

THE ELECTRIC SECTOR IN ETHIOPIA: POLICY, PERFORMANCE AND PROBLEMS

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1. INTRODUCTION

In the face of the economic reform pursued so far, there have been ample indications of rapidly growing demand for modern energy (of which electricity is one) without the fulfillment of which the danger of frustrating the economic revival still hovers.

This paper therefore examines the compatibility of the power industry in terms of institutional set-up, legal framework and industry organization with the background of the ongoing reform. In doing so, the paper attempts to provide personal insights into the major issues that are relevant to the issue stated above.

To achieve this, it is attempted to portray the particular role of the industry vis-à-vis the national economy. Accordingly, key factors that have direct relevance to the objective of this paper have been identified. It is then attempted to provide a cross sectional view of these points with the help of quantitative and qualitative information. In line with this, the following areas have been explored.

The current status, operational performance and prospective development requirement in the context of overall economic performance are indicated. A panoramic view of major players in the industry, the service coverage, demand structure by category of customers, the related problems and its implication on sector performance are discussed. Specific issues of the sector ranging from legal, structure, resource, capacity, pricing, end-use efficiency level are scrutinized and presented. These issues are highlighted against broad reference bases and in some cases are contrasted with relevant international developments.

Reform measures committed so far, viz., policy, legal, institutional, tariff, and how the reform measures could fit into the background issues are discussed. Aspects of the policy analysis is limited to key elements of the reform, especially the formation of regulation and regulatory institute which should in principle release much of the potential of the reform into action is yet to be completed. However, most probable issues with the given background of the degree of the reform so far committed is discussed vis-à-vis experiences achieved elsewhere. It is also attempted to provide

critical review in areas of regulatory structure, issues around possible private participation and probable external catalyst in sector development.

Finally, the balance of this analysis is used to bring into visibility most probable long-term gaps and, therefore, the long-term requirement believed to drive the sector into the realm most desired of it.

2. THE ELECTRICITY SECTOR

2.1. Industry Organization

The Ethiopian Electric Power Corporation (formerly Ethiopian Electric Light & Power Authority established by charter in 1956) is the only organized utility established by regulation (No.118/97) of the Council of Ministers to engage in the business of electricity generation, transmission and distribution and other related activities. The Corporation's statistics indicate that it operates two power supply systems: the interconnected system consisting of major hydropower plants with a total capacity of 377 Mega watt (Mw) and extensive power transmission over 6000 kilometer length of a 230, 132, 66 and 45 kilovolt lines and a distribution system consisting of a total length of 4500 km of 15 kilovolt (kV) lines and 8000 km of low-volt lines (400 and 220 volt).

The inter-connected system (ICS) supplies to about 350 cities and towns across the country. The self-contained system (SCS) which operates largely in remote areas mainly consists of diesel generating units and small hydropower plants with a total capacity of 26 Mw.

The hydropower plants contain the largest share in the total production of energy (Table 1) compared with the thermal plants. The share of the thermal plants has declined over the years due to increasing expansion of the hydropower systems to replace the diesel generators.

Table 1. Supply System Inventory

Primary Energy	System capacity (Mw)						System Generation (GWh)					
	ICS	%	SCS	ICS	Total	%	ICS	%	SCS	%	Total	%
Hydro	371.6	92.9	6.15	24.1	377.8	88.8	1564.6	99.9	14.9	23.5	1579.5	97
Thermal	28.3	7.1	19.33	75.9	4763	11.2	0.3	102	48.4	76.5	48.7	3
Total	399.9	100	25.48	100	425.43	100	1564.9	100	63.3	100.0	1628	100

Source: EEPCo, Facts in Brief, Information Bulletin, 1998.

About 600,000 customers are currently served by both supply systems, of these over 85 % are domestic customers. The majority of the domestic customers are low level customers who consume electricity only to meet basic lighting need. About 50% of the commercial customers are retail customers.

The demand for electric power has been growing at a faster rate than its supply. The suppressed demand¹ measured by the waiting list during the 1990s amounted to hundreds of thousands of customers. The recent long-term load forecast made in the ICS indicated a 6.8 % annual growth similar to the most recent growth pattern achieved after the last tariff revision. This implied a corresponding peak demand growth from the 317 Mw in 1998 to 366 Mw by year 2000. During the planning period, which is year 2000 to 2016, the energy demand will be four times higher compared with that of the 1980s.

With the inclusion of the new projects by the end of year 2004, 600 Mw additional capacity will be made available in the system. With the consideration of the programmed commissioning date of the new power plants, power and energy deficit is expected throughout the forecast period in excess of the planned capacity addition (Annex 1).

Even though the power market is extensively spread along a wide geographical area, only very few demand centers contain much of the supply. The Corporation sales statistics indicated that these centers are clustered around the capital, south east and north of the country. The share of Addis Ababa's sales alone from the total load has been 50%. The second important market center has been the central region which includes Nazret and the surrounding areas that constitute 20 per cent of the total ICS sales.

The share of the rest of the regions is less than 10 per cent of the total system sales. This small share among each region is further distributed among a number of small pockets of demand centers numbering a total of more than 350 towns and villages. The idea of rural electrification did not get off the ground.

2.2. Private and Municipal (community) Commercial Suppliers

As the Authority has been the only responsible body to supply electric service, this task has been carried out as part of other market expansion activities. The generally adopted definition for rural electrification was supply to small pre-urban towns with a population of 3 to 12 thousand. As a result, over the years conventional supplies have been provided to rural areas either by way of grid extension or small hydropower or thermal generators, primarily to address social and economic objectives such as industrial development, agricultural enhancement, reduction of the deforestation rate, and to facilitate rural health and education facilities. Basic criteria involved in these efforts include population size; social and economic condition, regional distribution

and whether the site is in border area. However, it cannot be said that these were strict criteria since, over the years, other factors have also affected this development.

The Authority over the years provided technical support and advice to private and community (Municipal) suppliers who usually operate the diesel system to supply power mainly for night time lighting need.

It is known that presently there are many private small-scale commercial supplies largely operating in rural Ethiopia out of the reach of the Corporation's supply zone. There is no any recent inventory taken to establish a clear picture about these private and community suppliers (EELPA 1992:250-252)

2.3. National Energy Consumption Structure

The sector has a very low share (0.6%) out of the annual national energy consumption of the country. The economy largely depends on bio-mass energy sources which supply 94.6% of the annual consumption followed by petroleum and petroleum products (Annex 2).

The domestic sector accounts for 93% of the annual biomass energy consumption while industry and service consume 3.5% of this. Transport and agriculture totally depend on petroleum products as the primary energy source.

This structure of energy consumption has been persistent over the years. Even though electricity has the smallest share from the total energy requirement for the industrial sector, it is a vital input to keep the economy alive. Per capita electricity consumption is the least in sub-Saharan Africa next to Mali (UNDP/World Bank/ESMAP 1996:52).

3. SECTOR ISSUES

3.1. Institutional Framework and Organization

The management of the energy sector in general and that of the power sector in particular has suffered from lack of appropriate institutional arrangements particularly in the face of a dire need of growth which ought to be realized by way of operational efficiency and financial prudence. Instead, the institutional difficulties have demonstrated adverse effects in operational performance, responsibility and accountability.

The Ministry of Mines and Energy (MME) played conflicting roles as operator and regulator, denying the utility authority and responsibility in day to day operation.

There has not been any clear delineation of the MME in its role as supervisor and regulator (UNDP/ESMAP 1995:75). As a result, the management of the Authority has been denied autonomy to operate viably, responsibly and accountably (EELPA 1992:8-10). There has not been a clear regulatory framework to provide a transparent regulatory exercise

Many activities had been centralized beyond a manageable limit creating additional burdens on top management and therefore distracts it from policy issues and overall development visions (EELPA 1992:8-10). Appropriate emphasis has not been maintained in regard to technical and service standards, to sufficiently address customers' needs. Nor has cost of service for each organizational unit been separately and clearly handled. Cost consciousness has not been properly incorporated in the disposition of routine activities. Performance standard has not been sufficiently established to evaluate staff, management and Corporate activities (EELPA 1992:1-105).

Manpower resource management has not been sound enough to be compatible to the changing scenario, and has not been supported by a documented system with regard to career path and succession plan for different professions and by long-term development strategy (EELPA 1992:42-90). Quite frequently, inexperienced incumbents assumed portfolios in various capacities.

Incentive and motivation systems have not been consciously developed to address the need. Labor productivity, as measured by Mwh per employee, is currently 193. The average value for sub-Saharan Africa is 397 MWh per employee excluding South Africa. The corresponding value for the developed world goes as high as 4000 MWh per employee. This comparison indicates the highly labor intensive operation of the industry partly for the reasons discussed in section 2 above

The average productivity performance in sub-Saharan Africa is 50 customers per employee. In the developed world it is as high as 400 customers per employee. Whereas in case of EEP Co it is close to 70 customers per employee (UNDP/World Bank/ESMAP 1996:53).

Information resource management has been affected by incomplete and inaccurate data, delay in information transmission, low level of management information system, lack of information service policies and procedure, and lack of documented and automated performance indicators and lack of sufficient information technologies (EELPA 1992:105)

The customers service management has been affected by lack of consistent application of service procedures and outdated systems which are not streamlined to take into account changing scenarios and problems associated with centralized operation and lack of qualified personnel. Customers are not also sufficiently made

aware of the internal working procedures. Most of the service procedures are designed not on the basis of the customer's need in as much as it is the reflection of the internally desired processes and working method (EELPA 1992:153-207).

Because of the centralized billing system, revenue collection practice has been characterized by delay and the practice itself is expensive and involves insurance premium and commission payments. Customers have also not been properly served in regard to bill settlement (EELPA 1992:105).

3.2. Financial Resource and Tariff

There has never been consistency in tariff revision and this has been evidenced over the past many years. After the 1952 tariff amendment, there had not been any adjustment till 1964 when it was increased by 11% on average after 12 years elapsed. Following this the second amendment came in 1971 after the elapse of six years bearing a 19% average increase. And the third came in 1978 after eight years with 54% average increase over the preceding revision. Even though these amendments were made, the effect had been too little in terms of real increase. This increase had been based on asset value which have not been continuously updated to represent current value.

The utility had been heavily subsidized by the government over the past many years. Between 1993 and 1998 the subsidy extended by the government to power plant rehabilitation and transmission line construction amounted to Birr 1.08 Billion. There had been a very long tradition to keep the tariff low and to subsidize particularly the domestic customers. This had caused budgetary burden on the government and also communicated wrong cost signals to customers and had a negative bearing on resource allocation. For quite a long period of time domestic tariff has remained regressive and was paradoxically subsidizing the rich at the expense of the poor². This category of tariff has enjoyed cross subsidy from the industrial and especially the commercial customers incorporating distortions against the productive sector. For all these reasons revenue generation capability had been weakened for quite a long period of time beyond what could have been compensated by government subsidy. In an attempt to execute the fourth tariff revision which was commenced in 1982 and in the absence of any clear policy to be pursued by the government in regard to electricity pricing, conflicting policy interests had been allowed to be incorporated in this study for tariff revision after consultation of various government offices by a foreign consulting company. And these include the promotion of efficient allocation of resources, generating sufficient revenue, covering all cost of services to support development programmes and to provide affordable tariff to the so-called lifeline consumer.

The implementation as it was enforced after government approval of the 1986³ tariff had witnessed a wide departure from these "Design criteria" and came out to be a source for misallocation of resources also by way of providing pseudo stimulus to demand growth and thereby partly contributing to the problems in the management and use of other renewable resources including traditional energy sources.

This revision has maintained the historical pattern of distortion where the domestic sector enjoyed large size of subsidy at the expense of the service and the industrial sector. In fact the domestic tariff has been left unchanged for decades while industrial and commercial tariff was revised relatively frequently. Even before the 1971 revision, it has remained essentially the same nearly for two decades. Therefore, in monetary terms, domestic tariff remained unchanged for four decades. This revision incorporated cost of connection to new customers, while charging a fixed lump sum has failed to recover connection expenses mainly because it has not been possible to forecast future connection cost, so that it can partly be incorporated in the distribution marginal capacity cost. Connection costs are specific to each customer; and even within the same category, costs are highly variable subject to location factor particularly in town or cities built without plan. Even if this may be possible, incorporating cost of connection in the rates poses an equity question as the already-connected should not bear costs for the newcomers.

This general tendency of consumerism created by annually declining rates, in real terms persistent over the years, is a serious indication of imbalances in the use of resources which was evidently hostile to growth. All the more, however, much has been invested in this sector in the past few years and a good part of this was channeled to compound these imbalances. New investment program has also been made with the general assumption that the prevailing consumption profile will persist, which gave accent to the already worsened bias in the national distribution of wealth.

As the tariff failed to incorporate the allocative efficiency ingredients⁴, it did not encourage consumers to promote efficiency in consumption and the development of other energy sources even for limited application; solar and wind, for example, that could to some extent substitute electricity has not been well contemplated by entrepreneurs, industrialists or other groups.

Failure to administer appropriate tariff structure to go abreast of the latest need of the sector has been evidenced by: the undesirable load developments; persistent administration problems; and the lag in the development inertia by denying the utility the required financial resources.

The development of other probably more efficient energy sources has not come to the extent of serving as a fair substitute for electricity for industrial and non-industrial use. Also the inequities imposed on the poor domestic customers in particular has been quite extreme. The reform pursued by the government particularly with regard to

devaluation of the Birr had inflated operating expenses, investment cost and interest expense on unpaid loans. At the outset of the devaluation, while it may be said the overall impact on the economy has not been too strong, because of delays in subsequent tariff adjustment to contain the effect, the impact on the utility has been too high in terms of financial loss resulting from effects on outstanding loan and operating expenses. The resultant financial performance had eroded the Authority's credit-worthiness to the extent of seriously entangling development efforts.

It is not technically possible to precisely establish the impact of devaluation on operating expenses (because of large size of items purchased from local and foreign market that directly and indirectly bear the effect). A look at the Corporation's operating expenses and energy generation after devaluation shows that during the latter years of the devaluation, where the Birr value declined relatively significantly, the growth rate of operating expenses soared up to a level of 18% while generation growth was in the order of 5 to 6 per cent. On the other hand, at pre-devaluation, growth rate of operating expenses was in the order of 8% while that of energy generation was 2%. Therefore, the net effect of devaluation on operating expenses alone may be estimated to be in the order of 10 to 15 %.

The loss from devaluation on long-term loan between 1991 to 1997 amounted to over 1.5 billion Birr⁵. The Corporation's financial statement indicated that the amortized loss from devaluation has been in the order of 30 to 40 million Birr.

Because of the pricing approach pursued, energy saving has not been an important issue to many of the electricity consumers. Even simple energy housekeeping has not been well implemented by the average and high-income consumers and by the public consumers in particular.

The subsidy prevalent for long particularly in the self-contained system supplied from thermal generators caused the expansion of this system and implementation of the 1994 proposed revision would not be politically sound and acceptable. As a result of this, a uniform tariff had been proposed and implemented with the recognition of future system expansion designed to diffuse this system by replacing them with the relatively inexpensive hydro energy.

Though tariff is an important policy instrument in promoting efficient allocation of resources by way of promoting efficiency at end-use level, this has not been the case as elaborated above, owing to the weak cost signals communicated to all the cross section of customers. All these have brought about the need for a tariff reform to be encapsulated into a newly defined industry objective as presented in the following sections.

3.3. Power Generation, Transmission and Distribution

Because of long service years and lack of planned maintenance of the generating facilities and operational problems, reliability of the hydro and diesel generating units had declined. This problem has also contributed to high cost of system operation. Generation capability is on the verge of depletion. Progress on capacity addition has been characterized by delays because of shortage of finance and for technical reasons. Capacity addition by way of thermal generators, even though technically possible to do away with the expected deficit, has a consequence on national fuel import and a negative impact on customers' purchasing capability and the environment does not make thermal generation viable.

Due to the nature of the power market which is characterized by small pockets of load centers widely spread throughout the country, transmission line had been quite frequently extended beyond what the market is able to justify.

Even the services provided cover limited areas because of the additional investment required to provide for the rather small centers served by retail voltage. In the face of growing demand, overloading at holiday eves frequents and affects high voltage systems at substation level.

A large section of the present distribution network has not been completely upgraded to contain the growing demand coming from both the existing and the new customers. Because of this and also because of human intervention, loss is high and reliability in some cases is also low and connection to new customers frequently involves delays.

The intensity of consumption per consumer is very low. In fact more than 60% of the customers consume to address basic lighting needs and to operate some electronics appliances. For these reasons, cost of supply, particularly that of transmission, distribution and sales cost is high.

Because of problems associated with town planning, the network has not been properly structured. And because of lack of delineation of city/town limit, service extension has been made difficult to customers.

3.4. End-use Efficiency

End-use efficiency is generally low and this problem is mainly attributable to the following factors. The level of awareness of customers about impact of end-use efficiency is generally low. There had not been significant and organized marketing effort to boost awareness of customers in regard to energy saving and related gains. Institutionally, government regulations and policy support is not sufficiently developed. For example the tax system is indiscriminate with regard to efficiency and both inefficient and efficient appliances are equally taxed.⁶

The prohibitive duties (30 % of CIF price) imposed on electrical appliances that have efficiency merits have an effect of deterrence on the salability of this equipment and it is still an expensive product in the domestic market. This partly contributed to the high rate of circulation of inefficient electrical appliances affecting the system. Institutional support in various areas is undeveloped, either for resource or organization mandate reason. Examples of these areas include promotion of energy auditing, efficiency codes and standard for building, equipment and appliances, rules and regulations and enforcement capacity of these rules, private efficiency companies to provide commercial energy services and technology information resources on efficiency feasibility, finance etc. and to lobby against policy barriers. At the utility level, marketing program is not generally developed to lead to increased efficiency at the customers' end and to eventually lead to optimum development of demand.

The tendency of the government to lower electricity price provided customers with a wrong signal, and virtually made investment in efficiency financially unattractive. For example, as one area where efficiency problem has been demonstrated, power factor (the ratio between active and reactive power demand) deterioration at the customers' side has been an acute problem and is responsible in limiting supply capability of the system. Since most industrial customers' power factor is low and reactive power is not generated at the consumer side, the entire power generation, transmission and distribution chain is disturbed. Therefore, partly as a result of this large voltage variation, voltage control problems etc. are frequent occurrences. The assurance of a low reactive power need (which implies higher power factor) leads to a rational use of all the generating, transmitting and distributing facilities.

At the macro level, the forces of competition have not fully prevailed to expose business operators to commercial pressure. Rather they had been insulated by protective policies and as a result the motive to improve energy efficiency for a defined gain in many cases has been frustrated.⁷ Technical know how to install and operate some of the technologies to promote efficiency in power utilization is generally lacking. In general energy efficiency problem is a typical characteristic of developing countries frequently demonstrated in high-energy input per unit of GDP.

4. INDUSTRY REFORM AND PROSPECTIVE MEASURES

4.1. General Reform Approach

The general approach that has been highlighted all the way through the reform may be said to follow the following pattern: establishment of the specific objectives for the industry with regard to compatibility with political structure, financial viability, operational efficiency and fair price.⁸ The details of this have been articulated in the

energy policy. Following this there have been efforts to assess performance of the industry and to analyze sources of problems. This has been conducted by a task force organized from the staff of the industry. Against these problem sources and within the broader policy framework, courses of action for reform have been identified which is presented below.

4.2. The National Energy Policy

The energy policy (TGE 1994) has been issued in May 1994 with a view to providing the basic principles for the development of the energy sector within the framework of the national economic policy. The specific objectives include:

- to promote energy supply and availability at fair price and at the desired place,
- to transform the dominant traditional energy sources to modern energy sources,
- to indicate viability in the development of alternative energy sources,
- to promote environmental protection in the development and appropriation of energy,
- to minimize energy losses at supply and end-use level.

The policy specifically envisages the development of hydropower in line with the national economic and social needs. It acknowledges the need to price energy in accordance with its economic value reflecting cost associated with production and to gradually remove subsidy. The policy highlights the need to restructure the energy organization at government level to facilitate the development of energy supply by establishing an appropriate organ to be responsible to create enabling conditions for the issuance of relevant energy law and regulations, appropriate standard and safety, efficiency code etc., and to assist the restructuring of state energy enterprises to be compatible to the new development approach as articulated by the economic policy.

4.3. Investment Law

The first investment law since the start of the reform in line with the economic policy has established that the electricity sector was largely to remain under government ownership except limited investment by private parties for supply less than 25 Mw. Since the enactment of this law there has never been any private investment formally coming into the sector mainly because of lack of clarity of the provisions and absence of regulatory laws and institutions. However, with a view to addressing these

problems, the government has recently issued an amendment code (No.116/1990) and a new electricity law.

The major amendment introduced includes the liberalization of electricity generation especially from hydropower source for foreign and local investors without any limit of capacity. On the other hand, generation of electricity using non-hydro technology and supply is reserved for local investors. Investment in non-hydro technology above 25 MW is a business left to the government.

4.4. Electricity Law

A proclamation by the government with a major purpose of establishing a regulatory agency, "Electricity Agency", to regulate the power industries has been issued. The Agency, while it is an independent federal organ, is accountable to the Ministry of Mines and Energy and is entrusted with the objective to promote efficient, reliable, high quality and economical electricity services. Towards this end, the agency has been vested with a power to:

- determine the quality and standard of electricity services,
 - issue, suspend and revoke license for generation, transmission and sale of electricity,
 - study and recommend tariff and supervise its implementation, and
- other specific obligations and rights of the Agency have been established by the same law.

This law has laid a foundation for the establishment of a distinctive regulatory portfolio to meet the need in the management of the industry.

4.5. Ethiopian Electric Power Corporation Establishment Regulation

On July 1997, the Council of Ministers issued a regulation to re-establish the former Ethiopian Electric Light and Power Authority into a public enterprise with a capital of 2.67 billion Birr with the objective of engaging in electricity business in line with the development policy and priority of the government. This Corporation is to be supervised by a government designated body.

4.6. Organizational Reform and Industry Structure

Since 1994 efforts have been going on to restructure the power Authority now renamed as Ethiopian Electric Power Corporation (EEPCO) after a commercialization and decentralization principle under the new legal framework and with a view to addressing the inherent problems discussed above. By commercializing the

Corporation, the objective is to promote efficient and cost effective operation to maintain financial prudence and customers' satisfaction.

This principle emphasizes the need to communicate cost of services subject to the condition of efficient operation in the setting of prices. In line with this and with the provision of the investment law, bulk procurement of power from private producers for distribution to customers is also considered.

By decentralization, the improvement of management performance by delegating responsibility and authority through the management chain has been incorporated in the reform. However, the central power system and the systems that the Corporation now operates outside its main system are likely to remain major power supply sources and therefore are targeted to be decentralized with particular responsibility of power distribution, operation and expansion to be disposed as per the delegation of authority to the decentralized units. The regional delineation of the operation departments of the Corporation are designed to take into consideration both the political boundaries where possible and the geographical spread of the supply system and the related technical management and resource requirement. Generally, in the area of organizational restructuring major implementation is still on progress including system reform/design and resource assignment, and therefore it is too early to dwell on either details of reform measures or reform impacts.

The law is not articulate with regard to the desired structural requirement of the power industry⁹. This may have been left for the regulatory details. The adopted industry structure of the Corporation indicated a vertical integration of all functions under a one Corporate management; and under the decentralization objective integration of small generation as part of the transmission and distribution network has been effected. Within the National Grid it is possible to maintain a vertically integrated (generation, transmission and distribution) utility, while organizational or administrative de-integration is not a mandatory condition. Actually, structural de-integration is to be seen in line with the degree of competition required to be introduced into the market where this competitive procurement has been envisaged. Within the framework of the legal and regulatory provisions the supply service, in the event when competitive dispatch is a favored option, may be required to be unbundled at two physical levels in the interconnected system: generation and vertically integrated transmission and distribution system.

From country experience, physical de-integration has been sought as the best way to clear competitive obstacles in the wholesale and retail power market.¹⁰ Less extreme alternatives could be internal organizational and accounts separation. In both cases accounting separation of services might be sufficient to begin with. This also means that new investment into the sector should provide unbundled service. De-integration of the industry in the free system (separate generation, transmission, distribution company), considering the prevailing market size in these centers, may not be a

necessary requirement. Since the law is open on this subject, regulatory details may be required to provide guidance in regard to when to (and when not to) establish organizational or accounting/internal de-integration or both at generation level in the event when this is of interest to the investor(s) with regard to, for example, providing investment opportunity at different levels, and to the regulator to look into the opportunity for promoting competition in the Market.

4.7. Tariff Reform

Because of the legacy of the problems discussed in section 4.2, reforming the tariff system has become a matter of dire urgency and was further necessitated by the economic and financial dynamism introduced since the policy reform. Therefore, highlights of the tariff revision were:

- improving the financial picture of the utility to cover all operating costs and to make it profitable enough to finance future development objective.
- alleviating some of the power supply problems by introducing rates consciously designed to address technical problems.
- increasing the resource allocation efficiency into the sector in particular and in the economy at large.
- gradually removing the adverse effect of subsidy on government budget which has been biased against the productive sector and the low income consumers.

To accomplish this, long run marginal cost of pricing approach with adjustment for a second best option for reasons of general distortions in price of other goods and services has been adopted. The previous approach to fixing connection cost has been waved on equity and technical grounds discussed in section 3.3. Instead the distribution marginal capacity cost has been computed without including costs for connection after the supply voltage level to which the customers belong. For this reason a separate charge of connection has been imposed on the customers. This resulted in relatively high connection cost in comparison with previous practices and there have been indications of acceptability problems by some sections of the customers.¹¹ The result of the marginal cost tariff study conducted by the utility indicated the prevalence of a significant distortion compared with the preceding tariff, particularly for low voltage rates and the thermal systems. This structure stipulated the need to introduce supply cost based rates in regard to time of use and reactive power demand which has a high prevalence on the system. Particularly the former, as discussed in section 3, is responsible for aggravating supply standard at the low volt level.

Since the financial performance of the long run marginal cost (LRMC) tariff has been found weak against the utility's financial requirement and for reasons of distortions in pricing at large, adjustments have been made in the area of designing a block tariff structure for domestic and commercial customers to entertain cross-subsidy within these customers group, to increase the LRMC tariff across all cross-section of customers category to meet the financial requirement and to provide inter-regional cross subsidy between the thermal and the hydro system, as the thermal system price has been more than prohibitive. This has been done to address previous error committed that has led to the uneconomic development of the system and to promote a politically sound and acceptable tariff. In doing so, the containment of the thermal system to its minimum and the diffusion of the large section of this system through the expansion of the hydro system was stipulated. The proposed tariff revision was high enough since it embraces the effect of accumulated problems to demand gradualism in sequences of revisions in a series of three years. Accordingly, in October 1994, 20% of the proposed increase for an effect of a 23% average increase has been introduced and the remaining 80% to follow suit in 1997 and 1998 for a 39.4% and a 32.5% average nominal increase on the respective preceding year rate. (EELPA 1994). Since the reform, financial performance has gradually improved covering expenses and improving credit-worthiness of the utility and virtually made subsidy unnecessary.¹² Now government participates in equity investment. In technical areas, the consumption profile of customers has shown improvement probably because of the cost-consciousness introduced and the campaign to increase public awareness and mass persuasion to avoid peak consumption as much as possible. Even though the time-of-use tariff is designed for application to industrial customers, appropriate hardware and system and manpower are not yet ready to introduce the rate which would have a direct impact to curb peak growth.

The trend of the subsidy to the domestic customers has been reversed where high level energy consumers are now paying for the "life line" ¹³ consumers in the seven-step block domestic tariff with a much broader definition of life line consumption. For purposes of lighting application, the domestic tariff is by far cheaper than other energy sources like candle, kerosene and gasoline.¹⁴ There has been an indication where particularly commercial customers happened to be conscious enough to introduce the efficient bulb which through the energy bill pays in the long run. To visualize the effect of the increase on macroeconomic performance such as inflation, income etc. construction of the use of an economic model might be required which is not considered for the purpose of this paper. But a glimpse of some of the economic impacts may be portrayed by the following presentation. The share of electricity cost from the total production cost¹⁵ has been very low for many industries because of the effect of the devaluation of the Birr as most industries use imported inputs.

For cooking application, the current price of electricity in the 1st and 2nd block domestic tariff seems to be competitive with fuel wood and charcoal and liquefied petroleum gas (LPG). This conclusion would be stronger if people use inefficient stoves. However,

kerosene is much cheaper as an energy source for cooking compared with any other sources.¹⁶ Subsidy extended to kerosene is the basic reason for this.

To evaluate the impact of the tariff on household expenditure, an average of 330 kwh annual consumption has been used, as implied from the survey made by the Central Statistical Authority (CSA), which was Birr 58.53 with a share much less than 1%.

The effect of the tariff increase has brought the average electricity expenditure to 2.342% which is more than double¹⁷—an increase which may be doubted as there has been gradual increase in income over these years.

Price elasticity of demand after the last revision remained fairly inelastic (0.095), suggesting that revenue is not guaranteed proportional to the rate of the increase but only a minor decrease in volume. When the present average tariff of Birr 0.41/kwh or US\$ 0.05/kwh is compared with that of the sub-Saharan African countries (1994 price), it is the least expensive next to five countries viz. Zambia, Cameroon, Zaire, South Africa, Malawi and Zimbabwe. The domestic average tariff Birr 0.38/kwh is the least in the region next to Nigeria and Zambia. The same conclusion also holds for the industrial tariff.

4.8. Financing

To finance the expected high cost of power system development, the financing source essentially depends on the financial prudence of the utility by increasing self-financing capability and credit-worthiness through the enhancement of operational efficiency, power export revenue and equity investment by government and private IPP financiers.¹⁸

4.9. Potential Private Participation and the Related Requirements

The current power market structure will be affected, at different degrees, both in the main interconnected and the isolated systems owned by the Corporation.

Under the 'Single Buyer Industry Model' private producers will be required to sell bulk into the National Grid. Therefore a complete organizational de-integration is not a subject to be entertained under the prevailing legal framework, except that de-integration on administrative and financial matters may be sought in regard to generation business in the event when an arrangement of competitive dispatch (power merchanting by competing with the existing generation facilities) is required to be instituted.

In the self-contained system, owing to market size, a vertically integrated private or government utility will be a most likely development. The need for independent generation and distribution companies or organizational de-integration may come from the possibility of extending competitive procurements as in the case of the ICS to avoid the danger of private monopolies even if at a local level. However, such a problem in small systems might cost effectively be taken care of by regulatory measures than what the free market arrangement would require.

4.10. Other Possibilities for Private Participation

Even though the policy and legal framework do not clearly establish all forms by which private sector may be involved in the market, private resource may be employed in different forms either directly by the decision of the management or the stakeholder upon the viability of the scheme. Accordingly, the following possible areas may be identified.

Service Contract¹⁹

At the periphery of the power business there are activities such as energy and power meter reading, revenue collection and billing services which in fact require a good deal of management attention, resource and time.

It has been argued by financiers that this scheme has been instrumental in promoting efficiency, transferring accountability and responsibility, technology and skill to the extent of releasing management resources and efforts to focus on core business. However, to practice this, the capacity of the market²⁰ to provide such services at competitive prices and its long-term viability without the need to bring into the picture the danger of private monopoly has to be studied. Considering the huge operational activities involved in running power utilities, this scheme would have a potential benefit in running large systems with careful and appropriate specification of all contractual responsibilities, accountability and service payment arrangements.

Management Contract²¹

Management contract is not actually an alternative to service contract but may be its higher version for increased participation of private resources by way of entrusting accountability and responsibility to manage a certain segment of the business, with ownership and financing remaining the responsibility of the Corporation.

In view of growing expansion, particularly in the regions, and of the prevailing policy which requires the Corporation to maintain ownership, the brunt of power distribution and thermal generators operation may be subject to a management contract with careful specification of required performance standard and operational relation with the management of the utilities.

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5. REGULATORY FRAMEWORK

5.1. Regulatory Structure and Responsibilities

The post-reform market of the industry would also be dominated by monopolistic operation in power transmission and retail services partly arising from the degree of the market reform—a single buyer model attributed to the large part of the market as it is now and from the nature of utility services. Therefore, to expose such monopolistic operation to commercial pressure, detailed regulatory procedures will have to be designed with a view to imitating the effects of competition.

Because of the special characteristic of the industry, as indicated before, a specialized Agency has been established by law indicating general duties and responsibilities leaving detailed technical and regulatory matters to be issued by directives.

The Agency is accountable to the Ministry of Mines and Energy (whose primary role in the sector has been in the area of long-term sector policy planning, issuance and supervision of relevant directives, to undertake studies for the growth and promotion of electricity services in the country)²⁴ which could be instrumental to enable the government to monitor the conduct of the regulators and has been vested with the responsibility of granting licenses against technical and non-technical criteria, administering price, determining specific service standards, monitoring compliance with rules and regulations, imposing penalties and sanctions against non-compliance, facilitating the resolution of disputes between operators and customers and between different operators, and providing advice to government on the regulatory system, policy direction and on other relevant matters. The latter, however, is contextual and not directly specified in the law (FDRE 1995).

The regulation established obligations and responsibilities of both the operators and the utilities and the expectation of conduct in the business relations. In the event of service dissatisfaction, customers maintain the right to file complaints either to the operator or the Agency as maybe appropriate and the operators have the obligation to maintain customers' complaint book and promptly respond to complaints. However, details of the procedures as to how regulatory intervention would be effected to handle unresolved complaints has not been specified in the regulation. The intricacies in this area may not allow to contain all possible scenarios in a regulation or might even be best subject to the discretion of the Agency with some action limits established by directives. And, therefore, with a view to minimizing the discretion that the Agency might have in the disposition of the responsibilities and for smoothing out the operator, customer and regulator interaction, in addition to maintaining relevant directives, arrangement to access the proceeds of regulatory conducts by interested parties (by way of which the regulator can provide an account of its disposition) has to be maintained. This might be in the best interest of customers and operators both of

whom are the object and beneficiaries of the regulatory system and should therefore be sure that there is a fair and impartial treatment.

5.2. Regulatory Independence

In the disposition of these responsibilities, to maintain an independent regulatory role by avoiding interest of conflicts and therefore with a view to promoting independence of conduct, the Agency has been provided with a general mandate by law which can be refined and clarified by regulations and directives.

Accordingly, Electricity Regulation has been recently approved by Council of Ministers providing technical subjects in the areas of licensing, tariff setting and technical and commercial services. From the point of view of an operator, independence and transparency demand that specific technical and non-technical subjects that potentially lead the regulatory action have to be established preferably by law. However, the technical subjects have been highlighted considering the conspicuous lack of experience with regulation and the infancy of the Agency. The regulation has not been procedural and too specific in technical matters. It rather requires the Agency to dispose such functions by means of directives which potentially reduces regulatory discretion probably leading to its predictability. However, to support the independent conduct of the regulator which reduces discretion and at the same time maintain balance from risks, such as difficulty to adopt the regulatory efforts to new and unanticipated phenomena, procedures ought to be developed with due consideration of these facts.

5.3. Regulatory Transparency

Transparency in regulation has been incorporated in areas of issuance of license by specifying general and specific requirements including project specific feasibility analysis and by the outlining of time bound procedural steps for the procurement of license and condition for refusal or revocation of license (in the case of the latter the applicant will be informed of the reasons) and operational obligations of the licensee²⁵.

And in regard to subjects that may put up commercial pressure on utility operation, such as establishing efficiency rates, it has been stated that operators would be consulted before adapting efficiency parameters to be incorporated in tariff formula. Technical standards for construction and operation have also been provided by regulation, leaving sufficient room for the operators' discretion where appropriate.

In the event of disputes, these documents and the expected contractual agreement and directives would be legally valid enough to enable the operator to go to litigation in search of resolution of cases by the judiciary however least desirable this may be. The transparency requirement ought to go through the decision process by way of

providing opportunity for the different parties to present their views before final decision and publication of decision together with its rationale at post-decision level by providing appeal forum for parties injured by the decision. These processes have to be set within definite time limits. This would also be instrumental to build regulatory impartiality under situations where the government might appear as owner, operator and, through its ministerial offices, a regulator posing the danger of conflicting interests. However, the price regulation, which is highly sensitive and decisive as far as private investment in the sector is concerned, is to be supported by detailed and transparent procedures to guarantee returns on investment.

5.4. Price Regulation

With regard to pricing, principles have been established with the acknowledgment of the need to minimize discretion in regulatory control of price by way of directives. In the ICS, where bulk power supply is the accepted modality for involving private capital, wholesale prices are to be negotiated in the power purchase agreement including its continuing review modalities for a direct transfer to the retail system. And the retail prices in both ICS and SCS, where the market with limited capacity is equally opened to private and government investment alike who would operate in different territory, are to be determined by detailed provisions of the regulation.

The legal framework discussed before is a factor to promote commercial principles in utility operation which since then has revealed some measurable practical results as far as financial prudence of utilities is concerned. Accordingly, the regulation broadly covers subjects ranging from viability of projects by way of the licensing procedure to technical service and rate design standards. Tariff has been highlighted in this provision by instituting commercial principle and the operational efficiency principle as reflected in the energy policy which also includes resource allocation efficiency, equity and simplicity of the price structure. To provide more transparency in the regulatory conduct, the provision recognized the need for the issuance of detailed procedural matters by directives. There is also a possibility to promote this to regulation and legislation upon establishing sufficient resource capability on the subject.

From the legal provisions, tariff is regulated with maximum price fixed by the Agency including generation price to be paid to the independent producers. The pricing approach has paid sufficient emphasis to cost of service for a regulated rate of return with adequate incentives incorporated into appropriate cost components so that operators would not be denied of incentives for capacity building or cost reduction initiatives. Even though the anticipated market structure would not require private producers to take price risk in the event of which pronounced need of tariff methodology and review procedure would arise, this same need is still important so long as the government owned Corporation is required to operate under the principle of commercialization as described before. Transparency in pricing, while making regulatory outcome predictable, also increases negotiating capacity of the

Corporation. Guarantees among other reasons are required by private producers for fear that utilities may not be able to meet their contractual obligations; and this is generally likely to increase project cost.

Generation pricing in the ICS

Peak power pricing in this system will be considered on the basis of the kilowatt cost of the most economical generation unit planned to be used to meet peak demand. This will be outlined using long run marginal cost methodology and could be used for kilowatt pricing for all type of generators appropriately used to meet the power demand adjusted for availability factor of the plant. On the other hand, energy is to be priced based on variable costs for each brand of generation technology used in the system. Generation price is subject to casual adjustment in a defined time period, by closely relating the price of electricity to price increase of factors that affect electricity price. This indexation is to provide adequate provisions for the net impact of efficiency increase on prices.

Generation pricing in the SCS

Similar approach as in the case of the national system for peak power and energy pricing has also been outlined in the regulation. The price is of course likely to vary in each system depending on the technology, unit size of the generation facilities and loading conditions.

Transmission pricing

A separate transmission pricing may not be required. Therefore, unbundling of transmission service in the system may not be a necessary condition at least at this stage. Therefore, within the bundled price in the ICS price, it has been outlined to be established on the basis of system marginal transmission capacity cost. While in the SCS it is to be established on the basis of estimated or actual accounting costs and an acceptable rate of return to be determined.

Distribution pricing

Unbundled distribution service in the ICS will not be required. The regulated customers will be charged a bundled price subject to regulation. Where the regulatory interest prevails, separate cost of distribution system can be maintained, though this is much less than maintaining unbundled distribution services.

For exactly similar reasons as in the case of transmission pricing in the self contained system, depending on the size and nature of the system to be established by regulation, unbundled distribution service (institutional de-integration) or a separate

account of distribution service may be important to establish depending on the specific case.

Therefore, a separate distribution price has to be maintained to facilitate the regulatory process and competitive market for large customers as discussed in section 6, and therefore detailed methodology and procedural steps are expected to be issued by directives.

5.5. Procurement Regulation

In the National Grid system generation procurement may be managed through competitive bidding for a Build Own and Operate (BOO) arrangement after determining the additional capacity and energy that is desired to be purchased. Depending on the interest of the purchasing utility, the arrangement could also be on bases of project transfer (BOT) after a period of operation where sufficient capital reform is achieved. Private investment is advocated for not only complementing the capital need but also for the spillover effect of efficiency to the public sector. This arrangement will allow investment to proceed probably with relatively little difficulty compared to the current financing difficulties (Keon-Woo 1993)²⁶. The bidding may be project-specific by identifying selected project details or simply by pointing capacity and energy addition requirements, leaving the technology choice to the producer for a least cost supply.

Potential suppliers might be allowed to compete on price with details of adjustment for fuel price where appropriate and other change of input prices. From experience, fixing prices²⁷ after which potential suppliers have to offer their bid has been problematic for two main reasons. Technically it is difficult; if attempted it is likely to be wrongly estimated. This could lead to high or no/little offer depending on the level of price offered.

The contract agreement has to contain effective risk management where the bidding producer should bear risks related to construction cost, financial price, project completion cost, non-fuel operating expenses and cost related to reliability. The utility, on the other hand, as it is commonly accepted, bears risks related to demand upon which the offer is extended and some part of fuel price. Effective contracting should be capable enough to transfer risk to the party that can either influence risk factors or absorb the risks at minimum cost.

The utility need not be subject to regulatory obligations to bid selection procedures. However, a guideline might be provided by the Agency in regard to build or purchase decisions to avoid difficulties in regulator/operator interactions in the event of price revision that comes at a latter stage.

Striking an efficient contract agreement with private suppliers is itself not a task to be easily arranged. However, the potential benefits of a competitive procurement may not be realized without anticipating many contingencies far deep in to the future.

This is important for both buyer and supplier who should be involved in the contract. From the producer point of view, financing of power projects is usually associated with cash flow depending on the agreed market volume. Project financing requires careful projection of market and its yield²⁸. Therefore, for the producer price and sales volume are key factors, they need to be reliably established by the utility.

For this reason, macro economic variables have to be carefully analyzed and included in the market forecast for a successful combination of both extremes. On the other hand, regulatory guide on unbundled generation service with separate service price and appropriate review process and methodology may also serve to facilitate the negotiation effort on procurement. The idea is to provide reference price for the optimum development of additional capacity. However, this approach may be more relevant in a situation where competitive dispatch is maintained. The financing challenge for cases of developing hydropower even though it involves higher initial cost and less operating cost, might be much stronger for the following reasons: cost of construction, the risk of which is to be shouldered by the producer, is likely to overrun for lack of standardization compared to fossil fuel generation, the building cost of which is relatively standardized. Hydropower involves long-time return period and requires huge investment cost which all the more makes the financing expensive. On the other hand, considering the national energy policy and the current political will as may be implied from the recent investment amendment code which favors hydropower development, it may be important to look into ways to further encourage investment in hydropower for example allowing unregulated international sales for the amount of capacity beyond the level that is nationally contracted. This may require a common carrier service of a certain stretch of the national transmission system which can be handled by specifying power transportation cost. Generally, writing a long-term power contract should involve addressing all possible contingencies that must be anticipated. And, therefore, long-term power sales contract is a complex subject covering price and non-price items that cannot be fixed throughout the contract period for reasons of external factors that affect the terms. Therefore, most frequently such contract involves high risk and cost of contracting.

Comparing contracts bearing different risk allocations is equally difficult. To develop and conclude a good contract arrangement with risks efficiently allocated, at the same time equitably addressing needs of parties involved, requires objective evaluation and expertise judgments to which exposure is generally lacking.

The contract price to be concluded between utilities and the private producers, with the knowledge and approval of the Agency, would require regulatory surveillance.

Even though this is not specifically articulated (as it is to be determined by negotiation and/or competitive tendering), it can be reasonably assumed that this need will also be incorporated in the contractual agreement. After contract is committed regulatory oversight may be exercised to monitor price development and guard the customer from risk by way of bench marking the offer price or price regulation of the supplying company in which case these arrangements have to be included in the contractual agreement. These, however, could involve a lot of difficulties in contract negotiation and enforcement and therefore would require flexibility and a clear regulatory role to be known by parties involved prior to commitment.

Payment should also be arranged either on a cost plus basis or a bench mark price. The purchase agreement will incorporate a two-part tariff for power and energy for remunerating fixed or variable cost respectively. While the capacity charge bearing investment and operation and maintenance cost and agreed amount of return on equity shall be payable based on availability even when not running, the energy charge should bear only cost of energy production and is payable based on the unit output. However, in the event that the producer might lack confidence in the utility's capability to honor the purchase obligation, it may require guarantee from the government as has been witnessed elsewhere. This potentially makes the project more expensive.

A special pricing approach has to be developed to govern the pricing arrangements in the Power Purchase Agreement for cases of wholesale procurement or such prices may be left to be provided through the competitive offer or a formula may be established to be agreed upon by both parties for a pre-defined rate of return.

6. SUMMARY

The power industry in the country has been facing governance problem where, policy making, ownership and operational activities were vaguely defined with apparent lack of clear objective and legal and regulatory framework to provide limits between regulatory responsibility, ownership and management of the industry. The industry has been structured with a monopolistic responsibility virtually closed to private capital.

The investment capability of the sector which has been eroded resulting from poor financial performance was the cause of large-scale capital injection into the sector by government and this brought about budget burden and strain on government expenditure on other needy sectors. The principle of commercialized operation which had not been clearly integrated in the operation has been the source of distortion of prices which, more than eroding the financial resource of the industry, caused resource misallocation and unfair income distribution.

For lack of financial motives and integrated promotional effort, end-use efficiency is generally low imposing additional factors for power service problems at the upstream supply structure. With the absence of a properly defined responsibility, financing strategy and approach for rural electrification, the service as it is now is far less than the requirement and shares similar problem that pertains to power distribution service in the large market centers.

With a view to combating these problems, a remedial course of action has been defined. Accordingly, within the broader framework of the economic policy and the investment law, the state role in power sector development and the level of private participation in the business is established. The energy policy, among others, has added enhancement at least in matters of guiding principle in efficiency pricing and energy efficiency in production, transportation, distribution and end-use level. Further, the framework for economic regulation has been instituted by law subsequently.

In view of the sector's problem ranging from governance to operational efficiency and financing, the reform measures are clear attempts to address these shortcomings. Public ownership has been preferred to continue with the possibility of incremental privatization of the incoming generation facilities within the National Power Supply system. On the other hand, equal opportunities have been given to both the public and private sector to develop the industry in what may be largely rural region.

To institute commercial operation, management autonomy and independence in utility operation, under circumstances where experience with independent public institution is rather limited, transparent and impartial regulation will be required. Where the latter is not yet sufficiently established, probably this might remain to be a *challenge* and therefore this area has to be persistently pursued for a fruitful result in reversing perhaps a good part of the sector's problems and bringing the benefit of the reform into reality.

From the national point of view, the burden of public monopoly on public finance has been very strong which required a shift in the financing strategy as it is also given emphasis in the reform which includes private financing in generation at a competitive procurement.

In the coming years there will be a high demand for power in the developing world. This would put private financing as the most important remaining source which only responds to attractive regulatory environment in particular and is to be won under fierce competition among countries in dire need of private financing. Development in Asia indicates introduction of private financing after establishment of a transparent and independent regulation and sector reform, pure commercial principle and a good macro economic performance and stability.

The reform might further need to take into account the growing trend in regional interconnection²⁹ which now is highly concentrated in south, central and some parts of east Africa. Behind the idea of developing Trans-African power transmission cherished by some countries in the south, there is a very good reason to expect it to materialize as primary untapped power source is abundant in this region. Further regional interconnection is known for its merit in reducing system costs, through shared reserve.

While the present legal framework does not put any restriction on import or export, the development of the hydro resources is also dependent on the regulatory environment. Therefore, the pressure to engage in large scale and long-term power procurement appears to be a possibility demanding attention much in the direction of being part of this development by providing attractive and convincing scenario for the unlimited (as stipulated in the investment amendment law) development of the hydropower for possible export via regional interconnection. This should also require reforming the internal market structure. For short-term development of hydropower plants, maximum effort needs to be extended to make use of international finance with private capital.

Further improvement in the regulatory design probably might need to stay at the heart of the reform and be compatible to the needs of inflow of private capital. Regulatory independence ought to be established against political influence, corporate business influence and budget restraints. The regulatory system has to recognize and define a step by step procedure clearly addressing all problems related to commitment and enforcement of commitment in regard to parties in the business. This is usually related to the disposition of demand risk for the utility particularly in the event when the problem is a result of unforeseen developments at the macro level. From experience this has been the source of dispute which either increases cost of private financing or altogether frustrates its prospect in the face of growing competition for winning IPP (World Bank 1998:4)³⁰

The long-term successful development and performance of the industry, in addition to the above factors, will also depend on a conscious development of industry environment along the line of competition at generation level above competitive procurement to competitive dispatch, and at supply level for bulk customers to be exposed to open access transmission and distribution arrangements. By opening access to the market, IPP will be required to bear the market risks which would probably soften demand risk for the purchasing utility.

The level of power saving from efficiency at supply and end-use level largely appears to be cost-effective and therefore has to be pursued with the necessary institutional backups. The future demands integrated effort in this direction ranging from institutional supports, improvement in efficiency and tariff reform to utility-driven promotional programmes.

Rural electrification would require a separate effort to promote non-conventional means until a time when conventional means become financially viable. For this purpose, under the proposed structure a portfolio responsibility might need to be identified and instituted as a mandate outside the purview of the utility.

Finally the future of the industry in general might be portrayed as follows:

*"The idea that electricity is the epitome of local business plants built in one country or region, to serve customers living and working in that country, paid in local currency and regulated by the local political structure is outdated. As a result of global competition, customer demand and competition for capital, regulator's primary function is to ensure that power is made available in the most effective manner possible (UNDP/World Bank/ESMAP 1996:179)."*³¹

This may seem to be a little bit exaggerated perhaps in terms of timing; but nevertheless it is a fair indication of the future to warrant attention for what could be a long-term objective in administering a reform.

NOTE

¹ This suppressed demand is caused by two main reasons:

a) because of financial capability problem network extension has not been made compatible to the prevailing demand.

b) existing distribution network has not been continuously upgraded to meet the growing demand of the existing customers.

Currently the average waiting time for service connection has been reduced to 10 months for single-phase customers and much less to commercial and industrial customers.

² Regressive block tariff has been applied till 1994 in the two systems. The blocks are defined as; 1st 25 for unit price of Birr 0.15 kWh, 2nd 75 kWh, for unit price of Birr 0.17 kWh and the 3rd the balance of the kWh for unit prices of Birr 0.09 and 0.12. The third rates are applied together to the portion of consumption above 100 kWh up to the 700th kWh.

³ The legacy of political oriented tariff revision left the 1986 revision to take effect after 3 years of submission to Government; during this period it had been scrutinized by various offices and series of committees. And when it appeared it incorporated distortions. (EELPA, Tariff Study, Main Report, January 1994)

⁴ This is because long run marginal cost principle is not applied to guarantee an efficient allocation of resources directed towards the production of electricity, Charles F. Phillips, January 1993, The Regulation of Public Utilities: Theory and Practice, Public Utilities report Arlington Virginia, Page 444.

⁵ Outstanding loan at the time of devaluation of the Birr, in 1992, was 807 million Birr. The same loan increased to the tune of 2.3 billion Birr by 1998.

⁶ The wisdom of including efficiency merits in tax administration has to be accounted because impact of efficiency particularly in power industry should be strong considering the high unit cost of hydropower development, around 2000 usd/kw (annuitized value is Birr 1700.) for generation only excluding transmission and distribution which is no less expensive. There is a high probability where efficiency gains could be economically viable than tax revenue. International experience indicated that there have been cases where countries tried to reduce high cost of efficient lighting appliances like compact fluorescent by way of gradual tax reduction, market aggregation and other financing means to structure profitable transaction of such

appliances to be paid out of energy savings. South Africa is currently launching large scale promotion program for a targeted peak power saving of up to 800 MW to also achieve positive impact on environment since 94% of electric energy is produced by coal fired thermal generators. (Newsletter 2/98; International Association for Energy-Efficient Lighting (IAEE), issue no. 21, vol. 7, pp. 3-4).

For example to realise a kw saving from lighting application by substituting the incandescent lamp (20x60w) 9watt of 20 compact florescent would be required. The monthly kw price from the current tariff which is far less than the actual value is Birr 56. The new technology would last for 10,000 hours or 14 months approximately if continually used. The net saving in terms of Birr will be $14 \times 56 =$ Birr 784. The import duty on this lamp is 30 per cent. The Addis Ababa retail price is Birr 100 per unit. If the import duty is waived the tax revenue loss will be Birr 600 (20x30) while the efficiency gain is Birr 784. Therefore, a net gain of Birr 184 would be achieved.

7 In 1990 a study was conducted by a consulting firm MERZ & MCLELLAN to evaluate energy efficiency in 14 industries. The results indicated that through house keeping and through measures that require moderate investment, potential power saving could be an average of 5% of the active load. There have also been cases where house keeping measures only could yield 6% of power saving. Generally some business organizations are not yet responsive to the need to adopt efficiency measures even when costs of inefficiency are proved to be much higher particularly after the subsequent revision of tariff as the sales statistic indicate that there are many who still pay. World Bank Policy Paper IBRD, 1993, Energy Efficiency and Conservation in the Developing World.

8 In countries which have been reforming the industry, the goals of deregulation have in general been economic efficiency, decentralization (regionalization), competition and sector stability through sound technical and economic foundation. World Bank Infrastructure and Energy Discussion, October 25/1990. Private Sector Participation in the Power sector.

9 The Bolivian experience indicates that the industry structure is regulated and, by law, operation in the national interconnected system must be carried out by a separate Generation, Transmission, Distribution and load dispatch company, where each company has no right to assume property ownership (direct or indirect) in any of its form over the other. However self-contained system may be vertically integrated. In the event of integration with the national system vertical de-integration is the pre-requirement. (Official Bolivian Gazette, December 21 1994 Law no.1604, Title III, Chapter 1).

10 No economies of scale has been found for operating small or big powerplant—40 Mega Wat (MW) to 600 MW. This has been one of the reasons for abandoning a single utility model and more to impact customer with the benefits of competition both at generation and supply end.

The World Bank Infrastructure and Energy Division, October 25/1990 Private sector participation in the power sector, the case of Chile, p. 8.

11 Average connection cost in A.A is between Birr 700 to 800 for single phase customer. For three-phase customer it is as high as Birr 1500. In sub Saharan Africa non-industrial connection charge ranges from USD 80-300. There are also cases as high as USD 500 and 600 as in Botswana and Mozambique respectively. Ibid. p. 128.

12 As of 1997, the current ratio was 1.78, the debt service coverage: 3.73, Return on (not fully revalued) assets 0.033. The average performance in sub-Saharan African countries is 1 to 2; greater than 1.1 and 0.04, respectively. Bank average usually presented as loan covenant is 6 and 1.4 % for rate of return on re-valued asset and debt service coverage respectively. UNDP/World Bank/ESMAP, 1996 Power Sector Reform in sub Saharan Africa Rep. No. 182/96, p. 55. While the debt service coverage is more than the minimum requirement, return on Asset is still less and might probably be even less in the event of incorporating re-valued asset which now is under progress.

13 Originally lifeline consumption has been narrowly proposed for domestic lighting with one or two bulbs for 5 hours each night. But later on it has been broadened to cover up to 100 kwh. In sub-Saharan Africa life line is defined narrowly i.e 10-50 kwh. with the exception of Tanzania which is similar to Ethiopia. World Bank/UNDP/ESMAP, June 1996, Power Sector Reform and Efficiency Improvement in sub Saharan Africa, Report No. 182/96, p. 128.

14 The comparison of price of electricity and other energy sources for lighting application has been made on the basis of average price as in the Addis Ababa retail market. The energy consumption unit for other

sources is kilogram for a light output (kilo lumen hour, klmh) and for electricity it is kwh per klmh. (The World Bank June 1988, Comparison of Lamp for Domestic Lighting in Developing Countries)

¹⁵ In the 1983 tariff proposal the share of cost of electricity in industrial production cost was in the order of 2 to 9%, but there have been significant variation from industry to industry. The impact of the last revision also significantly varies from industry to industry. Based on the 1997 production cost of some government owned industries, the effects of the increase were: 3.8% for food processing industries and a share of 22%; pulp industry 4% and a share of 18%; flour mill 0.325% and a share of 2%; textile 7.5% and a share of 37%; printing 1% and a share of 5.2%; leather industry 1.5% and a share of 7.3%.

¹⁶ This analysis is done on the basis of fuelwood, charcoal, kerosene and LPG at Addis Ababa retail price. The analysis is based on the calorific value of each energy source, the conversion efficiency and the different level of stove efficiency for fuelwood and charcoal application in particular. These technical parameters are established in Report of the joint UNDP/World Bank Energy sector assessment program; Ethiopia, Issues and Option in the Energy Sector. July 1984 Rep N.4741 ET.

¹⁷ This analysis is based on the report Household Income, Consumption and Expenditure Survey, volume one, Central Statistical Authority, January 1997. Even though it was issued in 1997 the survey was old, and therefore the electricity expenditure was based on the pre 1997 tariff, which was Birr 0.17/kwh for domestic consumption.

¹⁸ FDRE Ministry of Mines and Energy, Draft Report, April 1996, Power Sector Development Program, (1996-2000)

¹⁹ The revenue collection function used to be conducted by private contractors before. The contractors up on mortgaging property or cash proportional to the value of bill entrusted to them, in turn they would employ retailers under similar arrangements. However, this practice has been abandoned under the 'socialist' regime era where the Labor law (64/68) has forced the utility to employ the retailers permanently. Experiences of other countries also tell news of success as in Oman where the function (meter reading, billing collection) is given by competitive bidding, which is also periodically put out to competitive tender. (Symposium on power sector reform and efficiency improvement in sub Saharan Africa Johannesburg, 1995 Rep No. 182/96, African region, the World Bank. page 155.

²⁰ Recently it has been attempted by EEP Co to out source revenue collection process by way of the services of Bank & Post Offices who have a relatively ramified structure in most cases compatible to the operational territory of the Corporation However this proposal has not been accepted by both for resource reasons and for fear they might crowd out their own customers in the face of growing competition of banking services in particular.

²¹ The arrangement has been attempted in some African countries and a success story has been told to take place in 1990 in Cote D'Ivoire where the national privately owned utility (share between foreign and nationals) was run under a management contract for a utility management service the result of which is said to have led to a further engagement of private resource in the construction of a 99 Mw thermal power generation, (Power Sector Reforms: Efficiency Improvement in sub-Saharan Africa 1995, page 157. African Region the World Bank).

²² For operating hydropower plants and transmission system, technology plays the vital role and does not as such require decisive skill to be outsourced. The current performance with the absence of central load dispatch system and with the added problems inherited from the policy mistakes that have caused serious drain on the facilities, the system performs well. There have been cases where hydro plants run for a quarter of a century with out planned maintenance for lack of hard currency needed to procure parts; again the root cause lies in the absence of commercial principle for utility operation. A study on asset revaluation remarked high level maintenance of standard in construction, installation and house keeping of major plants and equipment with the exception of distribution assets. (Coopers & Lybrand Associates, EELPA; Tariff Study and Asset Revaluation, August. 1983.).

²³ World experience indicates that much of the barrier to international trade is often political and lack of commercial objectives in utility operation. With respect to the African experience contractual arrangements have been politically handled between governments while arrangements of trade have not required advanced institutional development and currently in east. central & south Africa, regional interconnection is doing pretty good with growing prospective development for a more interregional transfer of cheap energy source UNDP/World Bank/ESMAP; June 1996, Power Sector Reform: Efficiency Improvement in

sub-Saharan Africa; P. 137-151. The European directives also recognize regional interconnection and inter-operability to be instrumental in the development of the internal market. (Directives 96/92/ of the European parliament and of the Council: Common Rules for the Internal Market in Electricity 19 Dec. 1996, P. 1).

²⁴ Federal Democratic Republic of Ethiopia Proclamation No. 4/1995 Proclamation to define the power and duties of the central and regional executive organs No.4/1995, Article 15.

²⁵ In regard to clarity of criteria for authorizing construction and operations, it has been frequently experienced as in the case of the European directives, to publish criteria and procedure for safety, security, environmental protection, use of public ground, characteristics of technical, economic and financial capabilities of the applicant etc. (European Parliament and of the Council Directives 96/92/ December 19, 1996: Common Rules for the Internal Market in Electricity p. 4, Article 5).

²⁶ KEON-Woo Lee, January 1993, Introduction to BOO/BOT Private Sector Department, Asian Development Bank.

²⁷ in the USA it has been attempted in some states during the 1980s to fix price estimated as an avoided cost after which IPPs were required to supply. The result was bizarre where some states received enormous offer while others received none, depicting mistakes in price setting. Bernard Tenenbaum, Reiner Lock and Jim Barker Dec. 1992, Electricity Privatization: Structural, Competitive and Regulatory Options, p. 1148.

²⁸ The South Pacific countries who have had increasing investment need in the sector and opted for IPP financing are now facing deep generation cut because of economic recession but under the agreement must maintain the contractual obligation which normally involve "must-take or pay" arrangement in USD terms. For example the national utility in Indonesia must buy electricity from IPP at USD 0.08/kwh & sell at USD 0.02/kwh and this has led to 600 million USD subsidy injection into the industry by government. For similar reasons there are on going cases of litigation in Pakistan; IPP against the national utility on account of price disputes. (International Power Generation IPG, vol. 22, No. 05, May 1999, p. 49; vol 23 p. 4, June 1999). Similarly a utility in India, to successfully conclude negotiation with an IPP, agreed for a 90% "must-take" obligation but latter to find that had to back down its cheaper plants to honor the obligation. UNDP/World Bank/ESMAP; June 1996, Power Sector Reforms Efficiency Improvement in sub-Saharan Africa; P. 108.

²⁹ Back in 1989 there have been a wide range of inter African interconnection feasibility assessments financed by African Development Bank (ADB); this includes Ethio-Sudan-Egypt interconnection to tap the hydro source in Ethiopia, and a number of other cases such as Zaire to Egypt which was identified for continuing study. Power Sector reform and Efficiency Improvement in Sub Saharan African countries; Report no. 182/96, Page 147.

³⁰ International experience in private sector development, Regulatory Institutions for Utilities and Competition, Power Sector Development Department, the World Bank, Washington D.C., February 1998, Page 4.

³¹ UNDP/World Bank/ESMAP; June 1996, Power Sector Reforms Efficiency Improvement in sub-Saharan Africa, p.179.

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ANNEX 1. POWER SUPPLY AND DEMAND FORECAST

Year	Installed Capacity MW	Dependable Capacity (Mw)	Demand (MW)	Required Reserve (Mw)	Required Capacity (Mw)	Balance (Mw)
1998 – 2000 ¹	375-386	321-331	317-458	38.5	356 496	-103
2001 – 2004	459-687	440-654	510-701	38-64	549-765	-146
2005 – 2010	1014.2	930.23	764-1029	75	839-1104	-51
2011 – 2016 ²	1014.2	930.23	1094-1493	75	1169-1568	-430

Source: Forecast of EELPA, Electric Energy and Peak Demand, Applied Energy Group, Inc. January 1998,

Note: (1) Forecast energy deficit by 1998, 1999 and largely by the year 2000 will be 73.77 GWh.

(2) Forecast energy deficit by 2013, 2014, 2015 and largely by the year 2016 will be 219.37 GWh.

Annex 2. Final Energy Consumption by Sector for 1995/96 in Million Tones of Oil Equivalent (TOE)

Source of Energy	Household		Industry		Others*		Total	
	Quantity	Share in %	Quantity	Share in %	Quantity	Share in %	Quantity	Share in %
Biomass	15%2	98%7	0%57	72%2	0%57	52%8	16%34	94%5
Petroleum Products	0.17	1.11	0.17	21.5	0.49	45.7	0.83	4.8
Electricity	0.05	0.32	0.05	6.3	0.02	1.8	0.12	0.6
Total	15.42	100	0.79	100	1.08	100	17.29	100

* Others indicates the energy consumption of Service, Agriculture and Transport sector.

Source: Calub Gas Development Project, Petroleum Pricing and Market Structure Study Updated National Energy Balances for 1993/94-1995/96 G.C.

Note: The original unit of measure used was Tera Joule but converted to tones of oil equivalent using the following relations. 1 TOE = 41.87×10^9 Joule, 1 Kwh = 3.60×10^6 Joule.