

**T**HE FATES OF THE TWO GAS TO WIRE PROJECTS; ONE IN NAMIBIA TO THE SOUTH west and the other in Nigeria on the west central- both tied to gas deposits on the African edge of the south Atlantic- illuminate the challenges in delivering electricity on the continent. Stories and photos by *Toyin Akinosho*.

## Kudu is a Moving Target

Why the flagship Namibian Gas to Power Project has Stalled...

“THE KUDU GAS PROJECT IS A tantalizing project”, says Andrew Windham, Tullow Oil’s Managing Director for Africa region.

We are chatting in his smart new office on the 11<sup>th</sup> floor of the Convention Tower, overlooking the waterfront, in the South African coastal resort city of Cape Town.

To “tantalise” is to tease, but if you were looking for the slightest hint of anxiety or disappointment on Windham’s face, you’d search in vain. His only complaint is about the wintry weather, which has created a dull hue in the sky, obscuring an otherwise splendid view of the south Atlantic.

Yet it is less than a year since the company drilled a disappointing well, Kudu 8, on the gas field, located offshore Namibia. More crucially, it is only three months since Eskom, the South African power utility, pulled out of the deal to purchase power from the proposed \$1 billion gas to wire plant on the 1.3 trillion cubic feet deposit. Eskom was to purchase 400MW from the 800MW facility and its involvement was the major guarantee of commercial viability of the project. That project can only be viable now if the Namibian power utility NamPower is able to establish a market for the 800MW output.

Although the proposed tariff for gas and power purchase on the table is not known to anyone outside operator Tullow Oil, state hydrocarbon company Namcor, which doubles as equity partner on the field, NamPower and Eskom, the continent’s largest power company has been criticized for pulling out of the deal, given the dire shape of the SA (and southern Africa’s) power grid. “You would think every effort to increase

capacity would be embraced”, notes Dave Donelson, author of *Heart of Diamonds*, a novel of the Congo. “Continued failure to provide adequate power will only cripple the regional economy”.

Nto Rikhotso, Eskom spokesperson, says “the discussions were not concluded” due to the economics of the project. “Electricity would have been produced at a cost well in excess of Eskom’s own options and certain risk allocations (such as fuel price currency and indexation) could not be agreed between the fuel supplier, the project developer and Eskom”. This position is pretty close to what Tullow Oil itself disclosed at the Oil 2008 conference in Cape Town last March, namely: incompatible positions by all the parties, currency exposure, the price for gas and the schedule of supply.

As far back as Christmas of 2007, NamPower Managing Director Paulinus Shilamba had declared the project “as a marginal and not a commercially viable stand-alone project”. He said that it was “characterised by a high U.S. dollar-denominated gas price - meaning that the foreign exchange and hedging cost will translate into high electricity tariffs.”. Tullow wants NamPower to buy the gas in U.S. dollars whereas the utility wants to buy it with local currency since it sells its commodity in Namibia dollars.”

The point is that NamPower has been used to paying low tariff to its main electricity supplier, Eskom which, until 2008, had been the world’s

cheapest seller of electricity. Namibia generates only 380MW, which is half of its needs, importing 50% of the total consumption of 770MW from Eskom. The country has not built a single power plant for 30 years, in part because “prices of electricity have so far been below the margin needed to recover the cost of new generation plants ‘of any type’, according to Harald Schütt director of Namibia’s Renewable Energy and Energy Efficiency Institute (REEEI). Schutt says that NamPower’s average cost per kilowatt /hour has increased from three cents (\$.03) to over nine cents (\$.09) in 2007. So, he argues, “any option

### It’s Way Too Expensive-Eskom

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for building new plants will therefore as a matter of fact increase the price of electricity in Namibia,”. And with South Africa having its own power crisis, Eskom has declared it could cut power from Namibia at terribly short notice. So Namibia is aware it must get its citizens to pay more for electricity when a new, in-country power plant comes on stream.

It is instructive to note that for Eskom, gas generated electricity is more the exception than the rule. Of the utility’s 42,000MW nameplate generation capacity, only 1,316MW or 3%, is generated from gas. And two of the four , including Ankerlig 588MW and Gourikwa (438MW) were constructed only in the last three years. With 1,026MW these two produce the bulk of Eskom’s gas fired electricity supply.

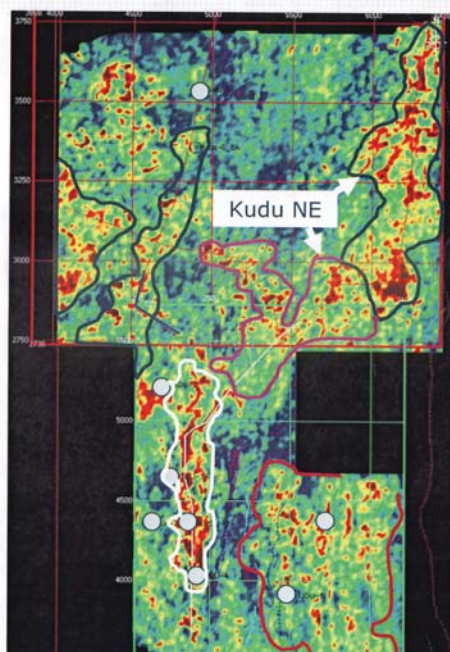
When I asked Rikhotso for price comparison between the two new Eskom gas fired plants and what would have obtained if the Kudu Power Project had succeeded, he said there was no basis for the comparison. “The Eskom Open Cycle Gas Turbines at Ankerlig and Gourikwa are peaking options designed to operate a limited number of hours per day, while Kudu is designed to operate as a base-load plant (i.e. 24 hours per day)”.

Nor is Eskom planning any gas fired plant in the near future. Of the five projects that would come on stream between 2010 and 2013, with 10,500MW of installed generating capacity, two are coal fired and would deliver 9,588MW, one is a 200MW windfarm, and the rest are pumped storage stations.

As far back as March 2003, Namibia had realized

### Kudu Field Development Status Update

- Geological work in progress to identify drilling locations
- 2 Tscf gas potential in NE area
- Requires at least 2 wells
- Drilling programme planned for 2009



## A Ray of LIGHT from Ikot Abasi

“I AM GOING TO FINISH BUILDING THIS station around September (2008) and move on to do something else with my life”, declares Gareth Wilcox, managing director of Ibom Power Company, a limited liability company set up to handle the development of the plant. “Right now, we are 95% done”

The entire generation equipment has been installed. The 191 Megawatt (MW) Open Cycle Gas Turbine Station consists of three units, one Frame 9 (manufactured by GE Belfort) and two GE Frame 6 units (manufactured under license by GE Essen (then Alstom) and Nanjing T&E). 120.6MW will be generated by the Frame 9 while the two Frame 6 units will generate 36.8MW each (or 73.6MW in total), at site conditions. The overall system efficiency (Energy In / Energy out) is 27.8% allowing for all anticipated losses. “This efficiency would be increased if we decide to convert to combined cycle in the future”, Wilcox explains. “This is an economic decision based mainly on the price of gas”.

When somebody expresses pessimism about the certainty of Mr Wilcox’s timeline, the soft spoken Briton recalls, with some humour, how an investigative panel of the National Assembly visited the site recently, carrying with it the skepticism borne out of disappointing evidence on ground in other project sites. “They saw the plant and asked me if there were any problems. I said that we were on course. There’s no problem. They left site within five minutes”.

The remaining work on the plant is just the 46 kilometre, 132kv double circuit transmission line, which will evacuate the power to the National Grid through the substation at Eket.

The State of Akwa Ibom (population four million) has assurances from the national power utility PHCN that power evacuated from Ibom Power Plant into the national grid would primarily be distributed within the state before the rest of the country gets supplied. Although the state sits on at least eight billion barrels of oil and



Gareth Wilcox, Managing Director, Ibom Power Company

To go by the controversy trailing the power projects embarked upon by the last Federal Government all over Nigeria, you could be forgiven for assuming that the Ibom Power Project has run aground. It has all the ingredients for failure. For one, it is located in Ikot Abasi, deep in Nigeria’s southeast, right in the Niger Delta basin which has been a poster region for community protests, militant restraint on work, kidnappings and a preponderance of acts associated with work stoppages. For another, it is being publicly funded, which could readily translate to long bureaucratic delays in approval and messy corruption details restraining progress on site. But the Power Plant, one of a handful of projects outside the purview of the beleaguered National Integrated Power Project NIPP, looks close to delivering power before year end - three years after the start of construction-if everything works according to current plans.



The generation part of the Ibom Power Plant is ready. On the foreground, in yellow, is the gas line. Inset is Obong Nsima Ekere, who is chairman of the boards of the Ibom power company and the Akwa Ibom Investment and Industrial Promotion Council (AKIIPOC), the investment arm of Akwa Ibom State Government

over 15Tcf of gas, and is host to the most profitable condensate export facility in the country, it is one of the least industrialized in the country and its indices for the information age are low (there are only a handful of cybercafés in a state where individuals are not generally connected to the Internet). This explains why the power delivered to the State from the (3,000MW) national grid is currently less than 30MW.

“By Christmas, we should be evacuating power from the plant”, says Etido Inyang, special assistant to the Akwa Ibom State Governor on technical matters. Although the distribution of all that power to the entire state will be a challenge, Inyang is sure that one third of the power generated should be available for the state before the end of the year.

The Ibom Power Plant has something going for it that is missing in most of the ongoing gas-to-power projects in Nigeria; an available gas line. The plant is connected to gas feedstock through a spur from the gas line that feeds the Rusal-operated Aluminium smelting plant ALSCON, located next door. This first phase will utilize 40 Million standard cubic feet of gas per day (40MMscf/d).

Alsccon has a power plant with capacity for 540MW, installed to power the aluminium plant. But the factory itself has been idle for upwards of 15 years. Now that it has been privatized, the power plant is only generating 20MW, as production is not yet in full throttle. Some of that 20MW is used to power Ikot Abasi, such that the town itself now has 24 hours uninterrupted power supply.

Although it has taken three years of construction to come this far, Wilcox says the delays have little to do with the crisis in the Niger Delta and funds have not been an issue. This is instructive; the south eastern part of the Niger Delta, the most oil-prolific part of the 75,000 sq km basin, is ironically populated by the least

**The Ibom Power Plant has something going for it that is missing in most of the ongoing gas-to-power projects in Nigeria; an available gas line.**

militant of the ethnic groups that inhabit the region. But where militancy is absent, the weather has been unhelpful. “This is the rainy part of the country, so you have less than half of the year to do the real work”, says Wilcox. The rains, which seem to be falling heavier this year, could delay the completion of the transmission line and push Wilcox’s September date farther into the distance. “You can’t have people on transmission line when rain is falling”, says Tony Apps, from PB Power, who works as Owner’s Engineer on the project. “You are trying to slaughter them!”

Wilcox says that the Ibom Power Plant has been run exactly like the limited liability company it is. “The State government put down \$110 million in an escrow account from day one in 2005. That was how I could do all the work. We had to pay for all the equipment upfront to cover letters of credit. At the time in 2005 it was to cost \$110 million to complete construction. That didn’t include the initial operations costs to fund initial spare parts

### ...Light from Ikot Abasi

35 ←

and working capital. It's only in these completion stages now that there have been delays. Most of what's required now is to be spent on operations".

The company was actually going for a bridge loan to complete construction but the governor said he didn't want a liability. "Government wants to fully fund this phase of the Akwa Ibom Power Plant", Inyang says.

The machinations of the rain aside, Group Five, the South African construction company contracted to do the engineering and construction works, has had to go through a steep learning curve. The company is working on a power project in Nigeria for the first time.

Group Five got the job in partnership with GE. The story goes back to 2004.

Eighteen companies were shortlisted after the expressions of interest were submitted. "In 2004, nobody was interested in coming to work in Nigeria. Even Daewoo Construction who was EPC contractor on the Afam Plant wasn't interested. They didn't want to work for a State government in Nigeria". Only two contractors made a bid. One, the consortium involving equipment supplier General Electric and the South African construction company Group Five. The other CNEEC, a Chinese firm. The Chinese lost and threatened to go to court. "I told them; you went through a bid process. You lost. I didn't promise you were going to get it". In Nigeria of 2004/2005, the Chinese could be forgiven for having a sense of entitlement. They were vigorously courted by the central government of the time, led by the former military leader Olusegun Obasanjo. Three of the 11 power generation projects in the NIPP were awarded to Chinese companies. The CEO of one Chinese power plant construction company reported that the Nigerian President met him in China and wrote at the back of his card: "Welcome to Nigeria, the Mambilla Station is waiting for you".

GE provided the team to assist and advise on the installation of all three units. The company also performed an invasive inspection specifically on the two F6 units which arrived earlier. GE has signed an agreement and has mobilized for the O&M contract. "All four key staff members are on site and have been since January 2008. It is expected that GE and IPC will sign the CSA contract (for the supply of key parts and key regular inspections) by end of July 2008. This CSA agreement will be valid for a 15 year period". So what, exactly, could go wrong and where does the investment go from here?

On the project site, money could be a problem. The \$110million paid to an escrow account to do the project has been exhausted. The project is waiting on government to pump in \$25million, which has been approved by the state Governor in principle, but requires sanction by other arms of the democratic government. [Post discussion Note: IPC received funds from the State Government mid July 2008]

But after the completion of the plant, distribution headaches could make the state unable to provide everyone with power. "You don't want to evacuate power to Eket and stop there", says Inyang. "You need to take the power out of Eket (and distribute to other parts of the state). The state government is negotiating with



"We will deliver power by Christmas," says Etido Inyang (above), Special Assistant to the Akwa Ibom State Governor on Technical Matters

Federal contractors working on the distribution segment of the NIPP to prioritise the projects that directly affect the state. "We need the NIPP line to strengthen the existing Eket-Uyo-Itu line", Inyang says. The existing line can only carry 100MW of the 191MW being generated. The cost for installing both transmission and distribution lines to ensure that electricity reaches consumers throughout the entire state is another 5 billion naira or (\$42million), which also has been approved and is awaiting sanction.

Some of the equipment for the transmission and distribution could be caught up in import delays, considering that the waivers that were granted for electricity supply equipment by the last central government have been cancelled by the current government. The Transformers actually take six to nine months to manufacture.

The state government certainly doesn't want to get involved in the next (second) phase of the Ibom Power Plant, which is planned to deliver 500MW of electricity. "Lets not even go there", says Inyang. The preference is for the company to be taken over by a private sector operator-investor.

The Akwa Ibom government is in talks with investors, notably the British power generating company Globelec, but Inyang would not be drawn into discussions about who builds the second phase, expected to deliver a further 500MW.

Still on the table are issues concerning power purchase agreement, guarantee of gas supply, as well as quality of the gas. The issue of the Power Purchase Agreement has almost been resolved. "Globelec is comfortable with the Multi Year Tariff Order (MYTO), as conceived by the National Electricity Regulatory Commission as it shows investors and lenders that the government is determined to achieve a sustainable tariff", according to Wilcox. "The aim has been to achieve a Power Purchase Agreement (PPA) that was both acceptable to the Nigerian government and international lenders and investors". However, the Nigerian Gas Company (NGC) seem reluctant to guarantee an uninterrupted supply of gas. "They also seem unable to guarantee that the quality will adequate to meet the specification required by the generating equipment, which would negate any

guarantees and warranties provided by GE."

These, as well as the issue of effecting broad distribution of the power throughout the state, may look minor, in view of the major milestones. But in a developmental state, these are just the sort of things that impede the overall effectiveness of major infrastructure facility.

### ...Moving Target

34 ←

a desperate need to increase electricity generation internally. Electricity demand had by then exceeded the installed capacity of 383MW and the country was considering a mix of thermal and hydroelectric power projects. Five years down the line, the demand has doubled to 760MW, with 50% of the power supplied by South Africa's Eskom and a little less than 5% imported from Zambia.

Everything was about to change, it seemed. Up until December 2007, when Shilamba pronounced the project as non commercial, there was a certain sense of assurance that construction on the Kudu Gas to Power project would commence sometime soon and turn the country into a net exporter of power. When I met Obeth Mbui Kandjoze, Namcor's acting General Manager, Exploration and Production at the African Petroleum Producers Association conference in Cotonou last year, he was enthusiastic about the project. "The South Africans are keen on this one", he gushed. "They don't just want the power, they also want the gas".

The more you look at the Kudu project, especially through history, the more you get the sense of a moving target. As of 2001, the Anglo Dutch major Shell had estimated that the intercalated basalt and aeolian sands were holding over 1Tcf of gas, but was hoping to prove up to 5Tcf, to establish the viability for a floating LNG project. The crucial well, Kudu 6, didn't deliver on that, and the AngloDutch major walked out. Next, Chevron took over the operatorship of the field, decided that the economics weren't good enough, and also took a hike. Energy Africa became operator after Chevron. Tullow Oil inherited the project after it bought over Energy Africa in 2004. By then, there was a looming power deficit in Southern Africa and everyone was sure that the idea of having an 800MW of gas fired electricity in Namibia was worthwhile, both for energy starved Namibia and the regional power company Eskom.

Tullow Oil is now considering direct gas exports from the Kudu gas field, as well as options to build small power stations to supply Namibia only. "The changing global and regional energy environments have resulted in a combination of local power options combined with direct gas exports having the potential to be commercially viable," Windham explains. CNG is a substitute for petrol, diesel or propane fuel. It is considered to be a cleaner alternative and is much safer than the other motor fuels. Windham says that CNG could allow gas to be produced directly to shuttle tankers with an option to put the actual processing plant on the shuttles, creating a virtual pipeline.

Kudu is certainly tantalizing. When everything's finally pulled together and it does work, it would be amazing.