

Trinidad and Tobago: First mover, still in the game

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Trinidad and Tobago's entry into the World Petroleum Council (WPC) is long overdue – after all, it was the earliest country in the world to attempt to explore for oil.

In 1857, a well was drilled to a depth of 280 feet in the vicinity of the world-famous Pitch Lake in south west Trinidad by the Merrimac Company.

Though no oil was found, this was two years before Colonel Edwin Drake sank the well in Titusville, Pennsylvania, which is generally credited with launching the international oil industry. This secured Trinidad and Tobago's place firmly in the annals of the global hydrocarbon sector.

The small, 5,155 sq km, two-island state at the bottom of the Caribbean archipelago, with a population today of a mere 1.3 million, did achieve exploration success when Walter Darwent, an English mechanical engineer who had served in the Union forces in the American civil war and was later sent to Trinidad by the West Indies Petroleum Company, sank a well at Aripero, 6.5 km east of the Pitch Lake and encountered 20 feet of oil-bearing sands, which yielded two and a half barrels over a period of seven hours. But drilling difficulties and shareholder scepticism caused the operation there eventually to be wound up. Darwent himself died two years later but his descendants are still living in Trinidad and Tobago today.

Ships loading pitch at La Brea, Trinidad, circa 1870



Photograph courtesy of Paria Archive

Further productive wells were drilled in Guayaguayare in south east Trinidad between 1902 and 1907 by businessmen Randolph Rust and John Lee Lum, whose first hole, Guayaguayare 1, produced 300 barrels before it was shut in (apparently, the duo could find no shipping line willing to carry the low-flashpoint oil to markets overseas). Rust and Lee Lum drilled nine wells during the period, the third of which introduced rotary equipment to the country, an improvement over the cable tool method employed up to then.

Though Rust and Lee Lum are regarded as having put the oil industry on an operational footing for the first time, actual commercial production, when it began in 1908, took place near the site of the original 1857 well.

"Commercial" as used here means an oil strike that enables the exploration company to sell its product, recover all costs and declare a profit. The Trinidad Petroleum Company (TPC) qualifies as the first commercial producer, with its Guapo 3 well at the south west coastal town of Point Fortin. The New Trinidad Lake Asphalt Company was simultaneously drilling nearby and its Point Fortin West 4 well, completed in 1909, was demonstrably a major discovery, flowing at what was then the extraordinary rate of 12,000-15,000 barrels a day (b/d).

The first cargo of Trinidad crude (we'll call it that because no oil has ever been identified in Tobago) was shipped out the following year and by 1911, the country already had its own refinery, at Brighton, near Point Fortin, which possessed a functioning port.

As oil discoveries were made in other parts of south Trinidad, processing capacity grew and another refinery was established further up the west coast in 1917, at Pointe-a-Pierre, adjacent to the main southern town of San Fernando. This still survives today, as the only refinery left in the country.

Finding crude on land in Trinidad was never an easy task because of the island's complex geology and, indeed, Trinidad was at one time, dubbed "the geologist's graveyard" by frustrated practitioners of the art.

As the country's Petroleum Association declared in a review of the industry in 1952: "Trinidad must be among the



most difficult places in which to find and produce oil in commercial quantities. All professional geologists may not agree that Trinidad is the grave of geological reputations but they will be the first to agree that geological conditions are highly complex and unpredictable.”

Even so, by 1934, 26 years after commercial production of crude had commenced, Trinidad and Tobago had actually become the world’s eleventh biggest oil producer, ahead of Iraq, Canada, Ecuador, Egypt and Bahrain, among others.

That eminence was to be short-lived, however.

Peak oil production on land reached 111,883 b/d in 1967 and then went downhill rapidly. Peak production in the Gulf of Paria, which separates Venezuela and Trinidad on the west and was the first offshore location for exploration, was 76,948 b/d in 1986 and then also declined. Peak production in the Columbus Basin off the east coast, attained the level of 139,163 b/d in 1978 and started to decrease thereafter.

It should be noted, however, that discoveries off the east coast gave the Trinidad oil industry a new lease of life in the early 1970s, just about the time that both land and west coast production was falling. The identification of three major oilfields – named Teak, Samaan and Poui – by the then Amoco Oil Company (subsequently absorbed by BP plc) sharply reversed the decline from land and Gulf of Paria sources, to the extent that Trinidad and Tobago’s overall oil output rose sharply to 240,000 b/d in 1978, six years after Amoco had commenced production.

Alas, this was the highest it has ever reached and today it is down to around 70,000 b/d (although the country’s Ministry of Energy and Energy Affairs – MEEA – has ambitious plans to address this situation, which we will come to later in this article).

Fortuitously, Amoco had also found natural gas reserves during its intensive exploration programme and that began laying the foundation for Trinidad and Tobago’s switch from an economy dominated by oil to one where gas has become dominant (indeed, if condensate is added to crude production, the liquids figure

rises to around 90,000 b/d).

For example, whereas the oil refiners never seriously considered taking their product further down the value chain into petrochemicals, the gas sector has done precisely that, with gas being employed at the internationally renowned Point Lisas industrial estate in west-central Trinidad to produce methanol, ammonia, urea, gas liquids and other products further downstream. Indeed, Trinidad and Tobago today is one of the world’s largest producers of both methanol and ammonia, almost all of which is marketed abroad.

Liquefied natural gas (LNG) was added to the mix in 1999, when Trinidad and Tobago became the first country in Latin America and the Caribbean to produce LNG. The ground-breaking project was financed by BP, BG Group, Repsol, what is now GDF Suez and the local, state-owned National Gas Company (NGC). They called the company Atlantic, and train one, at 3 million tonnes of production a year, was then the largest, single-train LNG facility in the world. Three more trains have since been added, train four, at 5.2 million tonnes a year, itself, for a time, being the biggest in the world.

Though well over 160 companies have, in their time, shown keen interest in exploring in Trinidad, only the bigger names, such as BP, BG, BHP Billiton, Repsol and →

NGC ‘slug catcher’, Beachfield, south Trinidad



Photograph courtesy of NGC



→ Centrica are left today, along with a growing group of feisty Canadian independents and some small local upstream firms (of which more later).

Notable about the shift from oil to gas in Trinidad and Tobago (gas production is now at least eight times that of oil on a barrel-of-oil equivalent basis) is that it has been led, at least on the production side, by the international players, such as BP and BG.

BP produces about 2.5 billion cubic feet a day (bn cfd) and BG around one billion a day, out of total gas production now topping 4.1 bn cfd, 59 per cent of which is devoted to LNG and 41 per cent to the petrochemical and metals companies, electricity generation and smaller users.

BG, which opened up a new gas province off the north coast of Trinidad in 2003, has never shown much interest in finding oil in Trinidad (unlike its attitude to Brazil, where it is a partner with Petrobras in giant deep water discoveries).

BP, for its part, actually exited the oil business in Trinidad in 2005, preferring to focus all its attention on gas exploration and production.

BHPBilliton, which arrived in the late Nineties, departed from the international company norm in Trinidad and Tobago by actively seeking out oil, though it did also find some gas, which it began monetising in 2011. Its Angostura discovery in block 2c off Trinidad's north east coast, was, however, a disappointment, with the original estimate of recoverable reserves having to be downgraded to about 60 million barrels. Its output is now only about 15,000 b/d a day. Repsol took over BP's Teak, Samaan and Poui fields in the mid-Nineties along with its state-owned partners, Petrotrin and NGC, but production there has never much risen beyond 15,000 b/d.

National companies

It is really the state-owned Petrotrin that has been obliged to carry responsibility for revitalising the oil industry in Trinidad and Tobago.

It now lifts around 40,000 b/d of crude from its land and Gulf of Paria fields, some 44 per cent of total liquids output.

Of course, the company has a vested interest in so doing: its refinery at Pointe-à-Pierre requires 160,000 b/d of crude to turn out the six different types of fuel it produces and local crude will always be cheaper than the imported variety.

So the role of state companies in the maintenance and growth of the energy sector in Trinidad and Tobago, 104 years after commercial oil production began, is a key one today.

Petrotrin is both the biggest crude oil producer and the only refiner, while NGC is the sole owner of onshore pipelines and only trader of domestic gas. Gas destined for LNG, in which NGC has no hand, travels through the company's major east-west onshore pipeline. A third state company, NP, is the major petroleum products distributor and retailer in the country.

Free marketers may argue that the state should stay out of the oil and gas business but that thesis falls down in Trinidad and Tobago when it is considered that Petrotrin actually exists because foreign majors, like Texaco and Shell, decided of their own volition to quit the refining business and left the state with little choice but to step in. NGC, for its part, has been the catalyst, through its wholly owned subsidiary, the National Energy Corporation (NEC), for the rapid development of the gas-based downstream industrial sector by deliberately promoting the country's attractions as a site for modestly-priced gas.

NGC has been the intermediary between the gas producers, like BP and BG and the gas users, like Methanex, PCS Nitrogen, Methanol Holdings Trinidad Ltd. (MHTL) and ArcelorMittal. It negotiates the price to the producers and the price to the consumers and has structured the latter in such a way that a low base price is augmented for NGC when prices of the methanol and ammonia made from the gas rise on the international market (if vice versa, of course, the returns to NGC fall).

With BP having opted out of oil production in Trinidad and Tobago, BHPBilliton's output having fallen far below expectations and Repsol not having done much with its TSP block, Petrotrin is the mainstay of the oil part of the country's energy industry.

It is little wonder then that the Minister of Energy and Energy Affairs, Kevin Ramnarine, who took over that job in June, 2011, describes Petrotrin as "a company very near and dear to my heart" and has vested it with the task of turning around the country's collapsing crude production, which, as earlier noted, now stands at around 70,000 b/d (another 20,000 b/d or so should be added for the condensate which comes with gas production and increases the liquids total).

Petrotrin is in the best position to do this, if only because it holds the vast majority of the onshore acreage in Trinidad and most of the offshore acreage in the Gulf of Paria as well. It is likely to receive strong support in this effort from the small local companies mentioned earlier, as well as from some of the Canadian independents now taking a renewed →



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→ interest in Trinidad, such as Parex Resources, Niko and Touchstone, as well as a bullish UK arrival, Bayfield Energy.

As the minister admits, however, Petrotrin's handicap has been that of cash flow, partly the fault of the government itself, which, as he says, "has built up a debt to the company in excess of TT\$4 billion (about US\$665 million) which arises because of money owed to it in relation to the petroleum subsidy that has crippled Petrotrin to the point where it is impacting even on its ability to pay its taxes."

The minister is referring to the government's policy of subsidising the price of gasoline and diesel at the pump and the state's obligation to meet the real cost to Petrotrin of refining those products.

However, Petrotrin did manage to gather enough funds to support a recent 3D seismic survey over 312 sq km of its land acreage that is expected to lead to a major exploration programme which has not been undertaken on land for a long time. This is likely to commence in January, 2013.

Simultaneously, the state company will launch a re-activation effort in South West Soldado (SWS), one of its four fields in the Gulf of Paria. This area has great potential but has been neglected for some time. Minister Ramnarine himself describes SWS and the other fields in what is known as Petrotrin's Trinmar unit as being "central" to the company's resurgence. The Trinmar fields have yielded over 710 million barrels of crude since production began in 1955 and it is widely believed there is much more to come.

Trinmar also contains substantial reserves of heavy oil (API gravity 18 degrees or less), which Petrotrin has never seriously attempted to recover, along with the medium gravity oil it has traditionally extracted for decades.

The SWS campaign will pre-empt most of the US\$1.2 billion Petrotrin intends to spend on its revival programme over the next five years, with the money going to upgrading ageing infrastructure, drilling many new wells, reactivating non-producing wells, undertaking workovers and replacing flow lines. Sixteen wells were to be sunk in Trinmar in 2011, most of them development wells.

Lindsay Gillette (pronounced with a hard "G"), the billionaire Trinidad and Tobago businessman who was appointed Petrotrin's chairman when the People's National Movement (PNM) government was replaced by the People's Partnership (PP) coalition in the May 2010 general election, is confident that the company will make a significant contribution to the goal of raising crude oil production.

"We are most definitely up to the task," he insists, "and Trinmar will be an important part of that process."

Petrotrin has, for decades, brought in partners to help it maintain oil production, principally on land, where its joint ventures (JVs), fall into various categories, such as Lease Operatorships (LOs), Farm Out (FOs) and, most recently, Incremental Production Service Providers (IPSCs), all with local upstream firms (though some of these have been bought out by foreign independents recently).

Between them, LOs and FOs contribute about 5,500 b/d to the local refinery, while IPSCs currently provide about 400 b/d.

Petrotrin has also handed over operatorship of some of its fields to small companies from overseas, such as the UK's Bayfield Energy, which has already succeeded in doubling production (to about 1,500 b/d) from the Galeota block nearshore the south east coast.

JVs initiated by Petrotrin (some have been mandated by the MEEA as part of the effort to maintain "local content" in larger land and offshore blocks) will continue, says chairman Gillette, "but we need better synergies and complementarities in the relationship."

On the gas side, NGC and NEC will continue to pursue their respective role of gas transporter/trader and gas-based industry promoter, respectively.

Current developments

One of the big challenges ahead for NGC, as its president, Andrew Mc Intosh freely admits, is negotiating new contracts with the gas producers, as current agreements expire in the next five to six years.

Rising development drilling and production costs – Derek Hudson, president of BG Trinidad and Tobago, estimates it will require a minimum of US\$750 million to develop the one trillion cubic feet plus of gas in the 5c block offshore south east Trinidad of which his company is the operator – mean that the sale of this gas to NGC will be more costly than has historically been the case.

But at the same time, the petrochemical companies are pressuring NGC to reduce its prices to them, because they sell methanol and ammonia principally in the United States, where bountiful shale gas production has driven down the gas price, thus giving their US competitors an advantage.

"In light of the competitiveness of US gas, NGC has to be very concerned about, and very sensitive to, how we structure our gas price regime going forward, so as to remain competitive in international markets," Mc Intosh points out. Equally disconcerting is the strong possibility of all that gas enabling the US to turn the tables on Trinidad →



→ and Tobago and resume the export of LNG itself. Indeed, Cheniere Energy of Houston, which, up to now, has been an importer of LNG has already successfully applied to the US Department of Energy (DOE) to add exporting capacity to its Sabine Pass, Louisiana, terminal. It is also said to have signed up its first client, an electricity generator in the Dominican Republic called Basic Energy, which will require up to 600,000 tonnes a year of LNG from about 2015.

To accelerate this about-turn in its business model, Cheniere is preparing for as many as four LNG trains, each with a nominal capacity of up to four million tonnes a year and built in phases. Should all of that go ahead, it will mean that Sabine Pass will have more LNG capacity than Atlantic in Trinidad, an eventuality that would have been unthinkable only a year or two ago.

What's more, both Dominion and BG Group, operators of the Cove Point, Maryland and Lake Charles, Louisiana LNG importing and re-gasification terminals respectively, have also applied for permission to become LNG exporters. Both will probably turn around imported LNG cargoes at the beginning and then establish new liquefaction plants after a while, using surplus US gas.

What all this means for Trinidad and Tobago and NGC in particular, since it is the only local company currently involved in the LNG business as 10 per cent shareholder in train one and 11.1 per cent shareholder in train four, which also carries with it the entitlement to a liquefaction quota of 88 million cubic feet a day (mmcf/d), is that the new US LNG exporters will want to target the nearest LNG markets in the first instance and that means, following Cheniere's example, countries in the Caribbean and Central America.

Analysts in Trinidad feel that, having lost out on its gas processing venture in Ghana, NGC should be thinking of taking advantage of the smaller LNG markets that are likely to develop in its own backyard, as regional utilities move to replace heavy fuel oil and diesel with natural gas for power generation.

McIntosh is aware of the opportunities but cautious at this stage. "The small LNG market in the Caribbean is a possible thing," he says. "However, the logistical and physical facilities required in Trinidad to achieve that, would not be easy."

All of which may be true but many observers of the local energy scene fear that the market will be lost over time if NGC does not take it seriously, since delivery of the smaller LNG cargoes (say about 15,000-20,000 cubic metres) will

then gradually slip into the hands of US exporters, maybe even some of the very companies, like BG, which are involved in the LNG industry in Trinidad itself.

Capturing small LNG markets would seem to fit neatly into minister Ramnarine's vision for "internationalising" the state-owned energy companies.

The Ghana gas processing initiative was seen as the first move in that direction but now that China has apparently put in a more attractive bid for its construction, NGC has been left with only the offer of being hired to operate the plant after it has been built. Discussions on the matter were continuing up to late October, when this article was written, but insiders think that NGC will not want to operate a complex facility which it has had no hand in installing.

If neither Ghana nor the small gas trades work out in NGC's favour, the internationalisation thrust will not be aborted. "The time has come for 'Brand Trinidad and Tobago' to go global," the minister insists. "Instead of only seeking to attract investment to this country, we must become investors in energy projects around the region and in Africa. That is the idea and that is the vision."

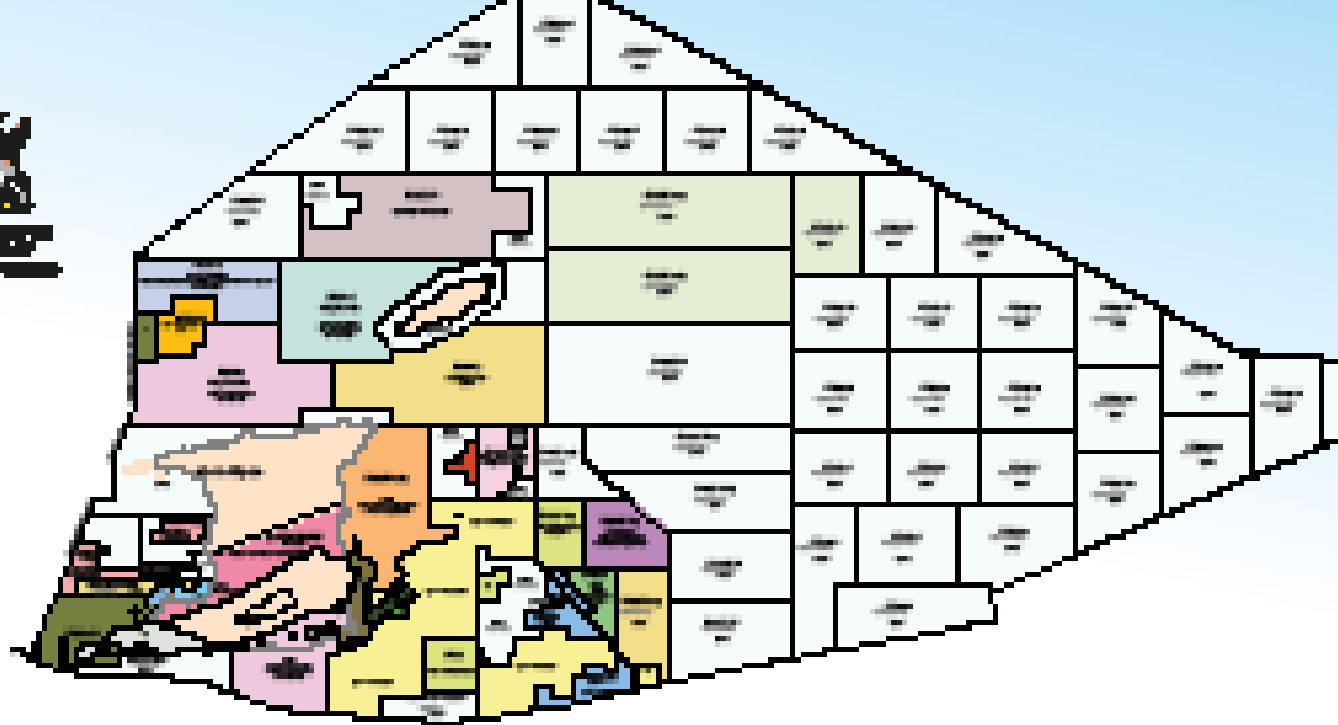
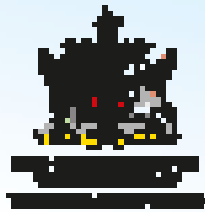
If it eventually gets the green light (and it has been stalled for several years), the Eastern Caribbean gas pipeline between Tobago and Barbados, in which NGC holds a 10 per cent share, will be one such project.

With offshore oil exploration about to re-commence in Guyana and the prospect of larger tankers eventually needing to call in, Ramnarine sees prospects for NEC to become project manager, and operator, of a new port there, based on the expertise it has long acquired in port construction and management in Trinidad.

Grenada has also been examining the possibility of Trinidad helping it with oil exploration on its side of the maritime delimitation line in the Caribbean Sea and the minister has received this suggestion enthusiastically.

Further afield, in other countries of Africa, where Trinidad and Tobago's success in gas monetisation is highly regarded, other initiatives are also possible.

Ramnarine has in recent months entertained a delegation in Port of Spain from Mozambique and made a presentation to African leaders at the recent Commonwealth Heads of Government Meeting (CHOGM) in Perth, Australia. "Africa is looking to Trinidad and Tobago for help and guidance in establishing its own oil and gas industry," he says. "This presents an opportunity to actualise South-South co-operation and the transfer of technology." →



Balancing the Energy Mix for a Sustainable Future

Oilfield and Tobago has been in the business of commercial hydrocarbon production for more than one hundred years. The country has produced in excess of three years for the life span of oil during this period, averaging a peak of 217,527 barrels of oil per day (bopd) in 1978. Since then oil production has consistently declined with production now at 22,000 bopd. It is not uncommon for some fields when taken past their life span to have their production of gas has gained momentum, instead of 2000 mcf per day just a 4.2 billion cubic feet per day (bcfd).

However, a major issue which concerns the Government of the Republic of Trinidad and Tobago (GORTT) is ensuring that the development of natural gas is not undermining new initiatives in the country. It is with this in mind that the 2007 Deepwater Oil Field and offshore energy gas permit block.

The existing work programme from the bid round will see the seismic acquisition papers being undertaken, one processing project and the exploration wells being drilled within the next three to four years. Expected resource bids will be in the region of 4 bcf of resources.

Concomitant with the bid round, the Minister of Energy and Energy Affairs, Senator The Honourable Keith Phoenix, is quite correct in advocating that the energy sector focus on a number of initiatives that form a national gas by a form of 10. The most important (highlighted) 'Hydrocarbon Production 10P' initiative that Trinidad and Tobago's production is a major feature of resources. However, given the ageing profile of oil which form the country's advantage in energy the need and the Minister has stated on numerous occasions that ensuring the decline of oil production is one of his major priorities. Hence, the reason why the philosophy of exploring and offering has had a focus that over time.

It is on the basis of the 2007/2008 bid round the deepwater exploration wells will be drilled in the 2011/2012 period, which includes the wells offshore and onshore. The critical wells to be drilled represent the offshore wells may have a combination of oil and gas.

These exploration to include some projects in the Gulf of Paria which would address the decline of oil production. These wells that began (paper being undertaken by BOCG, Ardea Trinidad Ltd (operator) and the Point Lisson?

Deep Offshore/Deep Water paper being undertaken by Ten Degree North. These papers will open the doors in the short term when we commence exploration in the deep water wells, which is a long term initiative.

Deep Water Exploration

The Oilfield and Tobago Deep Water Area is located beyond the already producing oil and gas fields and has an area of 40,000 sq km. Water depths range between 1,000 to 2,000 metres. The area is divided into 30 blocks of approximately 1,000 sq km each. [See 'Energy Map of Trinidad and Tobago' above.]

In the 2007/2008 bid round eleven blocks were offered and five bids were received for these blocks:

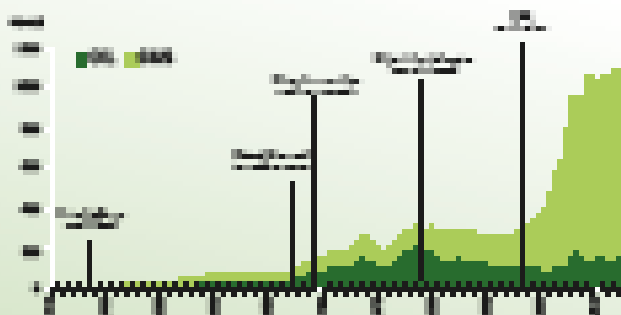
- Block 2263 – BOCG, BPPCO, BPP/Shell/Agip, Hinc Petroleum
- Block 2264 – BPP/Agip
- Block TTEGA 04 – BPPCO

BPPCO was awarded two blocks (2263 and TTEGA 04) and with support from Shell (2264), the Minister awarded the right to negotiate with BPP/Agip in relation to a mutually acceptable arrangement. It is expected that negotiation would be started in the next week by early 2010 – a very welcome start to our further exploration.

Additionally, another deep water competitive bid round will open in November 2011 with bids to be submitted in March 2012. A maximum of six blocks will be offered, based mainly on nominations by the companies. Companies will be invited, on the basis of the map to nominate a maximum of five blocks.

It is the stated stance of the GORTT that any exploration in the deep water of Trinidad and Tobago would deepen commercial quantities of liquid hydrocarbons from our existing oil fields and this is a high priority. While some companies may not agree with this view based on their previous evaluation of the data, the Ministry is supplying some new data which should result in a more positive view by the investor and some an affirmation to those who are inclined to explore our deepwater.

Hydrocarbon Production in Trinidad & Tobago





→ In the meantime, the immediate priorities for minister Ramnarine's four more years in office are unquestionably halting the haemorrhage in crude oil production by encouraging as much exploratory drilling as possible, especially in deeper water and deeper land horizons – as well as the determined application of enhanced oil recovery (EOR) methods.

A 20 per cent investment allowance for EOR in land fields was introduced in 2010, covering such applications as water flood, steam injection and carbon dioxide (CO₂) sequestration. Geologists feel there is potential for recovering another one billion barrels of oil this way.

The big prize for oil, however, may well lie in water depths between 1,700 to 2,000 metres out in the Atlantic Ocean to the east of Trinidad.

Two such blocks were awarded in 2010 – 23a and TTDA 14 – both to BP plc, through a special purpose vehicle, BP Exploration Operating Company Ltd. A third, block 23b, is the subject of direct negotiations between the MEEA and BHPBilliton/Repsol, since the consortium's bid did not meet the original ministry threshold.

Another deep water round is due in March 2012, at which six more blocks are to be offered for competitive bidding by companies, and the MEEA hopes to use its appearance at the WPC's Doha congress to promote this.

There are 36 open deep water blocks currently in the MEEA's inventory and Ramnarine has pledged continuous acreage auctions, both of deep and shallow water blocks as well as deep land blocks.

LNG tanker docking at Atlantic, Point Fortin, Trinidad



Photograph courtesy of MEEA

Extensive reprocessing of seismic data by MEEA and fiscal concessions, such as 60 per cent cost recovery and a reduction in petroleum profits tax (PPT) from 50 per cent to 35 per cent, are all expected to make deep water exploration more attractive to companies.

As for gas, while Trinidad and Tobago still has a fairly comfortable reserves and exploratory resources cushion of about 55 trillion cubic feet (tcf), the proven and probable components continue to fall and were down a combined 1.1 tcf in 2011, according to the annual natural gas audit by the Ryder Scott Company.

With the downstream gas based industrialisation programme now being revived – a second ammonia-to-melamine project is under construction and methanol-to-polypropylene, methanol-to-petrochemicals, bitumen upgrader and another direct reduction iron plant are all under consideration – it would be prudent to have more proven gas reserves.

Three major exploration initiatives in north coast offshore blocks 2, 3 (by Niko of Canada) and 4 (by Centrica of the UK) are considered to have a good chance of identifying new proven gas accumulations.

Yet another challenge for the minister in the near to medium term will be to get cross-border gas development between Trinidad and Tobago and Venezuela off the ground. The unitisation agreement for the reservoirs concerned – Manatee in block 6d in Trinidad and Loran in block 2 in Venezuela – has already been signed and reserves identified (2.1 tcf on the Trinidad side), so it is only a matter of deciding how the gas will be monetised, before actual development can begin. Minister Ramnarine is due to hold discussions on the matter with his Venezuelan counterpart before the end of 2011.

If cross-border gas can be unlocked, it will make an important contribution to the maintenance of production, perhaps even provide the input for possible expansion of the LNG industry in Trinidad, though tilting the imbalance even more in favour of gas. But as the country enters its second century of uninterrupted petroleum production, it may well be on the verge of a revival of crude output and Minister Ramnarine will be hoping that his faith in Petrotrin, and others, to be able to achieve that objective is eventually shown to be justified. ■