

Power to the People: electricity, oil and gas in Trinidad and Tobago

BY LEO MARTIN, CHAIRMAN, POWERGEN

The contributions that oil, natural gas and electricity have made in laying the foundations for the phenomenal level of industrial growth and development seen in the Republic of Trinidad and Tobago – especially over the past 63 years – are not only indisputable, but virtually inextricably interlocked.

On the occasion when the American Merrimac Oil Company drilled what was said to be “the first successful well in the world” at La Brea, Trinidad in 1857, few would have envisioned that this discovery would have fuelled such unprecedented levels of industrial growth and development in the country; and more specifically in the petrochemical sector so many years thereafter. Interestingly, the first discovery was struck at only about 280 feet.

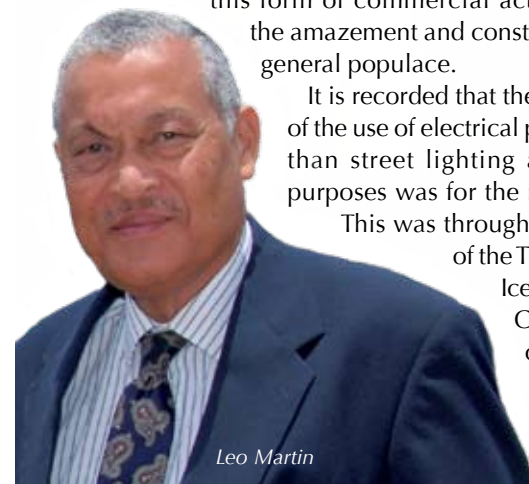
As if not to be outdone, it was back to the year 1895, a mere 38 years following this historical event, that the first evidence of the use of electricity in Trinidad had been traced. These two developments in the history of oil and electricity laid the groundwork for what was to become a marriage of major economic influences significant in the Caribbean region and the world at large. They were destined to place Trinidad and Tobago in the forefront of commercial and industrial activity, as well as among the world’s leading developing states, just 100 years thereafter.

There is no doubt of the value of the contribution that fuel oil made initially, and natural gas more recently, in propelling the development and maintenance of efficient and reliable supplies of electricity in Trinidad and Tobago. It is in the strength, determination and resilience of the visionaries who laboured in these sectors that this feature of life in Trinidad and Tobago has been solidly and indelibly rooted.

Electricity was first introduced in Trinidad and Tobago to light the streets of the capital city, Port of Spain. It was an initiative that was the brainchild of Edgar Tripp, an English immigrant whose entrepreneurial skills led him to venture into this form of commercial activity much to the amazement and consternation of the general populace.

It is recorded that the first evidence of the use of electrical power for other than street lighting and domestic purposes was for the making of ice.

This was through the formation of the Trinidad Electric Ice Manufacturing Company a sister company of the now defunct Trinidad Electric Company.



Leo Martin

Oil

The success of the oil exploration efforts by Merrimac did not fail to attract the attention of overseas investors. It is reported that commercial petroleum operations actually began in Trinidad in the year 1908. The result was that during the first half of the 20th century, several international oil companies sought and were granted exploration and refining licences. Included among them were Apex (Trinidad) Oilfields Ltd, Trinidad Leaseholds Ltd (TLL), United British Oilfields of Trinidad Ltd (UBOT), ESSO and in the latter years such companies as Shell, Texaco and Tesoro. In those days, each oil company owned its independent generation, transmission and distribution facilities and for the most part as a gesture of goodwill, extended supplies to the residents of neighbouring towns and villages at reasonable rates.

In earlier days, the Trinidad and Tobago economy was dominated by a very aggressive, successful and profitable agricultural sector that produced mainly cocoa, copra, coffee, citrus, bananas and sugar. Most of the agricultural plantations received their power supply from small, privately owned generating plants. The records show that up to the early 1950s the capacity of these privately owned and operated plants totalled about 52,000 kilowatts (kW) consisting of 275 prime movers and 123 power stations.

The influx of foreign-owned oil companies positioned Trinidad and Tobago as one of the leading oil refining countries worldwide. Combined with its experiences in the agricultural sector, this led to the country’s prominence as a reliable exporter of refined oil of the highest quality on the one hand and raw agricultural products of an equal standard on the other. Exports were principally to the United Kingdom and to a lesser degree to other British Commonwealth countries. It was not until the advent of the Trinidad and Tobago Electricity Commission (T&TEC) in 1946 that the transformation, development and sustainable growth of the industrial sector in the then colony began to accelerate.

It was from this period onwards that the development of the electricity supply sector in Trinidad and Tobago took a dramatic and historical turn. In that year, 1946, three major changes in the status of the electricity supply sector in the country took place. The first was that a new public sector electric utility was established; secondly, the new utility was charged by the government with the responsibility of being the sole authority for the generation, transmission and distribution of electricity throughout Trinidad and Tobago and thirdly, within the same edict, the government of the day took the legislative steps required to empower the new public sector electric utility to embark on an island-wide electrification programme. It was in fact this dramatic change in policy of the government that led to the establishment of T&TEC and at the same time saw the commencement of the dismantling of the Trinidad Electricity Board.

History records that it was from this point onwards that the country experienced significant advances in the expansion, growth and development of its generation, transmission and distribution systems, hand in hand with the growing industrialisation thrust and development within the country. ‘Trinidad and Tobago Inc’ was well and truly on its way.

For a short period after the government’s mandate, both the Port of Spain Corporation Electricity Board and the San Fernando Borough Council purchased electricity in bulk from T&TEC for distribution to their burgesses. In the case of the San Fernando Borough Council however this came to an end in 1952 when their small generating plant was bought by T&TEC, while the power purchase agreement with the Port of Spain Corporation came to an end in 1961. It was also in 1952 that the first public generating plant in Tobago was commissioned, accompanied by the inauguration of the first stage of the public distribution network in that island. In those days the charge for electricity on the ‘Sister Isle’ was based on the wattage of the bulbs in use and, in any event, domestic usage was by far the principal consumer of electricity in the island. The initial plant in Tobago had an installed capacity of 325kW and comprised three previously owned diesel-fired units.

Starting in 1946 with seven small generating units – with a total capacity of approximately 15 Megawatts (MW) and comprising a mix of diesel and steam plant – the newly created Trinidad and Tobago Electricity Commission generated a little over 33 million kilowatt hours (kWh) and achieved a maximum peak demand of about 7.5MW in its initial year.

These figures pale into insignificance when compared with the country’s current peak demand of over 1,200MW and the massive total of well over 7,000 Gigawatt hours (GWh) now generated by five interconnected power stations comprising 29 generating units and totalling an installed capacity of a little over 1,600MW. The units are made up of six in Port of Spain, five at Penal, twelve at Point Lisas and six in Tobago, together with the privately installed capacity on the island at the Trinity Power Station, Brechin Castle.

Prior to the 1950s, the oil companies generated their own power at Pointe-a-Pierre, Forest Reserve, Point Fortin and Santa Flora. Later, in response to their desire to take advantage of

cheaper electricity that was then becoming available from the public supply, the Commission met the challenge by building a power station at Penal in South Trinidad that was in close proximity to the oilfields.

Natural Gas

Among the positive attributes which led to the selection of the Penal site for the first T&TEC Power Station was that access to natural gas was not only in relatively easy reach but it was considered to be economically advantageous and environmentally friendlier for firing the boilers of the steam plants. It was an irresistibly attractive proposition when compared with the more expensive and environmentally unfriendly fuel oil.

It was in 1953 therefore that natural gas was first used to generate electricity. It was also the first time that a contract for supply of natural gas to a public sector electric company was executed. The contract with Shell Leaseholds Ltd for a 25-year supply of natural gas actually expired in the year 1975.

To transport the gas, a one and a half mile pipeline was laid connecting the Penal Power Station to UBOT’s Penal field. This link both symbolically and functionally dramatised the new synergy between oil, natural gas and electricity in the development and growth of the country’s economy.

Understandably, as the years progressed, demand for electricity spread to users in all spheres of domestic, commercial and industrial

Gas pipeline opening, 1964



Photograph courtesy of Peta Archive

activity. Contemporary records show that these included power for “constant temperature baths for killing plant viruses”, “floodlighting for tennis courts and gardens”, “electric pumps for irrigation”, “electric water heating in hotels”, “lighting for large bulk sugar storage buildings”, “electrification of sawmills, houses and small industries” and “electric crop drying”. Demand also expanded to include use for “grain dryers”, “rice and corn mills”, “coffee hullers”, “milking machines”, “tobacco drying”, “submersible pumps” and “air conditioning”. To meet this burgeoning demand, a new power station was constructed to replace the original one that the Commission had inherited in Port of Spain. Within a period of 10 years (1962 to 1972) a total of 260MW of plant was installed at the new Port of Spain Power Station and within a period of nine years (1953 to 1962) the capacity of Penal Power Station had already grown from a mere 5MW to 70MW.

The pattern of growth in demand for industrial and commercial use continued unabated at what could have been termed at that time, ‘normal’ levels. However, the 1970s heralded a period of unprecedented growth and the Commission was forced to accelerate its own generation plans, even though these were already considered to be aggressive. It was the start of the decade that witnessed the world being plunged into an oil crisis the likes of which, unwelcomed as it was in many countries around the world, paradoxically favoured the fortunes of Trinidad and Tobago.

With the price of oil having reached what was then considered the astronomical figure of some US\$40 per barrel, this country experienced unprecedented high levels of oil revenue inflows.

The Rolls Royce Unit at T&TEC's (now Powergen's) Port of Spain Power Station, 1984



To compound matters, the country had simultaneously made discoveries of substantial quantities of natural gas off the east coast of Trinidad.

This discovery of such large volumes of natural gas resulted in the country attracting an incessant increase in the number of additional overseas investors, made up mostly of those engaged in oil and gas exploration as well as others who wished to utilise natural gas as a feedstock for the manufacture of petrochemical products. Major international players included Amoco, British Petroleum, British Gas, Conoco, Elf, and more recently BHP Billiton, Chevron, Talisman, Petro-Canada, Kerr McGee, EOG Resources and Canadian Superior Energy.

New Power Station in Virgin Territory

Buoyed by the discoveries of natural gas in such enormous quantities, the Commission was faced with the almost overnight decision of the government to transform the economy from an agriculturally driven one, to one which would now be petrochemically based. One of the first major initiatives of the government in this regard was to establish a large petrochemical industrial estate at Point Lisas, half way between the existing plants at Port of Spain and Penal. It meant that the Commission was committed to building a new power station from the ground up on open, virgin territory covered only by vast acreages of sugarcane and wasteland. There was no kind of infrastructure in place or within easy reach whatsoever.

The industry which the government had decided to position at this new Point Lisas Industrial Estate to lead the transformation was a state-owned steel manufacturing plant which was named at that time the Iron and Steel Company of Trinidad and Tobago (ISCOTT). The Company has since changed hands and is now owned by the ArcelorMittal Group and has been renamed Caribbean ISPAT Ltd. Almost immediately thereafter industry followed industry with an almost nagging frequency.

The result was that within a period of 30 years, commencing from 1977, no less than 12 generating units with a total capacity of approximately 834MW were installed at the Point Lisas Power Station, principally aimed at supplying a wide range of energy based industries. These plants all demanded levels of sophistication in the quality of electricity supply unparalleled in the history of the country. Today the country provides supply of electricity to five ammonia plants, five methanol plants,

one liquefied natural gas (LNG) plant, one gas processing plant, one iron and steel plant, one cement manufacturing plant and several urea plants to name a few. An additional steel plant, Essar Steel, is due to come on stream in 2011 with a demand for 400MW.

Trinidad and Tobago has the distinction of housing the world's two largest methanol plants and is the leading exporter of both ammonia and methanol from a single site in the world today. The presence of this diverse range of highly sophisticated, energy-based industrial enterprises has established Trinidad and Tobago as one of the leading exporters of petrochemical products worldwide. For example, the Atlantic LNG plant located in the south of the country is reported to be the supplier of roughly 70 per cent of the LNG requirements of the USA.

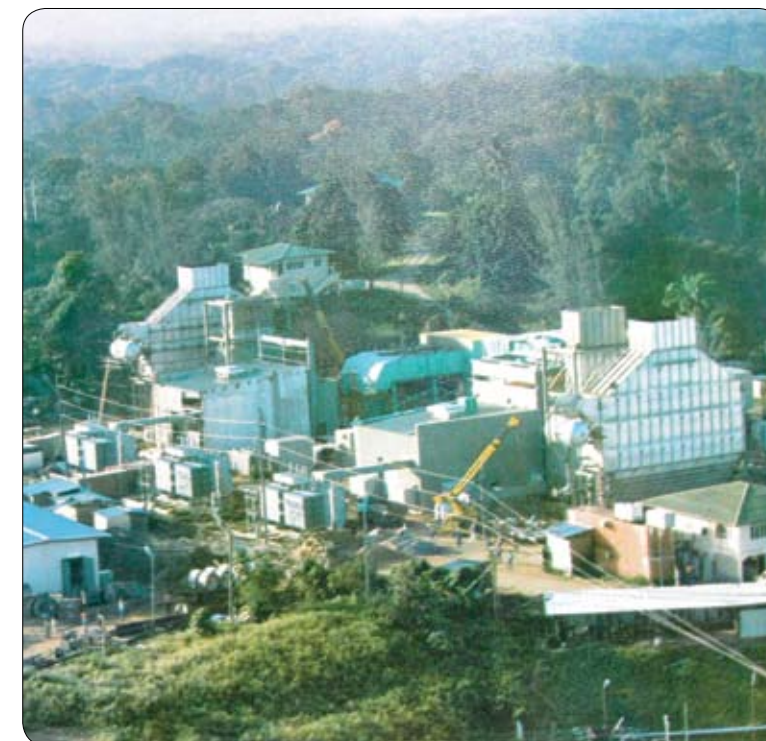
It should not be surprising therefore that within the short span of 30 years, since 1977, Trinidad and Tobago has become the largest producer of oil, gas and electricity in the Commonwealth Caribbean.

Not to be outdone, the non-energy based manufacturing sector continues to burst at the seams with plants that produce considerable quantities of rum, aromatic bitters and soft drinks, as well as agri-business and food products. In addition, numerous factories and commercial enterprises of varying dimensions span the landscape side by side in areas specially reserved for light manufacture. These include feed, rice and flour mills, chemical and pharmaceutical plants, cloth and clothing manufacturing, office and household furniture manufacturing, paper mills, bottled water and waste water treatment facilities. Added to these are the increasing demands from hotels, hospitals, sporting complexes, universities, colleges, elementary and secondary schools, and private and public sector multi-storey administration complexes. There is also a healthy and highly competitive telecommunications and mass media sector.

Toward the end of 1985, the country ventured into new generation technology when 186MW of Combined Cycle plant was installed at the Penal Power Station. This new plant replaced the original 70MW of steam turbines that were installed between 1953 and 1962. The introduction of this advanced technology enabled the Commission to take advantage of higher levels of fuel efficiency and consequently lower operational costs, much to the benefit of its customers. From a nationalistic standpoint it also assisted in the conservation of the country's energy resources.

T&TEC Pioneers Gas Transmission

Today, a 40-mile gas transmission pipeline built by T&TEC runs through the length of the country from the Penal Power Station in the south to the Port of Spain Power Station in the north,



Construction work in progress on the 196MW combined cycle plant at the Penal Power Station, 1983

branching off to supply fuel to Point Lisas Power Station and the Trinity Power Plant in the central part of the country.

It is not generally known that the National Gas Company, that is the government agency responsible for the transmission and distribution of natural gas in Trinidad and Tobago, originated within the walls of T&TEC. It was actually in the year 1963, when the decision was taken to build the North-South Gas Transmission Line, that the Commission had established its Gas Transmission Department. It was headed by Mr Knollys Ahloy, a local engineer. Ironically, when NGC was established in 1975, bringing to an end the T&TEC Gas Department, it was the same Knollys Ahloy who was appointed to start up the operations of the new company in the capacity of General Manager. All the records and personnel who were attached to the T&TEC Gas Department were in turn transferred to the newly established National Gas Company. This brought to an end T&TEC's 12 years as the pioneer in the natural gas supply business.

The year 1994 saw the divestment of T&TEC's generation assets to Powergen, a newly established company whose ownership structure at the time was led by T&TEC with a 51 per cent shareholding, followed by Southern Electric International with 39 per cent and Amoco with 10 per cent. On four occasions this ownership structure changed hands, with

T&TEC and the Government of Trinidad and Tobago retaining its majority shareholding. The remaining shares were distributed as follows: In 1998 BP Amoco replaced Amoco; In 2000 BP replaced BP Amoco; in 2001 The Mirant Corporation of the USA replaced Southern Electric International and in 2007 Marubeni Corporation replaced the Mirant Corporation.

Prior to Powergen coming on the scene, T&TEC's generation assets stood at 1188MW. T&TEC has, however, retained ownership of the standby generation facility in Tobago. During the first decade of the 21st century, Powergen has so far installed two additional generating plants, each of 104MW capacity, at the Point Lisas Power Station and plans are under way to add another 100MW of generating capacity in combined cycle mode. The already installed capacity of that power station at 834MW makes it the station with the highest installed capacity in the Commonwealth Caribbean.

Much of the credit for the development and growth of the electricity supply sector in the country has been attributed to those stalwarts who pioneered the sector, especially during the earlier years. Included among them was Kenneth Finch, the last of the expatriate General Managers. He was succeeded by a series of distinguished local General Managers starting with the late Karl Seheult followed by the late Leslie Dookie. Among this elite company, very special mention is always made of the unparalleled contribution and leadership role of George Ford who, like all those previously mentioned, rose through the ranks. He ended his career in the capacity of Deputy General Manager. Special tribute among the 'old guard' is always paid as well to John Woon Sam, former Deputy General Manager and Merlin Ramjohn, who retired in the position of Assistant General Manager, Administration. Of more recent vintage have been significant contributions from other local General Managers, such as Stanley Ottley (deceased) who presided over the divestment of T&TEC's generation assets in 1994, Denis Singh and Indarjit Singh, and the first local General Manager of Powergen, Garth Chatoor.

There is absolutely no doubt that the future growth of the industrial sector in Trinidad and Tobago hinges upon the confidence and assurance of a continuous supply of electricity in adequate quantities and in an efficient, reliable, safe and cost-effective manner.

Today the energy triad of the sector – T&TEC, Powergen and Trinity Power – are gearing themselves up to face the challenging opportunities that present themselves with the unprecedented demand which looms large on the horizon. And the competition is keen. Recent forecasts project that the demand for electricity will double over the next seven to eight years. This expectation is triggered by the imminent completion of the Essar Steel plant in Savonetta and a large-scale aluminium smelting plant earmarked for La Brea. Both these plants will represent very

large loads. Smaller yet significant loads, by normal standards, will also be demanded by e TecK's Tamana InTech Park, new entrants to the local petrochemical environment, the expansion of the Petrotrin's facilities as well as the government's plans to commission a number of desalination plants at strategic locations in the country. In addition, the Port of Spain Power Station, which is fast coming to the end of its useful economic life, is expected to be decommissioned and replaced by a modern, combined cycle plant, likely in the Sea Lots area. This plant will have to be commissioned in time to meet the steadily increasing industrial, commercial and domestic loads.

If all plans being initiated by the private and public sectors become reality, the forecast is that peak demand will exceed 2,500MW by the year 2016 and will therefore require an increase of over 1,400MW of base load plant prior to that date. Based on current calculations that include the need to maintain a comfortable amount of spinning reserve, it is forecast that the demand for additional plant will be in the vicinity of 2,000MW by 2016. Already under construction is a 48MW dual fuelled gas/diesel generating facility at Cove in Tobago where enhanced levels of tourism activity are currently being experienced. An undersea gas transmission pipeline extending from the east coast of Trinidad is being laid to provide the required fuel for this new Power Station. In addition, the Tobago House of Assembly is planning for the creation of a number of medium to large-scale industrial parks which will require loads way beyond the island's traditional expectations. Negotiations are well advanced by T&TEC in respect of the construction of a new power station to supply the aluminum smelter in La Brea as well the Essar Steel complex in Savonetta.

To meet the normal load growth, Powergen is preparing to add back-end steam turbines to two of its generating plants in Point Lisas to convert these units to operate under combined cycle mode. While all this development is taking place within the generation system, the national transmission grid is itself undergoing similar dramatic growth and rapid transformation to get the power from the power stations to the customers in the very large incremental quantities now being demanded. Soon the 132kV transmission system will be extended into the city of Port of Spain in the North and along the east-west corridor to Wallerfield in the East. This 132kV system will also be extended to what was previously considered to be remote areas in the south. Of notable significance as well is the fact that the first 220kV double circuit line in Trinidad is soon to be constructed.

This overview of the industrial landscape of Trinidad and Tobago, and the indispensable, interlocking role which electricity, oil and natural gas play in its development and growth augurs well for what seems to be very exciting times ahead for a country of such small size and insignificantly small population. When all is said and done it will be a difficult act to follow. □