THE PARTIAL UNBUNDLING OF THE ELECTRICITY SECTOR IN TRINIDAD AND TOBAGO

By C. Sharma* & G.S. Kochhar**

ABSTRACT

Trinidad and Tobago Electricity Commission (T&TEC) is 100% owned by the Government of Trinidad and Tobago. The Board of Directors is appointed by the Cabinet. The Chairman of the Board reports directly to the Minister of Public Utilities. T&TEC has the monopoly on the sale of electricity in the country. Other entities are allowed to generate for their own use or to sell to T&TEC but not to others.

In 1993, T&TEC concerned about impending shortages, sought approval from the Government to finance the addition of 200MW of generation plant. T&TEC was directed to seek a partner in the generation aspect of its operation. T&TEC did this by establishing a generation company, PowerGen, and divested 49% of the shareholding of PowerGen to SEI /AMOCO. PowerGen was awarded a power purchase agreement which obligates T&TEC to purchase specified capacity over a 15-year period.

This paper discusses the divestment of the generation aspect of T&TEC and analyses the effect on the future of the electricity sector. Conclusions are made about the existing T&D section and what are the options for the future. It also touches on the regulation issue and its effect on the solvency of T&TEC.

INTRODUCTION

Trinidad and Tobago, the southern-most country of the Caribbean chain is blessed with abundant reserves of natural gas. Proven reserves are 10.09 trillion cubic feet which, at the present rate of consumption would be sufficient for more than 35 years.

The electric utility in the country utilises natural gas as its preferred source of energy and this accounts for 27% of all natural gas consumed in the country. The utility has a force majeure Clause in its contract with the National Gas Company, so that in the event of a gas curtailment, the utility has the preference for the supply of gas. T&TEC has the sole authority to sell electricity in the country and has been providing this service since 1945.

Residential customers consume 28.1% of all energy produced whereas industrial and commercial customers utilise 61.9% and 10% respectively. Revenues earned through the sale of electricity for residential, industrial and commercial customers are 24.5%, 61.5% and 14% respectively. (See Figures 1 & 2).

The net energy produced in 1994 was 3345 x 10^6 kWh which gave a per capita consumption of 2715 kWh, one of the highest in the developing world. This is due to the high industrial base of the country where 71.9% of all electricity generated is consumed by the non-domestic consumers.

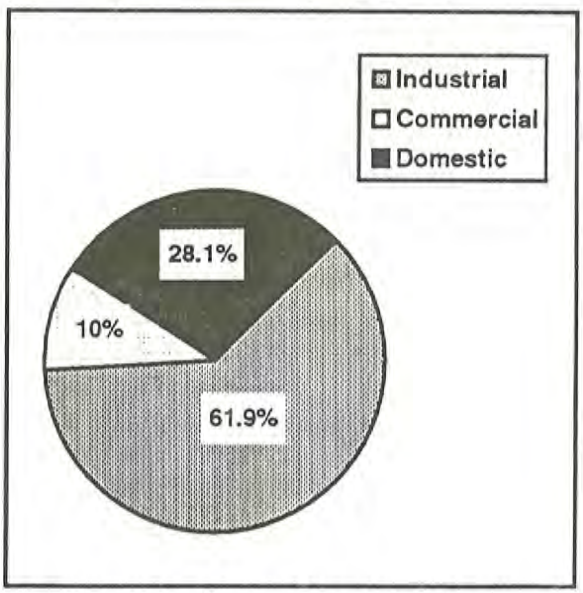


Figure 1: **Usage of Electricity (1994)**

* *Lecturer, Department of Electrical & Computer Engineering, The University of the West Indies (UWI)*

** *Dean of the Faculty of Engineering and Senior Lecturer, Dept. of Mechanical Engineering, UWI*

Pertinent discussion will be published in July 1996 West Indian Journal of Engineering if received by May, 1996.

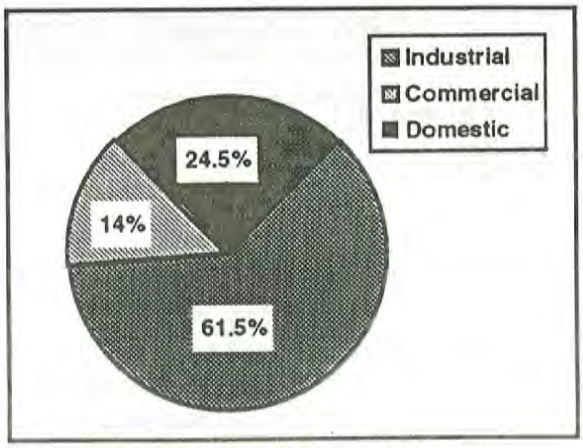


Figure 2: Revenue by Usage (1994)

3.0 FINANCIAL

T&TEC has been a perennial loss maker and up to December 1992 had accrued losses of TT$1.1 billion. In 1993, it made an after-tax profit of TT$7 million due largely to rate adjustments and reduction in operating expenses. The Government had been responsible for financing the operating deficit of the utility, its development programme and debt repayment.

Treasury funding peaked at TT$265.5 million in 1982. In 1984, the Government stopped funding the operating deficits and drastically reduced development expenditure. From 1984, total revenue exceeded operating expenses, but depreciation charges and interest payments turned these operating surpluses into losses. (See Table 1 for trend of exchange rates).

In 1993, $1.4 billion worth of government loans and advances were converted into equity as part of a restructuring exercise. By 1993, the public transfers to T&TEC were nil. Increasingly, recourse was made to debt financing to fund its operation. In 1982, the total debt outstanding was TT$78.5 million and by 1993, this had grown to TT$874.3 million. Trade credit formed a significant element of total debt, although increasing use was made of the local and foreign capital market. Outstanding debt to trade creditors was 42.8% of the total outstanding debt in 1993. Local and foreign debt made up 38.5% and 18.7% of the total respectively.

An investigation of the utility's cost structure reveals that over time, the cost of generation escalated faster than the other major categories of cost. This was due mainly to the devaluation of the TT dollar over this period. Whereas the major cost component of generation was spares; Transmission and Distribution's (T&D) was labour. T&D together with administrative expenses formed a decreasing share of total cost. The cost of generation rose from 38% (TT$ 48.8m) of total cost in 1980 to approximately 50% (TT$221.5m) in 1990. The cost of fuel and lubricants had also grown markedly. For the same period, the cost of fuel and lubricants which was 11.5% of total cost in 1980 increased to 20%.

Electricity tariffs in Trinidad and Tobago are amongst the lowest in the world. (See Table 2). The tariff levels for electricity are fixed by the Public Utilities Commission. The members of this body are appointed by the Government. Prior to 1991, the tariffs were at the 1984 levels. At about this time also (1983), the Government announced that *"T&TEC will be required as a matter of policy to ease reliance on the Exchequer by 1984"*. With a fixed tariff for seven years, the utility experienced severe financial losses. Arising out of an application made in 1989, an interim award of 8.5% increase and a final award of 26% increase were granted in November 1991 and October 1992 respectively. The current rates average at US$0.028/kWh for residential and industrial customers, and US$0.031/kWh for commercial customers.

Since the dramatic decrease in funding from the Government in 1984 and its total elimination in 1988, T&TEC had continued to operate in a precarious financial position that is compounded by the lack of a commercial rate increase since 1984. It was critical that its credit-rating be maintained with the various organisations with which it dealt. Since no new plants

YEAR	AVERAGE (TT$ to US$1)
87	3.6
88	3.82
89	4.25
90	4.25
91	4.25
92	4.25
93	5.7
94	5.8

Table 1: Rate of Exchange/US$

have been added since 1986, financial survival without Government guarantees has been accomplished by a dynamic prioritisation of payments.

4.0 FORECAST

The present forecasting technique used in T&TEC's planning department is a combination of econometric modelling for projecting energy sales for the domestic, commercial and light industrial users and the traditional trending - judgement method, (T&TEC History and Forecast 1994) for forecasting of energy sales for the heavy industrial users and the system's maximum demand. Finally, judgement is applied before the final forecast is produced.

The residential econometric energy model is made up of the following exogenous variables:-

(a) Non-petroleum GDP which was used as a proxy for personal disposable income.
(b) Nominal price of electricity.
(c) Number of customers.

Parameters (i) and (ii) were expressed in real terms using retail price index as a deflator.The following economic factors were considered in making projections of the exogenous variables:-

(i) Floating of the TT dollar.
(ii) Trade liberalisation.
(iii) Retrenchment (down sizing) in most companies.
(iv) Foreign debt commitment.
(v) Projected increase in gas and electricity rates from 1994 onwards.

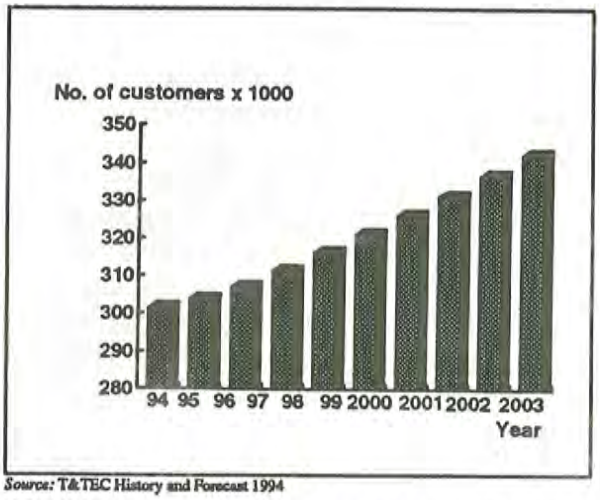
Since most of the aforementioned factors have only recently been implemented, it is difficult to ascertain the impact on the economic variables.

The approach of separating the heavy industrial customers from the rest of the system is satisfactory when one considers that these 13 customers, who consume approximately 1/3 of the total load, have accurate projections of their own growth. For the rest of the other consumers, a 1.5% growth rate in the short term is projected with this moving to a 3% growth in the long term. Any significant increase in load over the next ten years will be due to the energy-based sector (the heavy industrial customers). Figures 3 and 4 give these projections.

COUNTRY	AVERAGE RATE (US cents/kWh)
US Virgin	12.5
Jamaica	12.67
Barbados	14.17
Grenada	21.67
St. Vincent	23.0
Bermuda	23.5
St. Lucia	17.5
Cuba	7.49
Trinidad	3.1
Guyana	9.98
Suriname	15.83
Mexico	7.31
Venezuela	2.3
Panama	11.36
Argentina	17.08

Table 2: Comparison of 1994 Tariffs in the Caribbean

It should be noted also, that a proposed LNG complex for Trinidad would totally modify the whole forecasting if this project were to come on stream. This is expected to add a further 120 MW onto the maximum demand. If this project is realised, then the utility would not only have to invest in strengthening its T&D infrastructure but also new generation would be



Source: T&TEC History and Forecast 1994

Figure 3: Forecast of Electricity Customers in Trinidad and Tobago

required, just to facilitate this complex. There is some discussion that the complex would supply its own power, selling excess to T&TEC. An Independent Power Producer (IPP) is also being considered. Whatever the method, this project will totally change the power sector's composition in Trinidad and Tobago. As a normal planning exercise, forecasting is done by a utility every five years. In 1991, T&TEC performed one such study so as to forecast the expected generation required up to the year 2010. The criterion utilised was that the required LOLE (Loss of Load Expectation) should be less than 12 hours/year, while maintaining a minimum spinning reserve of 100MW.

Based on the results of the economic analysis, the least cost alternative was the installation of a 150-200MW combined cycle plant of unit sizes 75 to 100MW during the years 1993 and 1995. It was decided that the proposed plant should be sited at Point Lisas and was estimated to cost between US$86.2M and US$120M. When this was submitted to the Cabinet for approval, the Government took the decision that funding must be without Government guarantees and hence a decision was taken for the divestment of the generation arm of the utility.

5.0 DIVESTMENT

In February 1993, T&TEC placed a proposal for generation expansion to the Standing Committee on Energy for Government's approval. The capital cost of the project was estimated at between US$86.2m and US$120m. The proposal was then referred to a Technical Task force so that the various options which were available could be reviewed and recommendations made to Cabinet. Because of the magnitude of the projected cost and the Government's aversion to underwrite future projects, the Government took a decision to divest the generation arm of T&TEC. With the help from IFC, an Information Memorandum and a Request For Proposal (RFP) were prepared for international bidding. In order that the peculiar consumption pattern of the country be taken in to account by the bidders, it was decided that among the other engineering concerns to be considered were:-

(1) The three stations must be tendered for as a package and

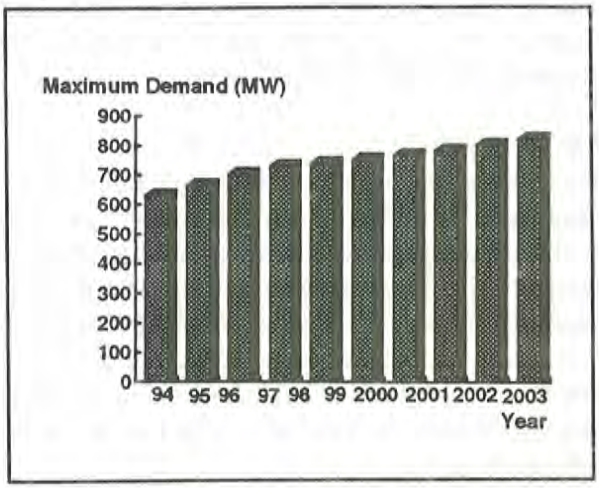


Figure 4: Forecast of Maximum Electricity Demand in Trinidad and Tobago

(2) There should be minimum generation output of 80MW, 200MW and 80MW from the Port of Spain, Point Lisas and Penal stations respectively.

In order to *"level the playing field"*, fuel (natural gas) for the operation was given as a pass through. This was because T&TEC wanted to ensure that none of the existing producers of natural gas in Trinidad would have any unfair advantage in their pricing structure, if they chose to tender for the generation assets. This meant that T&TEC would purchase all the natural gas requirements and then supply it at no cost to the investor. However, there is a penalty/bonus clause for the efficient utilisation of natural gas via a BTU to kWH conversion formula.

Documents were issued to 52 interested firms for pre-qualification. Black and Veatch were retained as Engineering Consultants to assist in the establishment of data rooms and the development of an evaluation model for the exercise. Black and Veatch were also asked to independently evaluate the proposal made by the Oil Fields Workers Trade Union (OWTU). Fifteen firms submitted data for assessment. In order to eliminate nuisance bids, any firm wishing to participate had to pay a fee of US$10,000 for the RFP document. Eleven requests were obtained, of which six submitted proposals. These were:-

1. Duke Energy Corporation and Tenneco Gas.
2. CMS Generation Company and NRG Energy Incorporated.
3. AES Americas Incorporation.
4. Enron Development Corporation.
5. Dominion Energy Incorporated.
6. SEI and AMOCO Business Development Company.

The proposal as set out by the partnership of Southern Electric International (SEI) and American Oil Company (AMOCO) was evaluated as the preferred tenderer. At the same time, legislation had to be enacted for the modification of the Electricity Act so that private companies would be able to legally generate and sell electricity to T&TEC. The control of generation, transmission and distribution of electricity in the country is controlled by the Electricity Act. The Electricity Act had given T&TEC the monopoly for the generation, transmission and distribution of electricity in the country.

After nine months of gruelling negotiations, the divestment contract was signed and the agreed sum was transferred on 23rd December 1994. The company formed, PowerGen, acquired the total existing generation assets and personnel of the generation arm of T&TEC (Tobago excluded). An agreement was made that no reduction of staffing would be instituted within two (2) years. T&TEC holds 51% of the share capital of PowerGen, SEI 39% and AMOCO 10%. The Board comprises of five "A" directors and four "B" directors. The "A" directors are appointed by T&TEC, one of whom would be the Chairman. The four "B" directors are appointed by the foreign partners. Day-to-day operation of the company is handled by a management committee which comprises of three "A" directors and three "B" directors. One of the "B" directors is the Chairman of the management committee and he has veto powers.

T&TEC has agreed via a 15-year Power Purchase Agreement to purchase electrical energy from PowerGen. T&TEC pays for power under two Clauses. The more onerous is the contracted capacity which starts at 745MW in 1994 and levels off to 819MW in 1998 and every year thereafter. This Clause is on a take or pay basis. The other Clause is for payment for actual energy taken. Both Clauses have a cost escalation factor which is linked to the change in the US consumer price index.

6.0 POST DIVESTMENT

PowerGen has three generating stations in Trinidad: Port of Spain, Point Lisas and Penal. (See Table 3). These facilities are located roughly to the north, centre and south sections of the island respectively. Tobago has a diesel-stand by facility (11MW) and is fed via two undersea 33kV cables from Trinidad. However, this diesel facility is still owned by T&TEC. All three generating stations in Trinidad are interconnected via 132 kV overhead lines.

T&TEC is presently responsible only for the transmission and distribution of electricity in the country and has a supply contract with PowerGen which at present provides all the electrical

A

CAPACITY BY SITE	
Port of Spain	308 MW
Point Lisas	634 MW
Penal	236 MW
Tobago	11 MW
TOTAL	1,189 MW

B

CAPACITY BY TYPE	
Steam	260 MW
Gas Turbine	722 MW
Combined Cycle	196 MW
Diesel	11 MW
TOTAL	1,189 MW

Table 3: Installed Capacity of Electric Utility (1994)

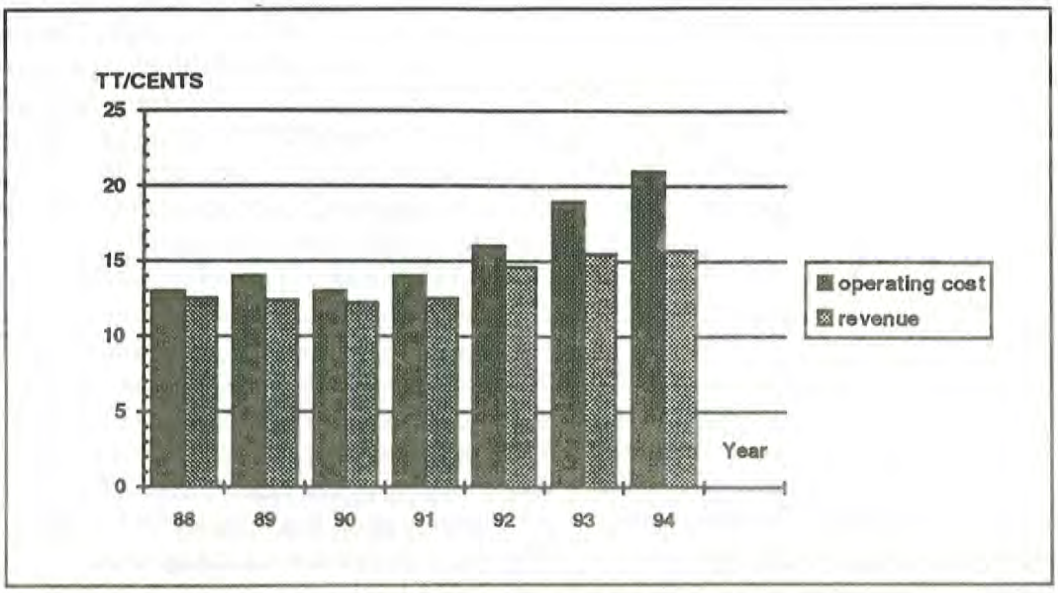


Figure 5: Trend per Kwh Sold

energy required by the country. Additional plants would be added in a competitive manner, making way for the establishment of IPPs. Any new IPP that is established would have to sell all energy to T&TEC which has the monopoly on the transmission and distribution of electrical energy in the country.

T&TEC is still operating at a loss (see **Figure 5**) and plans are afoot to request an adjustment of the tariffs. It is estimated that an increase of at least 35% is required if the organisation is to be placed on a sound footing. However with the PUC still controlling rate increases, it is difficult to envision a solvent T&TEC in the near future. With rates having been kept artificially low for so long, it is now necessary for the PUC to grant a substantial increase if the utility is not to become financially insolvent in the very near future. If this is not done, then the very same concern of the Government for funding the utility would have to be implemented.

With the divestment of the generation aspect, any new generation would be done via competitive bidding from PowerGen or any IPP. However, PowerGen has claimed that it can supply the required growth with 100MW spinning reserve up to 1998 from within the existing 1178 MW installed in Trinidad. This, they claim can be done through a mixture of refurbishment and repairs of the existing installed plant.

With the new arrangement, any further expansion of generation in the country can be done via two routes, that is, either PowerGen funds the installation (of which 51% of the cost is to T&TEC) or the installation would be on the basis of competitive bidding (the preferred method) via IPPs. This has opened up a new era of electricity generation in Trinidad and Tobago and it is too early to judge whether the method would redound to the benefit of the country.

However, this new mode of operation has literally placed T&TEC in an unenviable position. T&TEC has a 15-year contract to purchase power from PowerGen at a rate which is predetermined but at the same time cannot adjust its rate because the PUC has control of the rate setting mechanism.

With the modification of the Electricity Act (the generation, transmission and distribution of electricity in the country is controlled by the Electricity Act) as a pre-requirement for the divestment of T&TEC's generation arm to PowerGen, the way is now clear for other producers to come on stream. However, T&TEC still holds the monopoly for the transmission and distribution of electricity in the country, that is, all electricity produced for commercial use must be sold to T&TEC.

7.0 CONCLUSION

Forty-nine percent of the generation aspect of T&TEC has been divested to a partnership of SEI/AMOCO. The new partner has stated that they would defer generation expansion through an overall improvement in the power plant availability due to:

- SEI/AMOCO's ability to acquire essential spares in a timely manner thereby improving productivity levels and reducing plant down time and
- Through the immediate injection of cash to rehabilitate existing equipment.

In addition, the SEI/AMOCO partnership has projected that the plant's availability would be increased to 85-90% due to the above mentioned measures. Within the constraints that T&TEC was working, 75% plant availability was considered as feasible. With the hiving off of the generation aspect, it is imperative that for the survival of the T&D (the new T&TEC), addressing the following becomes critical:-

1. It is imperative for the survival of T&TEC that an economic rate adjustment be implemented immediately.
2. The PUC should be reorganised as an autonomous body so that rate setting could be timely, reflecting the true economics of supplying electricity.
3. The distribution function (T&TEC presently) should be completely reorganised so that many of its present functions (meter-reading, maintenance, disconnections and connections, trouble reports etc.) may be contracted out.
4. The present Agreement with the workers' union should be renegotiated so that realistic crew sizes and cross-crafting of employees can be utilised.

8.0 REFERENCES

1. T&TEC History and Forecast 1994. Internal Document.
2. T&TEC Request for Proposal Information Document, 1994. Internal Document.
3. CARILEC 1993 Survey. Published by CARILEC, Castries, Saint Lucia.
4. Summary Report on Equity Participation in the Generating Assets of T&TEC in Trinidad. Internal Document.■