

**INSTITUTION BUILDING IN THE ENERGY SECTOR OF AFRICA:
A CASE STUDY OF THE GHANA POWER SECTOR REFORM PROGRAMME**

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**Presented at the 6th Session of the Africa Regional Conference on Mineral and
Energy Resources Development and Utilisation, Accra, 14 - 23 November, 1995**

1. INTRODUCTION

Institutional rigidities and inconsistencies and structural barriers have in the past posed and continue to pose as major challenges in the rapid development of the energy sector of most countries and especially the developing countries. The Ghana energy sector has responded to these institutional challenges as they have come. The genesis of a formal institutionalisation of the energy sector of Ghana began with the establishment of a Ministry of Fuel Power in 1978 in reaction to the global energy crisis of the late 1970s and early 1980s. Since then the energy sector has undergone innovative institutional changes.

In 1982 the National Energy Board (NEB) Law (PNDC Law 64) was enacted. The NEB was given the mandate for policy formulation and planning in the energy sector and in fact, the formation of the Board began the rapid institutional development of the energy sector. The most innovative feature of the NEB was the establishment of an Energy Fund to provide funding support for the Board. The Energy Fund is serviced from levies on energy products (petroleum products and electricity).

Immediately following the NEB, the Ghana National Petroleum Corporation (GNPC) was established in 1984 to oversee the development and exploitation of the country's petroleum resources.

In 1987 a second electricity distribution company, the Northern Electricity Department, was established to take over the distribution role and assets of the Electricity Corporation of Ghana in the northern half of the country. This move was to improve the delivery of electricity services and also enhance the electrification of the northern parts of the country.

In 1993, the Parliament enacted the Statutory Corporations (Conversion to Companies) Act 461 which established the basis for converting about 35 state-owned companies into public limited liability companies. The companies include, Ghana Oil Company (GOIL) a state-owned oil marketing company, Ghana National Petroleum Company (GNPC), and the Electricity Corporation of Ghana (ECG). The Act 461 was enacted as a core element of the Government's strategy to encourage private sector participation and investment, reduce direct government control of operations, improve efficiency, and reduce government expenditures in several spheres of economic activity, including electricity services.

In line with streamlining the institutional arrangements in the energy sector with the view to enhancing the private sector involvement in infrastructure development in the country, Government has recently initiated a process of restructuring the power sector of the country.

This document discusses the background, issues, options and proposals for institutional restructuring of the power sector of Ghana.

Power Sector Restructuring : Overview

There is currently a wave of power sector reforms sweeping across the globe in the wake of economic liberalisation and privatisation philosophy of the last two decades. The World Bank, as a matter of policy, has also been very instrumental in pushing for reforms in the power sector of many countries. This push has been precipitated by the dwindling financing resources available for the huge demand of development projects world wide. The current policy of the Bank therefore supports the increased participation of private sector investment in infrastructure development. This is also in consonance with the Ghana Government's macro policy, under the Structural Adjustment Programme (SAP), of making the private sector "the engine of growth".

In line with this policy, the World Bank, under its financing arrangement with the Government of Ghana for the new Thermal Power Project at Takoradi, requested for reforms in the Ghana power sector to enhance private sector participation. Following this request, the Government set up a **Power Sector Reform Committee (PSRC)** to coordinate the formulation and implementation of the reform programme in the country. The Ministry of Energy and Mines further engaged the services of a consultant to study the opportunities for reforming the Ghana power sector. **The consultants (SYNEX of Santiago, Chile) concluded their study in June 1994** in which they proposed a new power market for the country. Following the submission of the report, the Power Reform Committee formulated an action plan for continuing with the implementation of the reform programme.

Reforms of similar nature and scope are being implemented to varying degrees and with varying successes in countries such as Chile, United Kingdom, Norway, Argentina, Ireland Jamaica, and in Africa Cote D'Ivoire has recently turned over electricity generation to a private monopoly generator while Zambia is in the process of experimenting with private Independent Power Generators.

Motivation for Reform

Motivations for power sector reforms in Ghana and most other countries have been precipitated by similar factors. These factors are summarised in a study conducted by the Latin America and the Caribbean Technical Department of the World Bank on "Reforms and Private Participation in the Power Sector of selected Latin American and Caribbean and Industrialised Countries", which concluded that the motivation for reforms in the Latin America and Caribbean countries have been driven by the following reasons:

- i). Ineffective operation of the existing electric system, with subsequent power shortages and high costs associated with back-up power sources causing overall productivity losses to the economy, actual or potential construction of economic growth, and inadequate levels of public service coverage;
- ii) Overwhelming debt burdens for the public sector associated with the power sector's previous development and/or future expansion requirements;

- iii) General government strategy of privatising public sector enterprises to reduce its involvement in commercial activities;
- iv) Supply-side preferences and under-utilised energy conservation practices which contributed to sub-optimal investment options, over-consumption of energy, excessive price increases or environmental impacts.

2. **EXISTING INSTITUTIONAL FRAMEWORK OF THE GHANA POWER SECTOR**

Organisations of the Power sector

There are three main institutions involved in the administration of the power sector of Ghana. A fourth institution, the Northern Electricity Department is a subsidiary of one of the main organisations. All these institutions are public institutions. The nature and operations of the institutions are discussed below.

The policy-making authority for electricity is the **Ministry of Energy and Mines**. In discharging its responsibility for establishing and monitoring the implementation of overall policy in the electricity sub - sector it is assisted by a Technical Wing. The Ministry is supported by two parastatal organisations, the Volta river Authority (VRA) and the Electricity Corporation of Ghana (ECG).

The Ministry of Mines and Energy is headed by a Minister of Energy and Mines, which is of Cabinet Rank. The Minister is assisted by a two Deputy Ministers -one responsible for Energy and the other overseeing the mining sector.

The Technical Department of the MEM comprises staff of the former Secretariat of the National Energy Board (suspended by the PNDC Government in March 1991). The Energy Sector staff of the MEM includes the Director of Power, who supervises and coordinates the implementation of the MEM's Power Development Programme including the National Electrification Scheme (NES) of extending the national electricity grid to unelectrified areas and also the development of hydropower prospects in the other major river basins (i.e., the Western Rivers)..

The **Volta River Authority (VRA)** was established in 1961 (Volta River Development Act 46) and is responsible for electric power generation, transmission and sales in bulk. The core mandates include the development and operation of hydropower generating facilities on the Volta River, and the transmission of electricity from such plants to sell in bulk to any government department and public corporation, including power utilities in the neighbouring countries. Besides operating the Akosombo and Kpong hydro stations, they are also responsible for developing other potential hydro sites along the Volta River. VRA also owns and operates the national transmission lines.

The management of VRA are overseen by a Board of Directors of VRA elected by Government. VRA's capital structure comprises of (1) Equity (81.6%), (2) Long-term Debt (17.3%) Deferred Liability (1.1%). The equity portion is made up of Government (0.1%), retained earnings (11.2%) and asset revaluation and other reserves (88.7%).

The **Electricity Corporation of Ghana** was created in 1963 to take over the assets and functions of the former Electricity Division of the Public Works Department. Currently, ECG retains the obligation to supply electricity to all parts of the country, excepting certain specified consumers in the northern zone (i.e., Brong Ahafo, Northern, Upper West, and Upper East regions) which are supplied by the VRA's NED.

ECG is governed by a Board of Directors, appointed by Government, which is responsible for formulating policy. ECG's Managing Director and the Chief Executive of VRA, are members of the Board.

Under the provisions of the Statutory Corporations (Conversion to Companies) Act, 1993 (Act 461), which was enacted recently the Government has decided to convert ECG into a limited liability company. Accordingly ECG will shortly be converted into the **Electricity Company of Ghana Ltd. (ECG PLC)** that would continue to purchase power in bulk from VRA and distribute/retail electricity under licence to all consumers in the franchised markets of the southern electricity supply zone of Ghana.

In 1987, the Act 46 of VRA was amended to extend the authority's mandate to distribute electricity in northern Ghana. A semi autonomous unit, the **Northern Electricity Department (NED)**, has been established within VRA to manage the Northern Grid Extension project and to undertake the distribution of electricity to the final consumers in the Northern Region of the country.

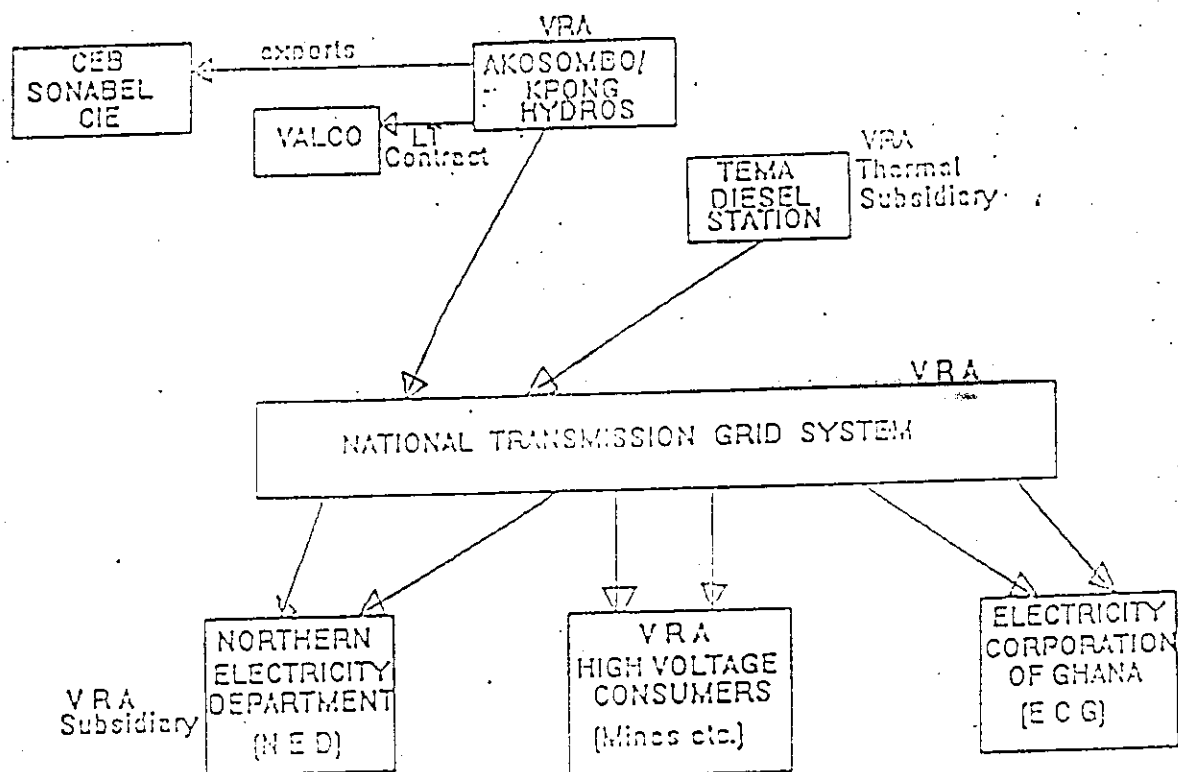
Overview of Existing Power Market

The principal markets for bulk electricity supply in Ghana are the: (i) 324,000 consumers in the southern sector that are supplied by the Electricity Corporation of Ghana, 67% of which are concentrated in the cities of Accra, Kumasi, and Tema; (ii) 30,000 consumers that are supplied by VRA's NED in the northern sector; (iii) the VALCO Aluminium Smelter; (iv) several large mining and industrial consumers that are supplied directly from the transmission grid; and (v) the exports to the power utilities in neighbouring countries (CIE in Cote d'Ivoire, CEB in Togo/Benin, and SONABEL in Burkina Faso). Figure 1 shows the structure of the existing electricity market in Ghana.

VALCO is the largest consumer (about 45.5% of total generation in 1993) and also contributes equally the largest proportion of VRA's revenue followed by domestic consumers whose contribution to revenue is smaller than their share of consumption.

The agreements with major mining companies cover the supply of electricity at specified voltages between 6.6KV and 55KV to meet each company's entire demand for electricity. The

Fig. 1 Existing Structure of the Ghana ESI



mining companies are permitted to use standby generating plant during periods when the VRA supply is interrupted due to breakdown or maintenance of plant.

Interconnection - Exports and Imports

Ghana's power system is connected with La Cote D'Ivoire (CIE) and Togo/Benin (CEB). The interconnection between Ghana and Togo is provided by a double circuit 161 kV line while a 225 kV line connects Ghana (Prestia) and La Cote D'Ivoire. The Ghana - Cote D'Ivoire line is capable of supplying a demand of 100MW and has been in operation since 1983. Future plans include a 225 kV line to interconnect the grid at Bolgatanga to Ouagadugu (SONABEL of Burkina Faso).

The export of power to CIE and CEB has constituted a very important source of revenue for the Electricity Supply Industry of Ghana. The average export tariffs are about five times the domestic bulk tariffs and constituted about 19.3 per cent of the total revenue of the Ghana ESI in 1993. Inter-connection in the African region would definitely enhance reforms on the continent.

Access to Electricity

It is estimated that about 35 percent of the population in Ghana has access to electricity. There are over 400,000 customers in the Ghana ESI made up of (1) residential, (2) non-residential and (3) industrial. VRA has 8 industrial (HV) customers while about 78 per cent of ECGs customers are classified as residential with 21 percent and 1 percent classified as non-residential and industrial respectively.

National Electrification Scheme

Since 1989 the Government has embarked on an ambitious programme to electrify the whole country by the year 2020. This has resulted in the electrification of over 200 towns and rural communities since 1989. The NES has two main programmes (1) District Capitals Electrification Programme (DCEP) (2) Self-Help Electrification (SHEP). Under the DCEP the target is to extend the grid to all the 110 district administrative capitals while the SHEP is targeted at electrifying village and towns within 20 km of the national grid. Under the SHEP, prospective villages and towns are required to make material contribution (poles and labour) towards electrification.

Growing Demand and Constraints in Energy Supply

Domestic consumption of electricity has seen substantial growth in the last few years. At the national level annual growth reached 13 percent in 1993 with stronger growth in the southern sector (ECG mandate area) of 16.3 percent and a rate of 11 percent in the northern sector (NED mandate area). The high growth in consumption have serious implication for investment in the power sector.

Electricity Pricing

Electricity prices charged by the utilities are regulated through the Ministry of Energy and Mines. Tariffs are set on the basis of cost-plus which allows the utilities to earn 8% rate of return on average net fixed assets employed by the utilities. This pricing arrangement is believed to breed inefficiencies as all the costs, whether appropriate or not, of the utilities are taken on board in the tariffs.

The above description shows that the existing institutional arrangement of the power sector of Ghana is monopolistic (public), heavily regulated and economically inefficient in view of the pricing mechanism that is used.

3. KEY ELEMENTS OF GHANA'S POWER SECTOR REFORM PROGRAMME

The strategic objectives underpinning the Government of Ghana power sector restructuring initiative are:

- (i) enhancing more effective commercialization of the operations of the existing power utilities;
- (ii) effecting structural changes that would move the power sector away from the existing monopolistic and centralized structure (i.e., for the planning and operation of the power system) towards a more decentralized structure that would expose the public utilities to competition in both the generation and distribution of electricity;
- (iii) encouraging private sector investment in the power sector through the establishment of independent power production schemes, and the provision of an "open access grid" to facilitate direct electricity sales by Independent Power Producers to consumers;
- (iv) reducing the extent to which the Government is called upon to apply public investment resources to provide sovereign guarantee to cover the debt contracted by the public monopoly utilities for power generation projects, and thereby targeting the application of sovereign guarantees to address non-commercial (country specific) risks; and
- (v) establishing a regulatory framework that is transparent and enables healthy competition to occur in the sector.

In practice the four businesses of generation, transmission, distribution and supply would be separated viz:

- i) generation will be open to competition

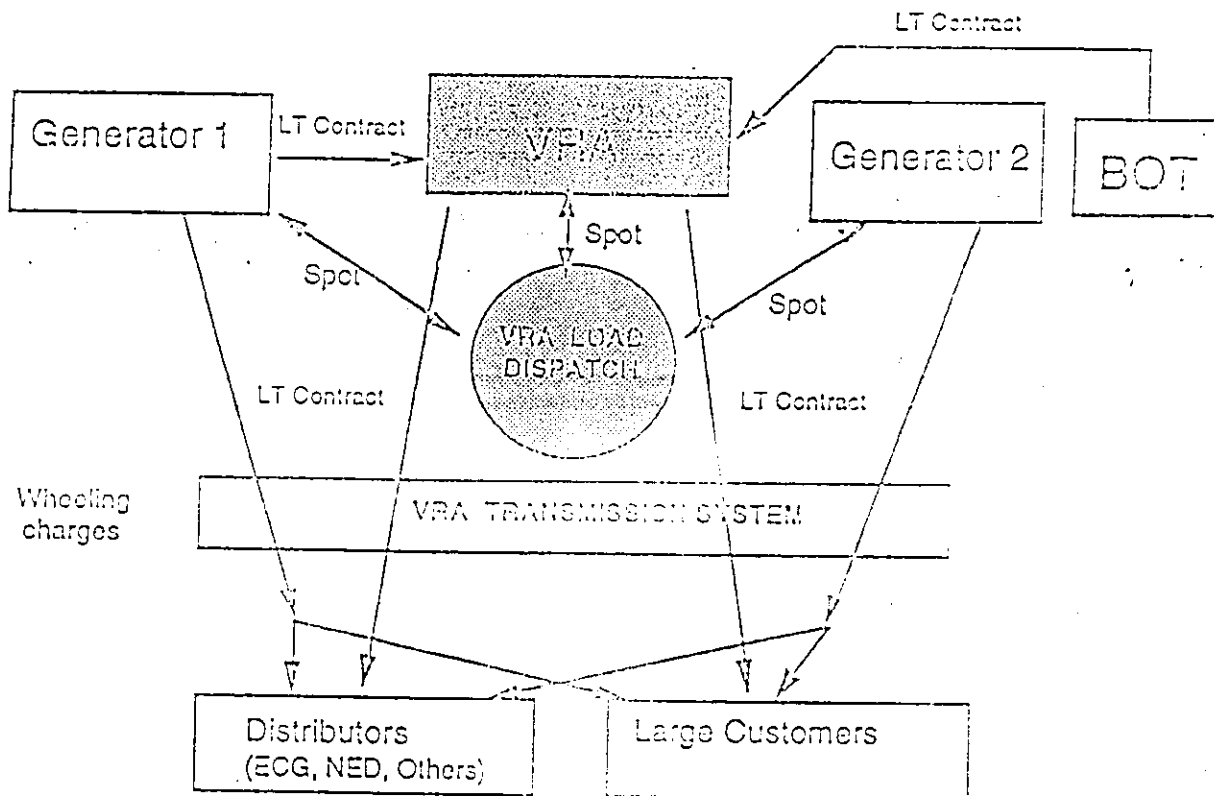
- ii) transmission would be "open access" to third party but regulated;
- iii) distribution would ultimately subject to third party but regulated;
- iv) supply would be open to competition for service above a certain franchise level but with tariffs under the purview of the regulator.

Within the context of these strategic objectives, the following guidelines form the basis for the institutional re-structuring of the power sector in Ghana:

- (i) The generation of electricity would be undertaken freely by private investment;
- (ii) The Volta River Authority (VRA) would compete as a generator and would not be privatised;
- (iii) Electric power generators can sell power to distribution enterprises, major consumers, intermediaries, or the system;
- (iv) The transmission functions of the whole system would be "open access" to be managed by a subsidiary company of VRA (as a Public Limited Liability Company);
- (v) At the distribution level, ECG would be established as a Holding Company with autonomous Regional Distribution Companies. Consumer cooperative group with consumption over a certain demand could be provided with concession to distribute power for its consumers;
- (vi) An autonomous Regulatory Agency would oversee the regulatory regime of the whole power sector operations;
- (vii) Tariffs for public electricity would be based on a transparent formulae for economically justified methodology to be defined by law; and
- (viii) Generation and distribution activities could be integrated by one company under certain regulations.

Figure 2 shows the proposed Ghana Electric Power Market under the reform programme. The key aspects of the proposed market are discussed below. The discussions are based on following five key headings: (i) industry structure, (ii) ownership, (iii) system operation and commercial relationship (iv) pricing system (v) regulatory framework (vi) system planning, (vi) Grid Extension and Rural Electrification. In discussing the proposed structure, experiences of some countries which have carried out power sector reforms have been reviewed for purposes of comparison.

Fig. 2 Proposed Structure of Ghana ESI Under Reform Programme



Power Industry Structure

A wide spectrum of alternative structures can be established for the power industry. The options span from highly vertically integrated national monopolies to highly competitive, decentralised, deconcentrated, deregulated system. The highly competitive and decentralised option or model is considered the radical end-point of a spectrum of increasing competition within the industry. In between these two extreme cases are several other modifications, usually set up to suit the socio-economic and political environment of a country. It is also important to note that the variations could all be considered as transitory to achieving the highly competitive model.

What is considered as the highly competitive, decentralised and deregulated model has been adopted in the UK where horizontally desegregated generators bid to supply electricity to a common pool, and the price of the pool is set to clear the market. A single transmission company (owned by independent regional electricity companies) then sells the pooled electricity to suppliers at prices which reflect the pooled generation price plus differential transmission costs. Suppliers (which include both generating and distribution companies) then compete to sell the electricity to final customers. The independent regional electricity companies are regulated, private, local distribution monopolies. The regionally-based distribution companies do not have a monopoly of supply, but must make their grids available to any licensed supplier at published common carriage tariffs. The major problems with this structure are that it requires an extremely complex legal and regulatory framework and the administration of the system needs considerable investment in information systems and customer metering.

The power structure in Chile, which started its reform programme in the early 1980s much earlier than the reforms in the UK, is composed of generation/transmission enterprises and distribution companies. The transmission grid is owned by different generation companies; the dispatch of the system is entrusted to a central dispatch centre in charge of operations planning and clearing transactions between generation enterprises. Distribution in Chile is entrusted to regional regulated enterprises, all of which are private investor-owned utilities.

The proposed Ghana Power Industry structure is similar in a number of respects to what pertains in the Chilean power sector.

Proposal 1: Ownership Structure

It is envisaged, in the Ghanaian system, that the state-owned VRA would continue to maintain its ownership structure except that its generation facilities outside the hydro dams (eg Takoradi Thermal Power Project) and transmission system would be treated as subsidiaries each with its own management, accounting, financial and administrative resources. ECG would assume the nature of a Public Limited Liability Company with Government retaining some minority shares in the company. The Government would also maintain minority ownership in the new transmission company if it is established as a subsidiary of VRA as envisaged. Eventually, the transmission company could be made a public limited liability company with Government

holding minority shares.

The cases of Chile and UK present similar aspects, having evolved relatively recently from totally state-owned, predominantly vertically integrated structures to a decentralized and privatised structure. In the UK system there subsists a state-owned enterprise with the nuclear generation assets; its privatization has not been envisaged in the near future.

The Chilean electricity industry was restructured and privatized in an ongoing process that started around 1980. The UK case is more recent and there is still a significant state presence in the industry as the owner of the nuclear-based plants which, due to their cost, were not privatized.

The main lessons to be learned from the point of view of property are that a wide spectrum of choices are available, and that an active government role in the sector is vital.

Proposal 2: System Operations and Commercial Relationships

The Ghanaian power system would consist of a two tier market: (1) Long-term market and (2) Short-term market. The long-term market would be an unregulated market in which generators agree on contracts to supply distributing companies and certain large clients (those whose capacity requirements are over a pre-determined demand). Transaction prices would be determined freely (negotiated) between generators and customers. Other Independent Generators may also supply power to VRA under long-term contracts based on Power Purchase Agreements between them.

The short-term market would serve as a spot market in which generators can sell power. An Economic Load Dispatch Centre (ELDC) would serve as the "nerve centre" of the short-term market. The ELDC, in addition to serving as the short-term spot market, would also be responsible for coordination and dispatch of power in the whole system, including power supply transacted in the long-term market. The goal of an ELDC is to coordinate the interconnected operation of plants and transmission systems owned by various entities, with a view to achieving an efficient and safe operation. The basic objectives which are to be met by the ELDC are the following:

- i) To preserve the electricity system's reliability;
- ii) To guarantee the operation, at a minimum cost, of the systems's generating/transmission installations;
- iii) To facilitate the shared use of the transmission systems by the various generating entities, through the payment of the tolls necessary to cover the cost of those systems;
- iv) To invoice the electricity transfers amongst generating companies according to the system's marginal costs

The ELDC would plan the electricity system's operation in the long term (5 to 10 years), medium term (1 to 2 years), short term (few weeks or months) and programme the daily operation. It would also estimate marginal costs derived from planning and programming the system's operation and determine and value electricity transfers among the companies.

It is proposed that the management of the ELDC would be made up of representatives of all generators, distributors and the operators of the transmission grid. Dispatch of power from the short-term market transactions would be based on least-cost economic dispatch criteria ie SRMC of the whole system.

The transmission system would be "open access" under a **National Transmission Grid Company** which initially would be a subsidiary of VRA with separate management and cost centre. The National Transmission Grid Company would draw its revenue from tolls from wheeling power on behalf of the ELDC and other clients. The wheeling tolls will be based on investment, operating and maintenance costs of the transmission system.

At the distribution level, it is proposed that ECG would be transformed into a Holding Company made up of autonomous **Regional Distribution Companies**. Ultimately, consumers could form **distribution cooperatives** which would be free to purchase power from generators of their choice or enter into supply transactions in the short-term market. Hence the regionally-based distribution companies of ECG and NED would not have a monopoly of supply. In the transition period, however, the distribution companies would retain monopoly over supply to smaller consumers.

The proposed system operation and commercial relationship is similar to the Chilean model. A distinct feature of the Chilean system is that the distribution companies assure their supply through long term contracts and do not have access to short term transactions. In Chile there is no national transmission grid company as a distinct operating enterprise: the transmission system is owned by the generators who charge a fee to other generators who use their lines.

The operation in UK is in many ways similar to that of Chile: distribution companies establish contracts with generators and they also compete for supplying large clients. Perhaps the most innovative aspect of the UK commercial system consists in having defined the concept of "supplier" as distinct from the enterprises who own physical assets in the system. A licensed supplier in the UK system consists of a regulated company who may enter into purchase or sale contracts with generators on one hand and final consumers on the other. In the process, a supplier must pay (i) generators for energy provided by them, (ii) the transmission enterprise according to the use it makes of the system and (iii) the distribution companies for the use of their network. The supplier can therefore be equated to an electricity broker who may not necessarily be the owner of either generating stations or transmission equipment.

In Norway, power transactions are negotiated between the buyer and seller for the contracted amount, on both a short and long-term basis. In addition, there is a power pool system, to which generators can provide power in return for compensation based on the marginal power price for the system, as calculated to have adequate power supply to meet demand on a half-

In a true spot market, consumers would buy energy directly when the price exceeds the market value that they attribute to the commodity, and declare at what price they are willing to pay for an assured amount of power. In the UK, this indication is supplanted by the fixed price as it is set by the OFFER. Selling prices for any of the industry business categories (generation, transmission, distribution and supply) are either controlled by market forces or by price controls set by the regulator over the non-competitive segments of the electric industry. Price controls set a cap on average revenue per unit sold. The controls allow increases in line with inflation in the franchise market, and a cost pass-through mechanism which applies to all of the supply market for costs beyond the supplier's control.

Transmission Prices

Transmission prices would also be based upon marginal cost economic concepts, with SRMC of the transmission system calculated by the ELDC. The wheeling toll is calculated based on investment, operating and maintenance costs. The wheeling toll would be paid by generators to the National Transmission Grid Company.

Distribution Prices

Retail prices of distributors of public electricity would be based on economic cost recovery criteria, with end-user tariffs composed of generation node prices (comprising peak power and peak energy components), transmission tolls and the value-added of distribution service (VAD). The value-added of distribution service would be regulated on the basis of an "efficient enterprise model" whose nature and elements specified by law (legislative instrument of the new Electricity Act). The reference model establishes a standard for efficiency for an optimal size in high-, medium - or low-density zone classification for power distribution companies. This standard encourages utilities to match or exceed the reference level of operating efficiency, and thus maximize their profits.

The Value Added of Distribution service (VAD) has three basic components: (1) system investment, operation maintenance cost; (2) administrative, billing and other costs not related directly to consumption; and (3) peak period losses for model distribution enterprises. These three components are used in devising formulas for the various tariff options for consumers, and the formulas vary in complexity depending on the type of meter or other consumption-measuring devices.

The proposed pricing system for bulk prices, transmission prices and retail distribution prices are similar to the Chilean model.

Key Pricing Issues

This system of pricing would raise a number of issues. A key pricing issue would be how to continue to subsidize low income residential consumers (lifeline tariffs is currently practised) through cross subsidies as is happening now.

It is proposed that the subsidisation of residential consumption which, if necessary, should be explicit and not indirect by penalizing bulk tariff level or through cross-subsidisation from industrial and commercial consumers. Further subsidises would be paid directly to the distribution companies and reflected on the next bill of the consumers as arrears due them.

Another key issue of concern is that of hydroelectric rents of Akosombo and Kpong. Although these plants have been practically totally depreciated, they continue to operate in satisfactory conditions and a tariff adjustment to the level of marginal costs would consequently give rise to windfall profits which represent the economic rents from these infra-marginal resources. These rents are currently being enjoyed by all categories of consumers in lower tariffs. It is suggested that, under the new scheme, the windfall profits could be lodged in a "Special Fund" to be used to subsidise low income residential consumers.

A similar scheme has been established in Argentina where the national generators sell their power exclusively to the grid, within a fixed price band set by their original international agreements. However, any compensation for their power sales which is set above the cost of supplying the power and maintaining the generating facilities is put into the National Fund, to be used for adjusting inter-regional cost differentials and financing ongoing nationally-sponsored projects in the sector.

Proposal 4: Regulatory Framework

The establishment of a competitive market implies interaction between a considerable number of economic agents which could give rise to abuses detrimental to consumers and to the community. The type of regulatory arrangement and pricing system constitute the critical factors in any reform programme. Depending on how the regulatory framework is conceived and formulated, it could be either an incentive or a disincentive to the successful implementation of the whole reform programme and therefore could "make" or "break" the programme.

It is envisaged that an autonomous, **Energy Regulatory Agency** would be established. It would be a public institution provided with full technical, budgetary, administrative and political independence. The Agency will provide oversight functions over the ELDC specifically with regards to standards for efficient operation of the system, including those for reliability, quality and continuity of supply; transparency in the tariffs for public electricity. The Agency would also be an avenue for providing an opportunity for consumers and service providers to participate in public hearings. The Agency would be responsible for the control and regulation of the hydropower water resources of Ghana, and issue concessions for the utilisation of these for the purposes of generating electricity.

It is further proposed that the jurisdiction of the Energy Regulatory Agency would extend beyond the full regulatory oversight of the electric power sector to cover the petroleum sector which is also in the process of being restructured.

The operations of the Energy Regulatory Agency could be financed by concessionaires - generation, transmission and distribution companies - from small payments (percentage) of their annual revenues.

They are many versions of regulatory regimes in the several reform programmes which have been introduced already in other countries. The cases of UK and Chile are the most advanced, however, and are discussed below.

In the UK the industry is supervised by a regulatory office (OFFER) with state-appointed officials. At the generation level, the regulator's role consists of establishing the commercial rules and supervising the behaviour of the enterprises, but it does not set prices: the latter are the product of a competitive market and an elaborate bidding system between generators. At the transmission and distribution level the regulator controls the prices for use of the network as well as the distribution margin.

In Chile regulation and its limits are defined within an Electricity Law. The regulatory agency is the state-appointed National Energy Commission. Its role, somewhat similar to the UK regulatory office, consists of controlling the performance of the market at the generation level and establishing the margin for distribution companies. Prices at the generation level are formed by a free market between generators and customers; however, there is a dispatch office which sets the price for compensation between generators by calculating the marginal cost of the system. This intervention is necessary due to the presence of hydroelectric plants together with long-term storage facilities. The margin for distribution companies is regulated by setting the price for final consumers on the basis of a "standard enterprise" and allowing companies to reach higher rates of return through lower costs (and maintaining regulated service quality levels).

Proposal 5: System Planning

System planning in the new environment would be indicative in nature and would be the responsibility of the **Ministry of Energy and Mines**. The power enterprises would not be obligated to undertake specific investment for supplying the market. The Ministry of Energy and Mines would play a role in investment by developing indicative plans which inform the industry as to which sequence of investments is most desirable but would not establish compulsory obligations. In this case Government would only play an informative role. The responsibility for doing indicative planning may be passed on to an appropriate agency such as the National Grid Transmission Company or the Energy Regulatory Agency as objective and impartial institutions on behalf of the Ministry.

This planning arrangement is similar to what pertains in Chile but different from the UK where there is no formal organisation responsible for planning. The enterprises undertake to

plan their own investment.

Proposal 6: Grid Extension and Rural Electrification

The level of access of electricity in Ghana is comparatively very low (35%). Under the reform programme, grid extension and rural electrification would be treated as infrastructure development projects to be financed with government guaranteed loans. In this respect, the current programme of grid extension and rural electrification through the District Capital Electrification Programme (DCEP) and the Self-Help Rural Electrification Programme (SHEP) will be continued as is being done now. Upon establishment of the **National Transmission Grid Company** and the **Regional Distribution Companies** the loans and financial commitments associated with the investments in the extension of the transmission and service lines would be passed on to them. They would also assume the design and implementation of the grid extension programme under the National Electrification Scheme (NES).

So far, all except about 10 district capitals have been supplied with power and it is envisaged that by 1997 the DCEP will be completed as the remaining district capitals would have been supplied with electricity. The rural electrification programme on the other hand will be **continued into the foreseeable future.**

FACTORS FOR SUCCESS SO FAR

A number of factors have made it possible for the programme to come this far.

Government Policy

The first important factor is the current policy of government of making the private sector the engine of growth. This policy has provided the strong basis upon which the whole programme draws its political steam. In addition to this is the personal commitment and support of the decision makers responsible for the energy sector. The Government on its own spent a substantial amount of money to engage consultants who did the initial diagnostic studies and provided advice on the need for the reforms.

Establishment of Power Sector Reform Committee

The PSRC has played an invaluable role in moving the process forward by interpreting government policy and preparing the necessary strategies for implementing the programme. The strength of the committee is the personal interest shown by the members. Another important feature of the committee which has contributed to its success is the inclusion of a large number of private sector people and others who do not belong to the energy sector. Infact, the Chairman of the committee is an executive of a private sector company.

Guided By Experience

A third important factor has been the willingness of the Government and the committee to talk to and learning from the experiences of those who have been involved in similar reform programme. Right from the conception of the idea the Government has worked closely with SYNEX Consultants of Chile who were directly involved in the reform process of Chile since 1980. They have also been involved in the reform programmes in many Latin American countries such as Argentina and Colombia. The programme in Ghana has benefited substantially from the wealth of experience they have gathered over the years.

Cooperation of Existing Utilities

The reform process in Ghana has also benefited from the cooperation of the bosses of the existing utilities. Resistance and lukewarm attitudes of utilities are known to pose great impediments for reforms in many cases. Utilities have usually seen reform of this nature as usurping their powers and have hardly given up without a fight. The reform programme in Ghana has not gone through the anticipated resistance of the utilities but rather measured cooperation. Indeed, the utilities were made part of the process right from the start of the programme and the communication links between the Ministry of Energy and Mines and the PSRC on one hand and the utilities on the other have been very fluid. A very senior decision maker of one of the utilities is the Chairman of one of the two Task Forces set up by the Power Reform Committee to undertake specific technical assignments. Majority of the members of the Task Forces are people from the utilities.

Support from the World Bank

After prompting the whole idea of reform as a condition for financing Ghana's Thermal Power Project, the World Bank has continued to be supportive. The Bank has not only made available some funds to supplement Government efforts in the implementation of the programme but continue to provide important information and advice on reforms in other countries to guide the process in Ghana.

CONCLUSIONS

By initiating reforms to re-structure the power sector, Ghana has joined the category of very few countries who are responding to the difficulties of financing and inefficiencies plaguing their electric power industry. Even though the whole reform programme has not yet been completed, the process has advanced considerably with the broad definition of the proposed institutional structures which are to be set up. The experiences from the process that has been initiated in Ghana will provide important lessons for many other developing countries with similar socio-economic and political environments.

In respect of Ghana, three major anticipated benefits of the proposed reforms are:

- (i) injection of private sector financing. Ghana requires about US\$1 billion to meet

the investment needs of the power sector in the next 10 years which the Government alone cannot provide;

- (ii) price competition in power supply which is likely to develop "at the margin" over and above the energy that Akosombo and Kpong power stations would be able to generate. Conceptually, the implication is that energy requirement of the country over and above what would be supplied from the existing hydro dams would be taken from either IPPs, Tema Diesel, Takoradi thermal, Western Rivers or imports on the basis of competitive prices; and
- (iii) providing an opportunity for the development of small Independent Renewable Energy Power Generator enterprises to service isolated rural communities.

The reform programme in Ghana has come this far because a number of factors, which could serve as guideposts for other countries, have worked together to make it possible. The momentum which has already been generated would need to be maintained to ensure the successful completion of the reform programme.

APPENDIX

Table 1 Comparative statistics of some countries which have already initiated reforms.

Country	Installed Capacity (MW)			
	Total	Hydro	Thermal	Other
UK	72,030	6,800	54,500	10,730
Norway	27,261	26,988	273	-
Argentina	17,801	6,610	10,172	1,019
Colombia	9,599	6,707	2,892	-
Chile	5,149	3,099	2,050	-
Peru	4,101	2,395	1,706	-
Ghana	1,102	1,072	30	-
Jamaica	796	24	772	-

Fig. 3. Breakdown of total energy consumption of Ghana by energy type.

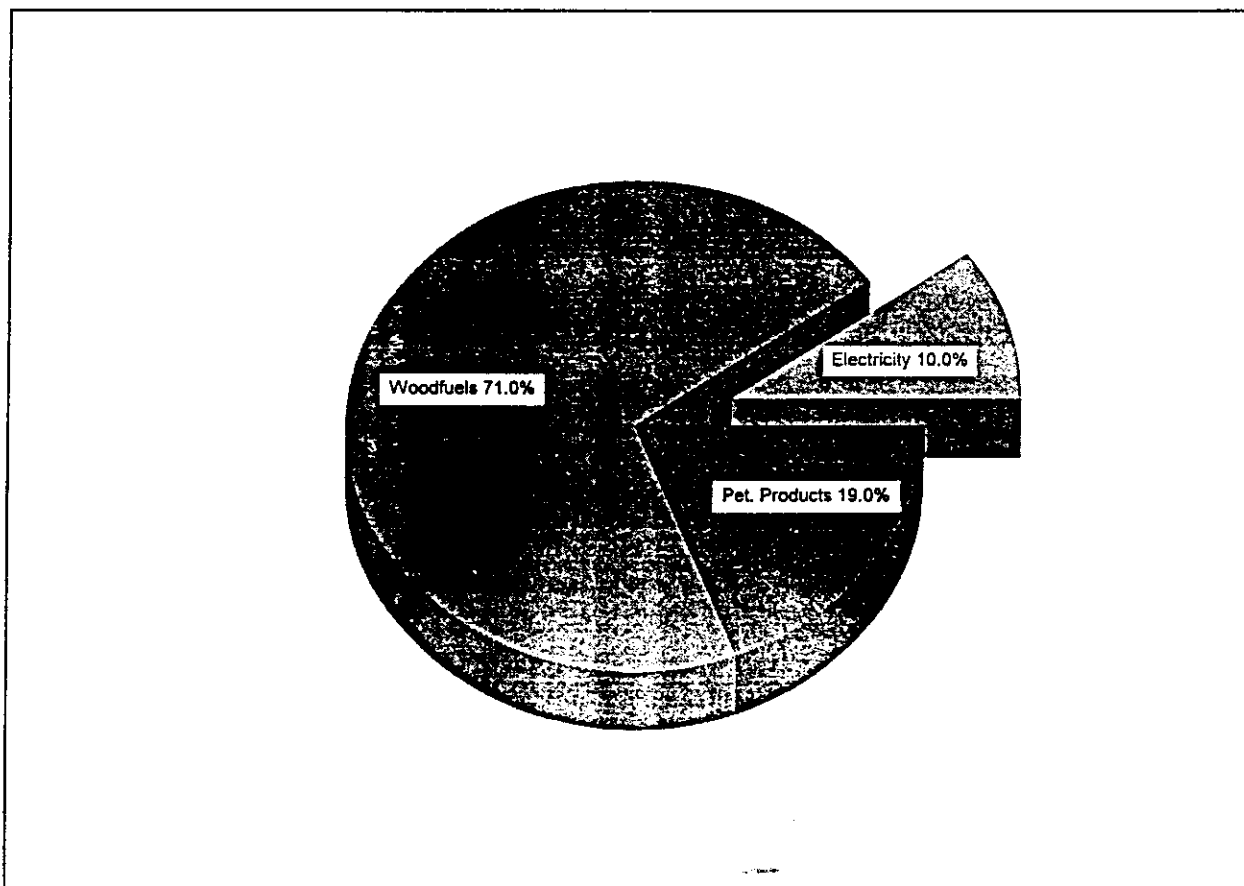


Fig.4. Growth in Annual Per Capita Consumption of Electricity (1989-1993)

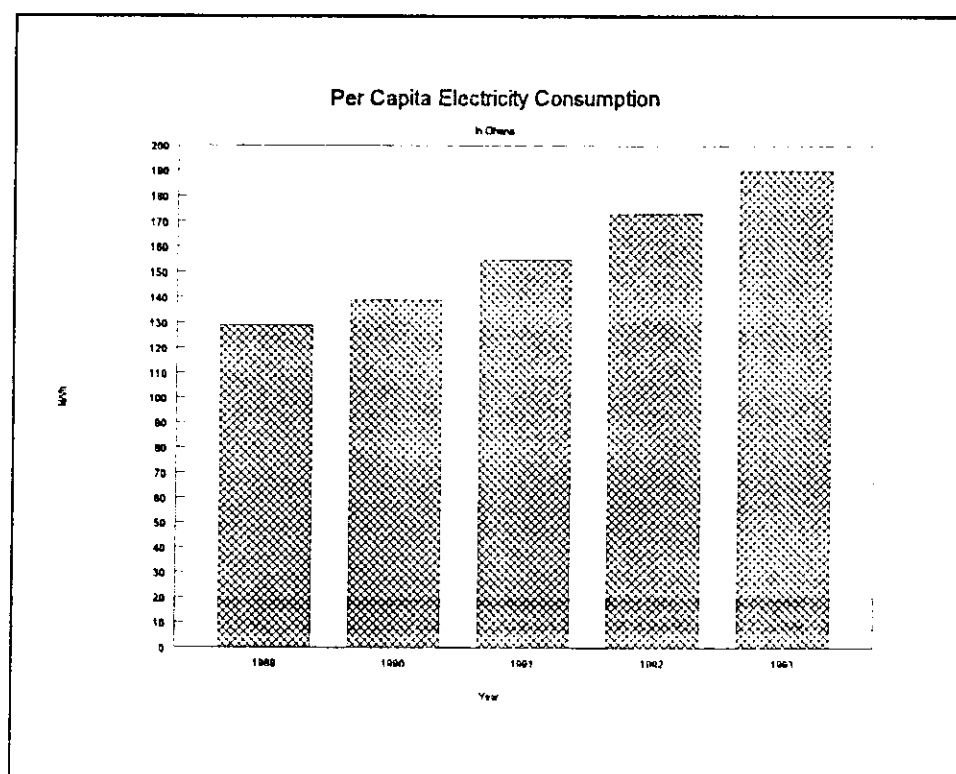


Table 2 Total Value Added of Ghana ESI from 1989-93 (C'million)

	1989	1990	1991	1992	1993
VRA	107.0	114.2	124.7	133.8	72.6
ECG	20.0	18.6	21.6	45.7	29.6
TOTAL	127.0	132.8	145.3	178.5	102.2

Table 3.. Installed Generating capacity 1988-1993

GENERATING STATION	GENERATING CAPACITY (MW)					
	1988	1989	1990	1991	1992	1993
Hydro						
Akosombo	912	912	912	912	912	912
Kpong	160	160	160	160	160	160
Thermal						
Tema	-	-	-	-	-	30
Total	1,072	1,072	1,072	1,072	1,072	1,072

Fig.5 Electricity Generation by the Ghana ESI

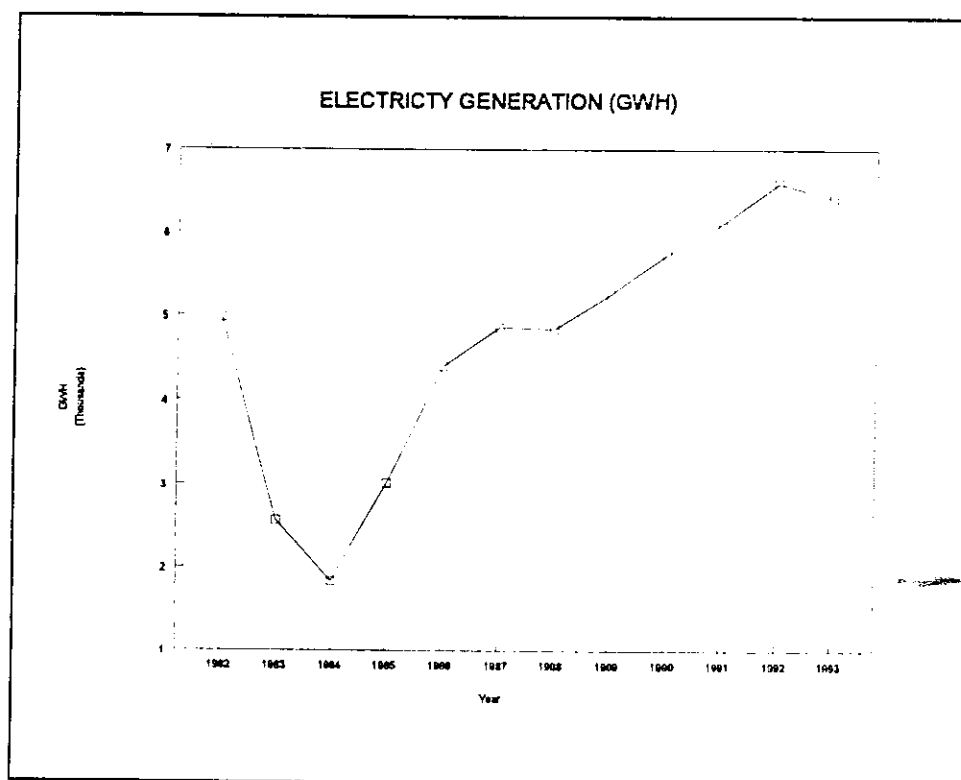


Table 6 Trends in Load factor and Maximum Peak Demand for the Ghana ESI

<u>Year</u>	<u>Load Factor(%)</u>	<u>Max. Peak Demand (MW)</u>
1989	78.7	765
1990	78.4	812.5
1991	80.5	856
1992	82.4	912
1993	82.3	946

Table 7. Growth of Transmission Lines (1989-1993)

YEAR	TRANSMISSION LINE LENGTHS (KM) VOLTAGE LEVEL (kV)			
	225	161	69	TOTALS
1989	86	2151.5	101.6	2339.1
1990	86	2369.6	101.6	2557.2
1991	86	2620.8	101.6	2808.4
1992	86	2747.8	101.6	2935.4

Transmission losses are estimated at about 3.2 percent of total energy transmitted.

Table 8. Distribution Facilities (1991-1993)

	1991	1992	1993
Kilometre Installed			
11.5 kV	57	114.8	171.3
34.5 kV	221	442.4	450.0
LV Lines	375	749.2	1301.2
kVA Transformer Capacity	16,043	32,085	42,000

Distribution losses are estimated at 19 percent made up of Technical losses of 11 per cent and non-technical losses of 8 percent.

Table 9. Trends in Power Supply Between Ghana and Her Neighbours in Gwh

	1989	1990	1991	1992	1993
<u>Imports</u>					
CIE	8.4	-	0.3	0.9	30.6
CEB	16.51	3.52	-	-	-
<u>Exports</u>					
CIE	189.85	312.86	449	409	84
CEB	335.65	452.08	359	485	311

Table 10. Energy Consumption by Consumer Type for VRA

	<u>Energy Consumption (%)</u>	<u>% of total Revenue</u>
VALCO	45.5	45.2
CEB	5.3	15.4
CIE	1.3	3.9
Domestic	<u>47.9</u>	<u>35.5</u>
	100.0	100.0

Table 11. Annual Growth in Domestic Electricity Consumption

	<u>Tot.Cons(GWh)</u>	<u>ECG/NED</u>	<u>¹ECG</u>	<u>NED</u>
	<u>(ECG/NED)</u>	<u>(%)</u>	<u>Only(%)</u>	<u>Only(%)</u>
1989	1811			
1990	1987	9.7	6.9	400
1991	2309	16.2	12.3	41
1992	2629	13.9	15.3	46
1993	2971	13.0	16.3	11

¹Includes losses