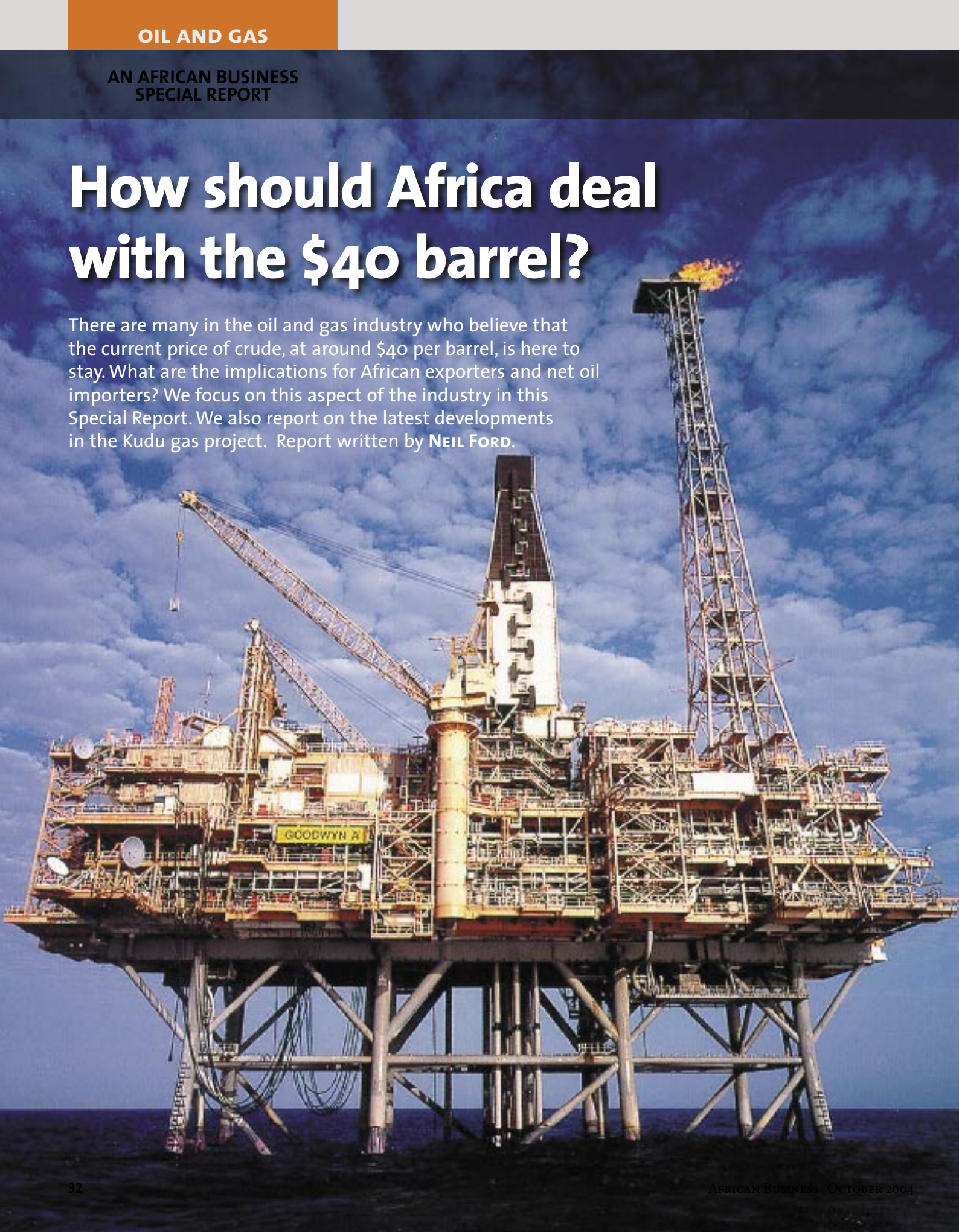
AN AFRICAN BUSINESS SPECIAL REPORT

How should Africa deal with the $40 barrel?

There are many in the oil and gas industry who believe that the current price of crude, at around $40 per barrel, is here to stay. What are the implications for African exporters and net oil importers? We focus on this aspect of the industry in this Special Report. We also report on the latest developments in the Kudu gas project. Report written by **Neil Ford**.



The current oil price boom has obviously proved something of a mixed blessing for African economies, with the majority – the net importers – losing out, while the net exporters benefit from higher revenues.

Yet the benefits for both current and potential producers may extend far into the future if the present high price of oil is sustained. Africa possesses many oilfields that are not commercially viable to develop at a price of $20-$30 per barrel of oil, but if the $40/pb is here to stay then a whole host of oil companies would be prepared to undertake development.

Many of the areas liable for development are deepwater and ultra deepwater fields where production costs have already fallen sharply over the past decade, largely because of technological breakthroughs.

The use of floating production storage and offloading vessels (FPSOs) is already becoming routine in the region but one new advance of particular use in the Gulf of Guinea is the introduction of subsea "trees", which allow the phased development of deepwater fields.

Deepwater development has become almost commonplace over the past few years.

Giant floating production and storage vessels (FPSOs) makes expensive on-shore production and storage infrastructure unnecessary.

According to analysts Infield Systems, 185 deepwater fields around the world, with estimated reserves of 40bn barrels of oil equivalent (boe) are scheduled for development over the next five years.

Just 81 deepwater fields were brought on stream over the previous five-year period. Increased focus on deepwater development should have a massive impact on African oil production given that much of the Gulf of Guinea – the heart of the African oil industry – comprises very deepwater acreage.

Table 1: Angolan deepwater field developments

Actual/ scheduled start up	Field	Block	Crude oil reserves (m barrels)	Investment ($m)	Consortium
1999	Kuito	14	456	1,300	ChevronTexaco, Agip, Sonangol, Total, Petrogal
2001	Girassol	17	860	2,671	Total, ExxonMobil, BP, Statoil, Norsk Hydro
2003	Xikomba	15	100	361	ExxonMobil, BP, Agip, Statoil
	Jasmin	17	229	623	Total, ExxonMobil, BP, Statoil, Norsk Hydro
2004	Kizomba A	15	1,000	3,518	ExxonMobil, BP, Agip, Statoil
2005	BBLT	14	unknown	2,088	ChevronTexaco, Agip, Sonangol, Total Petrogal
2006	Kizomba B	15	1,000	3,485	ExxonMobil, BP, Agip, Statoil
	Cravo, Lirio, Rosa	17	749	1,800	Total, ExxonMobil, BP, Statoil, Norsk Hydro
	Dalia	17	1,250	3,249	Total, ExxonMobil, BP, Statoil, Norsk Hydro
2007	Greater Plutonio	18	800	3,014	BP, Shell
	Landan, Tombua	14	361	1,630	ChevronTexaco, Agip, Sonangol, Total, Petrogal
2008	Kizomba C	15	984	3,895	ExxonMobil, BP, Agip, Statoil
2009	Perpetua	17	600	2,229	Total, ExxonMobil, BP, Statoil, Norsk Hydro
2010	Unnamed (contains Marimba)	15	800	3,000	ExxonMobil, BP, Agip, Statoil
	Gabela	14	500	1,500	ChevronTexaco, Agip, Sonangol, Total, Petrogal
2011	The Planets	31	800	3,000	BP, ExxonMobil, Sonangol, Statoil, Marathon, Total
2013	Unnamed	32	600	2,200	Total, Marathon, Sonangol, ExxonMobil, Petrogal

Sources: Wood MacKenzie and Deutsche Bank

Very deep development now viable

The current high level of oil prices could also open up a great deal of Gulf of Guinea ultra deepwater acreage – generally defined as maritime territory lying in excess of 1,500 metres of water.

Offshore oil reserves often lie many hundreds of metres below the seabed and so the overall distance from sea surface to reservoir can be 3,000 metres, which poses particular problems both for oil exploration and actual production.

The success of deepwater operations and further technological advances in offshore production seem to have convinced the oil industry that ultra deepwater production can be commercially viable if prices remain high.

Around the world, a total of 27 ultra deepwater fields containing 5bn boe are slated for development over the next five years on the back of investment of $10.7bn. Only 15 ultra deepwater fields were developed in the five years to the end of 2003.

Angola is one of the most important deepwater arenas in the world. Total national production is likely to increase from an average of around 930,000 b/d in 2003 to 2m b/d by the end of the decade as the result of the country's many massive deepwater developments.

The Jasmin field, developed by French firm Total, and ExxonMobil's Xikomba scheme both entered production at the end of last year, as the billions of dollars invested by the majors over the past few years finally began to pay dividends.

Total's Girassol deepwater field on Block 17 has been in production since 2001 and now the Jasmin, Tulipa, Dalia and Lirio discoveries are expected to push production on the field much higher than the current level of 230,000 b/d.

British giant BP has also invested heavily in Angola and the Cobalto, Cromio, Galio, Paladio, Platina and Plutonio deepwater fields on its Block 18 are in the process of being developed via an FPSO as part of the Greater Plutonio project.

US firm ExxonMobil is in the process of developing what may be the biggest ever oil project in sub-Saharan Africa. Production on each of the three phases of its Kizomba scheme on Block 15 could reach 250,000 b/d. The main fields in the development are Chocalho and Hungo in Kizomba A, Dikanza, Kissanje and Marimba on Kizomba B and Botuque, Mondo and Saxi on Kizomba C. All three phases could be in production by 2007.

Quota could block Nigerian development

How quickly deepwater and ultra deepwater fields are developed in Angola largely rests on the oil majors' expectations of the oil price over the decade to come. However, the relationship between oil prices and field development is a little more complicated in Nigeria because of the country's membership of OPEC.

Although billions of dollars have been invested in onshore, shallow water and deepwater exploration in Nigeria, the country's quota of around 2m b/d could cause many projects to be mothballed.

In line with most other members of the oil cartel, Nigeria has been producing significantly more than its quota for some time, but overproduction of 2-300,000 b/d is a completely different matter to, for example, 1m b/d. The majors realise that such overproduction could not be countenanced.

Although there have been rumours of Nigeria's withdrawal from OPEC for some time, the federal government is currently putting its energy into campaigning for a quota increase, to around 2.6m b/d.

The proportional division of the entire OPEC quota is largely determined by the size of proven national reserves. Nigeria's bargaining position should become stronger as more and more of the country's deepwater discoveries are confirmed.

In August, Shell and ExxonMobil both confirmed that they could boost production on existing developments in the country if the 2.6m b/d quota was achieved.

Given its dependence on oil revenues, the federal government is obviously eager for oil companies to make the most of the fields already in production. However, there is little doubt that the expectation of a sustained high oil price will encourage the majors to invest yet more in exploration and field development in Nigeria.

Oilfields in less established producers could also be developed. Although there is little oil

Table 2: Major Nigerian oil production joint ventures

Operator (% interest)	Other consortium members (% interest)	NNPC (% interest)	Major producing fields	Production (b/d)
Shell (30%)	TotalFinaElf (10%) Agip (5%)	55%	Bonny or Eastern Division – Nembe, Cawthorn Channel, Ekulama, Imo River, Kolo Creek, Adibawa and Etelelbou Forcados or Western Division – Forcados Yorki, Jones Creek, Olomoro, Otumara, Sapele, Egwa and Odidi	950,000 (2003 Est.)
ExxonMobil (40%)	None	60%	Edop, Ubit, Oso, Unam and Asasa	500,000 (2003 Est.)
ChevronTexaco (40%)	None	60%	Meren, Okan, Benin River, Delta/Delta South, Inda, Meji and Robertkiri Funiwa, Middelton, North Apoi, Pennington and Sengana	485,000 (2003 Est.)
Agip (20%)	Phillips (20%)	60%	Obama, Obiafu, M'Bede, Abgara and Oshi	150,000 (2003 Est.)
TotalFinaElf (40%)	None	60%	Obagi, Aghigo, Okpoko, Upomami, Afia and Obodo-Jatumi	150,000 (2003 Est.)

(Source: US Energy Information Administration)

Table 3: OPEC quota increases since April 2004

	Share %	1 April (b/d)	1 July (b/d)	1 August (b/d)
Algeria	3.2	750	814	830
Libya	5.4	1,258	1,365	1,392
Nigeria	8.2	1,936	2,101	2,142
Indonesia	5.2	1,218	1,322	1,347
Iran	14.7	3,450	3,744	3,817
Kuwait	8.0	1,886	2,046	2,087
Nigeria	8.2	1,936	2,101	2,142
Qatar	2.6	609	661	674
Saudi Arabia	32.5	7,638	8,288	8,450
UAE	8.7	2,051	2,225	2,269
Venezuela	11.5	2,706	2,934	2,992
OPEC production ceiling (excluding Iraq)	100	23,500	25,500	26,000

Source: OPEC

and gas activity in Senegal, the country does possess the sizeable Dome Flore offshore field. The structure was discovered in the 1960s, but production costs were far too high to proceed with development. It is estimated that an oil price of $35-$40 a barrel will be required during the course of the field's productive life to justify development. Even five years ago this looked unlikely, but in the light of the $40-$50 barrel, such an assessment may have to be reconsidered.

Field size is uncertain but could be around 100m barrels – not a great deal in Gulf of Guinea terms but a welcome addition to the Senegalese economy if it can be developed.

The field lies within the joint development zone (JDZ) that was set up in Senegal and Guinea-Bissau's maritime borderlands following negotiations under the auspices of the International Court of Justice (ICJ).

Under the original JDZ agreement, signed in 1995, any profits from the joint development of the area were to be shared 85:15. However, following an appeal from the government of the smaller partner, this division was adjusted to 80:20 in 2000.

High oil prices here to stay?

This brings us to the question of whether the current level of oil prices is sustainable. With oil prices touching $40 a barrel in April this year, demand for increased production from the industrialised world became increasingly vocal.

While major non-OPEC oil exporters, such as Russia, Norway and Mexico, generally produce at full capacity on an almost constant basis, a great cry went up for OPEC to increase its quotas to boost world oil output and therefore reduce prices.

The oil producers' cartel had spent the previous 12 months adopting a conservative approach: quotas had been reduced whenever there was even a hint of falling prices, despite a certain measure of overproduction by most member states, but the organisation finally gave in.

As Table 3 (above) indicates, total OPEC

IMPORTING DEBT

Britain's chancellor of the exchequer, Gordon Brown, has called for oil prices that are "conducive to economic prosperity and stability – especially for the poorest nations".

When pressure on OPEC for a quota increase was at its height, many feared that producers were not doing all they could to stabilise prices.

Speaking on behalf of the G7 group of leading industrial nations, the British chancellor of the exchequer, Gordon Brown, said: "We call on all producers to take action to ensure world oil prices return to levels that are consistent with lasting economic prosperity and stability – especially for the poorest nations." Despite OPEC quota increases, the current level of oil prices is proving disastrous for many African countries.

Net importers face a huge challenge: not only are they forced to deal with higher bills for importing hydrocarbon feedstock for their power sectors but those countries that continue to employ price controls are coming under increasing financial pressure to loosen or remove those controls entirely.

While price controls can help to stabilise an economy and reduce the burden on consumers, they can generate huge government debts and are unhelpful in dampening consumer demand.

Moreover, while many governments feel the need to subsidise fuel prices when the price of a barrel of oil is high, they are generally loath to increase fuel taxes during periods of low prices in order to recoup their investment.

This is bound to lead to constantly growing expenditure. Even the possession of an oil refinery seems to have little impact upon government policy. Motor fuel prices are lower in Ghana, which does have a major refinery, than in most other countries in the region, including Benin, Togo, Côte d'Ivoire and Burkina Faso, although kerosene prices are about par for the course. As a result, the Ghanaian government is continuing to subsidise fuel prices in spite of its determination to end the practice.

Filling up while the going is still good. The spiralling cost of oil on international markets will, sooner or later, impact the African consumer.

quotas were increased firstly from 23.5m b/d to 25.5m b/d from 1 July 2004 and then to 26m b/d from 1 August.

Africa's three OPEC members have had their quotas increased by a total of 420,000 b/d but the increases have merely returned these quotas to levels commonplace two or three years ago. Moreover, higher output appears to have had little impact.

If further production is needed, Saudi Arabia is the only OPEC member with spare production capacity that can be brought on stream in the short term. Any further production increases would require the type of field development that takes years to come to fruition.

So where can prices go from here? An oil price of $50 a barrel has been mentioned by some analysts, although even this would be far below the high levels of 1979 once prices are adjusted for inflation.

It is very difficult to predict future movements in the oil price, given that it is difficult to explain the current high levels, even with the benefit of hindsight. The war in Iraq has certainly been a major factor in the price rises: Iraqi production was halted for some time and oil installations have been targeted in the fighting. There is also a great deal of uncertainty over how quickly the Iraqi industry can be put back on its feet and over how high production will rise in the medium term.

An associated factor is the general threat of terrorist attacks around the world. Almost any major producer could be hit but analysts have feared that oil production and export facilities in Saudi Arabia would be targeted. The country is by far the world's biggest net oil exporter so any disruption to supplies would have a major effect.

In addition, Russia's biggest oil producer, Yukos, has had its assets frozen and it is difficult to estimate what impact this will have on production in the longer term.

While most other OPEC member states seem to be operating at maximum capacity, Saudi Arabia has some spare production capacity – perhaps another 1.5m b/d – that could be brought into production. However, this would take up to three months to come on stream once the cartel sanctions the increase. Moreover, while previous production increases have not managed to dampen down prices, it is difficult to conclude that the extra Saudi production would have the required effect.

Nigeria could also increase production if required, perhaps by 200,000 b/d, but other OPEC members may be unhappy at any interim re-division of the OPEC cake.

OPEC has complained that speculators have seized their opportunity to intervene in the oil markets and have driven up prices. However, it appears that much higher than expected global demand has been the unexpected factor that has seen prices rocket to $40-$50 a barrel. In particular, continued high growth in the Chinese economy has led to rapid increases in that country's demand for oil, both as a result of rising industrial consumption and because of increased car ownership. Analysts outside China still have relatively little access to Chinese data and so this consumption increase seems to have been missed.

The International Energy Agency (IEA) now calculates that global oil demand is rising at its fastest rate since 1980. With the notable exception of Yukos, there is every reason to believe that the other inflationary factors will remain in force for the foreseeable future.

The terrorist threat seems here to stay, while it is difficult to judge how quickly the security situation in Iraq could improve or even deteriorate. As a result, high oil prices could be a permanent feature for some time to come: a factor which could convince oil companies to speed up the development of fields in E & P hotspots such as Nigeria. The future certainly looks bright for the African oil sector. ■

SYNTHETIC OPPORTUNITIES

Sasol's Secunda complex leads the world in synthetic fuel technology.

The current high price of oil may have another unexpected side effect in Africa – encouraging the production of synthetic fuels. During the apartheid era, the South African government focused a great deal of time and money on the production of motor and other fuels from coal. The country possessed little crude oil but plenty of coal and so it made both strategic and economic sense for South Africa to seek to minimise its fuel import bill. This policy led to the creation of Sasol, and later Mossgas, as natural gas began to be used as an alternative feedstock to coal.

These synthetic fuels continue to be widely available in South Africa today, although they are more expensive to produce than refined petroleum products when oil prices are low. However, if oil prices were to average $30 a barrel or more over the next few years then synthetic fuels would be at a competitive advantage and South African companies with experience in this area could find both their output and their technical expertise in great demand around the world.

It was feared that the end of the apartheid era could also signal the demise of the synthetics sector. However, sales remain strong and production reached 182,000 b/d in 2003. Sasol and Engen have announced that they are to merge their fuel marketing and distribution businesses to form a new national liquid fuels company.

The two firms are to take a 37.5% stake each in the new venture, while black empowerment interests are to take the remaining 25%. Black empowerment company Worldwide African Investment Holdings already owns 20% of Engen, while Petronas of Malaysia holds the remaining 80%. Engen already controls over a quarter of South Africa's fuel retailing sector, while Sasol holds another 40% stake, so the joint venture could become the market leader.

As a result, the place of synthetic fuels in South Africa seems assured and further expansion seems more than likely. A pipeline from Mozambican gas fields to Sasol's Secunda complex is already under development, while other gas fields offshore South Africa and even Angola have the potential to provide much needed feedstock for the South African synthetics industry.

If oil prices remain high – and more importantly if the market believes they are going to remain high – then international expansion could be the next option for the South African synthetics industry.

Namibia's Kudu gets go-ahead

Work on developing Namibia's Kudu gas field will begin next year following a deal between Tullow Oil and Namibian oil and power corporations. This could be the beginning of a new era for gas usage in southern Africa.

After years of wrangling and indecision, work is finally set to begin on Namibia's Kudu gas project. Uncertainty over the size of the reserves and over plans to market the gas has held up development of the field, which was originally discovered in 1974.

Tullow Oil offshoot, Energy Africa, has agreed a joint development deal with the National Petroleum Corporation of Namibia (NPC) and power company NamPower to develop the 1.3 trillion cubic feet (tcf) field at a cost of $800m, providing much needed revenues to the Namibian government, as well as reliable power production to both Namibia and South Africa.

NamPower, Energy Africa, Texaco, Shell and South African power utility Eskom set up the original consortium to develop the Kudu field in 1997, with the aim of providing power sector feedstock for the South African market.

However, gas fired capacity could not compete with Eskom's cheap coal-fired plants at that time and the South African firm pulled out in 1999. Shell withdrew in 2002, citing the uncommercial size of the reserves, while ChevronTexaco was the last to pull out, at the end of 2003.

Shell, which held a 75% stake in the original consortium, hoped to develop the field for international export, probably in the form of liquefied natural gas (LNG).

However, the reserves are almost certainly too small to justify the construction of an LNG train in the region, without the supply of additional production from other fields. The discovery that the field was smaller than previously thought caused attention to turn towards supplying the local power market.

Energy Africa's takeover by Irish firm Tullow Oil (see *African Business* August/September) caused some to fear further delays to the scheme, but the buyout actually seems to have acted as a spur to progress, as Tullow sought the quickest possible return on its investment. Moreover, the Irish company's resources have provided the additional investment required to get the project off the ground, although it may take until the end of 2005 before all the required funding is in place.

The Kudu field will provide fuel stock for a new gas plant at Oranjemund in Namibia – strategically located to supply energy to Cape Town and much of South Africa's Western Cape.

800MW power for 20 years

The project was given the go-ahead after the completion of a commercial feasibility study. According to the managing director of Energy Africa, Rhidwaan Gasant, the field contains enough gas to supply an 800MW power plant for more than 20 years.

Energy Africa has taken a 90% stake in the project, while the NPC holds the remaining equity.

Actual construction work should begin towards the end of 2005, once a power plant design has been agreed and project financing arranged. The entire area along Namibia's coastline and over the border into South African waters is believed to offer some hydrocarbon potential, but although several finds have been made, it seems unlikely that any large oil or gas fields will be discovered. However, relatively small discoveries could be developed to provide additional feedstock once the planned plant is up and running.

Kudu gas will be piped onshore for processing and use at the 800MW plant near Oranjemund, which will sell its entire output to NamPower.

National generating capacity currently stands at just 400MW and although a massive increase in capacity will be very welcome, it is likely that much of the plant's output will be sold on to South Africa, via the Southern African Power Pool (SAPP). Namibia is already a net power exporter, so the additional deliveries will provide another source of income.

Despite its withdrawal from the scheme, Eskom has agreed to provide technical assistance to NamPower and to assist with plant operation and maintenance.

The two power companies are to begin negotiations for a power purchase agreement. The new plant will be ideally placed to supply the Western Cape in South Africa, although improvements may be needed to transmission infrastructure in the region.

The construction of an 800MW gas-fired plant may also end the controversy over the proposed Epupa dam project in the north of Namibia. A hydroelectric plant was planned for the site but the government may now decide that the additional generating capacity is not required.

Other benefits of the scheme include improved irrigation and tourism, but environmentalists and local people have campaigned against the flooding of the River Kunene and the government may now be prepared to shelve the scheme.

A dash for gas

Although Eskom has long relied upon coal-fired power plants, there is a feeling in the country that some diversification is preferable,

at the very least on environmental grounds. The way therefore seems open for the development of other gas reserves in the region.

Work is already progressing on developing South Africa's own, limited gas reserves, while Mozambican gas is being piped to South Africa for use in the country's synthetic fuel sector, where gas-to-oil is to some extent replacing coal-to-oil technology.

However, one potential major gas supplier has largely been overlooked. While Angola's oil sector goes from strength to strength, the country's gas potential has largely been ignored. The country's proven gas reserves stand at just 1.6tcf, only slightly higher than the figure given for Kudu, but the lack of interest in Angolan gas means that little effort has been put into evaluating the country's gas resources. However, the development of the country's first LNG project by a ChevronTexaco led consortium could lead to a re-evaluation of the country's reserves.

Unofficial estimates of Angola's gas reserves range from 25tcf upwards, but with massive investment in deepwater exploration across a number of blocks, it is likely that further discoveries will be made. A domestic LNG industry will be able to consume a great deal of any production but there is also the option of supplying more local needs. The ongoing development of the SAPP has been complemented by plans for a South African gas grid.

There are four main planks to the gas grid, centred on South Africa:

- The Sasol pipeline from Mozambique to Sasol's Secunda complex;
- The west-east pipeline from the west coast via Sishen to Gauteng Province;
- A west coast pipeline from South Africa's Ibhubesi field to Saldanha and then to Cape Town, with later extensions to Mossel Bay and Port Elizabeth;
- The final link would be a pipeline from Port Elizabeth through East London and on to Durban.

Any connecting pipeline from Angola to the grid would be at least 1,500km in length and possibly substantially longer. This may seem a massive undertaking but the gas industry rule of thumb is that it is generally cheaper to pipe gas over distances shorter than 3,000km and to process gas into LNG for anything over that distance. Any export of gas from Angola to South Africa would therefore be most feasible via a new pipeline.

Such a scheme has not been considered in the past because the civil war in Angola would have made a long distance pipeline an obvious target for sabotage. With the war at an end, such fears have diminished. Moreover, an Angola-South African pipeline would traverse Namibia and/or Botswana, both of which have few security risks.

Many regulatory and financial obstacles would have to be overcome before such a project could become a reality, but the gas is almost certainly there and South Africa needs a substantial increase in generating capacity over the next decade, so the basic economics of the pipeline should take care of themselves.

What remains in doubt, however, is the South African government's willingness to pursue power sector diversification. Electricity produced by any gas-fired plants located within South Africa would undoubtedly cost more than power generated by the country's existing coal-fired plants.

Recent environmental and energy sector legislation in South Africa has suggested a gradual shift in government policy towards environmental concerns: some encouragement has been given to renewable energy; while increased gas fired production has also been suggested. ■

THREE WIN ADDAX AND ORYX POSTER CONTEST

Three young artists have each won €,2000 and considerable fame for coming top in a poster design contest organised by the Addax and Oryx Group.

The competition, launched last spring with the support of IC Publications Ltd – publishers of *African Business, New African* and *The Middle East* magazines – is the first initiative of its kind. It reflects the AOG's and IC Publication's strong belief in Africa and their concern for the arts. The main idea behind the Poster Contest is to both promote artistic talent and to develop awareness about Africa and energy matters.

The theme for the 2003/4 AOG Poster Contest was: 'What are the new sources of energy for Africa?' The awards were presented at a special ceremony at AOG's head office in Geneva.

The winners are: Sabrina Régoui, a 25-year-old student of graphic arts at the Ecole Multimedia in Paris; Mathieu Léger, (23) and Guillaume Boonen (25) both of whom studied graphic art at the Ecole de Communication Visuelle in Aix-en-Provence in southern France. They are preparing to open their own graphic art studio in Marseille.

The 2004/5 AOG Poster Contest was launched last month (September). This year's theme is: 'Gas, a source of energy for Africa'.