, the US is pursuing a course in the Gulf which is reordering the balance of political, economic and oil power in the region.

The Gulf War produced a rough military balance between Iran and Iraq. However, Iran has embarked on a huge military modernization programme and a build-up of military capability that can threaten shipments of oil through the Straits of Hormuz. But it is Iran's attempts to acquire nuclear and missile technology that are worrying the US. The worry is that China could be a source of assistance to Iran having helped Pakistan's nuclear programme in the early 1980s. As China

	1990	1992	1994	1996	2000	% Change 1990–2000
Production	8.92	8.87	8.39	8.30	6.65	– 25
Consumption	16.6	17.10	17.75	18.40	19.60	+18
Total imports	7.69	7.89	8.93	9.40	12.95	+68
Imports from the Middle East	2.77	3.62	4.70	5.23	9.71	+251
As % of total	36	46	53	56	75	

Source: BP Statistical Review of World Energy, *June 1997/US Information Administration (EIA)/International Energy Agency (IEA)/author's calculations.*

Table 1: US Crude Oil Imports, 1990–2000 (mn b/d)

IP THE INSTITUTE OF PETROLEUM

Have you taken up the 1997 Membership Challenge yet?

Dear Member

The IP has taken the following two pages in the magazine in order to bring all Individual Members up to date on the ongoing **1997 Membership Challenge** Competition, which was proudly launched in September 1997. The IP's first ever competition offers all Individual Members the opportunity to win a fabulous prize by taking part in the **1997 Membership Challenge**.

A brief recap for all those Members who have not yet heard the news:

> The IP has a dream to get close to 10,000 Individual Members before the end of the decade, and in order to achieve this it needs the help of its most successful sales people - its members! It was in recognition of all the help that members have given so freely in the past that we decided it was time to offer them the chance to win a fabulous prize for their efforts, and felt that now was the right time for a challenge to take place - the **1997 Membership Challenge**. For details on how to enter, please keep reading . . .

But before that, and most importantly, news on the available **prizes**:

> The Institute of Petroleum is proud to announce that **British Airways** has agreed to act as the official sponsor to the competition. **British Airways** has agreed to donate two tickets to an exotic location to the IP Member who recruits the **MOST new Members** between 1 September 1997 and 31 December 1997.

AND THAT'S NOT ALL:

In addition, any Member who recruits **a single new Member** during the next twelve months (1 September 1997 to 31 August 1998) will have his or her name entered into a prize draw - one entry for each recruit. The first name drawn from the hat next September will win two tickets from London to Paris, ideal for an autumn break.

The story so far since the competition was launched:

To all those Members who have **so far recruited 1, 2 and even 3 members** - a big thank you. The IP has so far recruited 104 Members in September alone, which is over 35 up on this time last year. October already looks promising and, with your continuing efforts, November and December will be even better.

IP THE INSTITUTE OF PETROLEUM

Have you taken up the 1997 Membership Challenge yet?

But, to all the Members who have so far **not recruited a member**:

It is not too late to enter into the spirit of the **1997 Membership Challenge** - there are still **8 weeks left** and anything can happen!

Here are a few tips from the IP's Membership Department on how to successfully persuade someone that joining the IP is worthwhile:

- Remember, now is an excellent time for anyone to join as an Individual Member - all new members get the rest of 1997 thrown in for free, so that's 14 months for the price of 12!
- The IP prides itself on being a one-stop information source; anyone who has ever had a query relating to either the upstream or downstream side of the business will know how precious the IP's Information Service can be.
- All Individual Members can gain an entry in the *Consultants Handbook* free of charge.
- And here's something for 1998 - all Individual Members will receive a copy of the Retail Marketing Survey free of charge.
- . . . and don't forget the IP's monthly magazine *Petroleum Review*.

On the following page you will find an application form to use when you entice a colleague into joining. Remember, more application forms are available from our Membership Department. Please do feel free to contact me on my direct line +44 (0)171 467 7121 if I can be of further assistance.

Happy Recruiting!

Tracey Connellan
Membership Manager

P.S. To all those Members who have told us that they **miss receiving a diary** for their efforts at this time of year - remember to indicate on your form that you would like to receive a diary, and we will be happy to send you one.

1997 Membership Challenge . . . 1997 Membership Challenge

Application for Individual Membership

Please complete both sides of this form and return to: Membership Administration,
The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR
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Fax: 0171 255 1472 or (+44) 171 255 1472
E-mail: lis@petroleum.co.uk

IP THE INSTITUTE OF PETROLEUM

1 HOW WERE YOU INTRODUCED TO THE IP? (PLEASE TICK ONE BOX ONLY)

- ❑ Personal recommendation
- ❑ Company requirement
- ❑ Via library/information services
- ❑ Via IP conferences/meetings
- ❑ Via IP's technical work
- ❑ Via *Petroleum Review*
- ❑ Other
- ❑ By the IP contacting me

2 ACADEMIC OR PROFESSIONAL QUALIFICATIONS AND SUBJECTS (HIGHER FIRST)

Qualification	College/University	Year	Subject

MEMBERSHIP OF PROFESSIONAL BODIES (EG INSTITUTION OF MECHANICAL ENGINEERS)

Professional Body	Grade of Membership	Chartered Status (eg CEng)

3 EMPLOYMENT STATUS

❑ Employed ❑ Self-employed ❑ Retired ❑ Student ❑ Other

4 TYPE OF ORGANISATION BY WHICH YOU ARE CURRENTLY, OR WERE MOST RECENTLY, EMPLOYED
(PLEASE TICK ONE BOX ONLY)

- 00 ❑ Major international integrated oil company
- 01 ❑ Other integrated oil company
- 02 ❑ Independent oil company upstream
- 03 ❑ Independent oil company downstream
- 04 ❑ Supply/distribution/storage
- 05 ❑ Other energy industry (gas/coal etc)
- 06 ❑ Eng. contractors/manufacturers/suppliers of equip.
- 07 ❑ Shipping
- 08 ❑ E & P services
- 09 ❑ Inspection/laboratory service company
- 10 ❑ Chemical/additive company
- 11 ❑ Transport industry & retail services
- 12 ❑ Information technology/computing/publishing
- 13 ❑ Traders/brokers
- 14 ❑ Investment/finance/banking/legal
- 15 ❑ Educational/ training establishment
- 16 ❑ Government/military/local authority
- 17 ❑ Consultancy
- 18 ❑ Industry association
- 19 ❑ Research establishment
- 20 ❑ Geophysical/seismic company
- 21 ❑ Other (please specify) _____

5 JOB FUNCTION (PLEASE TICK MAXIMUM OF 2 FUNCTIONS WHICH BEST DESCRIBE YOUR CURRENT OR MOST RECENT JOB)

- 00 ❑ Director/general manager
- 01 ❑ Planning/economics/project management
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- 03 ❑ Personnel/industrial relations/training
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- 05 ❑ Product & process research & development
- 06 ❑ Exploration & geophysical
- 07 ❑ E&P services/offshore support/subsea
- 08 ❑ Drilling & production
- 09 ❑ Supply & trading
- 10 ❑ Transport/pipelines/shipping
- 11 ❑ Refining/manufacturing
- 12 ❑ Marketing/sales/distribution
- 13 ❑ Product quality/analysis/testing/measurement
- 14 ❑ Engineering/design/construction
- 15 ❑ Medical/health & safety
- 16 ❑ Environment
- 17 ❑ Academic
- 18 ❑ Gas
- 19 ❑ Media/publications
- 20 ❑ Storage
- 21 ❑ Microbiology
- 22 ❑ Loss control
- 23 ❑ Retail
- 24 ❑ Inspection
- 25 ❑ Lubricants
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- 27 ❑ Library/information services
- 28 ❑ Other (please specify)_____

6 INTERESTS Please indicate, using the code numbers in '5' above, the three subject areas which most interest you:

❑ ❑ ❑

7 IS/WAS YOUR WORK PRIMARILY: ❑ Upstream? ❑ Downstream? ❑ Both?

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Date of Birth

Job Title

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Postcode

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Postcode

Country

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PREFERRED MAILING ADDRESS: ❑ HOME ❑ BUSINESS

You require a proposer who is an IP Member, or, if you do not know one, a letter of recommendation from someone who knows you professionally

PROPOSER

I, being an individual member of the Institute of Petroleum (membership no.....) or nominated representative of a collective member (company name.....) and having known the candidate personally for..... years, propose and recommend them in accordance with the By-Laws as a fit and proper person to belong to the Institute.

Signature:

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becomes more dependent on Gulf oil and loses the Iranian conventional arms market to Russia, cooperation between Iran and China might focus on weapons of mass destruction (WMD) and missiles in the coming years.[5]

It is the political failure of the US to address the issue of its growing dependence on imported oil that led to its being continuously involved in Gulf politics and security issues. The consequence for regional security is that the US commitment is now intrinsic to the prevailing balance of power in the Gulf and any significant reduction in US involvement could presage an unravelling of the existing order and also undermine oil security.

Asia-Pacific oil demand

The 'centre of gravity' of oil consumption is shifting to the Asia-Pacific region. In 1990, the region overtook Western Europe in oil consumption and if the oil demand trend continues, the Asia-Pacific region is projected to overtake North America (including Mexico) by 1998 to become the world's biggest consumer of crude oil (see **Table 2**).

The Asia-Pacific countries are growing increasingly concerned about their ability to supply enough oil to fuel future economic growth. Nowhere are these concerns as manifest as in China. In 1993, China became a net crude oil importer for the first time. It must now make new oil discoveries if it is to maintain the momentum of its economic growth and avoid becoming heavily dependent on oil imports.[6]

In 1996, the Asia-Pacific region imported 11.12mn b/d of crude oil and refined products, or 60% of its oil needs. By 2000, the region could be importing about 17.20mn b/d or 73% of its needs, most of which will come from the Gulf (see **Table 3**).[7]

Of course, oil and geopolitics can continue to be a volatile mixture. After all, the first of the post-Cold War crises was the Gulf crisis which was, in its essence, about oil and geopolitics.

The China factor

China's spectacular economic growth has led to a growing dependence on oil imports which in 1996 accounted for just over 12% of its oil needs. And if China's economic growth continues at its current pace, it will become the world's third largest importer of crude oil after the US and Japan. By 2000, China will need to import more than 2mn b/d, or 40% of its oil needs, if no substantial new oil reserves are found in its territory (see **Table 4**).

	1990	1992	1994	1996	1997	1998	1999	2000
North America	19.45	19.43	20.36	20.74	20.97	21.20	21.43	21.91
Western Europe	13.27	13.77	13.80	14.20	14.47	14.74	14.91	15.31
Asia-Pacific	13.70	15.26	17.00	18.68	19.83	21.36	22.33	23.70

Source: BP/author's projections.

Table 2: Oil Demand: North America and Western Europe vs Asia-Pacific, 1990–2000 (mn b/d)

	1990	1993	1995	1996	1997	1998	1999	2000	% Change 1990–2000
Production	6.73	6.99	7.32	7.56	7.40	7.03	6.78	6.50	–3
Consumption	13.70	15.88	17.88	18.68	19.83	21.36	22.33	23.70	+73
Net imports	6.97	8.89	10.56	11.12	12.43	14.33	15.55	17.20	+147

Source: BP/East-West Center, Honolulu, USA/author's projections

Table 3: Current and Projected Oil Demand, Supply and Imports in the Asia-Pacific Region, 1990–2000 (mn b/d)

	1990	1993	1996	1997	1998	1999	2000	% Change 1990–2000
Production	2.79	2.89	3.17	3.24	3.20	3.00	3.00	+ 8
Consumption	2.27	2.92	3.62	3.88	4.16	4.57	5.03	+122
Net imports	+0.52	–0.03	–0.45	–0.64	–0.96	–1.57	–2.03	+351*

Source: BP/China Energy Study, 1995 , East-West Center/author's projections.

** Covers the period 1996–2000.*

Table 4: China's Crude Oil Production, Consumption and Imports, 1990–2000 (mn b/d)

One thing, however, is certain. China will be as robust as the US in defending its access to oil supplies. Furthermore, China may not shy away from the use of force to defend its rights of access. However, to satisfy its needs, China may look to the Middle East, southeast Asia or Siberia. It could trade arms for oil with the Middle East or could use arms to secure oil from southeast Asia, especially from the South China Sea.[8]

It is this growing thirst for oil which is behind China's assertion of its sovereignty over the Spratly islands and other specks in the South China Sea. (see *Petroleum Review,* January 1997). The Spratlys which are claimed in whole or in part by China, Vietnam, Taiwan, Malaysia, the Philippines and Brunei, lie atop substantial undersea oil and gas resources estimated by some accounts at 7bn barrels.[9]

However, oil wealth beneath the South China Sea is fuelling an explosive arms race in southeast Asia. So the threat of conflict is real. This raises the question as to whether China will risk upsetting its southeast Asian neighbours over the South China Sea when it is trying to attract investment and secure markets? The answer to that question will be determined by China's need for foreign investment and technology for the development of its oil sector.

This leaves the Gulf region as the other major source of oil supplies for China. China has for years been supplying arms to the Gulf countries, especially Iran and Iraq, not only as a source of hard currency but also in exchange for oil. However, at a time when the US is trying to prevent both Iran and Iraq from re-arming, any attempt by China to sell sophisticated weapons systems to Iran and assist it in acquiring nuclear and missile technology, will incur the wrath of the US and would prompt it to orchestrate an embargo on oil supplies to China by the Gulf producers and possibly take a pre-emptive action against Iran's nuclear installations.

Sometime in the not-too-distant future, the US will no longer be in a position to guarantee the stability of the Asia-Pacific region by its unilateral actions and forward military presence. This will primarily be due to the growing economic and military power of key Asian nations, particularly China, which will increasingly allow them to resist US influence.

The US will have to accord a higher priority to the nation most likely to present a challenge in the Asia-Pacific region, namely China. Confronting and establishing a new modus vivendi with China will be extraordinarily difficult, but there is no practical or responsible alternative for US foreign policy in the 21st century. The US has a special interest in improving relations with China. China is one of two nations (the

other is Russia) with the greatest potential either for working with the US to control nuclear proliferation or for undermining the nuclear control regime possibly through passing nuclear technology to countries like Iran as it did with Pakistan in the early 1980s.[10]

China's interests

If the US can neither contain nor engineer the collapse of China, then US national security is best served by policies designed to enhance China's interest in the international system. So a strategy of 'positive conditionality' composed of at least the following features, begins to emerge:[11]

- Because China will become increasingly dependent on Gulf oil supplies, the US could encourage states with an interest in Gulf security, namely the GCC states, Japan and Western Europe, to join it in making it clear to China that it could have access to Gulf oil supplies provided it refrains from transferring nuclear and missile technology to Iran.
- As China is likely to be a long-term importer of high technology from the West, the West can offer China high technology in exchange for not passing its own nuclear technology to countries like Iran.
- Because China needs substantial foreign investment and oil technology to develop its oil sector, provision of foreign technology and investment to China's oil sector will be conditional on its agreement to a peaceful settlement of the territorial disputes in the Spratly islands in the South China Sea and a joint exploitation of the resources in the area.
- As China is likely to have a long-term trade surplus with the developed world, the leading markets (the US, Japan and the European Union) will have major leverage on China's behaviour. While these states want China in the World Trade Organization (WTO), they can also use the terms of entry to ensure that China has an open economy that plays by international rules.

Conclusions

If China responds positively to the strategy of 'positive conditionality', then the global oil security (based on Gulf oil supplies) would be enhanced, the new political order in the Gulf strengthened and stability in the Asia-Pacific region assured.

However, there is a remote but disturbing possibility that China may decide to reject this strategy in an attempt to assert its growing weight and independence in foreign affairs. China may then go on to actively pursue its policy of achieving sovereignty over the South China Sea and may also decide to continue its policy of arms for oil with Iran. And should the US and its allies respond by blocking Gulf oil supplies to China, the Chinese might retaliate by going as far as to assist Iran in acquiring nuclear and missile technology, thus leading to a direct armed conflict between the US and Iran. In such a dire situation, oil shipments through the Straits of Hormuz could be threatened and the global oil security and the new political order in the Gulf would be undermined leading to rocketing oil prices reminiscent of the late 1970s. ●

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Business Process Outsourcing

Multinational corporations, in every industry, are embarking on yet another period of dramatic change affecting their structure and culture. In the quest to increase shareholder value there is a new facilitator – Business Process Outsourcing. Major companies in the petroleum industry, such as British Petroleum and Mobil, are among the pioneers of this new worldwide strategy to achieve competitive edge, writes *Richard Smith*, Chief Executive of Price Waterhouse Business Process Outsourcing in Europe.

Outsourcing, as a concept, is not new. For decades now, companies large and small have been outsourcing peripheral functions such as catering, cleaning and security to specialists in these functions, with the dual objectives of saving cost and management time in the provision of these services. More recently, many companies have also outsourced major segments of their information technology (IT) support services, perhaps for slightly different reasons (for example, the difficulty of keeping in-house staff technically up-to-date) but with the same objectives in view.

The new approach

Business Process Outsourcing is based on the same principles, but takes the practice of outsourcing to the very heart of the business. It requires management to undertake a fundamental review of their company's operations, and to decide what is their core business – what does the company do that provides real and increasing value to shareholders – and what can be classified as support services which could be provided by an outsourcing partner.

Forward-looking companies are now entrusting previously sacrosanct internal support services, which had been regarded as integral to the company's culture, to specialist partners. These services can include a variety of finance and accounting functions, internal audit, tax compliance, procurement and sourcing, customer management, human resources administration and real estate management.

Why is this to a company's advantage? Because it allows management to concentrate on the real core of their business – the strengths that distinguish their company in the marketplace, and provide competitive edge. Petroleum multinationals are at the forefront of this structural and cultural revolution.

This is no management fad or fashion. By the millennium, it is predicted that all multinational companies, and most major nationals, will have embarked on a Business Process Outsourcing exercise. The Outsourcing Institute in New York forecasts that the outsourcing market will be worth US$120bn in the year 2000. This is good news for the outsourcing providers, but also good news for companies and their shareholders. The companies will, over time, save costs and achieve better levels of service in their outsourced functions. Even more important will be the concentration of management focus on the core business.

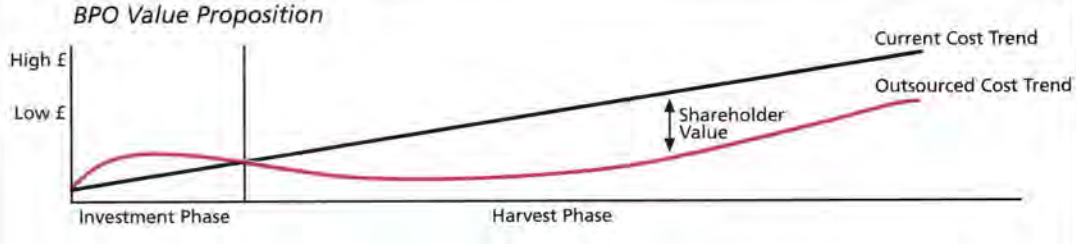
The growth of this market will be fuelled as much by the emergence of competent Business Process Outsourcing providers as by the potential demand from industry.

Core competencies

Consider the companies which have already achieved outstanding success by concentrating on their core competencies. Nike, the largest producer of athletic footwear in the world, does not manufacture shoes. Gallo, the largest wine company, does not grow grapes. Boeing, the pre-eminent aircraft company, constructs little more than cockpits and wing bits.

These companies have identified and focused on their core competencies, which create shareholder value. Nike knows that its core competency is in designing and marketing shoes. Gallo has decided to mitigate its exposure to agricultural risks. And Boeing concentrates on assembly and logistics. They do not ignore the other functions which contribute to their worldwide success; they have formed partnerships with specialists who provide best-in-class support services in non-core areas.

These examples provide a blueprint for the companies of the future. Their Finance Directors will not have to spend time, or money ensuring that the



Once Business Process Outsourcing is up and running, costs drop and shareholder value is likely to climb.

accounts payable department has the most up-to-date and efficient software.

Their Human Resources Directors will not divert their attention to routine enquiries about tax compliance or pensions entitlements. Their Operations Directors will not be distracted by the problems of maintaining quality standards of corporate stationery around the world. These Directors will concentrate on the strategic issues which contribute to the company's success.

They will have identified their core functions, and they will devote their talents and energies to these, while outsourcing non-core functions to specialist partners.

As Business Process Outsourcing gains momentum and the pressure to increase shareholder value grows, the range of functions that are candidates for outsourcing widens considerably
Directors and Boards *magazine, Spring 1997*

The industry's response

How is the petroleum industry reacting to this new approach to efficiency, success and the creation of shareholder value? All around the world, new initiatives are under way.

Latin American units of British Petroleum, for example, have contracted with Price Waterhouse to perform a five-year, US$40mn finance and accounting services project for their operations in Colombia and Venezuela.

In September 1997 it was announced that the BP/Mobil joint venture in Europe is the first client of the new Price Waterhouse International Shared Services Centre in Rotterdam. As part of a long-term contract, Price Waterhouse will provide financial accounting, payroll, purchasing and procurement, and cash/banking services for the joint venture in a number of European countries.

The Rotterdam staff have been carefully selected for their combination of industry experience and technical skills in accounting and procurement, and then trained to Price Waterhouse standards. The Centre currently has 100 multilingual staff, of 12 different nationalities, but has the capacity, in terms of space and IT support services, to expand to accommodate some 400 staff.

The Director of the International Shared Services Centre is Peter Smith, who previously managed Ford's Accounting Service Centre providing accounting services to national sales companies throughout Europe. He says: 'This is the leading edge of European Business Process Outsourcing. The concept of a multi-client, multi-service centre operating across national boundaries is very exciting and has huge future potential.'

North America

Earlier this year it was announced that Mobil Business Resources Corporation would negotiate a business process and application sourcing agreement with Price Waterhouse to assume day-to-day general accounting, lease administration and financial reporting functions for Mobil Exploration & Producing US Inc (MEPUS), Mobil Corporation's domestic upstream exploration and producing affiliate.

At the time of the announcement J Michael Yeager, President and General Manager of MEPUS, said: 'By working together with Price Waterhouse, we intend to build a leading edge market-based support structure for our domestic upstream financial services. This is part of Mobil's overall drive to have a very competitive cost structure. We expect to experience about a 20% reduction in our upstream accounting costs as a result of this agreement.'

Cost savings of the magnitude of 20% (and more) are not unusual in mature outsourcing arrangements. Companies can significantly reduce the overhead and administrative costs of back office functions by entrusting them to outsourcing partners who can manage them more efficiently and effectively. Increased productivity is an integral part of most outsourcing agreements.

However, companies considering outsourcing some of their non-core business processes have to recognize that, in the short term, there is likely to be a considerable demand for management attention during the vital transition process; indeed, this will be vital to the success of any deal.

Another important aspect of cost reduction is that companies can reduce their own capital investment in computer-based information systems, freeing up investment capital that can be used to better advantage elsewhere and, at the same time, benefit from their outsourcing partner's state-of-the-art technology.

But cost reduction is not the only benefit to be achieved.

When the company's own internal support staff are transferred and retrained by the outsourcing partner, there is an immediate and obvious reduction in payroll costs. But there is also a benefit in terms of revitalized employees who, when they move from the company's back office to the front office of the outsourcing partner's core competencies, find for themselves a commitment and career structure that most have not previously experienced.

Business Process Outsourcing also provides the opportunity to achieve organizational change, more rapidly and often more radically than would be possible within the confines of a company's own culture and vested interests. Indeed, the requirement for change is sometimes one of the main reasons for a company to seek an outsourcing solution.

The prime benefit to be achieved from Business Process Outsourcing, however, is the concentration of management attention on the company's core businesses and competencies, giving them a competitive advantage in the marketplace. This, combined with the cost savings, can lead to substantial improvements in shareholder value.

When properly implemented, Business Process Outsourcing can lead to more strategic benefits including increased customer satisfaction, competitive advantage, and shareholder value
The Outsourcing Institute, USA

The future

Price Waterhouse is in no doubt that Business Process Outsourcing will become a vital strategy for the majority of companies in the energy industry during the next decade. At present, the full capabilities and potential are properly understood by relatively few. But if a discussion of Business Process Outsourcing has not yet taken place in an energy company's boardroom, it is only a matter of time before it will.

Information management in the upstream oil industry

The challenges facing the oil industry are well documented. They include growing competition, higher production costs and more stringent environmental legislation. Overall, oil companies are under pressure to take as many costs out of the business as possible. Analysts suggest that industry in general can save up to 20% of its annual revenues by adopting a seamless approach to information management. *Marion Stern*, Senior Consultant, CMG oil division, explains the potential benefits to the oil industry of improving information management.

Like all organizations, oil companies build up silos of information in different formats, in different departments, to support different processes. Design specifications may be produced electronically, but they are typically delivered by a vendor to a contractor operator as hard copy, and vice-versa. Physical designs are created as 3D models, but fabrication drawings are still normally delivered on paper.

Information management is a strategy that amalgamates and standardizes corporate information, making it easier to access and easier to manage.

Instead of storing information in disparate applications, organizations create a central backbone of standardized data. This backbone is maintained separately from applications, such as those supporting exploration, seismic analysis, engineering and production. Applications can change to suit the changing organization, but data is still held in the same place, in the same standard format.

This concept is particularly important for oil companies because of the long life-cycle of assets and resources. The life-cycle of application software and hardware may be three to 10 years: an oil-field may be active for up to 10, 20 or even 50 years, from exploration to abandonment. By separating the way the information is managed from the application, organizations can ensure that they always use current technology to support their business, and that they can continue to carry out their work whatever changes the information technology industry may introduce.

The key benefit of information management is that all of the data relating to the asset, at all stages of its development, is stored once. This means that knowledge is not spread around different departments in different formats, but is accessible from applications which are suited to the task in hand. Information from different assets, all held in a similar and standard form, can be readily brought together to form a corporate knowledge base.

This leads to further benefits, such as increased productivity by skilled staff, who can spend their time making decisions and planning, instead of getting information into IT systems – and finding it again later. At present it is estimated that up to 80% of the geoscientist's time is spent searching for the information, and only 20% on carrying out the work that is needed to take the company forward.

Information management can also ensure that there is one set of standard information that everybody can use to make decisions, or as the basis of planning and forecasting. It reduces the number of times that data is input to a minimum, eliminating mistakes and inconsistencies as a result. It also means that information can flow freely around the organization, instead of being stuck inside a paper filing cabinet, or a poorly documented PC system. This information can be held in a variety of media, reflecting how it was captured, such as video, pictures, and sound, as well as documents.

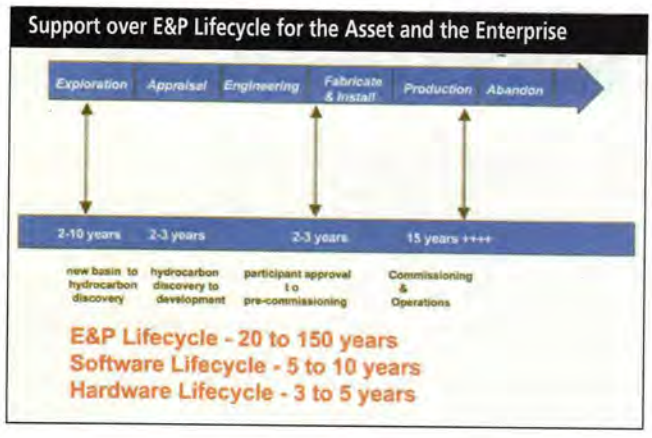
Information stored in different formats is difficult to share between different groups. By adopting a single format or standard, organizations can enable more effective team working leading to further significant cost savings. The approximate cost of an engineer handling each paper document once is estimated as $200.

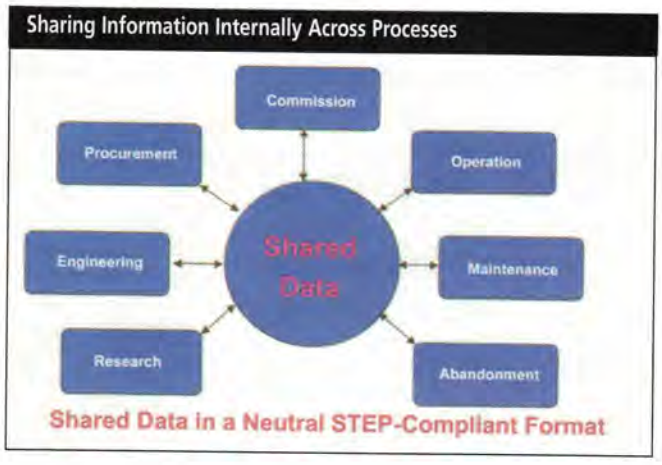
Industries other than upstream oil have already benefited from the information management approach. Manufacturing, retail and logistics companies recognize the value of working with standard, centralized data that can be accessed and used within a number of evolving business-driven applications. Analysts suggest that industry can save up to 20% of its annual revenues by adopting a seamless approach to information management.

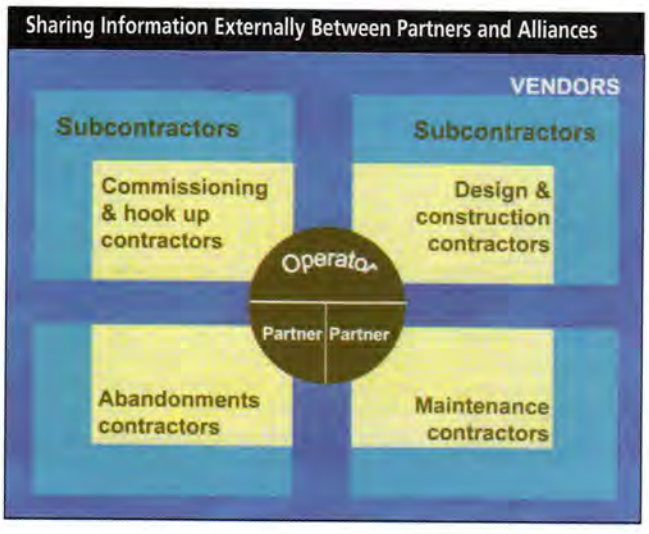
It is possible that the oil industry could gain even greater benefits, mainly because of the sheer complexity and longevity of its operational and business processes, including asset management, engineering, maintenance, logistics, reservoir modelling, drilling and highly detailed documentation.

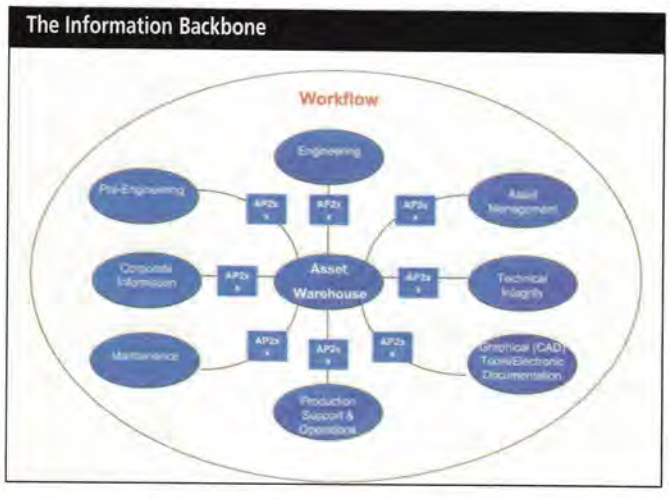
The oil industry is also heavily dependent on its partners, vendors and contractors. Information management means that oil companies can maintain data for exchange with third parties in a single format, again smoothing the information flow, reducing inaccuracies and multiple versions, and speeding up communication.

Yet for any of that to happen, organizations need to create an information backbone. The backbone stores data which is accessed by different departments, such as engineering, maintenance, asset management and production









support, using appropriate applications.

Those departments use information based around a variety of media, such as 2D and 3D drawings, documents, charts and maps. This means that an information backbone must be capable of storing multimedia information, as well as providing links to existing corporate data and legacy systems.

At the same time, the overall system should reflect the way that the company itself works, supporting fast and accurate decision-making and established workflow. It should also be possible to audit the system if necessary.

Although the oil industry is recognizing the benefits of information management, its implementation has been less straightforward. In the past the technology has not been at hand which was able to store or allow ready access to the large and complex data required to support exploration and production applications. Also, a traditional hardware configuration did not reflect the various geographically disparate organizations that work together in the oil sector.

However, the technology, tools and standards that are needed are now available commercially. Object technology and object oriented databases will permit different views of the same data, whilst client server technology supports dispersed organizations. Similarly modern network communications, and the use of the Internet and intranets will support the remote and virtual team working which is an inherent ingredient of the oil industry.

One standard that has been developed is ISO 10303, or the Standard for the Exchange of Product model data (STEP). One of a number of standards including POSC and PPDM, STEP enables data sharing, reliable archiving of asset data and accelerates effective automation and communication in a number of different industries.

An example of how STEP works in practice is at Netherlands-based GE Plastics. CMG worked in partnership with GE Plastics to develop its Engineering Information Back Bone (EIBB) project, a site-wide database for engineering data.

EIBB is based around the principles described within the European Process Industries STEP Technical Liaison Executive (Epistle) Framework V2.0. These principles cover the way in which data and other attributes are represented and named.

Overall, it allowed GE Plastics to replace a large number of disparate databases and unstructured data sources (such as drawings and charts) with a single backbone.

The main benefits of EIBB to date are that data is shared across sites, which means fewer inconsistencies and no data redundancy. Users have faster access to data, and the organization is moving towards a site-wide use of the same data structures, conventions and procedures.

The implementation of a STEP database at GE Plastics shows that this approach to information management on a large scale is not only feasible and logical, but also achievable in the real world.

It's clear that the oil industry is well-placed to take full advantage of the benefits that information management can deliver. But information management still means a variety of different things to different people, ranging from document management, through a project data store to an enterprise wide information system supporting knowledge management, executive decision making and corporate communications.

Each company needs to understand its own information requirements, as well as the potential benefits of introducing information management, before deciding how best to implement the new approach. They should also seek out reliable partners to work on implementation, and remember that it often requires a mix of different technical skills.

Gas developments to help rebuild post-war economy

Five years on from the peace agreement that ended its 16-year civil war, Mozambique is at last beginning to exploit its extensive natural gas reserves. The top priority is the creation of a substantial downstream sector centred on two export-orientated iron-ore reduction plants, reports *Colin Barraclough.*

Like many African countries, Mozambique enjoys vast natural resources which remain heavily under-utilized. A 16-year civil war between a Marxist-run government and anti-communist rebels sent business to other ports in the region. Yet its strategic coastline, stretching for 2,600 km along southeastern Africa, and good natural harbours make it an obvious entry point for goods destined for the African interior. Furthermore, exploration of its significant natural gas resources, originating from extensive coastal reserves, could yield a significant export-orientated sector.

Few other sectors of Mozambique's post-war economy exhibit such potential for foreign investors as natural gas. With the added attraction of low-cost hydropower, a cheap labour market, liberal economic controls and an energetic government, the gas sector is set to become one of the country's leading export sectors within the next five years.

The most promising gas development is the $662-mn Beira Iron Project, announced in August 1997. Using low-cost natural gas from fields in central Mozambique, JCI, one of South Africa's leading mining houses, intends to produce 2.5mn t/y of hot-briquetted iron for export to end-users in the Middle and Far East. Finance, to be sourced from Dresdner Kleinwort Benson UK, is already in place; current estimates show that construction could start as early as mid-1998 with the plant coming onstream in 2001. The putative go-ahead date is set for March 1998.

'The JCI project started two years ago and has been the fastest moving project in the country,' said John William Kachamila, Mozambique's Minister of Mineral Resources and Energy. 'JCI presented a feasibility study in a very short time. In response, we agreed to promote the project as much as possible.'

The government's rapid decision to approve the creation of a free-trade zone at the project site, 25 km north of Beira, has been a major boost to start-up procedures. It is particularly crucial for the construction of a new port terminal near Beira to accommodate delivery of imported iron ore to the site.

According to JCI, gas supplies will be sourced from two coastal reserves: Temane, some 300 km south of the plant site, and Buzi District in Sofala Province, less than 50 km south. Dallas-based Atlantic Richfield (Arco), in partnership with Sasol, has a concession on the Temane block, which lies in Sofala Province. Three wells have been drilled in Temane and seismic data researched in 1993 has been reinterpreted. Geophysical, geological and reservoir engineering studies show that Temane's reserves of some 660bn cf are sufficient for 20 years' supply to the plant.

Exploration has also started on Buzi field, JCI's preferred site, by Leopardus Resources, in association with the Canadian firm Scimitar Hydrocarbons. Initial indications are that Buzi's reserves are sufficient to sustain the plant for the whole of its intended 30-year life. Gas from both fields will be sold on a net-back formula, ensuring that the cost will be one of the lowest in the world, estimated by JCI at less than $0.75/Gigajoule.

Another associated but unexplored gas reserve lying off the coast of Inhambane Province, known as M10, may also be brought into the project. Arco, which currently owns the exploration concession to M10, has said that the field could yield reserves of up to 9tn cf.

CVRD, a Brazilian mining company, has agreed to provide a high-quality iron ore supply, while Mozambican officials are also studying plans to import iron ore from Zimbabwe. Initial exploration in Zimbabwe by JCI has ruled out existing known reserves due to a high level of impurities, but it has uncovered small deposits of high-grade hematite in the Zimbabwean Midlands. The company says that further exploration would be needed before the consortium makes any commitment to Zimbabwe.

Doubt still hangs over Mozambique's second planned gas project. The Pande

Mozambique

field, lying onshore in Inhambane Province, cannot be exploited until a gas pipeline to South Africa is built, but attracting a firm long-term customer has proved troublesome. A small portion of the field's proven 3tn cf reserves is used domestically, but Enron Corporation, which currently holds exploitation rights, is still looking for a major South African term customer.

For the past two years, Enron has banked on piping gas some 600 km south from Pande to Maputo Province, the planned site for an iron ore reduction plant using ore from the 220mn-tonne reserve located at Phalaborwa on the edge of South Africa's Kruger National Park. Enron has offered to build the $750-mn gas pipeline, while the government would finance related infrastructure construction via discounted funding from multilateral institutions.

However, the most direct routing for the iron ore, which would be transported via pipeline, would pass through the Kruger National Park, one of South Africa's most environmentally protected regions. Alternative routes would take it around the north of the park or around the south. 'Neither route is desirable,' said a South African diplomat in Maputo.

Furthermore, significant impurities in the Phalaborwa ore would require the use of advanced purifying technology, which could make the project commercially inviable. 'The Pande gas project is a little more problematic than the JCI project,' said Minister of Mineral Resources and Energy, John William Kachamila. 'The South African ore contains nickel, copper and chromium. We really need better technology to purify it.'

Neither Enron nor the Mozambican Government has given up hope of finding a suitable customer for the Pande gas, although it is unlikely that Pande's gas will flow before the early years of the next century. 'South Africa is the only real market for us,' said Kachamila. 'Once the pipelines are up and running, there is a possibility that other industrial uses in South Africa will turn to gas.'

Analysts point out that South Africa's supply of energy sources is limited to coal – which is environmentally unclean – and nuclear power, the promotion of which is controversial. Likewise, its labour pool is heavily unionized and political. 'Some industrial projects are simply more viable in Mozambique than in South Africa,' said Fernando Couto, a Maputo-based import-export agent. 'Mozambique has cheap energy sources and cheap labour.'

Moreover, its natural ports are convenient for the importation of raw materials, and political support from South Africa, which is seeking to reduce the number of Mozambican migrants seeking work in South Africa, gives the government strong political backing.

Gas Developments in Mozambique

Government officials agree that they will have to work hard to change the country's dismal image overseas, which has improved little since the civil war ended in 1992. The first step is to persuade foreign investors that both government and rebels are firmly committed to democracy.

The Frelimo Government, which was returned to power at UN-sponsored elections in 1994, has been working hard to persuade foreign investors that Mozambique is now stable enough to merit long-term investment. 'We had investors here throughout the war,' said Kachamila. 'Of course, the peace settlement has accelerated the investment process.'

World Bank officials agree. They are overjoyed that the Frelimo Government has dropped its strident socialism in favour of a conventional set of free-market policies which have already led to a stable currency, 5% economic growth and the sale of more than 900 state-owned companies – a considerable chunk of the economy – to private investors.

But the wheels of reform have largely been oiled by foreign largesse: aid donations make up 60% of the state budget. 'Mozambique is still the darling of the donor community,' said a Western diplomat in Maputo. 'But how long will that last? The projects will finish as soon as the donor money dries up.'

The government is aware of how much needs to be done. 'Sure, we have a weak infrastructure,' agreed Prime Minister Pascoal Mocumbi, who took office after the UN-supervised elections in 1994. 'But we have already started to reconstruct. The currency has been stable for two years, prices have stopped rising and goods are now available in the markets. Just two years ago, none of this was true. The whole country can feel the difference.'

The government's solution has been to attract enough foreign investment to keep the economy rolling when the donor money runs out. 'Mozambique has great potential for the development of its natural resources,' concluded Mocumbi. 'Our infrastructure is still weak, but we are working on the road and rail network and the Maputo Corridor development will change the economy of the country.'

The $1bn development, an ambitious plan to re-position Maputo as the port of choice for South Africa's northern provinces, has already attracted significant investor interest. In addition, major European and Asian corporations have pledged to build an aluminium smelter, an oil refinery and three new power plants. 'The Maputo Corridor will open the gates for some serious business opportunities in Mozambique,' said Fernando Couto. 'It will send a message to the world that this country is now a serious place in which to do business.'

NEW Publications

Lubricating Oil Basestocks

(CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 52 pages. Price: No charge.

Prepared by CONCAWE's Petroleum Products and Health Management Groups, this report (no 97/108) summarizes the health, safety and environment data currently available on lubricating oil basestocks derived from the refining of petroleum, including product toxicities, exposure limits, handling advice, disposal and associated hazards.

Argentina & South America – Investment Opportunities in Energy & Regional Integration

(Price Waterhouse, World Energy Group, 1201 Louisiana, Suite 2900, Houston, TX 77002-5678, USA). Price: No charge.

The Argentinian oil industry has undergone a number of significant changes since the deregulation of the industry began in 1989 and state-owned oil company YPF lost its monopoly. Reviewing the changes that have taken place in this market sector, this book also looks at the trend in coming years for the Argentinian oil business in the context of regional transformation and explains how energy integration will be affected in South America as a whole.

Glossary of Maritime Technology

Editor: N S Swindells (The Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London EC3R 7JN, UK). ISBN 0 907206 90 5. 386 pages. Price: £12.50 (£10 to IMechE members).

This glossary combines the functions of a dictionary, text book and micro-encyclopaedia to provide information on over 3,500 words, phrases and abbreviations used in the marine technology sector. It also contains over 30 explanatory diagrams.

The Coming Oil Crisis

C J Campbell (Multi-Science Publishing Co Ltd, 107, High Street, Brentwood, Essex CM14 4RX, UK). ISBN 0 906522 110. 210 pages. Price: £23.50 UK, £28.50 elsewhere.

This publication reviews the geological origins of oil and gas and the history and current status of the industry. It assesses how much oil and gas has been produced, what remains in known fields and what is yet-to-find and explains how to properly interpret published numbers, many of which can be spurious or distorted by vested interests.

The author is well known for his pessimistic assessment of the size of remaining conventional oil reserves. The book traces and develops the ideas and analysis that led him to this conclusion. These are backed with comprehensive statistics and interpretation of the reserves figures in the Petroconsultants' database and the views of a number of industry figures. While many would wish to disagree with the author's findings, they need to address the conclusions of his book.

European Downstream Oil Industry Safety Performance

(CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 16 pages. Price: No charge.

Prepared for the CONCAWE Safety Management Group, this report (no 3/96) reviews the safety performance of the downstream oil industry in western Europe in 1995. It includes the results of 22 companies which together represent over 80% of the oil refining capacity in Europe. The study indicates that the responsible management of safety in the oil industry resulted in a low level of accidents in 1995, broadly comparable with those reported in 1993 and 1994.

Petrol Forecourt Retailing – 1997 Market Report

Editor: Russell Langley (Key Note Ltd, Field House, 72 Oldfield Road, Hampton, Middlesex TW12 2HQ, UK). ISBN 1 85765 715 2. 96 pages. Price: £205.

The face of the petrol forecourt retailing sector in the UK has undergone major change in the past four years with increasing competition from supermarkets, price wars and the rising cost of oil on the international market forcing one in five stations out of business. This report provides an overview of the market place during this time, profiling the key players and assessing the various strengths, weaknesses, opportunities and threats in the petrol retail sector. It also analyses buying behaviour and the role of outside suppliers to the industry and proffers a market forecast for the period 1997 to 2001.

Offshore Blowouts – Causes and Control

Per Holand (Gulf Publishing Company, PO Box 2608, Houston, Texas 77252-2608, USA). ISBN 0 88415 514 5. 163 pages. Price: $95 ($85 if orders received before 31 May 1998).

Based on the SINTEF Offshore Blowout Database, this book explains why more than 100 offshore well operations in the Gulf of Mexico, Norwegian Sea and the North Sea erupted into destructive blowouts during 1980 to 1994. It outlines which operations (drilling, completion, production, workover or wireline) were in progress at the onset of the blowouts, reveals the causes for the loss of primary and secondary barriers and details fatal accident rates. It also outlines the important parameters required in preparing a risk analysis, including time to ignition, ignition trends, blowout flowpath, release point, blowout flow type and duration, and pollution.

Geological Risk and Uncertainty in Oil Exploration

Ian Lerche (Academic Press, 24-28 Oval Road, London NW1 7DX, UK). ISBN 0 12 444174 2. 658 pages. Price: £100.

Oil exploration is a high-risk business with a worldwide drilling success of only 10% and a typical price tag of $15mn per well. This book integrates quantitative knowledge of basin analysis with scientific uncertainty and economic risk to create an integrated hydrocarbon exploration strategy. It also instructs the reader in handling a variety of geological, geophysical and geochemical problems by applying quantitative methods to determine uncertainty. Each chapter opens with a general introduction to the subject and concludes with a review and discussion of the major concepts. A number of appendices containing ancillary data, equations and examples are also provided.

Technology of Underground Liquid Storage Tank Systems

John P Hartmann (John Wiley & Sons Ltd, Baffins Lane, Chichester, West Sussex PO19 1UD, UK). ISBN 0 471 15412 1. 292 pages. Price: £60.

This publication is based on the author's training course at the University of Wisconsin-Madison and has been written for busy engineers, contractors, owner/operators and inspectors who need to come up to speed on both the technology and the regulatory requirements involved in designing, installing and closing underground liquid storage tanks. It covers all the key issues, from site assessment to damage control, regulatory compliance and legal considerations to project management.

No leaded fuel after 2000

On 1 January 2000, motorists driving on to forecourts in the UK will find that they are being offered 'lead-replacement' gasoline (petrol) in place of the leaded gasoline that they had filled up with the previous day. As the vehicle fleet requiring both lead-replacement and high octane unleaded declines, the point will be reached, probably around 2004/5, when only the standard Eurograde premium unleaded is offered on forecourts. For the oil companies this will offer considerable savings in their supply logistics and free up considerable amounts of tankage but, until that date, they are faced with the costs of supplying declining volumes of dying grades, reports *Chris Skrebowski*.

Current plans are that leaded gasoline will be phased out across the European Union from 1 January 2000. Some European countries have already phased out lead and there is still the possibility that some of the southern European countries, such as Greece and Portugal, may invoke a derogation of the lead phaseout to 2005. There is, however, pressure for a harmonized phaseout on 1 January 2000 and current expectations are that this will be achieved.

Lead additives were first incorporated into gasoline in the 1920s to improve octane ratings. The incidental benefit was that the lead deposits lubricated valve stems and seats, preventing localized spot welding of the valve seats and allowing the development of more powerful and efficient petrol engines.

From the late 1920s to the 1970s oil companies generally added lead to gasolines in volumes that gave the largest and most economic increase in octane ratings. However, in the early 1970s concerns about the environmental and health impacts of the lead additives led governments to progressively reduce the permissible levels of lead additions to gasolines.

In 1971, the maximum permissible level of lead addition in the UK was 0.84 grammes/litre (g/l), a level which was progressively reduced over the following 15 years to reach the current maximum of 0.15 g/l (**Table 1**).The only company to have marketed low-lead gasoline is Shell which introduced a 0.075 g/l gasoline that continues to be sold by the company in the UK.

The current British Standard (BS4040) also specifies a minimum level of lead addition of 0.05 g/l. This is the minimum level required to inhibit 'valve seat recession'. This is the phenomenon in which a non-hardened valve, that is insufficiently lubricated/protected by deposits of lead oxide and lead sulphate, is slowly destroyed by attrition of the valve seat and localized welding.

The real pressure for unleaded gasoline came with the invention of the three-way catalytic converter which has the ability to reduce the main undesirable exhaust emissions (HC, NO_X and CO) by up to 90% but whose platinum-based catalyst is rapidly poisoned by lead in gasoline.

In the UK the major companies introduced unleaded in 1987. From 1990 all new cars sold in the UK had to be able to run on unleaded and from 1993 all new cars had to be fitted with catalytic converters and have to be run on unleaded. However, because new cars are often sold some months after they are manufactured the changeover dates are not clearcut.

The move to the use of unleaded gasoline required the use of hardened valve seats to avoid the valve seat recession problem. The various car manufacturers, however, changed over to hardened valve seats at different dates, sometimes even at different dates for different models. As a result of this the various car fleets in the main European countries have widely different requirements in terms of their need for leaded gasoline.

Shell has done extensive research into the problem and according to Dr Cathryn Hickey, Shell's Technical Manager for Automotive Fuels, the current situation in the UK is that of the 21mn cars on the roads some 7.25mn are being run on 4-star leaded gasoline. However, Shell's research shows that only 50% of the cars being run on it actually require the engine protection afforded by leaded gasoline.

At the moment there are some 3.39mn cars that have 'soft' valve seats according to the research. These require the protection of leaded or lead-replacement gasoline. Of the remaining 3.86mn cars, 1.6mn could safely switch to unleaded without any modification while the other 2.3mn could have their engines adjusted by retiming the ignition and could then run on unleaded.

According to Hickey although large numbers of drivers could make immediate savings by switching to unleaded fuel there are a number of reasons why some drivers are reluctant to make the change. There is a quite widely held, but usually inaccurate, belief among some motorists that their cars run better on leaded gasoline. There is also

Table 1: Maximum Permitted Lead Additions to Gasoline in the UK

Year	lead (grammes/litre)
1971	0.84
1973	0.64
1975	0.55
1977	0.50
1978	0.45
1981	0.40
1986	0.15

Source: Shell UK

the problem of establishing exactly when certain manufacturers moved to hardened valves which means it can be difficult to establish if some models require leaded fuel or not.

On current trends by 2000 only 4mn cars will be using leaded fuel and 1.5mn of these will actually need leaded fuel.

Traditional leaded fuel will disappear from forecourts from 2000 but to meet the needs of 'special interest groups', such as vintage and classic car clubs, leaded fuel will be available, possibly at sites such as racing circuits. However, this exemption to the overall ban from 1 January 2000 is on the basis that the volumes do not exceed 0.5% of total gasoline sales.

Alternative additives to lead already exist and have been proven in service. The most commonly used alternative additives are based on potassium and sodium, and additives of this type are in use in Europe, South America and Asia. Another alternative based on phosphorus is being used in New Zealand.

According to Hickey the experience gained with lead-replacement additives in Austria, Sweden, Denmark, Finland, Norway, Germany and the Netherlands, all countries where leaded gasoline has already been phased out, gives great confidence that effective replacements are available and proven in use.

However, the Shell view is that there should be an agreed British standard for lead replacement gasoline to ensure adequate protection of engines with soft valve seats before any attempt is made to market it widely. A British Standard will also help overcome the perception that 'leaded is best'.

Work is already underway on a draft British Standard and a preliminary version is already being circulated to interested groups.

The relatively high proportion of the vehicle fleet using leaded fuel means that it is unattractive to sell lead-replacement gasoline in the UK before the 1 January 2000 deadline, according to Philip Cholerton, Brand Manager–Shell Fuel. After that date the company, along with the other UK retailers, will have to decide how to provide lead, replacement gasoline.

Sales of Super Unleaded Gasoline (98 RON) in UK 1990-96 (tonnes)

1990	925,037
1991	1,171,938
1992	1,422,421
1993	1,463,727
1994	1,349,112
1995	1,349,112
1996	709,319
1997*	132,594

Source: Institute of Petroleum
** 1st three months*

According to Cholerton, Shell already supplies more lead-replacement gasoline than any other European retailer with sales in Scandinavia, Germany and the Netherlands. It also introduced the fuel to Austria in 1993. Outside the region the company sells lead-replacement gasoline in Thailand, Canada and Argentina.

The UK industry appears to have two options: follow the path used in the Netherlands where pre-blended lead-replacement gasoline is sold through the pumps, or, later, when the number of vehicles requiring the fuel has declined, some companies may wish to follow the German example of providing a bottled additive for the motorist to add to the tank after filling up with unleaded.

Once the UK's gasoline marketers have coped with the phaseout of leaded gasoline and the likely disappearance of the super unleaded grade the immediate challenge will pass to the refiners who will have to produce fuels to meet even more stringent gasoline and diesel specifications to meet the European Commission's draft proposals for emissions reductions by 2005.

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World trends for winter

Falling sulfur levels, steady cold flow performance and concern over cetane number among engine manufacturers in the US and Europe are just some of the findings in the recently published and latest annual *Paramins Worldwide Winter Diesel Fuel Quality Survey*.

The new report, the thirteenth in the series, provides a definitive guide to winter diesel fuel trends and is the result of analysis of 313 fuel samples from around the world.

'The *Paramins Worldwide Winter Diesel Fuel Quality Survey* is designed to provide the petroleum refining and distribution industry with a survey of the quality of diesel in the market place around the world,' comments Paramins' Fuels Technical Service Manager, Brian Davies.

'In addition to identifying overall trends in the quality of winter diesel, the report's findings both highlight refineries' responses to legislation introduced over the year and reveal the developments that will be required in order for these refineries to meet any further emerging legislation,' he continues.

The 1997 survey shows continuing environmental improvement following the trends identified in the 1996 survey. Sulfur levels continue to fall, not just across Europe, but also within the Americas and the Asia-Pacific region – notable sulfur reductions have taken place over the last two years in Australia, Hong Kong, Korea, Singapore and Canada. Cold flow performance worldwide remains essentially constant and cetane number continues to cause concerns for engine manufacturers in the US and Europe.

Excepting for the above points it is difficult to identify more detailed trends for the Asia-Pacific and Americas regions. Much of the value of this analysis comes from more detailed and specific examination of individual market or refinery requirements and the selection of appropriate additives to help meet these needs. The main areas of general interest this year concern European specification changes past and future.

Sulfur limits and lubricity

The European sulfur limits reduction in October 1996 and the subsequent concerns about diesel fuel lubricity provide an interesting picture of the market's ability to adapt to change (see *Petroleum Review*, December 1996 and July 1997). With the exception of Portugal, all countries which subscribe to the European Diesel Specification EN 590 now produce diesel with a sulfur content below 0.05%.

A comparison of the High Frequency Reciprocating Rig (HFRR) results from these countries before and after the change to 0.05% sulfur reveals that the average lubricity performance both across Europe and within each country has not changed significantly – a heartening fact for drivers of diesel vehicles indicating widespread use of lubricity additives and components able to provide lubricity.

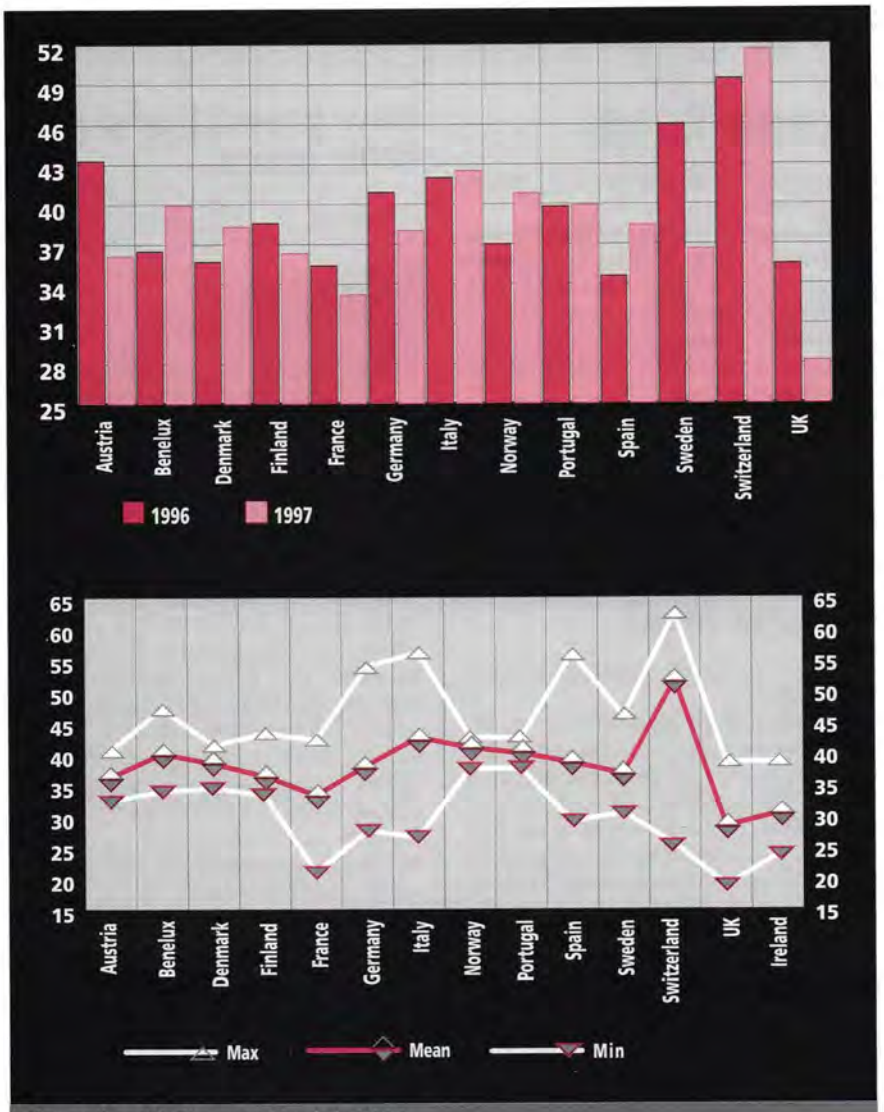
Additionally the data show that the production in most European countries will meet the proposed HFRR wear scar limit of 460µm without an increase in the quantity of lubricity additive consumed. The most notable exception to this is Switzerland where the majority of samples return HFRR results above 460µm but a number of samples from Germany, Italy and Spain would also fail to meet the proposed limit.

Proposals for the new Millennium

European proposals for the year 2000 call for a tightening of the specifications for distillation, sulfur content, density and cetane number. Samples from countries which are covered by these proposals were analysed to obtain a measure of the gap which exists with current winter production.

In general the proposals for 95% distillation at 360°C maximum, and density at 845 kg/m, are unlikely to cause concern for refiners as less than 10% of the European samples collected for this survey would be outside the proposed limit for the year 2000. However, if the data are considered at a national level it is clear that some countries will need to make changes. Of the samples analysed, a little over 50% of the UK diesels and 25% of the Spanish diesels would not meet the proposed density limit and 20% of Italian fuels would not meet the proposed distillation limit.

As would be expected given the recent history of sulfur reduction, the situation with sulfur is somewhat different and will require consideration



Figures 1 and 2: European Trends in HFRR

when the new limits are set. With the exceptions of Sweden and Finland none of the countries concerned currently meet the proposed sulfur limit of 0.035% maximum in more than 50% of the samples collected.

Cetane number will also require some consideration as 75% of all European samples collected fall short of the proposed cetane number limit of 52. Again, however, local variations exist which are against the general trend. All samples from both Sweden and Greece, and almost 50% of UK samples, would meet the proposed limit for cetane number.

Diesel data collection

In order to paint an accurate picture of diesel standards around the world, Paramins aimed to obtain one sample which represented production from each refinery or region in a given country. To minimize the possibility of taking multiple samples from a single refinery caused by pipeline distribution or local exchange, Paramins used its knowledge of local exchange agreement and distribution systems to carefully select the area from which each sample was collected.

For the majority of countries, samples were collected during the northern hemisphere deep winter months of January and February 1997. For southern hemisphere countries which produce winter grade diesel, sampling was delayed until later in the year when true winter grade samples could be obtained.

Of the 313 samples collected 48% were taken from Europe, 23% from the Americas, 26% from Asia-Pacific and the remainder from the Middle East and Africa.

Standard testing

The majority of testing was conducted at NAMAS and ISO 9001 accredited laboratories in the UK. Wherever possible, industry standard test methods were applied and in-house test methods avoided. Thus, the published data most accurately reflect the results that would be generated by organizations within the petroleum industry.

'Discussion of specific issues with the local Paramins contacts has proved the most invaluable way of exchanging ideas in the past. In times of changing fuel quality this is even more important, and we encourage such dialogue,' says Brian Davies.

To receive a free copy of the *Paramins Worldwide Winter Diesel Fuel Quality Survey* call +44 (0)1235 545721.

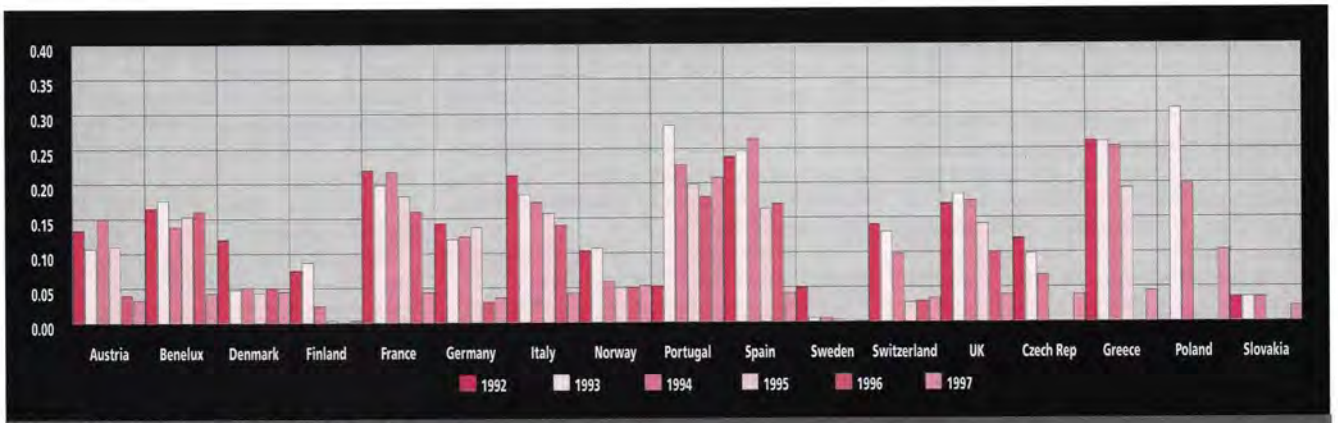


Figure 3: European Trends in Sulfur Levels

New transmission traction fluids

Shell has developed a new generation of advanced 'traction fluids' designed to meet the requirements of new, fuel efficient, infinitely variable automotive transmission (IVT) systems where conventional automatic transmission fluids cannot be used.

IVT systems use a series of variable geometry discs and rollers to transmit the power from the engine to the driven wheels and are claimed to offer the potential for smoother, quieter driving than the alternative belt drive CVT systems, as well as significant improvements in fuel efficiency compared with conventional automatic or manual transmission systems.

The new fluids combine high traction coefficients (the ability to transmit power across a fluid film) with wet-clutch performance, gear protection and viscometric characteristics that maximize the potential of the traction IVT system, states Shell.

The fluids are currently being supplied to a diverse range of prototype applications utilizing traction drive technology.

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Shipping data in the palm of your hand

Data contained in shipbroker Clarksons' series of printed, hard-backed shipping registers is now available on a pocket-sized Psion 3C organizer.

The computer screen shows information covering tankers, bulk carriers, gas carriers, chemical tankers, container ships and reefers at the touch of a button. Data on other vessel types is to be included at a later date.

According to Clarksons, the computerized version offers a number of advantages over the conventional shipping registers. For example, it can pick out and group vessels of the same type or age and provides a 'notebook' facility which allows the user to add and store comments about any particular vessel. It also gives the names, addresses, telephone and fax numbers of the owners of the vessels listed. The Pocket Ship Register can also be used for writing reports, preparing spreadsheets, storing addresses and listing appointments. A facility is also available for e-mailing clients or surfing the Internet.

Tel: +44 (0)171 334 3134
Fax: +44 (0)171 522 0330

Sound development for drill cuttings disposal

The Expro Group has developed an ultrasonic processor that reduces the size of drill cuttings to sub-millimetre particle sizes which are then suitable for zero discharge strategies, such as reinjection or onshore containment, and for disposal through natural dispersion when suitable non-toxic drilling fluids are utilized.

Drill cuttings are reduced in size by the intense ultrasonic energy created by the small bubbles that are generated, enlarge and then implode as acoustic waves pass through the cuttings/seawater mixture in the ultrasonic processor's chamber. As the bubbles implode they create tremendous heat as localized hot spots which rapidly dissipate while the surrounding area remains close to ambient temperature. The imploding cavity also generates high friction and collision forces which help the size reduction process.

Field trials were recently completed on Agip's Thelma field in the northern North Sea where the technology was employed to treat cuttings contaminated with synthetic oil-based drilling fluids prior to their disposal through natural dispersion. According to the manufacturer, the tests showed that, through the effective reduction in size, cuttings were dispersed over a wide area thereby abating any hostile effects in the localized marine environment. In addition, the subsea template remained uncontaminated of cuttings, eliminating the costs of expensive subsea clean-up operations.

The technology is being marketed under Expro's new 'Ecotec' brand.

The company started work last month on a £2-mn, two-year contract with Saga Petroleum of Norway to treat cutting produced from the drilling of seven wells in the Varg field.

Tel: +44 (0)1224 214600
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New generation of cable gland

CMP Products' Poseidon 2000 is said to be the first deluge-proof cable gland of its kind which is EMC tested.

Developed specifically for the offshore market and hazardous environments, the new gland is also claimed to offer the widest possible cable acceptance range currently available on the market. This means that there will be fewer products per range of cables, making selection a more simple and accurate process, states the manufacturer. Fully operational from –60°C to 130°C and Baseefa certified, the cable gland incorporates an O-ring design to provide extra protection from mechanical damage.

Tel: +44 (0)191 265 7411
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Remote controlled fire-fighting

A new advanced gas mitigation and fire-fighting system designed to operate in extreme conditions offshore has been unveiled by Fireater, part of Aberdeen-based John Wood Group.

The Storm electric remote control system is an 'intelligent' fire monitor fitted with microprocessors capable of remembering how to cope with specific situations and reacting instantly at the touch of a button if those circumstances are repeated. 'Such a system delivers an immediate response in hazardous situations and can be operated without waiting for a fire-fighting expert to arrive on the scene. The monitor "knows" instantly what to do,' says the company.

Manufactured from brass to provide the maximum corrosion resistance in severe conditions, the Storm system is capable of pumping out up to 2,000 gallons of water a minute and can throw out a 95-foot diameter curtain of water around 135 degrees.

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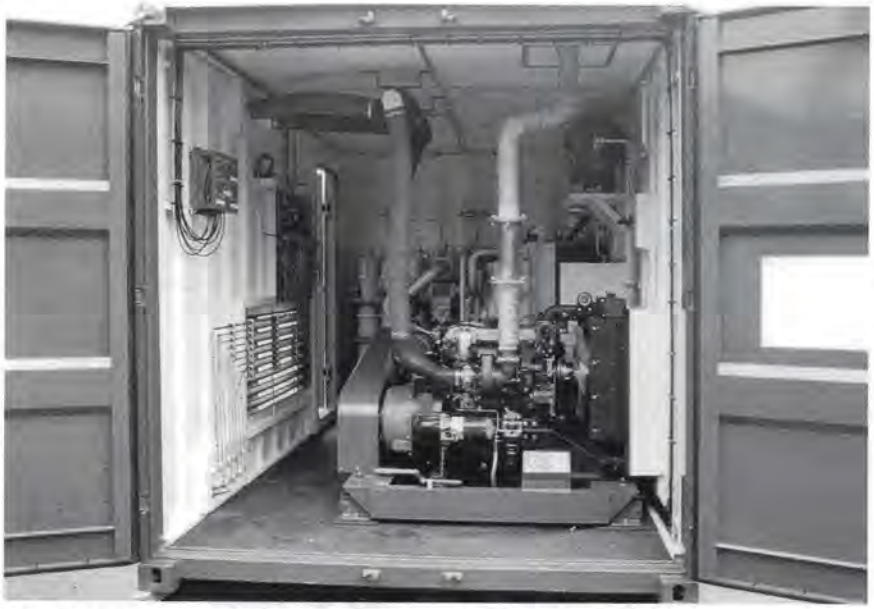
Fax: +44 (0)1224 871997

Containerized seismic compressor system



A self-contained seismic compressor package has been introduced by SAS to simplify oil and gas exploration operations both onshore and offshore. The equipment, complete with air storage facilities and pressure control station, is containerized and can be easily transported to the exploration site.

The seismic compressor is diesel driven and incorporates a four-stage, air-cooled unit with filtration, interstage cooling and oil and water separation. The compressor control panel is arranged for pushbutton electric start and stop functions and has a number of built-in safety features.

The air storage facilities comprise six 42-litre cylinders with operating valves. A stainless steel control/reducing panel provides control of air during seismic operations.

Tel: +44 (0)1942 724248
Fax: +44 (0)1942 270771

Differential flow measurement

A new range of Sensybar averaging pilot tubes has been introduced by Hartmann & Braun (Bush Beach Engineering).

Sensybar is designed to span the process pipe diameter and comprises an outer impact tube, internal averaging tube, low pressure chamber and head. The unit is claimed to be accurate to ±1% of actual flow rate with repeatability at ±0.1%. Accuracy is optimized by the positioning of flats around the downstream hole creating a stable pressure which maintains a more constant flow coefficient K at high velocities and enables a large range of flow measurement (turndown). The unit is capable of handling temperatures up to 1000°C and 400 bar pressure.

Sensybar is available as an integral package comprising a three-valve manifold and DP transmitter fitted to an averaging pilot flow sensor. Such an integral system offers the advantages of simple installation, a compact construction, reduced transmission lags, balanced legs and competitive pricing, states the manufacturer.

Tel: +44 (0)161 485 8151
Fax: +44 (0)161 488 4048

Helicopter airbags

BMT Fluid Mechanics and Westland Helicopters have recently tested a number of new helicopter floatation devices that have been designed to stop a ditched helicopter capsizing in the sea before the cabin is full of water and all escape routes immersed.

While helicopters used for over-water transport operation are already fitted with emergency floatation sytems – usually consisting of inflatable buoyancy bags attached to the lower fuselage or undercarriage units which either inflate automatically on contact with water or can be activated manually by the pilot – such designs only work well in calm water and in moderate waves. In more severe weather conditions a breaking wave easily capsizes the helicopter into a completely inverted attitude.

Tests were carried out on models in test tanks at Haslar Hydrodynamic Test Centre in Hampshire. Two devices which provided additional buoyancy at the top of the helicopter – where it is heaviest because of the location of the engine and gearbox – were found to be most effective at preventing the helicopter 'turning turtle'. One of the designs features a pair of inflatable sausage-shaped floats positioned on either side of the cabin, roughly in line with the the roof, which automatically inflate on impact with the sea. The other incorporates permanent foam wrapping around the engine and gearbox housing.

Full results of the study, conducted on behalf of the Civil Aviation Authority, will be published later this year.

Tel: +44 (0)171 735 8366
Fax: +44 (0)171 793 0425

Wellhead development

Ulverston, Cumbria-based Tronic's new Wellhead, Downhole and Power Division has launched a land and platform wellhead and packer feedthrough system which is claimed to be capable of handling the most severe well conditions.

The system comprises EExd surface connector, wellhead protector, downhole packer penetrator, in-line splices and ESP (electrical submersible pump) potheads, and has been designed to minimize deployment time. The design also permits the re-use of many components which can be refurbished when the system is worked over.

The system is rated up to $5kV_{ac}$, 180A.

Tel: +44 (0)1229 580500
Fax: +44 (0)1229 589200

On-the-spot breath tests

Designed for use throughout the oil and gas industry, the new Alco-check alcohol breath test kit manufactured by Draeger is a disposable, low cost breath test system that provides instant breath alcohol readings. The system is said to be manufactured, tested and calibrated to the same stringent standards as the UK Home Office-approved units that are used by British police forces.

In terms of drink-driving legislation, the current UK legal limit of alcohol is 80mg of alcohol in 100ml of blood, ie 0.8 promille (parts per thousand). However, because lower blood alcohol levels may be required, depending on the industry and workplace environment concerned, Alco-check can be calibrated from 0.3 to 0.8 promille.

The system is simple to use. An Alco-check tube is inserted into a one-litre measuring bag which is then inflated in one breath by the person taking the test. Once blood alcohol concentrations (BAC) of 0.3 promille and above are evident, the reagent crystals in the tube turn green. If the crystals turn green beyond the indicator line on the tube the BAC is above the unit's calibrated limit.

The Alco-check system is available from Grendonstar Distribution.

Tel: +44 (0)161 793 7099
Fax: +44 (0)161 793 7275

Heave forecasts reduce production disruption

A new collaboration between The Met Office and WS Atkins is to provide the ffshore industry with accurate 'heave' forecasts which show how semi-submersible drilling rigs and dynamically positioned vessels respond to long-period swells which can be generated by storms thousands of miles away and may take several days to travel to the site. Even very low energy levels, virtually undetectable by eye, can give rise to significant vessel or rig heave.

A five-day forecast presented as time-series tables is faxed through to the operations manager with updates every 12 hours. The forecast allows the operator to minimize disruption and plan production in advance of the swell.

Two BP floating rigs have been involved in the trial. Both units are located west of Shetland – one on the Clair field, the other at Schiehallion. A third will be joining the trial soon.

Tel: +44 (0)1344 856655
Fax: +44 (0)1344 854942

Flue gas analyser first

The Ametek Thermox WDG and Insitu range of flue gas analysers, and Series 2000 control unit, have been awarded Cenelec EExd.IIC flameproof certification. They are the first zirconium oxide flue gas analysers to achieve such certification states manufacturer APK Engineers.

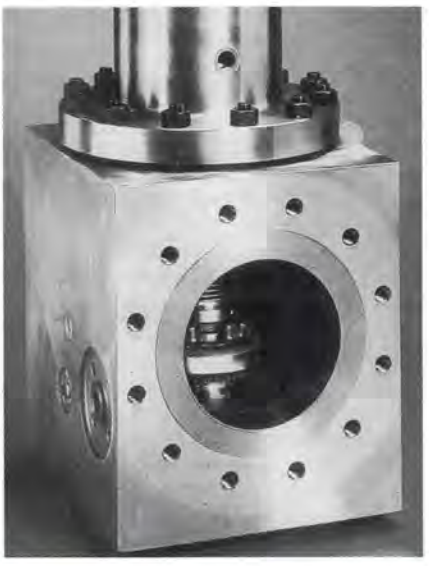
Tel: +44 (0)1380 720831
Fax: +44 (0)1380 720597

Block-body valves for HP/HT applications

Anderson Greenwood has developed a spring loaded block-body safety relief valve specifically for use in high pressure, high throughput applications in the oil and gas industry.

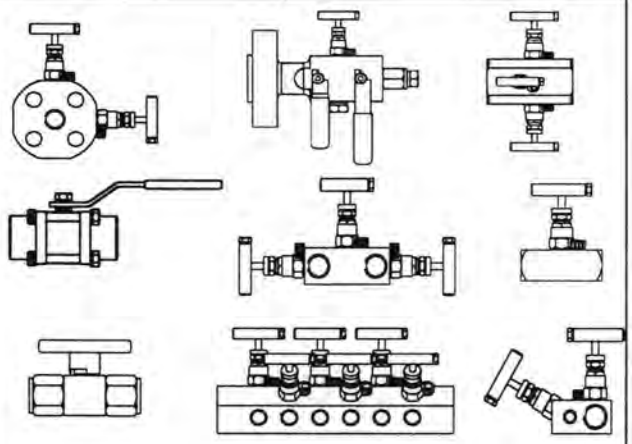
In the past, spring loaded valves could only accommodate high set and back pressures using a series of smaller safety relief valves operating simultaneously or by using pilot operated valves. However, this new valve is said to be capable of handling extreme pressures up to 400 bar gauge and provides the equivalent pressure relief of 12 smaller standard units. Use of a single block-body valve also reduces the possibility of leakages as well as providing weight and installation savings.

Tel: +44 (0)161 494 5363
Fax: +44 (0)161 494 5672



If you would like your new product releases to be considered for our Technology News pages, please send the relevant information and pictures to:
Kim Jackson
Deputy Editor, *Petroleum Review*
61 New Cavendish Street, London W1M 8AR, UK

The Valve & Manifold Company.



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NIGERIAN

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Publishers:
Advent Communications Limited
for Oil & Gas Readings Group

Publications Announcement

Portland Press Ltd has been appointed as the official distributor for IP publications previously sold through the Institute of Petroleum's Library in London.

John Wiley & Sons will continue to distribute a number of IP publications, as in the past. However, some 150 titles which were previously distributed by the Institute of Petroleum's Library will now be handled by Portland Press Ltd.

The new arrangement will enable the Institute of Petroleum to provide a more efficient service for its Members and other customers. The existing discount structure will be upheld, including the 25% discount available to Members of the Institute.

For more information, contact:
Shirley Day, Assistant Director, Sales & Distribution, Portland Press Ltd,
Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK.
Tel: +44 (0)1206 796351 Fax: +44 (0)1206 799331 e-mail: sales@portlandpress.co.uk

UK Deliveries into Consumption (tonnes)

Products	†Aug 1996	*Aug 1997	†Jan-Aug 1996	*Jan-Aug 1997	% Change
Naphtha/LDF	204,128	207,336	1,873,393	1,271,521	-32
ATF – Kerosene	765,269	791,486	5,312,477	5,527,346	4
Petrol	1,893,078	1,844,271	14,721,249	14,864,663	1
of which unleaded	1,272,393	1,333,742	9,877,085	10,548,730	7
of which Super unleaded	54,330	40,691	497,403	353,993	-29
Premium unleaded	1,218,063	1,293,051	9,379,682	10,194,737	9
Burning Oil	176,273	158,379	2,120,579	2,084,308	-2
Derv Fuel	1,196,401	1,152,323	9,451,727	9,812,962	4
Gas/Diesel Oil	549,079	531,393	5,092,199	4,825,495	-5
Fuel Oil	480,199	201,695	4,526,863	2,749,525	-39
Lubricating Oil	69,999	71,310	580,291	588,162	1
Other Products	755,997	740,943	5,848,402	5,737,268	-2
Total above	6,090,423	5,699,166	49,527,180	47,461,250	-4
Refinery Consumption	553,209	551,023	4,363,371	4,308,221	-1
Total all products	6,643,632	6,250,189	53,890,551	51,769,471	-4

† Revised with adjustments *preliminary

IP News

NEW MEMBERS

Mr D G Ashton, Union Texas Petroleum Ltd
Mr A J Baskott, George Mellor Ltd
Dr G M Bliss, IPE Consulting
Mr A Brearton, Haverfordwest
Mr A C Briggs, Margate
Mr M Bussell, Peter Chadwick Ltd
Mr V R Chamberlain, Phillips Petroleum Co UK Ltd
Mr P J Chatfield, Colas Ltd
Mr C Christison, BP Oil UK Ltd
Mr S Christopher, Fleet
Mr G H Clarke, Industrial Flow Control Ltd
Mr D Coady, Fisher-Rosemount
Mr P J Collins, Staines
Mr L Connellan, Dublin
Mr J P Cooper, Scottish Oils Ltd
Mr F Da Re', European Marine Contractors
Mr M A Douglas, Berkshire
Mr I Findlay, LASMO plc
Mr S K Fryer, Stanford-le-Hope
Mr Y Fujisawa, Cosmo Oil (UK) plc
Mr M G Gaskin, Stonehaven
Mr S R Griffiths, Rugeley
Mr A Hanzawa, Cosmo Oil (UK) plc
Mr R A Harris, Husseys
Mrs S Henderson, Herbert Smith
Mr A D G Hill, Adrian Hill & Associates Ltd
Ms R Jiwa, London
Ms H J Jones, Upminster
Mr R A Jowett, Herbert Smith
Mr A Kamau, Engen Petroleum UK Ltd
Mr A D Kinsey, Voelcker Science
Miss M C Kirkpatrick , London
Mrs C Knickel, Conoco (UK) Ltd
Mr D Lawes, Salisbury
Mr P J F Livock, London
Dr E Lois, National Technical University
Mr A G Lucas, Chester
Mr J L Lynch, Environment Agency
Mr B MacAleese, London Electricity plc
Mrs S Martin, Wellstream North Sea
Mr J E Menon, APS Consultants
Mr Y R Merchant, Saudi Petroleum Overseas Limited
Mr R J Miller, Milton Keynes
Mr B Minty, Ellon
Mr D E Morris, London
Mrs L Morton, Leatherhead
Miss S C Mott, Univar plc
Mr J-M Muls, Fina plc
Mr D F Murdoch, Wood Mackenzie Consultants Limited
Mr N S Nichols, G L Hearn & Partners
Mr D J Nichols, Inspectorate plc
Mr K A Norman, Gerald Eve
Mr C E O'Neill, Nuneaton
Mr A Okoibhole, London,
Miss O A Oladeinde, Abacan Resources Nigeria Limited
Mr T B Olsson, Sweden
Mr I C Oputa, London
Mr M Pritchard, Lloyd's Register Integrity Management
Mr P F Richmond, David McClean Contractors Petroleum Development
Captain P S Roberts, Strath Services Ltd
Mr T E Robinson, Aberdeen
Mr G J Rohan, Price Waterhouse
Mr A H Seymour, London
Mr J Shackleton, Newburgh
Mr W P Shammas, Goldman Sachs & Company
Miss M A Smalley, Hednesford
Mr P J Stedman, SAP (UK) Ltd
Mr O G A Sucquart, Fife
Mr M P G Taylor, Norton Rose
Mr S J Teakle, Farnham
Mr C A Verdonck, Belgium,
Mr T Vlassopoulos, Deminex UK Oil & Gas Ltd
Miss C M Ward, Arthur Andersen
Mr W D Wilson, Brigg
Mr A J Wood, KBC Process Technology Ltd
Mr G A J Woollard, G L Hearn & Partners
Mr H Zaitoun, Federal Bank of Lebanon

STUDENTS

Mr B N Balachander, Aberdeen
Mr G Brice, Southampton
Miss A T David-West, London
Mr N D Green, Chatham
Ms K McAloon, Fife
Miss J A Omene, Brighton College
Mr G L Thomson, Montrose

NEW CORPORATE

Goldman Sachs International, Peterborough Court, 133 Fleet Street, London EC4A 2BB
Representative: Mr C Holmes, Research Analyst
Goldman Sachs International is a leading international investment banking and securities firm providing a full range of investing and financing services to corporations, governments, institutions and individuals worldwide. Goldman Sachs has over 40 fully dedicated energy professionals located worldwide and has an unequalled list of energy company relationships, with service to over 150 companies through a variety of creative financing and merger transactions totalling over $200 billion.

NEW FELLOWS

Mr Donald A Bennett FInstPet
Mr Bennett graduated from the University of Houston with a BSc in Mathematics. Joining Texaco in 1969 as a Geophysicist, he was promoted to Senior Geophysicist in 1979. After transferring to the company's executive offices in Harrison, New York in 1980, he was appointed Assistant to Management in the office of the President. In 1987 following a series of management positions in exploration research, Mr Bennett was named Division Vice-President, Exploration and Production Technology, Texaco USA, and subsequently appointed Division Manager of Onshore Exploration. In June 1990 he transferred to London as General Manager, Exploration Texaco Ltd and two years later was named Managing Director, Exploration and Production for Texaco Europe. In May 1994 Mr Bennett became General Manager of Texaco's information technology department in Houston and was appointed Chairman of Texaco Ltd in March 1996.

Mr David R Blakemore FInstPet
After graduating from UMIST with a BSc Hons in Chemical Engineering, Mr Blakemore joined Conoco as a Process Engineer and worked in the US and Germany. He is presently General Manager of Conoco Ltd – Supply, Operations and Commercial Marketing. Responsibilities include Aviation, LPG, Marine and Commercial Fuel businesses, as well as Safety, Environmental and Occupational Health. Mr Blakemore is an active member of the Institute, joining the IP's Downstream Operations Committee in 1992 and becoming Chairman in 1995. He was elected an IP member of Council in June 1996.

DEATHS

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

	Born
W D Boardman	**1928**
ATM Brownbridge	**1952**
S J Goldsmith	**1935**
JFK Williams	**1922**

IP News

New IP President appointed

Chris Moorhouse (left), Chief Executive of BP Oil UK Ltd – the UK marketing and refining arm of BP which formed a joint venture with Mobil Oil Company Ltd in 1996, will take over as IP President from David Setchell in July 1998.

Currently an IP Member of Council, Chris joined BP in 1970 and has held various management positions, including overseas assignments in Rotterdam and Spain. He was appointed Chief Executive of Alr BP in 1992 prior to his current position.

He is board member of the British Road Federation, the British Energy Association and a council member of UKPIA.

Around the Branches

A full listing of Branch Events is available on the IP web site:
http://www.petroleum.co.uk/petroleum/
or, if you require further information, please contact your individual Branch Secretary.

IP THE INSTITUTE OF PETROLEUM

Branches Regional Organizer

The IP seeks to appoint a Part-time Branches Regional Organizer for the North of England to support the development of local programmes and increase the involvement by members, both individual and corporate, in 'Lifetime Learning', networking and social activities.

The role will involve supporting the Branch Committees primarily,

- in the development of Branch programmes including securing of speakers;
- administration;
- in liaison with existing Corporate members and identification and pursuit of new ones.

The postholder will work closely with the Branch Committees but will report to the IP Management in London on the progress of Branch activities and make recommendations for improvement or necessary support.

Qualifications and experience required:

Knowledge of the industry;

A self-starter, highly committed and able to work without supervision;

Good presentational skills;

Good organizational skills;

Committed to the philosophy of the Institute;

Mobility and enthusiasm;

Likely early retirer seeking part-time employment.

Scope: Located in the North supporting Stanlow, Northern, Yorkshire and North Eastern Branches involving up to 2–3 days per week (100–130 days per annum) on a per diem rate of £100 plus travelling expenses.

Apply in writing enclosing CV and letter of justification to: John Evans, Membership Services Director, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

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MOVES People

Brian Nixon has been appointed Sales and Marketing Director of Wood Group Engineering. He joins the company from AOC International where he was responsible for business development and marketing.

Lisa A Floyd has been named Vice-President of Business Development for Apache Corporation. She will hold responsibility for acquisitions, divestitures and corporate land administration. Prior to her appointment, she served as the company's Vice President of Technical Services.

Tommy Werlefores has been appointed Managing Director of Scana Ramnäs AB with effect from 1 November. He was previously employed as Business Unit Manager at Avesta Sheffield and as Marketing Manager at Oxelösund.

David Bailey has been appointed General Manager of Parker Hannifin's Instrumentation Products Division. He will become responsible for a division serving western and eastern Europe, the CIS and the Middle East. His successor is *Chris Toncheff* who has been promoted to European Sales Manager for the company's Instrumentation Products Division.

The American Petroleum Institute has named **Red Caveney** as its new President, replacing **Charles DiBona** who is to retire. Caveney has served on the White House staffs of former US Presidents Nixon, Ford and Reagan. He is currently President of the American Plastics Council.

Delta Oil Company has announced the appointment of **V Ray Harlow** as its President and Chief Operating Officer with immediate effect. Harlow will have responsibility for all oil and gas operations of Delta Oil Company worldwide.

CMG has promoted *David Rounds* to Associate Director to help manage the growth of its business within the oil sector.

John Steele, currently Managing Director, Esso Exploration and Production UK has been appointed Vice President, Exploration and Production, Esso Norge. Two new directors have been appointed to the board of Esso Exploration and Production UK: **Mike Fry**, currently Manager, Production and **Rick Vierbachen**, currently Manager, Exploration. All three appointments took effect from 1 October.

OMV has announced the appointments of **Marc Hall** and **Dr Gerhard Roiss** as members of its Executive Board, and **Dr Walter Hatak's** appointment as Deputy Chairman of the Board. Hall will be responsible for Exploration & Production and Gas. He has been Head of the Natural Gas division at OMV since January 1995. Dr Roiss will be responsible for Plastics and Chemicals. He joined the company as Marketing Manager in 1990 and since March this year he has been Chief Executive Officer of PCD Polymere. Dr Hatak joined the company in 1997 and has been a member of the Executive board since September 1992. All appointments take effect immediately.

Tim Stevenson has been named Chief Executive of Burmah Castrol with effect from 1 February 1998. **Mike Dearden**, currently Chief Executive of the Chemicals group, will take over from Stevenson as Chief Executive of the Lubricants division. **Jamie Pike** will succeed Dearden and join the Board of Castrol. Pike is currently Chief Executive, Construction. **Lawrence Urquhart,** currently non-Executive Chairman, will retire in May 1998. He will be succeeded by **Jonathan Fry**, currently Chief Executive of the company who will retire from this role on 31 January 1998 and serve as non-Executive Deputy Chairman until the role of Chairman is vacated.

James Marr, Director of J Marr has taken up the new position of Managing Director of J Marr (Shipping) with direct responsibility for day-to-day operation of the vessels in the fleet. **Joe Watson** has stepped down as Technical Director to undertake a consultancy support role within group subsidiary Marr Technical Support Services. He has been succeeded by Marine Superintendent **Gil Sawyer,** who joined the company as Technical Director designate last year. Operations Manager **John Cannan** has been appointed to the new post of Operations Director.

Apache Corporation has elected **Roger B Plank** as Vice-President and Chief Financial Officer and also named Treasurer **Matthew W Dundrea** and Controller **Thomas L Mitchell** as Vice-Presidents. **Daniel L Schaeffer** has also been promoted to Vice-President Human Resources.

Derek Watling is to become the new Chairman of BPA replacing **Terry Lazenby** whose worldwide duties as a Director of BP Exploration now demand his fuller attention.

Bob Chase has been appointed Chairman of Valetmatic succeeding **Hamish Paton** who died in March. He is Deputy Chairman of Gill Aviation, a non-Executive Director of London Regional Transport and was, until recently, Group Managing Director of The Automobile Association. **Noel Harasyn** replaces **Graham Round** as Managing Director. Prior to Valetmatic Harasyn was Service/Operations Director of Modern Security Systems.

Parker Filtration has promoted *Nigel Gregson* (right) to the position of Hydraulics Product Manager. Since 1990, when he joined the company, he was Area Manager prior to his last post as Hydraulic Product Specialist.

John Solomon (below) has been appointed Automotive Specialist. He joined the company in 1980 as Area Manager and previously was with the Motion & Control Division.

C A Bayens, Kenneth R Roberts and **Branch J Russell** have recently joined the Syntroleum Corporation as Business Development Managers. They will work with existing and prospective Syntroleum Process® licensees to support them in selecting and developing GTL projects.

Petsec has appointed **Alan Stevens** as President and Chief Operating Officer of the company's US unit. His previous role was as Senior Vice-President in charge of worldwide exploration of Occidental Petroleum.

Kourosh Bassiti, formerly head of Energy with Scottish Enterprise in Aberdeen has been appointed Managing Director of Smith Rea Energy Aberdeen.

Monument has appointed **David Bremner** to the Board of Monument Oil and Gas as Exploration Director. Bremner has over 20 years' experience in the oil and gas industry.

IP Conferences and Exhibitions

Seminars on

Opportunities in the Brazilian Oil and Gas Industry

London: 10 November and Aberdeen 12 November

organized in association with the UK Department of Trade and Industry

dti
Department of Trade and Industry

The demonopolization and liberalization of Brazilian upstream oil and gas enacted in August 1997 will stimulate substantial new foreign investment in 1998 and beyond. These Seminars will outline the significant new opportunities that will arise for UK suppliers and service companies.

Speakers include: **Lord Clinton-Davis** (Minister for Trade, DTI), **Dirceu Abrahao** (E&P New Ventures Manager, Petrobras), **Tom Cardale** (Managing Director, Consolidated Supply Management), **Hugh North** (Exploration Manager, Amerada Hess), **Dick Winchester** (Director of Programmes, CMPT), **Natal Mendes** (Director, Odebrecht-SLP Engineering) and **Iain Murray** (Consul General, British Consulate-General, Sao Paulo).

Who should attend?

Potential investors in acreage and exploration, operating companies and contractors, suppliers of materials and services especially small medium-sized companies specializing in niche technologies involving deepwater, subsea operations and field rejuvenation.

In order to encourage maximum attendance by UK service and supply companies, a *specially reduced* registration fee of £100 plus VAT is offered.

International Conference

The World's Your Oyster: New Opportunities for Upstream Oil and Gas

London: 18 November 1997

The structural changes wrought in the oil and gas world during the nineties have far reaching consequences for service providers and contractors as well as oil companies. A positive view of the future by analysts coupled with a renewed appetite for investment in the sector by the banks have created significant new opportunities for upstream oil and gas. This Conference will consider these issues from the standpoint of oil companies, operators, contractors and financiers.

Speakers include: **Iain Paterson** (International Director, Enterprise Oil plc); **David Owen** (Industry Affairs Manager, Amerada Hess Ltd and CRINE Network) and **Colin Bousfield** (Director, BZW Energy Finance).

Who should attend?

Oil company strategists and planners, entrepreneurs and investors, bankers and their financial and legal advisors, contractors and service providers.

3rd International Conference on

Logistics – Competitiveness through Innovation

London: 27 November 1997

In reviewing the logistics of petroleum products from the refinery to the end user via bulk storage terminals, this Conference will focus on those links in the chain where value can be added, through new technology, developments in IT, outsourcing and rationalization. It will be of interest to oil company general managers, strategists and planners as well as contractors, equipment suppliers and service companies.

Speakers include: **Michael Everard CBE** (Chairman, FT Everard & Sons Ltd); **Peter Pass** (Operations Manager, Murco Petroleum Ltd) and **Graham Douglas** (Business Change & Systems, BP Oil Europe).

Who should attend?

The Conference is aimed at those oil company general managers, operations managers, strategists and planners involved in the handling and transportation of products as well as contractors, equipment suppliers and service companies. Attendance at this event is essential for those personnel who want to ensure their company retains its competitiveness through continuing innovation.

IP Week 1998

London: 16–19 February 1998

An influential programme of Conferences appealing to an international audience has been planned, which together with the Annual Luncheon and Dinner, means that IP Week 1998 represents an excellent opportunity for delegates to meet and discuss the latest developments with senior executives in the industry today. Ticket application forms for the Annual Dinner are now available from the Conference Department.

Conference and Exhibition

Oil Spill Response – The National Contingency Plan

Gatwick: 10–11 March 1998

This Conference will address the key issues affecting all those involved with oil spill response in the UK and will attract representatives with a common interest in oil pollution control representing the maritime counties, regions, districts and the port authorities of the UK.

An exhibition will be held in association with the Conference. Space is limited and potential exhibitors are advised to contact the Conference Department for further details.

To obtain copies of the programmes and registration forms when published, please contact: Conference Department, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK. Tel: +44 (0)171 467 7100 Fax: +44 (0)171 255 1472 Internet Address: http://www.petroleum.co.uk/petroleum/

EVENTS Forthcoming

November

4–6 **London**
Profit Solutions '97
Details: KBC Process Technology Ltd, UK.
Tel: +44 (0)1932 856622
Fax: +44 (0)1932 854551

5–7 **London**
Environmental Management Implementation in the Oil & Gas Industry
Details: MD Consultancy (UK) Ltd, UK.
Tel: +44 (0)1224 626268
Fax: +44 (0)1224 626950
e-mail: 106334.2720@compuserve.com

5–8 **Athens**
Central Mediterranean Upstream Oil and Gas Conference
Details: Mr Anis Adel, MEC (Athens Conference), UK.
Tel: +44 (0)171 924 2980
Fax: +44 (0)171 924 2991

5–7 **London**
The Changing Economic Geography of the Gulf: Implications for Trade and Investment
Details: The Conference Unit, The Royal Institute of International Affairs, UK.
Tel: +44 (0)171 957 5700
Fax: +44 (0)171 321 2045

6 November
London: *IFEG Conference: Re-engineering the Energy Information Service*
Details: Pauline Ashby, The Institute of Petroleum.

6–7 **Billingham, UK**
Helicopter Escape Seminar & Workshop
Details: Mills Advertising and Publicity, UK.
Tel: +44 (0)1642 566656
Fax: +44 (0)1642 713174

6–7 **London**
Doing Business in Uzbekistan
Details: IBC Financial Focus, UK.
Tel: +44 (0)171 453 2703
Fax: +44 (0)171 323 4298
e-mail: sarah.ritchie@ibcuk.co.uk

7–9 **Hertfordshire, UK**
The Fundamentals of Pipeline Planning, Financing and Operation
Details: Petroleum Economist, UK.
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567/5313

10–11 **Rome**
Global Gas '97 – Business Opportunities & Gas Strategies Upstream & Downstream
Details: Global Pacific & Partners, Australia.
Fax: +27 11 781 3362
e-mail: global.pacific@pixie.co.za

10–11 **Birmingham, UK**
17th APEA Conference and Exhibition
Details: Barbara Jacketts, APEA, UK.
Tel: +44 (0)1473 828539
Fax: +44 (0)1473 828 538

10–11 **Rome**
Global Gas '97
Details: Global Pacific & Partners Pty Ltd, South Africa.
Tel: +27 11 781 3358
Fax: +27 11 781 3362
e-mail: global.pacific.@pixie.co.za

11 **Tokyo**
Petrochemical Industry: Outlook for Growth and Profitability
Details: Chem Systems Inc, US.
Tel: +914 631 2828
Fax: +914 631 8851

11–12 **London**
9th Annual FT Petrochemical Industry Conference
Details: Sarah Gibb, FT Conferences
Tel: +44 (0)171 896 2639
Fax: +44 (0)171 896 2696
e-mail: sarahg@pearson-pro.com

13 **Houston**
Innovation & Technology in the New Energy Age
Details: Price Waterhouse World Energy Group, US.
Tel: +1 713 758 6173
Fax: +1 713 658 3181
e-mail: PW_Energy@notes.pw.com

15–19 **Abu Dhabi**
Environmental Management Implementation in the Oil & Gas Industry
Details: MD Consultancy (UK) Ltd, UK.
Tel: +44 (0)1224 626268
Fax: +44 (0)1224 626950
e-mail: 106334.2720@compuserve.com

17–18 **Houston**
Production Separation Systems
Details: IBC USA Conferences
Tel: 1 508 481-6400
Fax: 1 508 481 7911
e-mail: reg@ibcusa.com

17–18 **Hong Kong**
GasTrade '97
Details: GasTrade Secretariat, Turret RAI plc, UK.
Tel: +44 (0)1895 454533
Fax: +44 (0)1895 454578

17–19 **London**
The European Refining Technology Conference
Details: ERTC, UK.
Tel: +44 (0)1737 830068
Fax: +44 (0)1737 830036
e-mail: ertc@btinternet.com

18 **Sutton Coldfield, UK**
Integrating Transport and the Environment
Details: Frances Read, Freight Transport Association, UK.
Tel: +44 (0)1892 552302
Fax: +44 (0)1892 552333

18 November
London: *The World's your Oyster: New Opportunities for Upstream Oil & Gas*
Details: Pauline Ashby, The Institute of Petroleum.

18–19 **London**
Oil and Gas Agreements
Details: Langham Oil Conferences, UK.
Tel: +44 (0)1509 881022
Fax: +44 (0)1509 881576
e-mail: enquiries@langham.co.uk

18–19 **Stavanger**
Advanced Petroleum Conference
Details: May-Lis Thorsson, Norwegian Petroleum Society, Norway.
Tel: +47 51 59 81 62
Fax: +47 51 55 22 70
e-mail: may-lis.thorsson@npf.no

18–20 **Singapore**
2nd World Tanker Outlook
Details: Conference Connection Administrators, Singapore.
Tel: +65 356 0960
Fax: +65 356 0962
e-mail: cconnect@pacific.net.sg

18–20 **Seattle**
Marine Fuels: Specifications, Testing, Purchase and Use
Details: Kristina Falkenstein, ASTM, US.
Tel: +1610 832 9686
Fax: +1 610 832 9635
e-mail: service@astm.org

EVENTS Forthcoming

19 **London**
The Challenges Posed to Our Industry by New Regulations from the EU and UK
Details: Petroleum Training
Tel: +44 (0)1491 411113
Fax: +44 (0)1491 411919

19–21 **Bogota, Columbia**
Expo Petroleo '97
Details: Birmingham Chamber of Commerce and Industry, UK.
Tel: +44 (0)121 455 9600
Fax: +44 (0)121 456 1785

19–21 **New Orleans**
Marine Fuels: Specifications, Testing, Purchase and Use
Details: See entry for 18–20 Nov, Seattle

20–21 **London**
Reform in the Russian Gas Industry
Details: The Royal Institute of International Affairs, UK.
Tel: +44 (0)171 957 5700
Fax: +44 (0)171 957 5710

21–23 **Uxbridge, UK**
The Fundamentals of Upstream Energy Politics
Details: Petroleum Economist, UK.
Tel: +44 90)171 831 5588
Fax: +44 (0)171 831 4567

24–25 **Vienna**
Transmission and Distribution of Gas in the Emerging Markets of Central and Eastern Europe
Details: IBC Financial Focus, UK.
Tel: +44 (0)171 453 2703
Fax: +44 (0)171 323 4298
e-mail: rebecca.luing@ibcuk.co.uk

24–25 **London**
Financing Petrochemicals Projects in the Middle East
Details: IBC Financial Focus, UK.
Tel: +44 (0)171 453 2753
Fax: +44 (0)171 453 2703
e-mail: joanne.chapman@ibcuk.co.uk

24–28 **Kuala Lumpur**
Environmental Management Implementation in the Oil & Gas Industry
Details: MD Consultancy (UK) Ltd, UK.
Tel: +44 (0)1224 626268
Fax: +44 (0)1224 626950
e-mail: 106334.2720@compuserve.com

25–27 **Aberdeen**
Offshore Drilling Technology
Details: IBC UK Conferences Ltd, UK.
Tel: +44 (0)171 453 2750
Fax: +44 (0)171 453 2058
e-mail: sonia.klaege@ibcuk.co.uk

25–28 **Paris**
Financial Management in the Oil and Gas Industry
Details: Ms Josée Foucault, ENSPM, France.
Tel: +33 1 47 52 72 93
Fax: +33 1 47 52 70 66

27 November
London: *Competitiveness Through Innovation: The 3rd IP International Downstream Logistics Conference*
Details: Pauline Ashby, The Institute of Petroleum.

December

2–3 **London**
The Refining Industry in the CIS
Details: Busines Seminars International Ltd, UK.
Tel: +44 (0)171 490 3774
Fax: +44 (0)1424 773334
e-mail: 100451.3120@compuserve.com

2–3 **Moscow**
Production Sharing Agreements in Russian Oil, Gas and Mineral Extraction Projects
Details: EuroForum, UK.
Tel: +44 (0)171 878 6886
Fax: +44 (00171 878 6885
http://www.businessmonitor.co.uk

2–4 **Cologne**
MariChem '97
Details: MariChem Secretariat, Turret RAI plc, UK.
Tel: +44 (0)1895 454545
Fax: +44 (0)1895 454647
e-mail: 100730.1313@compuserve.com

4–5 **London**
Floating Production Systems
Details: IBC UK Conferences Ltd, UK.
Tel: +44 (0)171 637 4383
Fax: +44 (0)171 4453 2712
e-mail: sonia.klaege@ibcuk.co.uk

5–8 **Buckinghamshire, UK**
The Mechanics & Operations of Oil Trading
Details: Petroleum Economist, UK.
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567

6–10 **Muscat, Oman**
Bulk Liquid Measurement
Details: Abacus International, UK.
Tel: +44 (0)1245 328340
Fax: +44 (0)1245 323429

8–9 **London**
Management of Fire and Explosions
Details: Anne Lomax, Institution of Mechanical Engineers, UK.
Tel: +44 (0)171 973 1261
Fax: +44 (0)171 222 9881
e-mail: a_lomax@imeche.org.uk

8–9 **Coventry, UK**
The International Energy Experience: Markets, Regulation and Environment
Details: Mary Scanlan, BIEE, UK.
Tel: +44 (0)181 997 3707
Fax: +44 (0)181 566 7674

8–9 **London**
3rd International Forum on Ship Arrest
Details: IBC UK Conferences, UK.
Tel: +44 (0)171 453 2107
Fax: +44 (0)171 453 2117

8–9 **Aberdeen**
Meeting Environmental Standards for the Offshore Industry
Details: IBC UK Conferences, UK.
Tel: +44 (0)171 637 4383
Fax: +44 (0)171 453 2058
e-mail: caroline.murgatroyd@ibcuk.co.uk

8–12 **Caracas**
Environmental Management Implementation in the Oil & Gas Industry
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Fax: +44 (0)1224 626950
e-mail: 106334.2720@compuserve.com

10–11 **Amsterdam**
Cost Effective Drilling
Details: International Quality & Productivity Centre, UK.
Tel: +44 (0)171 691 9191
Fax: +44 (0)171 691 9192

10–11 **London**
Subsea '97
Details: Knighton Enterprises Ltd, UK.
Tel: +44 (0)1367 242525
Fax: +44 (0)1367 241125
e-mail: sen@btinternet.com

15–16 **London**
2nd World Annual Baseoils Conference 1997
Details: ICIS-LOR, UK.
Tel: +44 (0)181 652 3535
Fax: +44 (0)181 652 3929
e-mail: sales.uk@icislor.com

18-19 **Austria**
The Russian Refining Roundtable
Details: World Refining Association.
Tel: +44 (0)1242 529090
Fax: +44 (0)1242 529060

Diary Dates

Energy Economics Group

'Financing Britain's Transport – finding the solutions the public will back'

Thursday 13 November,
17.00 for 17.30 until 19.00

John Dawson, Group Policy Director, The Automobile Association

IP Contact: Jenny Sandrock

Exploration & Production Discussion Group

'Offshore Underbalanced Drilling Operations'

Wednesday 19 November,
17.00 for 17.30 until 19.00

John Foy and Peter Brett, Senior Well Engineers, Shell Expro

IP Contact: Jenny Sandrock

REVISED DATE ... REVISED DATE ... REVISED DATE

Energy Economics Group

'The Fundamental Impact Competition is Having on the Gas Industry'

Monday 8 December,
12.00–14.15

Clare Spottiswoode, Director General of Gas Supply, OFGAS

This meeting includes a buffet lunch at a cost of £15. Prior registration is essential. Please write, fax or phone for a registration form.

IP Contact: Jenny Sandrock

REVISED DATE ... REVISED DATE ... REVISED DATE

All meetings are held at the Institute of Petroleum unless otherwise stated. Please tell the IP contact if you plan to attend any of these free meetings
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Forthcoming Conference

The European Downstream Industry – A Vision for 2010

11–12 December 1997, Paris/Rueil-Malmaison

A joint AFTP-IP-DGMK Symposium
(administrated by AFTP)

Since the early 1980s the European downstream industry has experienced major changes including plant closure, upgrading programmes and other initiatives to improve overall efficiency.

The Symposium provides a vision of how the European downstream industry will adapt and evolve over the next decade.

Over the next 10 to15 years further significant changes are anticipated resulting from:

- changes to European and domestic legislation to resolve health, safety and environmental issues;
- the need to compete with alternative sources of energy;
- the desire to meet customer/market demand both in terms of quantity and quality of products;
- the need to maximize margins from refined products.

The Symposium is jointly sponsored by Association Française des Techniciens du Pétrole (AFTP), Deutsch Wissenschaftliche Gesellschaft für Erdöl, Erdgas und Kohle (DGMK) and the Institute of Petroleum (IP).

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- Loss Prevention – Marine
- Lubricant Technology
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- Marketing – Operations
- Measurement & Fluid Flow
- Microbiology
- Oilfield Chemicals
- Oilfield Development
- Oilfield Machinery & Equipment
- Oilfield Sub-Sea Development
- Petrochemicals
- Pipeline Planning & Management
- Planning & Economics
- Plant Design
- Platform Decommissioning
- Production
- Project Services & Engineering
- Public Relations
- Quality Management & Assurance
- Refinery Operations
- Reliability
- Retail Outlets, Valuation/Management
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- Risk Analysis – Financial
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