An overview of T&T's petroleum industry, post-independence

BY DAVID RENWICK

Despite Trinidad and Tobago's first barrel of commercial oil having gushed out of the ground in south west Trinidad in 1908, it was only in the decade of the 1960s that the two-island Caribbean state's most important economic sector began to assume a 'national' hue.

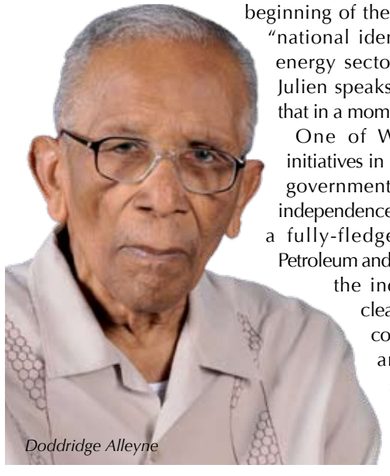
By that we mean, until that time, virtually all upstream (production), mid-stream (refining) and downstream (marketing) activities were in the hands of international companies, with local state or private capital playing no part in the development and growth of the industry.

The individual domestic entrepreneurs active in exploration in the very early days, such as Randolph Rust and John Lee Lum, who themselves had been almost entirely reliant on foreign capital to fund them, had long since disengaged from the industry.

What turned the tide in the 1960s was both a historical event and fortuitous circumstance, the former being Trinidad and Tobago's independence from Britain in 1962, with the Oxford-educated historian, Dr Eric Williams, becoming the first Prime Minister (he lived on for another 19 years until his death in office, in early 1981).

The distinguished Trinidadian educator, Dr Ken Julien, an electrical engineer by training and someone who has been tapped by successive governments to play a key role in the formation and implementation of petroleum policy, puts it this way: "Dr Williams accomplished what had previously escaped the country – the creation of a national identity within the energy sector."

The 'fortuitous circumstance' was the decision of the then British Petroleum Company to relinquish its producing operations in Trinidad, which opened a door to the beginning of the creation of the "national identity within the energy sector" of which Dr Julien speaks – but more on that in a moment.



Doddridge Alleyne

One of Williams's first initiatives in re-organising the government structure after independence was to establish a fully-fledged Ministry of Petroleum and Mines to oversee the industry that was clearly crucial to the country's success as an independent state.

As Trevor Boopsingh, one of the leading figures in the Trinidad and Tobago energy sector, who subsequently became a permanent secretary in that Ministry and later Chairman of the state-owned Petroleum Company of Trinidad and Tobago (Petrotrin), reminds us: "Prior to the advent of the Ministry in 1962, all we had was something called the Petroleum Inspectorate as a part of the Ministry of Agriculture, Lands and Fisheries. It occupied a small upstairs office in San Fernando (Trinidad and Tobago's second largest city after Port of Spain). One inspector was initially all that existed to supervise petroleum industry operations."

Doddridge Alleyne, a senior civil servant and one held in high regard by Dr Williams, was appointed the Ministry's first Permanent Secretary. Mr Alleyne would also play an important role in the creation of the state-owned energy holding as lead negotiator in the government's purchase of the local assets of Shell, Texaco and Tesoro, more of which later.

An independent Trinidad and Tobago clearly needed to take a new look at its most important industry and see how it could be managed in such a way as to be more reflective of the 'national identity' desired by Dr Williams.

This exercise was obviously one that could benefit from independent advice, so in 1963, only a year after independence, the government set up a commission of enquiry specifically into the oil industry. It was headed by Dr Baghair Mostofi of Iran and assisted by Dr C.A. Heller and Dr J. Devaux-Charbonnel.

The commission's terms of reference were:

- To examine the present situation and future prospects of the oil industry in Trinidad and Tobago in the context of the economics of the world oil industry.
- To recommend a legal framework for the oil industry in Trinidad and Tobago which would stimulate the operations of foreign investors while safeguarding the interests of the nation.
- To make recommendations designed to ensure the greatest possible stability compatible with growth in the industry, including the level of employment.

At the end of its four sittings, which extended into 1964, the commission made a number of proposals regarding exploration, enhanced oil recovery (EOR), employment in the industry, greater control by the Ministry of oil companies' activities, pipelines, refining, royalties, taxation, the need for oil companies to provide full information to the Ministry and other matters.

Ironically, the commission had little to say about 'a national identity within the energy sector,' per se. The seven oil-producing companies of the day were all fully foreign-owned, as were the two refineries (at Pointe-a-Pierre in south-central Trinidad and Point Fortin in the south west) and all petroleum product distribution and marketing. The commission did, however, display what, in hindsight, can be seen as a remarkably prescient position on natural gas and the subsequent role it was to play in

Trinidad-Tesoro Managing Director J.P. Schmaltz with Oilfield Workers Trade Union President General George Weekes

the diversification of the energy sector.

It observed that, "the important development of a petrochemical industry in Trinidad requires the assurance of reserves in years to come. The commission was satisfied that the existing gas reserves should take care of the requirements of this industry and its expansion programmes, as they are known today. The use of gas for the production of electricity and other domestic requirements should be encouraged as much as possible."

This was at a time when the only petrochemical industry in existence was United States (US) chemical company WR Grace's Federation Chemicals (FedChem) ammonia plant, established in 1959 and located in the vicinity of what was later to become the Point Lisas gas-based industrial estate.

Seven years after independence, in 1969, came the opportunity, as noted above, which allowed that 'national energy identity' referred to by Dr Julien to begin to take root.

British Petroleum (Trinidad) Ltd, the then third largest oil producer in Trinidad and Tobago, concluded that greener production pastures elsewhere necessitated the closure of its Trinidad operation.

British geologist George Higgins, who worked in Trinidad for decades and authored the definitive *A History of Trinidad Oil*, points out: "BP concluded that there was little to be gained by holding on to their land operations in Trinidad, particularly since it had managed to find major reserves in Libya, with more modest ones in South America and the Gulf of Mexico. It seemed to them that there were few remaining exploratory or development prospects on land, whilst secondary recovery operations were proving uneconomic."

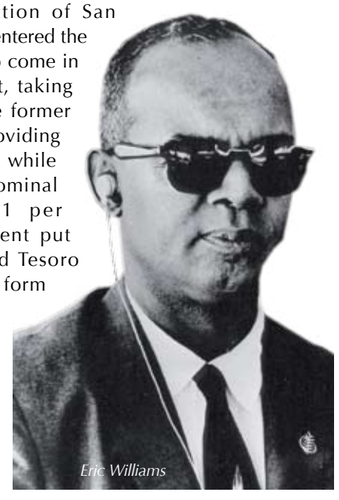
BP Trinidad's production and the amount of employment its fields provided to oil-workers were much too important to the health of the Trinidad and Tobago economy and society for the government simply to acquiesce in its abrupt demise.

Dr Julien recalls: "Acquiring the local producing assets of BP was the first bold step of state ownership in strategic industries. It was prompted by the concern over the impact there would have been on unemployment, particularly in the St Patrick area of Trinidad. It also tied in with Williams's thinking, articulated as early as 1955, that there would come occasions when the state would have to take the initiative as an investor, without prejudice to the policy of encouraging and supporting private enterprise, in order to protect and promote the national interest."

But this historic initiative was undertaken with a certain degree of caution, in keeping with the fact that, though the Petroleum Ministry had been set up as a regulatory body, the government had little experience of direct control of an industry as important, not to say as global, as oil.

As Barry Barnes, a lifetime oil man who became the country's Energy Minister at one point in his career and is currently a special adviser to the present Energy Minister, Senator Conrad Enill, remembers it: "Dr Williams preferred that Trinidad and Tobago not go it entirely alone in this first foray into oil, which was not without risk and approached his good friend, Augustus Long, President of Texaco Inc (which was then the largest oil producer in Trinidad and Tobago) and asked if they could help out, but Texaco said it had enough problems with its own stripper production."

A small US independent, the Tesoro Petroleum Corporation of San Antonio, Texas, then entered the picture and agreed to come in with the government, taking 49.9 per cent of the former BP operation and providing the top management, while the state retained nominal control with 50.1 per cent."The government put up US$100,000 and Tesoro a similar amount to form the Trinidad-Tesoro Petroleum Co Ltd." Mr Barnes notes. "A further TT$90 million was borrowed to pay off BP, pledged against the assets of the company and



Eric Williams

backed by government guarantee. And they agreed that Tesoro would come in and operate the company."

Longtime energy technocrat, Malcolm Jones, now Chairman of state flagship energy company, the Petroleum Company of Trinidad and Tobago (Petrotrin), into which, ironically, Trinidad Tesoro was later subsumed after the government eventually bought out Tesoro's share, makes the point that the government of the day was careful not to let the BP asset acquisition be seen by the outside world in an 'ideological' light.

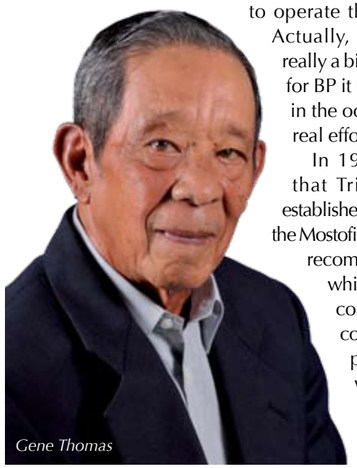
"It was definitely not nationalisation, per se," he says. "The government was, in a sense, forced into it because it felt the need to secure the livelihood of the thousands of workers involved."

Other veteran observers agree that not only were well-paid oil-workers' jobs preserved but Tesoro managed the former BP producing assets more skilfully than the much bigger UK multinational had done.

Barry Barnes recalls: "Tesoro basically kept the thing going and, in fact, actually increased crude oil production. They were experts on stripper well production and a lot of money was invested in the company. The venture here was also Tesoro's first outside of the US, so they put a lot of attention into it."

R.A. (Gene) Thomas, a former Permanent Secretary in the Ministry of Petroleum and Mines (which today is known as the Ministry of Energy & Energy Industries) remarks that Tesoro also enjoyed the good fortune of increased oil prices only a few years after it set up shop in the Trinidad and Tobago oil industry.

"Oil prices doubled or tripled after the Arab-Israeli war of 1973," he notes. "That clearly helped the new company. But I have to say that it was really good decision-making that made it possible for a company like Tesoro to operate these small entities. Actually, for Tesoro this was really a big operation, whereas for BP it had been like a drop in the ocean, so Tesoro put a real effort into it."


Gene Thomas

In 1969, the same year that Trinidad-Tesoro was established, and following upon the Mostofi Commission's various recommendations – one of which was to "compile a consolidated ordinance containing all legislative provisions dealing with all aspects of the oil industry from exploration for, to exportation of, hydrocarbons" – the government moved to introduce an omnibus Petroleum Act, with regulations governing its various aspects receiving parliamentary sanction the following year.

Anthony (Tony) Paul, a leading Trinidad and Tobago geophysicist and former Ministry technocrat, who is now Managing Director of local energy consulting firm, ACES (of which Trevor Boopsingh is Chairman), describes that legislation, which still exists today, as "very broad, the regulations were very specific, very clear as to what would happen in any instance, what was the Minister's role, the companies' roles and responsibilities and so on."

Trevor Boopsingh recalls that the Act "set a legal framework for everybody to operate in, though it did not try to define everything. Good law, I am told, must be general. The specifics must be in the regulations, which can be varied, as necessary, simply by an Order." A key element in the Petroleum Act was that it sanctioned the use of production sharing contracts (PSCs) between the government and the companies for the first time.

The Petroleum Act was followed five years later, in 1974, by a radical departure in petroleum taxation, embodied in the Petroleum Taxes Act, which came hard on the heels of the 1973 jump in oil prices triggered by the turmoil in the Middle East.

The emboldened Trinidad and Tobago Government wished to recoup for the treasury as much tax revenue as it could, consistent with the rise in oil prices and that piece of legislation had many controversial features, at least from the companies' point of view. These included:

- A tax reference price system, under which the Trinidad and Tobago Ministry of Finance itself set the price of a barrel of oil, irrespective of what market conditions at the time happened to be. "There was no appeal," Mr Boopsingh remembers.
- The separation of a petroleum company's business into three taxable parts – production, refining and marketing (and, remember, those were still the days when, with the exception of the BP Trinidad asset acquisition, the industry was still in the hands of integrated, foreign-owned companies, such as Texaco and Shell). The act did not allow any carry-over of losses from one part to the next.
- A special tax on crude processing, known as the refinery throughput tax.

The legislation also inspired the setting-up of the oil audit section in the Ministry of Finance.

Whatever the companies may have thought of the provisions in the Petroleum Taxes Act, it appeared to have achieved its primary purpose. As Mr Boopsingh tells it: "All of a sudden, in 1974, real money started flowing into the treasury. By 1976 there was even more, 1978 more yet and by 1980, it went out of sight."

This fiscal windfall enabled the government to underwrite what was to be the most significant development in the energy industry in the second half of the first petroleum century – the


An early offshore platform, circa 1974

rapid commercialisation of gas reserves at the Point Lisas Industrial Estate in west-central Trinidad, but more on that later.

Major Oil/Gas Discoveries Offshore

The 1970s were significant from more than a revenue-generating perspective, however.

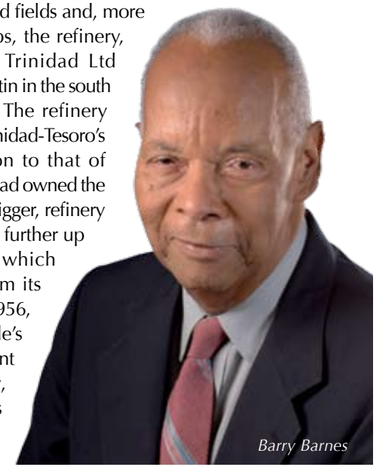
Several key events in the petroleum history of Trinidad and Tobago occurred in that decade, some of which helped contribute to the strengthening of Professor Julien's 'national identity within the energy sector.'

Chief amongst these energy milestones were:

- The discovery of natural gas off the North Coast of Trinidad for the first time in 1971, following the extensive 1968 seismic survey of the area, sponsored by the government. These reserves were to play a major role in future gas monetisation and to form the basis of the expansion of the liquefied natural gas (LNG) industry in Trinidad and Tobago in the early 2000s.
- The commencement of oil production off the east coast by the Amoco Trinidad Oil Co (ATOC) in 1972 which opened up a new offshore province that became the mainstay of crude production in Trinidad and Tobago for the next 30 years, despite the fact that peak production was reached as quickly as six years afterwards in 1978, at 139,163 barrels per day (b/d).

Amoco had found oil reserves in 1968 after an extensive drilling programme that was nearly abandoned out of frustration at numerous initial dry holes. The other oil companies in the country had dismissed the possibility of offshore East Coast oil, including the then main producer, Texaco. Trevor Boopsingh recalls that the Texaco man in charge in Trinidad and Tobago paid a price for that misjudgement. "Texaco was telling the government that there was no chance of finding oil off the East Coast. When it was found, the local Managing Director was immediately transferred out of Trinidad."

- The setting-up in 1972 of the wholly state-owned National Petroleum Marketing Company of Trinidad and Tobago (known as NP) to assume ownership of the BP-controlled service stations in the country, which were relinquished the same year – three years after the UK multinational had sold its oilfields to Trinidad-Tesoro. This was the government's second direct incursion into the industry and it triggered the state's eventual acquisition, by agreement of the companies, of the fuels retail networks then owned by Esso, Shell and Texaco. As Ken Julien recalls: "By December 1976, all the local marketing operations previously owned and operated by the multinationals were assigned to NP. The word 'national' appeared for the first time on retail stations." He clearly regards this as all part of the movement towards 'a national identity in the energy sector.'
- The 'national identity' momentum took a quantum leap two years later, in 1974, when the government bought out the land fields and, more important, perhaps, the refinery, owned by Shell Trinidad Ltd located at Point Fortin in the south west of Trinidad. The refinery was processing Trinidad-Tesoro's crude, in addition to that of Shell. Texaco Trinidad owned the other, and much bigger, refinery in Pointe-a-Pierre, further up the West Coast, which it had bought from its British owners in 1956, the year the People's National Movement – PNM – party, which Dr Williams headed, first came into office. Barry


Barry Barnes

Barnes, who was working with Shell Trinidad at the time, recalls that the company felt it was being pressured by the government in negotiations for a commercial price for Trinidad-Tesoro crude. "It is fair to say there was a feeling at Shell that we were being hard done by, since we had to negotiate with the government which is, at the same time, telling you you must buy the crude. So Shell went to the government and said, look, you are sending this crude to our refinery, it represents virtually 50 per cent of our throughput. It would be much more practical if we joint-ventured the refinery and you will put your crude in and we will put our crude in and the refinery will process for both of us and pay us both the same price."

This proposal was not, apparently, well received and according to Mr Barnes, there was a lot of 'emotion' involved. "The government appeared to feel affronted," he remembers. "And it decided it wanted to buy the whole refinery. Shell's offer had been 50 per cent of the refinery only but the government's position was – if we take the whole refinery, then we want the producing fields too."

The transaction cost the government £21 million or TT$93.6 million in those days, payable in three instalments. Shell Trinidad was re-named the Trinidad and Tobago Oil Company (Trintoc) and Walton (Wally) James, a chemical engineer employed as Manufacturing Manager and a Director with Shell, was appointed the first Trinidadian Managing Director. Shell had offered him a transfer to London but he opted to stay home and guide the fortunes of the new national petroleum asset.

While Trinidad-Tesoro was a 50.1 per cent state operation, with any expertise required being provided by the 49.9 per cent US partner, Tesoro Petroleum Corporation, Trintoc was 100 per cent locally-owned and therefore entirely dependent on its own resources. "One of our difficulties was getting technical people," Mr James recalls. "As Shell, we would get a lot of foreign support for technical matters, as needed, but that was cut off. Shell told us that they could offer us services but we would have to negotiate an agreement. They were hard businessmen. One of our big deficiencies was in geology. We had petroleum engineers, drillers, people like that, but no geologists. We had to advertise in Canada and the US for geologists with Trinidad and Tobago connections who might want to come back."

With the discovery of major gas reserves by Amoco off the East Coast, first with the Teak field in 1968 and then the huge Cassia field in 1973, the government technocrats realised that there was enough gas to launch Trinidad and Tobago into its second petroleum revolution – one based on natural gas, rather than crude oil. It was decided that this could not be left to the whims and fancies of private capital and that the state should take the lead in ensuring this gas was brought to shore and delivered to customers at a site ideal for the purpose – the Point Lisas Industrial Estate on the west coast, fronting the placid waters of the Gulf of Paria. So the National Gas Company of Trinidad and Tobago (NGC) was formed in 1975, as the sole seller of natural gas to local customers. One of its first tasks, other than pipeline expansion, was to capture the associated gas being flared on Amoco's Teak and Poui oil platforms and bring it ashore for use in the gas-fired boilers of the Trinidad and Tobago Electricity Commission, T&TEC. (More detailed articles on NGC and T&TEC can be found elsewhere in this publication).

- The gas-based development initiative commenced in 1977 when the Trinidad Nitrogen Company (Tringen) began production of ammonia in the Point Lisas area, though it was not actually located in what was soon to become the Point Lisas Industrial Estate itself. Tringen was the government's first incursion into ownership of a gas-based petrochemical plant. The then US chemical giant, WR Grace, which had been operating an ammonia plant in Trinidad since 1959, agreed to become the minority partner, with 49 per cent of the equity leaving the state with 51 per cent.
- Two milestones which everyone concerned would probably have preferred not to reach occurred in 1978 – peak oil production off the East Coast, earlier mentioned and peak oil production nationally, at 240,000 b/d, with the average for the year being 229,598 b/d.
- In that same year, 'local content' in the energy industry – a key measure of the 'national identity' of which Dr Julien speaks – made a spectacular advance with the construction at home of two of Trinidad-Tesoro's four production platforms in its Galeota block nearshore the South East Coast of Trinidad. This was a major achievement at the time but never expanded upon and it was not until 25 years later, in 2003, that the Anglo-Australian multinational, BHP Billiton, agreed to build in Trinidad the topsides of its Kairi One drilling and production platform in the Greater Angostura discovery in block 2c off Trinidad's north east coast.

Having been initiated in the 1970s, gas-based development speeded up in the 1980s, with the Iron and Steel Company of Trinidad and Tobago (Iscott) in 1980, which used gas in its directly-reduced iron process (100 per cent government-owned), the Fertilisers of Trinidad and Tobago (Fertrin) ammonia plant in 1981 (51 per cent government, 49 per cent Amoco Chemicals), the Urea Company of Trinidad and Tobago plant in 1983 (100 per cent government-owned) and the Trinidad and Tobago Methanol Company (TTMC) in 1984 (100 per cent government-owned).

These plants were all located on the Point Lisas Industrial Estate mentioned earlier, where the entity set up by the government in 1979 to partner NGC in facilitating gas-based industry, the National Energy Corporation (NEC), had built a port to cater to construction activity and later serve as the entry point for raw material imports and the export of product. The ▷

Aerial view of Shell's refinery at Point Fortin, circa 1960; much of the site is now occupied by Atlantic LNG

◁ Point Lisas Industrial Port Development Corporation (Plipdeco), a company in which the government had assumed the majority share, meanwhile set about the task of preparing the site itself for occupation by tenants such as the four just mentioned.

Trevor Boopsingh has an interesting tale to relate about the birth of Iscott. "Dr Williams had been to Romania on a trip in 1975 and Nikolai Ceausescu, then President of the country, had persuaded him that the way to industrialise was via steel. He decided on his return to build a steel plant at Point Lisas."

The Fertrin ammonia plant, for its part, was facilitated by the fact that Amoco had an obligation, under the 1969 Petroleum Act, to build its own refinery in Trinidad and Tobago, if its oil production remained at 100,000 b/d, or over, for seven successive years. But the company was not desperately keen to do so – "it didn't fit in with its global plans," Dr Ken Julien remembers – so Amoco 'traded off' the refinery for a 59 per cent interest in Fertrin.

Barry Barnes recalls that "Amoco did it reluctantly, claiming that fertiliser production was not its real business and the government had to twist its arm. But it did come in because it needed Trinidad and Tobago's support on the crude production side."

Fertrin was the state's second majority-owned incursion into gas-based fertiliser manufacture and, along with steel, urea and methanol, symbolised the unprecedented role as investment risk-taker that the government had assumed in order to get the gas-based industrial initiative off the ground. The Trinidad and Tobago public sector was almost certainly the biggest risk-taker anywhere in the Caribbean and Latin America during the 1980s, employing billions of US dollars of taxpayers' money. But the fact is that without its willingness to do so, the monetisation of natural gas reserves would have taken much, much longer to come to fruition, if it had happened at all. It was only in 1993 that the first totally private sector financed petrochemical plant at Point Lisas – Caribbean Methanol Company (CMC), owned by what eventually became today's Methanol Holdings Trinidad Ltd (MHTL) – came on stream. The state eventually sold all its petrochemical plants to either local or foreign investors, who have carried the ball at Point Lisas ever since.

Texaco – The Big Prize

While the establishment of the firm foundation of the industrial revolution in gas development was the defining event of the 1970s and 1980s, Dr Julien's 'national identity' process as far as the oil industry was concerned probably reached its climax in the latter decade when, in 1985, the big prize of Texaco Trinidad Incorporated, the largest land producer and operator of the country's biggest refinery at Pointe-a-Pierre in central Trinidad, fell into the hands of the state.

Texaco had acquired producing interests in Trinidad since the late 1930s, through its association with the Antilles Petroleum Company and had provided imported crude for processing at Pointe-a-Pierre since the mid-Forties, so it was certainly no stranger to the country when it made a bid in 1956 for the refinery, owned by a UK company, Trinidad Leaseholds Ltd (TLL). The British Government of the day was not at all happy that a British company was falling under American control but the sale went through and Texaco ownership proved beneficial for the oil industry in Trinidad and Tobago as a whole.

"Texaco made a big difference because it brought a lot of capital and modern methods," says Trevor Boopsingh. "It was American and therefore not perceived to be the 'colonial masters'. They were more open with the government. Augustus Long, the chairman of Texaco, struck up a famous relationship with Dr Eric Williams. Texaco eventually discovered new fields in Guayaguayare, helped expand the Trinmar offshore operation in the Gulf of Paria and brought in a huge amount of crude from Saudi Arabia to refine in Trinidad. By 1970, the refinery was the largest in the British Commonwealth and probably the second or third largest in the world."

The asset the government eventually acquired in 1985, however, was not what the refinery had been at its height in the 1970s. As Malcolm Jones, a chemical engineer who has spent a lifetime in both the oil and gas sectors in Trinidad and Tobago and is currently Chairman of Petrotrin, into which Texaco's assets were eventually incorporated via various routes, tells it: "Times had changed and by the mid-'80s, Caribbean refineries started to lose their prominence. Crude was taken directly to the US, instead of having to be refined in the region. The amount of crude needing to be processed at Pointe-a-Pierre decreased."

Trevor Boopsingh supports this. "The Texaco refinery was seen as no longer an international refinery but a small regional one. The company insisted that the proper size would be somewhere around 120,000 b/d, compared with 360,000 b/d in its heyday. This meant the refinery was over-manned and Texaco naturally wanted to reduce the workforce, to which the union, the Oilfield Workers Trade Union (OWTU), objected. At first, Texaco wanted to sell the refinery alone but the government insisted on taking the producing fields on land and some other assets. To my mind, the relinquishment of the land assets was very important, in that it repatriated a whole lot of land back to Trinidad and Tobago."

For three years before the actual sale of the refinery, Trintoc was forced to supply some crude for refining at Pointe-a-Pierre "in order to keep the refinery there going," according to the company's former managing director, Wally James.

Texaco was careful not to cut its long-standing links with Trinidad and Tobago completely and retained its 50 per cent share in east coast offshore block 6, which is today an important producer of natural gas, some of which is exported as LNG and, for 14 years, held on to a one-third share in Gulf of Paria producer, Trinmar, until selling out to co-owner Petrotrin in 1999.

The government had acquired the rest for US$189.2 million. Trintoc ran the former Texaco assets for eight years until 1993, when both it and the other state-owned company, Trinidad and Tobago Petroleum Company Ltd (Trintopec), which Trinidad-Tesoro had renamed when the government bought out Tesoro's 40.9 per cent share in 1985, were merged to become Petrotrin.

Re-birth of the Small Domestic Producers

The term 'national identity in energy' does not, of course, refer only to state ownership of oil or gas assets, even though a strong government role in these sectors, as seen particularly in the case of gas, has proved extremely beneficial.

The active involvement of private domestic capital is also necessary for a true 'national energy identity' to emerge. As noted at the beginning of this narrative, domestic oil entrepreneurs had virtually vanished from the scene as early as the beginning of the 1900s and for the next 50 years or so oil exploration and production was in the firm grasp of foreign multinationals and independents.

In 1989, however a significant development occurred: the then Trintopec, closely followed by the then Trintoc, began inviting small local companies, mainly drillers and other service operators, to take an active role upstream in reviving thousands of old wells and also assume control of small parcels of acreage on which they could do their own exploration and production.

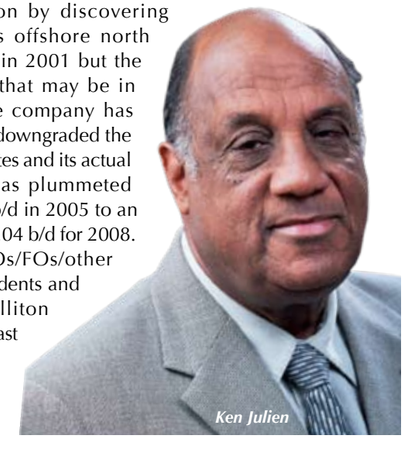
This was known as the lease operatorship (LO) and farm out (FO) programme and opened the way for a return of private domestic capital to the oil industry.

True, it was to some extent a matter of self-interest: both Trintoc and Trintopec, highly unionised as they were, faced a rising cost base and determined that it made more economic sense to hive off a portion of their production to private local entrepreneurs (though the two companies' successor, Petrotrin, eventually also brought small foreign companies into joint ventures in other parts of its acreage).

Millions of barrels of crude have been supplied to the Petrotrin refinery by LO's and FO's over the past 19 years, which helped improve the refinery's margin because it is cheaper to process than imported crude.

You could call the return of local entrepreneurship the last significant 'structural change' in the Trinidad and Tobago oil industry because it provided a net new source of crude that has continued to this day, however modest in absolute terms.

At least one foreign multinational, the Anglo-Australian BHP Billiton, has also helped add to oil production by discovering new reserves offshore north east Trinidad in 2001 but the longevity of that may be in question. The company has continuously downgraded the reserve estimates and its actual production has plummeted from 40,948 b/d in 2005 to an estimated 20,204 b/d for 2008.



Ken Julien

Did the LOs/FOs/other local independents and then BHP Billiton represent the 'last hurrah' for the upstream oil industry?

That could

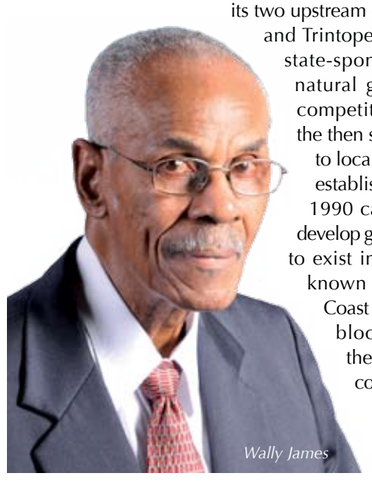
well be the case, when actual new discoveries and output levels are taken into account, though we will consider towards the end of this review whether oil production has a chance of making a comeback in Trinidad and Tobago or not.

Natural Gas Takes Over

The fact is that from the 1980s onwards, natural gas in all its manifestations has been the dominant preoccupation of politicians, planners, explorationists, bankers, investors and all who are involved at any level in the Trinidad and Tobago energy sector.

The rush to turn gas reserves into tradable products in the 1980s also included the first attempt to commercialise compressed natural gas (CNG) as an alternative fuel for motor vehicles, when a demonstration station was set-up in 1985. CNG has not since then been adopted by a substantial number of motorists, even despite the effort by Amoco to set the example with its own CNG station near its on-shore base in the south east of Trinidad in 1995. In 2008, the government finally moved to make CNG less expensive to install and kept its price well below that of various grades of oil. Rupert Mends, a former Permanent Secretary in the Energy Ministry, now a senior executive of BP Trinidad and Tobago (bpTT) – the successor company to Amoco – believes CNG use will eventually take off when "mass transit starts using it, the price incentives remain in place and there are enough stations that deliver the product quickly, so you don't have to wait too long."

In the 1980s, the government attempted to take the 'national energy identity' to a new level by sanctioning the involvement of its two upstream companies, Trintoc and Trintopec, and NGC, in a state-sponsored attempt at natural gas production in competition with Amoco, the then sole provider of gas to local industry. The three established a company in 1990 called Trintomar, to develop gas reserves believed to exist in offshore acreage known as the South East Coast Consortium (SECC) block. Unfortunately, the experiment was a costly failure.



Wally James

The drilling programme was beset by misfortunes and the Pelican discovery, the first to be exploited, turned out to have much less gas than originally believed. The three shareholders in Trintomar were saddled with a large debt payment they had to settle out of their own companies' cash flows. Output quickly plummeted and the then Enron Oil and Gas from the US, subsequently de-merged before the collapse of the Enron Group to become EOG Resources, had to be hurriedly called in to salvage the rest of the SECC block (which, it should be said, it has done handsomely).

Trevor Boopsingh remembers: "Amoco had a stranglehold on gas supply at the time and in an attempt to diversify the government put in what I call political drivers so as to get alternative supplies, using the state enterprises. They were so focused on the political driver of diversifying supply that they didn't carefully work out how they would work this thing through. With hindsight, the mistake was that they ought to have had a joint venture partner, who might have been more cautious about the rate at which capital was applied to the project."

Suffice it to say, government companies never again attempted to fund exploration and development offshore (discounting Petrotrin's activities in the shallow water Gulf of Paria basin off the west coast and its small production activity nearshore the South East Coast) and subsequent state participation in all such activities has been on the basis of minority positions for Petrotrin, which is carried by foreign majority partners through the risky exploration period.

By contrast to Trintomar, a very successful gas initiative in which the government was a major partner, was that of Phoenix Park Gas Processors Ltd (PPGPL), set up in 1991 to extract valuable liquids from the gas stream. Conoco and the US company which built the plant, Pan West Engineers and Constructors, joined forces with NGC to remove the propane, butane and natural gasoline fractions and export them to markets in the Caribbean and North America.

In 1991, too, the Supplemental Petroleum Tax (SPT), which had been introduced in 1980 just after the second oil price shock – to capture revenue for the treasury on a quarterly basis, which companies could set against Petroleum Profits Tax (PPT) at the end of each fiscal year – was adjusted to take various price levels into account.

"It introduced predictability into the tax system," says Trevor Boopsingh, "so that the companies would know if the oil price was US$25, they would pay so much SPT. If it was US$30, they would pay so much. So predictability came into the investment scenario, which was a critical requirement."

Some further tweaking of the SPT rates occurred in 2005. Significantly, SPT has never been levied on what has long become the major hydrocarbon produced in the country – natural gas. According to Boopsingh, this was meant to "encourage the development of the gas industry at Point Lisas and ensure relatively low gas prices continued."

Although the Production Sharing Contract (PSC) had been the preferred method of sharing income with the companies since 1974, this had merely been theoretical, since no actual production had commenced in any of the blocks to which a PSC applied. Existing producing companies discharged their obligations to the government under Exploration and Production (E&P) licensing, first introduced with the start of commercial oil production in 1908. Those operating under E&P licences such as the biggest gas and oil producers, bpTT and Petrotrin, still do so up to this day. The first operational PSC, in fact, came into being in 1993, when British Gas (BG) and its partner Texaco (now Chevron) signed a PSC for the development of block 6 off Trinidad's east coast.

As Boopsingh wryly points out: "It took 22 years for the 1974 contract to start delivering results." But those results have since been outstanding with BG/Chevron having provided around 275 million cubic feet a day (mmcfd) of gas from its Dolphin discovery in block 6 since 1996, when production first commenced.

One of the main reasons for the government turning to first, Enron, then BG/Texaco, as new gas suppliers was the shock effect of the Trintomar failure which had convinced the planners and NGC that more experienced and dependable suppliers had to be brought into the picture in order to provide real balance to the then Amoco.

It is an indication of the clear shift in the structure of hydrocarbon output in Trinidad and Tobago that PSCs first began having an impact on the tax system on the basis of gas, rather than oil, recovery even though the original intention of the change had been to maximise the government take from higher oil pricing and production. In fact, since 1993, the only PSC to deliver oil has been that with BHP Billiton/Total/Talisman for block 2c off the North East Coast and even that, as noted, has been something of a disappointment.

Natural gas officially established its production supremacy in Trinidad and Tobago in 1996 when it overtook oil as measured in barrels of oil or energy equivalent (boe) terms. It has not looked back since. In 2007, according to MEEI figures, the amount of oil lifted in Trinidad and Tobago averaged 120,018 b/d: the amount of gas produced was 689,200 boed, a huge disparity but one that explains why today, according to a government spokesman, "revenue derived from gas exports vis-à-vis oil is now in the ratio of 60-40" and even that may have shifted further if the world recession-induced fall in oil prices is taken into account.

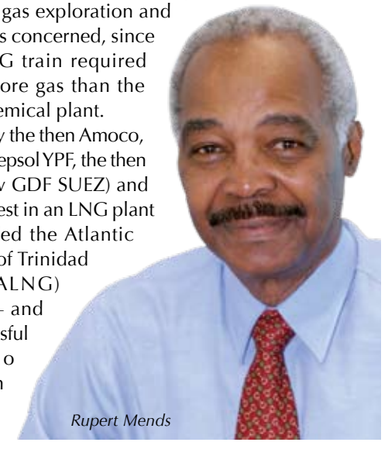
Another key gas-related development in the 1990s was undoubtedly NGC's decision in 1993, at a time when the prices of the petrochemicals produced from gas, like ammonia and methanol, were fluctuating on the world market, to introduce a system that lowered the cost of gas for its petrochemical customers when prices of their own commodities fell and raise it when prices rose again. The calculations were based on a reference price for the commodities concerned and the system's success was evident from the fact that no petrochemical plants at the Point Lisas Industrial Estate, where they were all located, ever closed down during the worst days of ammonia and methanol pricing, whereas several did in the US, Canada and other developed countries.

The commodity-linked pricing system was in its way the bedrock of the Trinidad and Tobago model of gas-based industrialisation that is so admired by emerging countries with largely unexploited gas resources of their own, because it ensured there was no lack of investors to keep the development momentum going.

In 1996, there was an important adjustment in PSCs to take cost recovery and acreage surrender into account. It also separated the government's share into three categories – A in lieu of royalty, B in lieu of SPT and PPT and C to take account of what was called 'excess profit,' which yielded a higher share for the government at higher levels of production and pricing. This was modelled on the Indonesian system of the time, in contrast to the Peruvian system on which the 1993 BG/Texaco PSC had largely been based.

LNG – A Quantum Leap in Gas Usage

But the most outstanding event in the 1990s as far as the expansion of the gas industry was concerned was Trinidad and Tobago's entry into the production of liquefied natural gas (LNG) in 1999. This created a step-change as far as gas exploration and development was concerned, since the average LNG train required several times more gas than the average petrochemical plant.



Rupert Mends

The decision by the then Amoco, now bpTT, BG, Repsol YPF, the then Cabot LNG (now GDF SUEZ) and NGC itself to invest in an LNG plant which they called the Atlantic LNG Company of Trinidad and Tobago (ALNG) was the fourth – and ultimately successful – attempt to establish an LNG industry in Trinidad and

Tobago. The three earlier efforts had begun as far back as 1971, when Amoco felt it had enough gas reserves to be able to support an LNG plant but the government of the day opted for the use of gas in domestic industry instead.

Circumstances in the mid-'90s, when the five resolved to proceed with an LNG investment in Trinidad, were quite different from those that had prevailed in the decades before. For one thing, Cabot, the largest purchaser of LNG into the US at its terminal at Everett outside Boston at the time, wanted a more secure source of gas than it had from Algeria and offered a market for LNG from Trinidad and Tobago. Cabot LNG's then President, Gordon Shearer, flew down to Trinidad in 1992 to talk over the matter with NGC, thus establishing Atlantic as 'buyer-led' from the beginning, which meant half the battle had already been won. Mr Shearer, now with Hess LNG, was henceforth regarded as the 'godfather' of the LNG industry in the country.

Natural gas reserves were considered sufficient to support both the local demand that had been classified as priority in the 1970s and the export trade, especially in the light of Amoco's string of new gas discoveries at the time and BG's recent arrival in Trinidad following its purchase of the then Tenneco interests. BG was anxious to find a larger market for the gas it knew existed off the north coast.

Perhaps the most important factor of all was the willingness of the PNM government of the day to sanction the export of gas, having previously decided against it.

Trevor Boopsingh recalls that it was Dr Julien who persuaded the PNM's political leader, Patrick Manning, to "alter the party manifesto for the 1991 general election to include a commitment to consider exporting gas. It was the general consensus among people like myself and Ken Julien that north coast gas would never see the light of day unless the companies were allowed to export it." Dr Julien himself has described the decision to take the leap into gas exporting as one of the 'riskiest' even a government as prepared to take risk with gas-based initiatives as the PNM had ever made.

"Here we were dedicating at least 50 per cent of the amount of gas reserves at the time, which were about 12 trillion cubic feet (tcf), to one industry," he recalls. "This small country, with less than 1 per cent of global natural reserves, was taking a major step and bringing the multinationals who controlled the reserves, along for the ride. And what a ride it has been!" What's more, Atlantic established a number of firsts in the world LNG business, some of which have stood the test of time.

- At 3 million tonnes a year output, Train 1 was the largest LNG facility in the world in 1999 and for some years thereafter. Its gas input was 164 billion cubic feet a year (bn cfy).
- It was the world's most inexpensive single train ever built, estimated to cost about US$1 billion but eventually coming in at US$950 million.
- It was the world's fastest LNG project, taking six and a half years from conception to completion, including 34 months for construction and handover.
- It was conceived on interlocking relationships among gas supplier (Amoco provided all the 475 mmcfd required, since BG at the time did not possess the infrastructure to contribute any gas from the North Coast and its East Coast reserves were pledged to domestic users in a 20-year contract with NGC), plant owners and LNG buyers.
- First-time financial arrangements for an LNG investment were used with bankers, including no pledge of shares, liberal ownership covenants, expansion of plant without lender approval under certain circumstances, and monthly dividend payments allowed to shareholders.
- Atlantic was the first LNG plant ever built in the Caribbean and South America and only the second in the Western Hemisphere after the Marathon Oil and Phillips Petroleum-owned Kenai plant in Alaska, after which it was partly modelled.
- Atlantic also inspired the establishment of the 522MW Eco Electrica combination power plant and LNG receiving terminal at Penuelas in Puerto Rico, the first facility of its kind in the world, on the basis of a supply of gas from Cabot as part of its offtake from Trinidad.

Atlantic also helped popularise the Phillips optimised cascade process of LNG production, which had originally been installed at Kenai in 1969 but had gone virtually unnoticed in the LNG world since then, investors preferring to use Air Products and Chemicals' technology.

Atlantic's second non-executive chairman, BG's Martin Houston, (Dr Julien was the first, as representative of NGC on the board) records that the Train 1 start-up team at Atlantic "which included many with substantial experience on Air Products and Chemicals base load NGC plants, was continually surprised at how many traditional operational problems were either eliminated by the process or solved in a very simple manner."

One major advantage of the Phillips process was that it provided two-train reliability for the price of one train. As a spokesman for US construction and engineering giant, Bechtel, which built Train 1 and all succeeding trains at Atlantic, put it at the time: "Instead of building two identical plants, as other countries with LNG had done up to now, we built one plant with key equipment duplicated. Traditional plants line up three refrigerant turbine compressors on each train, which cools the natural gas to its liquid state. We put six of them in one train, using smaller, well-proven and easily operated units, specifically designed for mechanical drive. Of course, this also helped to reduce capital costs."

With its shareholders all involved in some way or another ▷

◁ with Atlantic, it was prudent, both commercially and politically, to have a neutral Chairman who was also a Trinidad and Tobago national follow BG's Houston as non-executive Chairman.

Veteran Trinidad and Tobago civil servant, John Andrews, who had had lengthy experience of the energy sector as a senior official in the Ministry of Finance's oil audit section formed in 1974 and then as head of the government's Technical Advisory Group, "became aware," as he puts it, "that there was some difficulty in Atlantic having a representative of one of its shareholder companies as the Chairman and I got wind of the fact that they were looking for a neutral Chairman. I felt I could have done the job, having worked on the opposite side of the table with many of the people. I approached Martin Houston, since BG was sort of 'sponsor' of the chair and enquired whether they would consider me as Chairman. In April, 2000, I became Chairman of Atlantic LNG supported, I have to say, by all the shareholders. I stayed there for six years, until 2006."

Aerial view of Atlantic LNG's Point Fortin site during the construction of Train 4

Chairing board meetings of a company as important as Atlantic, owned by shareholders who were fierce rivals in other areas of the energy sector in Trinidad and Tobago and elsewhere in the world, was clearly a challenging exercise.

"They didn't come to blows or anything," Mr Andrews recalls with a chuckle, "but I often wondered how things ever got done with such a competitive group. I usually found myself having to adjudicate as to issues among the various shareholders. In the early days, when board meetings were coming up, I'd go and visit all the shareholders individually on my own in an effort to discover what would be of concern, what were the issues they would like to see resolved at board meetings."

Andrews believes the shareholders, in turn, "probably looked on me as someone who had worked with the government and might be able to make their relations with the government a little better. Having been active in the government at a high level, they knew I could approach ministers, could approach the Ministry of Finance to help justify some of what we were doing and be a good spokesman for Atlantic all round."

Under Mr Andrews's watch, Atlantic expanded no less than fourfold between 2000 and 2005, adding Train 2 in 2002 (3.3 million tonnes), Train 3 in 2003 (3.3 million tonnes) and the mammoth Train 4 in 2005 (5.2 million tonnes). The latter held the title of world's biggest LNG train for over two years but has now been superseded by even larger trains being built in the Gulf State of Qatar.

As mentioned earlier, these huge monetisation opportunities triggered a vigorous search for gas, certainly by the two main producers, bpTT and BG. (Repsol YPF is a 30 per cent shareholder in bpTT and obtains its gas for processing through Atlantic from bpTT's production).

"If you want exploration to go on," Mr Boopsingh points out, "you have to have the markets. The companies are not going to drill exploratory wells costing US$50 million just to sell to domestic industry. I speak to the producers and they are not happy with selling gas to make steel, say, because the price paid is too low."

Exploration activity pushed proven gas reserves up to 20.7 trillion cubic feet (tcf) in 2002, the highest it has ever been. Proven, probable and possible reserves in that year totalled 35.09 tcf. Natural gas production for domestic and export use averaged 3.7 bn cfd in 2007 but proven, as well as overall reserves, have fallen since 2002. However, the good news is that this slide may have been stabilised in 2007, when new gas identified as proven was able to replace virtually all that had been used up during the year.

The relentless expansion of LNG was clearly the most important development in the continuing saga of Trinidad and Tobago's natural gas in the first decade of the 21st century. But it was not the only one, by any means. In the year 2000, for example, NGC achieved the feat of one billion cubic feet a day (bn cfd) in gas sales to domestic industry.

In 2008, it will be catering to 41 per cent of the market or 1.57 bn cfd of gas sales in Trinidad and Tobago, divided among the following industries: methanol (15 per cent), ammonia (14 per cent), power generation (7 per cent), iron and steel (3 per cent), others (2 per cent). The rest of the market for Trinidad and Tobago gas is in LNG exporting, where NGC is not involved, save for the small amount of gas, about 88 mmcfd, that fulfils its 11.1 per cent quota in Atlantic Train 4, which it buys from bpTT and EOG Resources Trinidad.

LNG consumes 59 per cent of all the gas utilised in Trinidad and Tobago or about 2.12 bn cfd. Keeping a balancing act between export and domestic gas, at a time of caution over proven gas reserves, will require close attention as the decade proceeds. Trevor Boopsingh himself has identified "a range of options", which he says could vary from 70/30 to 55/45 in favour of LNG.

The government will certainly be required to bear some sort of allocation system in mind as new gas reserves are discovered and claims are made on them. A fifth LNG train, for example, would need significant amounts of gas, probably as much as Atlantic's Train four.

The BG Group which was mandated in 2007 to undertake an LNG expansion study for the government in conjunction with the MEEI, partly to facilitate the government's wish for Trinidad and Tobago to become an investor in parts of the gas value chain other than liquefaction, has reported on the matter favourably, according to Derek Hudson, President of BG Trinidad and Tobago (BG T&T).

"The reserves potential of the country is there – it only requires some work," Mr Hudson has remarked. He does stress, however, that, as Boopsingh himself has observed, "other opportunities" will be competing with LNG for the use of gas, that might even include expansion at Atlantic itself as well as the needs of domestic industry. Mr Hudson says the study also outlines ways in which the government can achieve its ambition to insert itself into the gas value chain and stresses that BG Group, with the largest access to the US market of any company in the LNG business, is eager to assist.

For its own natural gas production from East Coast offshore fields, bpTT, the country's largest gas producer (about 2.4 bn cfd) began developing the concept of hubs in the year 2002. Its Cassia B hub was devised as a processing point for gas from several of its fields, with a capacity of 1.6 bn cfd, and was said to be the world's largest offshore gas processing unit at the time.

An offshore processing unit of this size was new to the Trinidad and Tobago energy industry. It included a large gas compression footprint, which would enable bpTT to improve gas recovery by over 10 per cent when that became necessary.

Concurrent with Cassia B, a new 48-inch pipeline was installed to bring gas to shore. Called Bombax, it was the biggest offshore pipeline ever built by bpTT at the time and the largest in the western hemisphere until NGC inaugurated its 56-inch Cross Island Pipeline (CIP) onshore Trinidad in 2006.

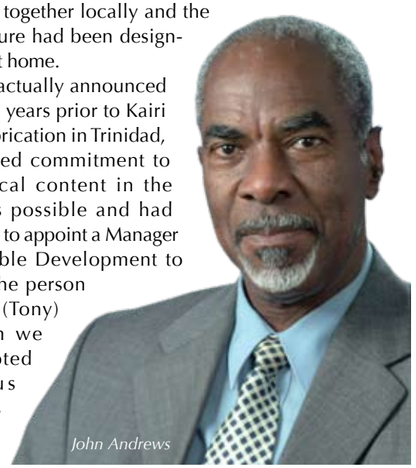
Local Content Assumes Key Role

The Bombax pipeline was an important element in helping push local content in the upstream forward after its long period in the doldrums following the 1978 achievement of fabricating the two Trinidad-Tesoro platforms for the Galeota field off the South East Coast.

Local mechanical construction contractor, Damus Ltd, built the sub-sea manifold, the first installed in Trinidad and Tobago, which tied gas from various sources into Bombax, as well as the bridge and flare boom for Cassia B. Two years later, in 2004, BHP Billiton Trinidad and Tobago (T&T) pushed the revival of local content in the upstream even further forward with its decision to have the topsides of the first platform to exploit its Angostura oil discovery in its offshore 2c block, named Kairi 1, partly fabricated and fully assembled, in Trinidad. At 550 tonnes, this was a major advance on the much smaller Trintes B and C platforms of 30 years earlier and was also undertaken by Damus.

BHP Billiton T&T launched a trend in local platform fabrication that has become unstoppable. The following year, 2005, bpTT completed the locally constructed 950 tonne platform for its Cannonball field off the east coast, which went twice better than BHP Billiton T&T in that the platform jacket was also put together locally and the whole structure had been design-engineered at home.

BPTT had actually announced in 2002, two years prior to Kairi 1's partial fabrication in Trinidad, its determined commitment to as much local content in the upstream as possible and had gone so far as to appoint a Manager for Sustainable Development to head it, in the person of Anthony (Tony) Paul, whom we have quoted on various subjects throughout this survey.



John Andrews

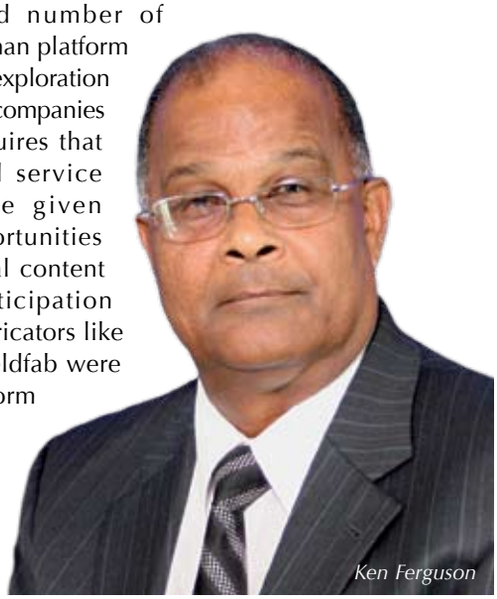
Cannonball ushered in what bpTT's Chairman and Chief Executive Officer (CEO) Robert Riley described at the time as "a new concept in platform construction – a prototype that may very well find a place in offshore fields around the world." This 'prototype' has since been utilised in the construction of platforms to develop bpTT's Mango, Cashima and Savonnette gasfields and at least another three are planned in the foreseeable future.

Other companies have also jumped on the bandwagon – EOG Resources, first with parts of the topsides for its Parula platform and then with the entire topsides of its Oilbird platform followed by its Toucan platform, while BG T&T has also joined in with the topsides of its mammoth 4,000 tonne Poinsettia platform.

The pursuit of local content upstream became formal policy for the energy sector in October 2004, when a government-appointed committee issued a 'Local Content and Local Participation Policy Framework' under the watch of the then Energy Minister, Eric A. Williams.

Clearly, the platform fabrication industry has been the shining success of this effort, so much so that Mr Paul tells us that when, in his consulting capacity, he advises governments in West Africa about Trinidad and Tobago's development of its gas sector, he is immediately told that "we want you guys from Trinidad and Tobago to come here and build our platforms for us because the prices we are paying are twice as much as it costs in Trinidad. In fact, they want to extend that to other infrastructure, like gas pipelines. As you know, NGC has built the largest gas pipeline in the Western Hemisphere."

It is estimated that platform fabrication has increased local content in the upstream from 10 per cent to over 30 per cent and rising. But there is still clearly room for growth, particularly in the myriad number of services other than platform fabrication that exploration and production companies need. This requires that locally-owned service companies be given the same opportunities under the 'local content and local participation policy' that fabricators like Damus and Weldfab were offered in platform construction.


Ken Ferguson

A leading local provider of platform operations and maintenance services, Ken Ferguson, chairman of the Kenson Group, who is also the current mayor of Trinidad's second city, San Fernando, in the south of the country, which likes to refer to itself as the 'energy capital' because it is close to petroleum production and refining facilities, insists that not enough effort is being put in by the authorities into safeguarding the interests of the general body of local service suppliers.

He feels they are still being overlooked when it comes to getting the first crack at services needed in the upstream, and foreign service companies still continue to obtain the best contracts.

"The producing companies I have struggled to help over the years all of a sudden tell me my services are no longer required," he recounts. "Out of the blue they accuse us of not having proper systems and processes or good managers. Local companies are increasingly being relegated to the role of sub-contractors but that situation deprives us of the chance to grow. I don't want to have a British company like the Wood Group replace me in Trinidad and Tobago. On the contrary, I want Kenson itself to have the opportunity to grow as big as the Wood Group, which started out, I understand, as a small fishing company and has grown into a large, international services provider."

Mr Ferguson must envy the platform fabricators, whom the government facilitated by mandating the National Energy Corporation (NEC) to establish a platform fabrication yard at the Brighton port it was already managing at La Brea in south west Trinidad in order to kick-start the business.

This was ready by early 2004, the same year in which NEC was formally assigned the task of managing the new wave of gas-based development to follow the ground-breaking Point Lisas model, to which we will return in a moment. Suffice it to say, the 'old wave' saw its culmination in 2004 and 2005, when, first, the Atlas methanol plant, owned 63.1 per cent/36.9 per cent by Methanex of Canada and BP, and then, Methanol 5000, MHTL's fifth methanol plant at Point Lisas, came on stream.

At a production capacity of 5,000 tonnes a day (t/d) or 1.7 million tonnes a year, Atlas was the world's largest methanol plant, requiring 164 mmcfd of gas to function. Equally important, Atlas was the first industrial application of German engineering company Lurgi's proprietary mega methanol technology anywhere in the world.

But that record was short-lived, being exceeded by Methanol 5000 a year later, with a capacity of 5,400 t/d and a gas demand of 175 mmcfd. It's little wonder that, by then, Trinidad and Tobago had attained the distinction of being the world's biggest exporter of methanol from a single site. Simultaneously, it was also the world's biggest ammonia exporter.

Trinidad and Tobago's ability to establish huge gas-based projects was further entrenched in 2005 with the start-up of Atlantic LNG's fourth train, which had a gas requirement of no ▷

◁ less than 800 mmcfd and could produce as much as 5.2 million tonnes a year of LNG. At the time, it was the world's largest single LNG train, continuing the tradition of record-breaking that Atlantic had first started with Train 1 in 1999.

Train 4 cost US$1.2 billion to build, a 'low spend' in international terms because many of the facilities needed were already in existence. The new train did, however, require a second jetty at the Atlantic site and a third LNG storage tank. NGC helped to further deepen Dr Julien's 'national identity in energy' by taking an 11.1 per cent share in Train 4, which unlike its holding in Train 1, enabled it to process its own gas (about 88 mmcfd) for the first time. The train was devised as a tolling facility, which liquefied gas for its shareholders according to the amount of equity each held in the plant. Theoretically, a tolling arrangement allows other companies with gas reserves also to put gas through the plant and pay a fee for doing so but that has not yet happened as far as FIRST is aware.

The arrival of Train 4 pushed Trinidad and Tobago up into fifth place in the international LNG exporting league and maintained its position as the world's single largest exporter of LNG to the US. Since then, with other countries having expanded their own LNG production, Trinidad and Tobago now ranks seventh in the world LNG trade.

With so much gas being exported, the government moved in 2005 to bring forward the date by which the biggest gas producer, bpTT, would start to pay 10 per cent royalty on exported gas under its exploration and production (E&P) licences for its offshore fields.

But the arrangement had a new twist to it, which was that this royalty was to be honoured in kind not cash because the government wanted access to what amounted to very low priced gas which NGC could, in future, provide to industries that it was government policy to encourage, such as aluminium. NGC now gets about 6 per cent of its gas supply under the royalty substitute system, which so far applies only to bpTT.

BP Group Chief Executive Tony Hayward visits the fabrication yard at La Brea during the construction phase of bpTT's Cannonball platform

Cross-Border Gas Becomes a Possibility

Gas development moved into a totally new realm in 2005 when the Manatee well, drilled in BG T&T/Chevron's block 6d, confirmed that gas reserves did, indeed, straddle the Trinidad and Tobago/Venezuela maritime boundary delimitation to the south east of Trinidad and the area Venezuela calls Plataforma Deltana north east of the Orinoco Delta.

Chevron, which holds the licence on the Venezuelan side, had earlier drilled the productive Loran wells in the matching block 2 in Plataforma Deltana. A joint technical team has since estimated that cross-border gas between block 6d and 2 could amount to as much as 10 tcf, of gas, 2.7 tcf or 27 per cent of it on the Trinidad side and 7.3 tcf (73 per cent) in Venezuelan waters.

The delimitation treaty between Trinidad and Tobago and Venezuela lays down that joint agreement is required before any of this gas can be exploited and discussions are still continuing as to how best this can be done. Trinidad and Tobago clearly sees 2.7 tcf of gas as helping facilitate the fifth LNG train earlier mentioned and would probably want to bring some of the Venezuelan gas over to Trinidad too but Venezuela may have other ideas.

Another pair of cross-border blocks, bpTT's Kapok and Plataforma Deltana block one, held by Venezuelan state company PDVSA, has also been the subject of discussions by both sides but this is regarded as having fewer reserves than 6d/block 2. A third pair, block 5b (bpTT/Repsol YPF in Trinidad) and StatoilHydro/Total's block 4 in Venezuelan waters, is only at the preliminary assessment stage. If 'unitisation' of gas reserves, as it is called, between Trinidad and Tobago and Venezuela goes ahead, it would be the first such development in the Western Hemisphere. Rupert Mends who was involved with the process when he was Permanent Secretary in the Energy Ministry, observes that there is "goodwill" concerning the exploitation of cross-border gas and both sides are working to identify reserves "but there is usually a political dimension to these matters and politics often cramps the economics."

Oilfield workers operating a horizontal drilling rig: the MEEI is bullish on the prospects for an onshore oil renaissance in Trinidad and Tobago

NGC's Cross Island Pipeline (CIP) in 2006 was designed to provide transmission capability for the producers sending gas to Train 4 as well as service tenants on the new Union Industrial Estate at La Brea and for future gas transportation requirements, such as gas from 6d/block 2, including any that might come from the Venezuelan side.

As noted, at the time, it was the largest in the Western Hemisphere and among the largest in the world. It is able to carry 2.4 bn cfd of gas on free flow and 3.2 bn cfd with compression. A pipeline not wholly-owned by NGC – it only had a 10 per cent interest in it – but was as ground breaking in its own way as CIP moved out of the concept stage in 2007 and became an on-going project to provide natural gas from Trinidad and Tobago to Caribbean territories too small to accommodate LNG (only Puerto Rico, the Dominican Republic, Cuba and Jamaica are regarded as having demand large enough to do so).

The Eastern Caribbean Gas Pipeline Company (ECGPC) was an initiative to help other territories in the region burdened with high prices of oil-based energy like fuel oil and diesel for electricity generation, by offering competitive pricing for gas instead. It is an all-private sector effort, with the Trinidad and Tobago Government's role confined to agreeing to sanction the export of gas for the project.

Energy stalwart Trevor Boopsingh is Chairman of the company and its goal is to provide the transportation capability for gas to be delivered first to Barbados and, later, the French Caribbean territories of Martinique and Guadeloupe. Tie-ins with St Lucia and Dominica are also possible.

The Barbados Government changed hands in early 2008 and the new administration had not, at the time of writing, re-affirmed its predecessor's approval for gas to be imported into that country. ECGPC has, however, gone ahead and hired a Trinidad and Tobago company to undertake a detailed survey of the seabed for the initial section of the line between Tobago, where it will originate, and Barbados.

Gas requirements of the principal customers are relatively small – with Barbados needing 25 mmcfd at the beginning and Martinique and Guadeloupe a total of about 60 mmcfd.

An attempt at diversifying the uses to which methanol can be put in order to help safeguard the market for one of Trinidad and Tobago's premier export products was also launched in 2007 with MHTL's US$12 million methanol-fired 8.3MW demonstration power plants at Point Lisas. Within two years, MHTL is expected to know whether it could potentially have a market in the fuel required for power-generation in the Caribbean and elsewhere. Of course, this would provide potential competition for ECGPC and it remains to be seen how these energy projects, both gas-based, eventually proceed.

In light of the concerns over natural gas reserves as Trinidad and Tobago's first petroleum century was drawing to a close, the confirmation of two new gas discoveries was music to the ears of energy industry practitioners.

The Minister of Energy and Energy Industries, Senator Conrad Enill, himself announced in 2008 that Petro-Canada (now Suncor Energy), operator of block 22 north of Tobago, had found about 1.2 tcf of gas during its exploration programme there. Another Canadian company, Canadian Superior, for its part, had identified around 3.3 tcf of gas in block 5c off Trinidad's South East Coast.

2008 was marked by yet another initiative in gas-use

BG's Hibiscus platform: the company's Manatee well in block 6d confirmed the existence of cross-border gas reserves between Trinidad and Tobago and Venezuela

diversification, namely the on-going construction of the first gas-to-liquids (GTL) plant in the Western Hemisphere and one of the few in the world. World GTL Trinidad Ltd, owned 51 per cent by World GTL Incorporated of New York and 49 per cent by Trinidad and Tobago's flagship energy company Petrotrin, was moving to complete a small, 2,250 b/d GTL facility, using the Fischer-Tropsch process, sited at Petrotrin's compound in Pointe-a-Pierre. The plant is costing US$240 million.

The New Wave of Downstream Gas Development

While methanol for power generation and GTL are both variations on the traditional uses to which Trinidad and Tobago gas has been put, the 'new wave' of gas development mentioned earlier is focusing on extending the existing primary chemical route further down the value chain within the country itself.

The government strongly believes that more 'value added' can be obtained this way and building on what the country has already proved to be good at is the best way to enlarge the industrial and manufacturing base.

The programme had already been firmly worked out in the waning years of the first century and, it is expected, will come to fruition in the early years of the next one.

Methanol, ammonia and the basic metal products of steel and aluminium, both of which are significant gas users, have all been earmarked for a major add-on industrial programme. Some examples follow.

• Ammonia: MHTL has already gone ahead and invested in an ammonia/urea/melamine (AUM) complex at Point Lisas, at a cost of about US$1.6 billion. It will consist of a plant producing ammonia, which will then be used for the manufacture of urea solutions. Nitric acid, ammonium nitrate and UAN mixing plants will then be added, taking the complex to melamine. Melamine will provide Trinidad and Tobago manufacturers for the first time with local access to a raw material for such products as decorative laminates, surface coatings, tableware, wood adhesive, resins and many others.

• Methanol: LyondellBassell, one of the world's leading chemical companies, engineering group Lurgi and NEC, have signed a project development agreement (PDA) for a US$2.2 billion investment in a new methanol plant that will be used as input into propylene which will be converted into polypropylene, from which any number of plastic-related products can be made, such as appliance parts, film sheeting, bottles and caps, brushes, rope, carpeting, toys and many others.

• The government, which believes a plastics industry has the potential for spawning the most downstream manufacturing opportunities, is also keen on the ethane route into plastics, as well as the methanol route, the former being the more traditional way of doing it. Westlake, a US company, has proposed a US$2.3 billion polyethylene complex, using ethane extracted from the gas stream. This will utilise a liquid that now remains in the gas when it is used as a fuel or in petrochemical production (propane, butane and natural gasolene are currently recovered and exported by Phoenix Park Gas Processors Ltd – PPGPL – a company in which NGC has the 51 per cent majority share). The ethane will be converted into ethylene and then polyethylene, which can be used to make the same range of products as polypropylene.

• Butane already has a market as a fuel through PPGPL but it can also be the raw material for maleic anhydride, which can be the foundation of a complex consisting of malic acid, fumaric acid, tartaric acid and food acid plants. Isegen of South Africa says it is going ahead with such an investment in Trinidad and Tobago, which will spawn a whole host of food and pharmaceutical-related investment possibilities for local manufacturers as well as in personal care products, water treatment chemicals, detergents, pesticides and agricultural chemicals.

• Iron and steel. Essar Iron and Steel from India is building the first steel complex in Trinidad, though the country already has basic steel production from three units owned by the world's largest steel maker, ArcelorMittal. Essar's production of hot briquetted iron (HBI), pellets and hot rolled coils could open the way for scores of steel-using industries locally, such as roofing materials, sheets, beams, pipes, wrought iron, cast iron, storage tanks, plates, bearings, balls, etc.

• Aluminium qualifies as a gas-linked downstream industry in that it depends on substantial amounts of electricity for its production and electricity is generated with natural gas in Trinidad and Tobago. NEC and Votorantim of Brazil are going ahead with a US$800 million, 125,000 tonne a year (t/y) aluminium plant at the new Union Industrial Estate, La Brea, which will provide the raw material for a rod mill, wire and cable plant, billet and bars plant, wheel plant, auto parts plant and an alloy rods and continuous bar plant. There are innumerable further consumer-related manufacturing opportunities downstream from such plants, including vehicle body parts, containers, ladders, doors and windows, bottle caps, tables, chairs, handicrafts and so on.

The six routes into downstream manufacturing detailed above constitute the core of the 'new wave' of industrialisation emanating from gas. Analysts generally seem to agree with this approach. As Gregory McGuire, a senior NGC executive, now seconded to the University of the West Indies (UWI) in Trinidad and Tobago, notes: "We really need to be in the value-added game. The gas sector is really well defined now in respect of primary production and the challenge is to get some downstreaming and some linkages."

Can Oil Make a Comeback?

For the best part of this survey we have focused on Trinidad and Tobago's gas sector, since it is indubitably now the dog that wags the petroleum tail and has vast potential for expanding the country's manufacturing base downstream. But does this mean that the days of oil, the mainstay of the economy for the first 69 years of the petroleum century, are numbered?

Any suggestion that that is the case would be frowned on by the analysts and certainly by the MEEI, which is busy putting out blocks for exploration that it hopes will yield new oil as well as the new gas that is already beginning to appear.

Trinidad and Tobago's last oil discovery of any consequence was made by BHP Billiton T&T and its partners in block 2c with the Kairi and Canteen wells in 2001. But that has turned out to be a disappointment and instead of rising, as hoped, the country's oil production has been falling, and is expected to average about 118,000 b/d in 2008, compared with 121,754 b/d in 2007.

Highest production in the last 16 years was 145,114 b/d in 2005, the year Kairi and Canteen commenced production.

Though gas-related economic activity, particularly that of LNG, which utilises 59 per cent of all gas currently produced, now provides more revenue to the treasury than oil production and refining, the latter is still crucial, since the 6,000 cubic feet of gas it takes to provide the energy equivalent of one barrel of oil is priced at considerably less than its oil counterpart (though the differential has been narrowing recently). Oil is also much easier, and quicker, to monetise.

Point Lisas Industrial Estate: experiencing a new wave of downstream gas development

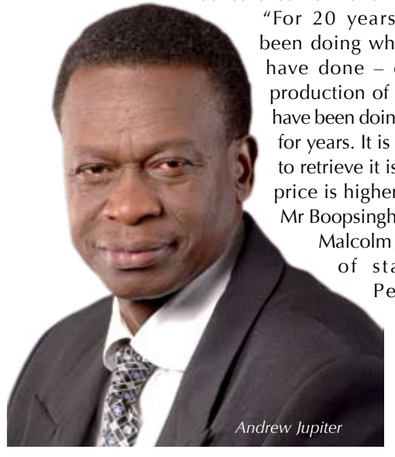
Photograph courtesy of MEEI

If new exploration taking place both offshore and in deeper horizons or land does not do it, are there other possible sources of incremental oil in Trinidad and Tobago? The answer is yes. Two in particular – the conventional oil that has remained 'stranded' in reservoirs because the gas pressure is no longer enough to get it to the surface and methods such as gas injection or water flood must be employed to do so and 'heavy oil' of a gravity of under 18 degrees API which requires to be lightened by agents such as steam in order to be able to flow at all. "Because of the technological challenges and the economics, heavy oil has not been actively exploited," explains Energy Minister Enill.

But heavy oil is regarded as a particularly promising source of additional oil and, as the first petroleum century came to an end, the MEEI was sponsoring an audit of such oil first and then one of conventional reserves after.

The current estimate of conventional oil reserves amounts to 2.7 billion barrels – 621 million proven, 40.6 million probable and 1.68 billion possible. This has been largely built up by the MEEI from the companies' own calculations over the years and a formal audit is considered the only reliable way of confirming or adjusting those figures. Heavy oil is largely excluded from these statistics and geologists believe such reserves could account for almost as much as conventional oil – around 2.5 billion barrels, located on land and in the Gulf of Paria off Trinidad's West Coast.

Consulting company Association of Caribbean Energy Specialists (ACES), of which Trevor Boopsingh is Chairman and Anthony Paul Managing Director, estimates that about 100,000 b/d of heavy oil could be lifted from Petrotrin's Trinmar acreage in the Gulf of Paria in the future, while around 50,000 b/d could be retrieved from land reservoirs.


Andrew Jupiter

"For 20 years we have not been doing what we ought to have done – encourage the production of heavy oil. They have been doing it in Venezuela for years. It is more expensive to retrieve it is true but the oil price is higher now," remarks Mr Boopsingh.

Malcolm Jones, Chairman of state company Petrotrin, has pointed out that the heavy oil reserves in Trinmar "contain heavy metal content and acidity, which pose significant challenges for our refinery but it does represent an attractive opportunity." As part of the on-going review of the petroleum fiscal system, which had not yet been concluded at the time of writing, ways are being looked at to make the enhanced recovery of conventional oil and drilling for heavy oil, more attractive to producers.

Incentives for deep water exploration in the Atlantic Ocean off the East Coast of Trinidad are also expected to be revised as part of the fiscal package. No company has ever gone into what MEEI chooses to call the Trinidad and Tobago Deep Atlantic Area (TTDAA), where water depths range from 1,700 feet to around 3,000 feet, which makes drilling both a technological and financial challenge, StatoilHydro bid for one block there two years ago but no contract has yet been finalised.

This is definitely 'frontier territory' as far as the Trinidad and Tobago petroleum industry is concerned but some experts think there is a good chance of finding either oil or gas there.

Anthony Paul, for one, is an enthusiast for deep water exploration. "If you look around the world," he says, "and especially around the Atlantic margin, most of the major discoveries have been in deep water." Trevor Boopsingh concurs. "I believe there are more hydrocarbons to be found in the deep water," he says.

Basharat Ali, a former Energy Ministry technocrat, now a respected observer of the industry, believes "deeper horizons, because Trinidad is a mature province," is probably one of the best places to look for new oil.

Under Minister Enill's stewardship, a renewed effort is also likely to be made to further deepen what Dr Julien calls the 'national identity in energy' in the upstream, with particular reference this time to the domestic private sector. It is just as important for private local companies to be contributing to oil and gas production as it is for state companies to have a presence there. It is generally agreed that the effort by local companies to maintain their position in the petroleum services business needs to be matched by greater involvement in the producing area.

Minister Enill's declared intention to "review the Supplemental Petroleum Tax on small operators" and to provide better incentives for "marginal or small fields" should make it easier for local players to participate more vigorously in the upstream.

Exporting Trinidad and Tobago's Petroleum Expertise

After 100 years, Trinidad and Tobago thinks it is more than equipped to export its petroleum expertise, especially as it relates to platform construction, as Anthony Paul has mentioned and, perhaps more so, to monetising limited reserves of gas successfully.

Mr Paul himself has visited several African countries in his capacity as an ACES consultant and in mid-2008, a delegation from the Economic Community of African States (ECOWAS), led by the ECOWAS Commission chairman, Dr Mohammed Chambas, visited Trinidad for discussions with the government and private sector.

Dr Chambas spoke of the "remarkable progress" in gas-based development he witnessed during his visit, the background to which was an offer of assistance to West African countries made by Trinidad and Tobago's Prime Minister, Patrick Manning, when he attended an African Union meeting sometime previously.

Trinidad and Tobago has also recently provided assistance to fellow member of the Caribbean Community and Common Market, Belize, which needed advice on how to tax the company that recently began producing oil there and with the training of petroleum inspectors to monitor the industry. In a way, this should be déjà vu for Trinidad and Tobago, since it has, in the past, even been asked to help the former colonial power, Britain, in relation to its oil discoveries in the North Sea.

RA (Gene) Thomas, a former Permanent Secretary in the Energy Ministry, recalls that "the British Government asked Trinidad and Tobago for technical assistance when oil was found in the North Sea, so I went up to London together with two other people and we found out that they wanted advice in various areas – what sort of grid they should set up in the North Sea, what sort of obligations to put on the companies and acreage surrender obligations. I gained the impression this sort of information was necessary to enable the British to deal with the US companies that were coming in."

As the second petroleum century proceeds, Trinidad and Tobago may also add another energy source to its portfolio – renewables. Contrary to popular belief, the petroleum-rich country has not entirely ignored renewables – there have been experiments with solar heating in Tobago and the MEEI has been mandated to prepare a renewable energy policy.

But as long as electricity and, even more so, natural gas and LPG are as low-cost as they are, renewables are likely to face challenges of acceptability in Trinidad and Tobago.

"The key to promoting solar energy or other renewables in the country is to price electricity properly," Trevor Boopsingh observes. "Until we do that, alternatives like solar will have a hard time becoming attractive." ❑

Minister of Energy & Energy Industries, Senator Conrad Enill welcomes a delegation of African energy officials to Port of Spain as part of Trinidad and Tobago's technical assistance programme to African countries