

AFRICAN DEVELOPMENT BANK GROUP



**ETHIOPIA – NORTHERN ETHIOPIA POWER
TRANSMISSION PROJECT**

Project Performance Evaluation Report (PPER)

**OPERATIONS EVALUATION DEPARTMENT
(OPEV)**

11 August 2004

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CURRENCY EQUIVALENTS

Currency Unit – Ethiopian Birr (BR)		
At Appraisal (December 1992)	At Project Completion (July 1999)	At Operations Evaluation (December 2003)
Birr 1.00 = US\$0.2000	US\$0.1250	US\$0.1161
US\$1.00 = Birr 5.0000	Birr 8.0000	Birr 8.6120

WEIGHTS AND MEASURES

V	-	volt
1 kV (kilovolt)	-	1,000 volts
1 kVA (kilovolt-ampere)	-	1,000 volt-amperes
1 MW (megawatt)	-	1,000,000 watts
1 MVA (megavolt-ampere)	-	1,000 kilovolt-ampere
1 kWh (kilowatt-hour)	-	1,000 watt-hours
1 MWh (megawatt-hour)	-	1,000 kilowatt-hours
1 GWh (gigawatt-hour)	-	1,000 megawatt-hours
1 km	-	1,000 meter

ABBREVIATIONS

ADB	-	African Development Bank
ADF	-	African Development Fund
NTF	-	Nigerian Trust Fund
EA	-	Executing Agency
EELPA	-	Ethiopian Electric Light and Power Authority
EEPCO	-	Ethiopian Electric Power Company
EIRR	-	Economic Internal Rate of Return
FIRR	-	Financial Internal Rate of Return
GOE	-	Government of Ethiopia
GDP	-	Gross domestic Product
IDA	-	International Development Association
ICS	-	Interconnected System
LRMC	-	Long Run Marginal Cost
SCS	-	Self Contained System
NEPTP	-	Northern Ethiopia Power Transmission Project
OEM	-	Operations Evaluation Mission
PCR	-	Project Completion Report
PPER	-	Project Performance Evaluation Report
PIU	-	Project Implementation Unit
SMI	-	Small and Medium Enterprises
TA	-	Technical Assistance
TOR	-	Terms of Reference

NOTES

- (i) The fiscal year (FY) of the Government ends on 7th July.
- (ii) In this report, “\$” refers to US dollars.

RATINGS (out of 4)

No.	Evaluation Criteria	PCR	PPER
1	Relevance	4	3.64
2.	Achievements of objectives “Efficacy”	4	3.25
3.	Efficiency		4
4.	Institutional Development Impact	3	2.88
5.	Sustainability	3	3.5
6.	Aggregate Performance Indicator	3.45	3.45
7.	Borrower Performance	2.75	3.3
8.	Bank Performance	3	3.34

Note: By and large the overall evaluation in PCR and this PPER rates the different criteria as satisfactory.

PREFACE

1. This report is a Project Performance Evaluation Report on the Northern Ethiopia Power Transmission Project (NEPTP) located in Northern Ethiopia.
2. Northern Ethiopia was one of the least developed regions of Ethiopia that lacked adequate and reliable domestic energy. The region has experienced frequent severe droughts and environmental degradation due to its over dependence on fuel wood for energy. In early 1992, the then new government of Ethiopia, in line with its aspiration to extend electric power from the national grid to the various regions for economic development, approached the Bank with a feasibility study on the Northern Ethiopia Power Transmission Project to be considered for funding. A well-sized project was determined based on available funding during preparation and appraisal missions carried out in the same year. The Bank approved in December 1992 a blend loan from ADB and ADF resources for a total of UA52.03 million, which represented 72.4% of the total project cost of UA 71.89 million and 100% of the foreign exchange cost. The Government of Ethiopia was to finance the remaining 27.6% of the cost, which was in local currency. The Executing Agency of the project was the then Ethiopian Light and Power Authority, which was reorganized in 1997 as Ethiopian Electric Power Corporation in order to operate on commercial lines.
3. The main components of the project included high and medium voltage transmission lines ranging from 230 kV lines to 66kV lines and low voltage distribution lines of 15kV and below; distribution transformers, corresponding substations (ranging from 230kV to 66kV) logistics and consultancy services.
4. Bank's Project Completion Report was issued in July 1999. The project was executed between 1994 and 1998, registering a 28-month delay over the appraisal estimates mainly due to delays in fulfillment of loan conditions for loan effectiveness, in design review, in launching and evaluation of bids, and in construction works. There was cost underrun for a total amount of UA5.38 million on ADB/ADF loans due to competitive bidding results; but a cost overrun on local cost for an amount of UA3.77 million resulting mainly due to design modifications and bad weather conditions during implementation. The PCR concludes that the project has achieved its primary objective of economically meeting the power demand of the areas served in the Northern region and the performance of all parities was satisfactory.
5. This PPER is prepared in order to complement the findings and lessons drawn in the PCR by way of evaluating in greater length the socio-economic and environmental benefits of the project for the region and drawing additional lessons of experience at policy, strategy, program, and project levels to guide future Bank assistance in the sector.
6. The evaluation is based on a desk review of policy and operational documents in the Bank and on findings from an evaluation mission to Ethiopia.
7. Comments received from the organizational units of the Bank have been incorporated in this final report. No comments were received from the Government on the Draft Report sent.

BASIC PROJECT DATA

Northern Ethiopia Power Transmission Project

Preliminary Data:

Country : Ethiopia
 Project : Northern Ethiopia Power Transmission Project
 Loan Numbers : **B/ETH/POW/92/11**
F/ETH/POW/92/35
 Borrower : The Government of the Federal Republic of Ethiopia
 Guarantor : The Government of the Federal Republic of Ethiopia
 Beneficiary : Ethiopian Electric Power and Lights Authority-EELPA
 (renamed Ethiopian Electric Power Corporation – EEPCo since 1997)
 Executing Agency: Ethiopian Electric Power and Lights Authority-EELPA
 (Now renamed Ethiopian Electric Power Corporation - EEPCo)

A. Selected Loan Data

Key Dates	ADB and ADF Loans	
	Expected	Actual
Preparation		June 1992
Appraisal		Sept. 1992
Loan Negotiations	Oct. 1992	Nov. 1992
Board Approval	Dec. 1992	14 Dec. 1992
Loan Agreement		14 Apr. 1993
Loan Effectiveness	January 1993	23 Nov. 1993
First Disbursement	31 Aug. 1993	05 May 1994
Last Disbursement	31 Dec 1997	31 Dec. 1998

B. Key Project Data

Financing Plan. (UA/Million)

Source	Appraisal Estimates				ACTUAL			
	F.E	L.C	TOTAL	%	F.E	L.C	TOTAL	%
ADB	24.39	0.00	24.39	33.9	20.12	0.00	20.12	28.63
ADF	27.64	0.00	27.64	38.4	26.53	0.00	26.53	37.75
G.O.E	0.00	19.86	19.86	27.6	0.00	23.63	23.63	33.62
TOTAL	52.03	19.86	71.89	100.0	46.65	23.63	70.28	100.0
%	72.4	27.6	100.0		66.38	33.62	100.0	
Effective Date of First Disbursement	31.08.1993				05.05.1994			
Effective Date of Last Disbursement	31.12.1997				31.12.1998			
Commencement Date	January 1994				May 1995			
Completion Date	December 1995				June 1998			

C. Implementation Performance Indicators

	Of Total Project Cost		Of Local Currency Component	
Cost Overrun/underrun on loans	5.38 mil UA	10.34% (under)	3.77 mil UA	18.98% (over)
Time Overrun	28 months	183.33%		
Slippage on Effectiveness -			11 months	
Slippage on 1 st Disbursement			8 Months	
Extensions of Last Disbursement			1	
Implementation Status			Completed	

D. Missions Data

No.	Type of Mission	No. of Missions	Date	No. of Persons	Person-Days
1.	Identification				
2.	Preparation	1	June 1992	2	14
3.	Appraisal	1	Sept 1992	2	14
4.	Supervision	5	Various	1	About 45
5.	Completion	1	Oct 1999	2	14
6.	Post-Evaluation	1	Dec 2003	2	14

E. Disbursements (UA/Millions)

YEAR	APPRAISAL PROJECTIONS				ACTUAL			
	ADB	ADF	GOE	TOTAL	ADB	ADF	GOE	TOTAL
1993	3.66	4.51	2.98	11.15	-	-	-	-
1994	8.54	9.52	6.95	25.01	-	0.41	0.51	0.92
1995	9.76	10.88	7.95	28.58	2.55	12.83	0.62	16.00
1996	2.44	2.72	1.99	7.15	0.91	5.00	2.94	8.85
1997	-	-	-	-	11.61	4.28	11.67	27.56
1998	-	-	-	-	3.25	3.64	6.96	13.85
1999	-	-	-	-	1.79	0.92	0.92	3.63
TOTAL	24.39	27.64	19.86	71.89	20.11	27.08	23.62	70.81

F. Implementation Performance and Project Outcome

Implementation Performance	PCR	PPER
Bank Performance	Satisfactory	Satisfactory
Borrower Performance	Satisfactory	Satisfactory
Project Outcome	Satisfactory	Satisfactory

Internal Rates of Return	Appraisal	PCR	PPER
Financial Internal Rate of Return	11.5%	11.42%	12.40%
Economic Internal Rate of Return (%)	16.0%	17.75%	17.52%
Sensitivity Analysis- FIRR*			5.04%
- EIRR*			11.30%

* Using Consumer Willingness to Pay instead of the LRMC- Highly sensitive to tariff rates

EVALUATION SUMMARY

1. The Project

1.1 The Northern Ethiopia Power Transmission Project aimed to extend the transmission of electricity from the national grid to the Tigray administrative region in northern Ethiopia and its environs. The objective was to provide reliable electric power to the inhabitants of the region to meet their energy requirements for industrial and domestic applications and to halt the degradation of the environment that was taking place. The area lacked adequate and reliable energy because diesel generators in operation at the time were unreliable and also the land cover had been depleted for fuel wood.

1.2 The goal of the sector is to enhance the socio-economic development of the country through provision of adequate and reliable electric power by exploiting fully its indigenous hydroelectric potential. The specific objective of the project was to provide cheap and reliable electricity to the Northern region of the country by transmitting electric power from the Interconnected System, which is fed by hydroelectric plants. The main components of the project included high and medium voltage transmission lines ranging from 230 kV lines to 66kV lines and low voltage distribution lines of 15kV and below; distribution transformers, corresponding substations (ranging from 230kV to 66kV) logistics and consultancy services.

1.3 A Bank Loan for UA 24.39 million, and an ADF Loan for UA27.64 in support of a total project cost of UA 71.89 million were approved on 14 December 1992. The beneficiary and executing agency of the project was the then Ethiopian Electric Light and Power Authority, which is reorganized as Ethiopian Electric Power Corporation. Loan effectiveness was delayed for 11 months due to delays on the part of the Government to fulfil the loan effectiveness conditions. During implementation detailed designs were optimised for least cost in the technical specifications and scope of the project.

1.4 The project was completed in June 1998. Bank's Project Completion Report was issued in July 1999. The project was executed between 1994 and 1998, registering a 28-month delay over the appraisal estimates mainly due to delays in fulfilment of loan conditions for loan effectiveness, design reviews, bidding process and construction works. There was cost underrun of UA5.38 million on ADB/ADF loans due to competitive bidding results; but a cost overrun on local cost for an amount of UA3.77 million. The local cost overrun was a result of design modifications and claims due to delays resulting from bad weather conditions during implementation. The PCR concludes that the project has achieved its primary objective of economically meeting the power demand of the areas served in the northern region and the performance of all parities was satisfactory.

2. The Evaluation

The evaluation is based on review of documents available in the Bank, interview of project staff and findings from field mission to Ethiopia in December 2003. An objectives-based evaluation approach for Project Performance Evaluation that defines performance in terms of outcomes, sustainability, institutional development impact, and bank and borrower performance has been used in this evaluation.

3. Evaluation Conclusions and Ratings

3.1 The project rationale to meet the suppressed demand for electricity, promote economic development, reduce dependence on fuel wood, and strengthen the operating performance of the then Ethiopia Electric Power and Lights - EELPA, was and is still highly relevant. The project configuration was appropriate for achieving its purpose. However, project start up was impaired by the lack of setting reasonable timeframe for meeting loan effectiveness conditions by the Executing Agency with possible loan cancellation for non-fulfilment on time. Conditionality that takes reasonably longer time to be fulfilled should be handled up front during preparation of County Strategy Papers to avoid undue delays in implementation of projects following loan approval. Changes in design and re-surveying also contributed to delays in implementation. Despite these deficiencies, project outputs and operational targets as measured against appraisal targets were all achieved or have even exceeded. The quality of construction and installation was of a high order. Operation and Maintenance performance has also been satisfactory. The Ethiopian Electricity Power Corporation's (EEPCo's) financial performance has been sound. The blend resources of ADB and ADF loans have helped to ease the debt burden on EEPCo as evidenced by the debt service coverage, which stood at 3.56 in 2001/2002. The re-estimated financial internal rate of return of 12.40%, and economic internal rate of return of 17.52%, confirms the viability, efficiency, and sustainability of project operation. The limited connection to electricity supply (about 6% of the population) against huge generation investment has made the electricity tariff rates too high for the average income population. Paradoxically, the existing rates are still far below the level of economic rates (the Long Run Marginal Cost).

3.2 The project shares with other infrastructure projects in the region of influence a positive impact on economic growth, employment opportunities, incomes, and household savings. The 40 towns in the region representing some 38,500 consumers exceeded the 20 towns targeted for electrification under the project. Without the project, power generation sources would have been insufficient to serve the growth in industrial and commercial activity and in tourism; and the income benefits from employment and business opportunities would not have been as large. Without the project, village households would have been denied access to electricity as well as the opportunity to reduce their average monthly expenditure on cost of kerosene used for lighting and improve their quality of life.

3.3 Implementation provided valuable experience for design scrutiny and scheduling of major transmission projects in similar mountainous areas. Technical Assistance packages from the Bank would have helped the Executing Agency fulfill key loan covenants relating to the revaluation of fixed assets and conduct a tariff study taking into account the socio-economic and environmental conditions (heavy dependence on firewood for cooking) in the country. Institutional development impacts has been mixed. Where as the Executing Agency's financial and operating performance indicators point to growth in terms of cost recovery, debt repayment, partial self financing and improved accounts receivables; overall access to electricity in Ethiopia and its rate of growth, rate of connection of new industrial, commercial and domestic consumers (particularly of urban and rural poor, who have continued to heavily depend on firewood) detract from its performance.

3.4 The evaluation results give satisfactory ratings to all the performance benchmarks- relevance, outcomes (efficacy and efficiency), sustainability and institutional development impact. The project's overall performance is, therefore, satisfactory. The Borrower's and the Bank's performance was also rated satisfactory. However, dialogue should continue between the Government and the Bank as to how, a country with huge hydropower potential should expand access and connection to electricity both in urban and rural areas since current access is limited to only about 13%, while actual connection is further limited to about 6% of the population.

3.5 This project portrays several best practices as evidenced by good performance of all the stakeholders and, in particular, it can serve as success story on the importance of Government commitment for project success and socio-economic development of a region.

4. Lessons, Recommendations and Feedback

4.1 The key lessons learned from the project are as follows;

- (i) A good front end design process could help revise design considerations, including provision for variable tower heights, tower spans, and tower support structures, for major transmission projects in regions with mountainous topography. Detail design scrutiny by the Bank in its effort at arriving at the most optimal technical and cost effective design prior to implementation helps to avoid undue implementation delays (paras. 1.2.2, 3.1.3);
- (ii) An unusually long period between loan approval and loan execution contributes to delays in loan effectiveness and project implementation (para. 3.1.1);
- (iii) The absence of a reasonable time frame for meeting loan conditions required for loan effectiveness with appropriate sanction could potentially impair the implementation with regard to scheduling and the availability of funding (para. 3.1.2);
- (iv) Loan conditions that place undue technical and professional demands on the Executing Agency such as the revaluation of fixed assets and the Tariff Study, stands the risk of non-compliance without the appropriate Technical Assistance package (paras. 3.3.2 and 4.2.11);
- (v) A strong Government commitment is very critical for the successful implementation and performance of projects (paras. 4.2.5; 4.5.3);
- (vi) Broad project objectives such as improving the economic status of women and halting environmental degradation, whose achievements require multi-sectoral interventions, also require a multi-sectoral collaboration to attain (para. 4.2.20);
- (vii) Achievements of Institutional Development impacts should be considered within the broader national context (para. 4.4.4);
- (viii) A more pragmatic approach to resolving issues of accessibility and affordability of electricity by the most vulnerable groups will need to be adopted in order to make an observable impact on the social status of Ethiopia's women and on the environment (para. 4.2.21).

4.2 The main recommendations are:

For the Bank

- (i) Loan conditions that could potentially impair the efficacy of implementation with regard to scheduling and the availability of funding should be given reasonable time bound with appropriate sanction to avoid discretionary compliance on the part of the Government. Loan conditions should be realistic to be fulfilled within a reasonable time bound. Otherwise, conditionality that takes reasonably longer time to be fulfilled should be handled up front during preparation of Country Strategy Paper (CSP) (para. 3.1.2);
- (ii) Loan conditions that place undue technical and professional demands on the Executing Agency such as the revaluation of fixed assets and the Tariff Study, should be accompanied with the appropriate Technical Assistance package to acquire the expertise and ensure their realization (paras. 3.3.2 and 4.2.11);
- (iii) The shield wire technology can be considered as a cost effective alternative for supplying small villages and communities located within 100 km along HV and MV transmission line routes in the Bank's subsequent interventions in Rural Electrification (para. 4.2.25);

- (iv) It is very important for the Bank to proactively monitor the development of an acceptable tariff policy in Ethiopia that will ensure affordability and safeguard the viability of investments (para. 4.3.6);
- (v) It is important that the Bank increases its financial assistance and enhances its catalytic role to attract private sector investment for the development of the power infrastructure in countries such as Ethiopia, where access to electricity is only about 13% of the population despite the existence of huge hydropower potential (para. 4.3.6);
- (vi) The Bank should monitor new developments in EEPCo's management structure in order to exploit new business opportunities such as private sector investment (para. 4.4.2).

For the Government

- (i) Appropriate incentive measures are required to assign and retain engineers in regional stations (paras. 4.2.8, 4.5.3);
- (ii) Investments in transmission and distribution systems should be given particular attention in order to improve system reliability and increase the utility's consumer base and achieve economies of scale so that the utility's inefficiencies are not passed over to consumers through tariff increases (paras. 4.2.16, 4.3.6, 4.4.2, 4.5.5);
- (iii) Special concessions may need to be designed for low income consumers through an affordable flat rate tariff for a reasonable level of consumption to encourage the use of electricity instead of fuel wood as a way of deepening the social impact of the project on the status of women in Ethiopia (paras. 4.2.21, 4.5.7);
- (iv) The Government in consultation with other agencies in energy and environment such as the Rural Energy Development and Promotion Centre and the Environmental protection Agency should adopt should (a) continue in devising and distributing energy saving cookers and furnace to very low income consumers for economy and efficiency in the use of firewood; (b) take an aggressive approach to the marketing of the electric Injera cookers in all urban centers giving cognisance to pricing and affordability as a way of encouraging the use of these devices to help curb environmental degradation (paras. 4.2.21, 4.2.23);
- (v) The Government may have to consider alternative sources of commercial electricity to diversify its sources of supply in order to enhance energy security in the country. In addition, other new and renewable energy sources, such as mini-hydro, wind and solar energy, need to be exploited cost effectively to supply isolated rural settlements at affordable tariffs (paras. 4.5.7, 4.5.8, 4.2.24).
- (vi) There is need for a special study to streamline the roles and responsibilities of the various institutions and agencies handling energy related activities in the country (paras. 4.4.3, 4.4.4);

1. THE PROJECT

1.1 Country and Sector Economic Context

1.1.1 Ethiopia with a population of about 67 million in July 2002 is the third most populous country in Africa. The country has a long-standing history, diverse cultural heritage and reasonably good resource potential for development. Yet, the majority of the population lives in absolute poverty. Ethiopia was in a state of crisis in the 1980's. By the turn of the 1990's, economic policies and management under the command economic system, protracted civil war and recurrent drought left the economy in a deep crisis. The early 90's saw the end of internal conflict in Ethiopia followed by a successful transition towards peace and democracy with the installation of the then Transitional Government of Ethiopia (TGE). Since then, a federal system of Government has been put in place with the 1994 constitution guaranteeing democratic and human rights.

1.1.2 A broad spectrum of reform measures to address short and medium term economic recovery and reconstruction as well as long-term structural problems of underdevelopment were put in place in mid-1992. The reform programs were aimed at reorienting the economy from command to market economy, rationalizing the role of the state and creating legal, institutional and policy environment to enhance private sector investment. Adjustment policies since 1992 have focused on liberalization of prices and markets, removal of subsidies, reduction of tariffs, and current account convertibility. These were supported by fiscal and monetary policies aimed at macroeconomic stabilization. Fiscal decentralization to the regions was also implemented which has permitted grassroots participation in the development process. The performance of the reforms is summarized in Table 1.1.

Table 1.1: Selected Socio-Economic Indicators

	1980/81- 1991/92 Average	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	Annual Average growth Rate (%)
Real GDP Growth Rate (%)	1.7	11.9	1.5	6.2	10.6	5.2	-1.4	6.0	5.4	7.7	1.2	5.8
Real GDP Per Capita (Birr)	243.3	228.7	226	231.6	248	253.2	242.8	250.6	260	275	286	
% Change in GDP over Previous Year	-1.0	9	-1.2	2.5	7.1	2.1	-4.1	3.2	3.8	5.8	4.0	2.4
Real Agricultural value Added per Capita (Birr)	128.4	122.3	114.5	115.1	127.8	128.3	111	111.9	112.7	123.9	128.4	
% Change in Agric. Value Added over previous year	-1.44	3.2	-6.4	0.15	11.0	0.4	-13.5	0.8	0.7	9.9	3.6	0.2
Non-Agricultural Value- Added per Capita	114.9	106.4	111.5	116.6	120.2	125	131.8	138.7	147.8	151.1	157.5	
% Change in Non-Agric. Value-Added over previous year	-0.47	16.4	4.8	4.5	3.2	4.0	5.4	5.2	6.6	2.2	4.2	4.4
Inflation Rate (%)		10	1.2	13.4	0.9	-6.4	2.33	4.8	4.2	-7.2		
Mid-Year Population Growth rate. (%)	2.83	2.8	2.9	2.9	3.0	3.2	3.0	3.1	3.0	2.93	2.89	
Total Education Expenditure as % of GDP	2.3	3.6	3.9	3.4	3.4	3.4	3.5	3.5	3.2	4.2	4.8	
Total Health Expenditure as % of GDP	0.7	10	1.2	1.3	1.3	1.3	1.5	1.4	1.0	1.8	1.9	
Total Road Expenditure as % of GDP		0.7	1.5	2.2	1.8	2.3	2.2	2.5	1.7			
Defense Expenditure as % of GDP	7.9	2.6	2.3	2.2	2.0	2.0	4.9	8.7	13.1	6.4	5.9	

Source: Ministry of Finance and Economic Development (MOFED), various issues

1.1.3 The Agricultural Development Led Industrialization Strategy (ADLI) was adopted to provide a long-term development framework for economic transformation. The smallholder farming family, mostly in rural communities was made the focus of economic development with a massive agricultural extension and credit scheme, and expansion of primary education, primary health care, rural water supply and other rural infrastructure such as roads and electricity.

1.1.4 Ethiopia is endowed with an indigenous hydroelectric potential to produce some 230 billion kWh, of which only a fraction (almost negligible) has been utilized so far. Of the total energy consumed by industry, commercial services and households, biomass fuels comprise about 94.4 percent of Ethiopia's current total energy consumption. In the household sector, biomass fuels contribute a massive 99.4 percent of the total household energy. On the other hand, current level of accessibility to electric power is limited to about 13% and actual connection is limited to about 6% of the population. This has resulted in negative environmental consequences. Thus, the Government's policy is to develop the hydroelectric potential and increase the availability of hydroelectricity to the population at large.

1.1.5 At the time of appraisal of the Northern Ethiopia Power Transmission Project (NEPTP), the only sources of commercial electricity in Northern Ethiopia were isolated diesel generators, which were very expensive to run, unreliable and inadequate. This project was, thus, initiated to provide not only the energy needs of the population in the region, but also to reduce dependence on fuel wood energy, which was expected in turn to reduce the rate of deforestation and land degradation.

1.1.6 Public electricity generation, transmission and distribution in Ethiopia is the responsibility of Ethiopia Electric Power Corporation (EEPCo.), a 100% government owned autonomous utility, formerly known as Ethiopia Electric Light and Power Authority (EELPA), created in 1956. Since 1976, EELPA was under the then Ministry of Mines and Energy. Today, energy is under the Ministry of Infrastructure following the break-up of the Mines and Energy ministry. Up to 1991, the northern region of Ethiopia, including the major towns of Asmara and Masawa in Eritrea, were supplied by EELPA's unconsolidated subsidiary, the Eritrea Regional Electric Supply Agency (ERESA) with headquarters in Asmara. Since 1991, and with the new political status of Eritrea, ERESA has been separated from EEPCo. The Northern region of Ethiopia is served by EEPCo's regional office located in the flourishing town of Mekele.

1.1.7 The Bank Group participated in the development of the electricity sub-sector in Ethiopia since 1979 when the Bank financed a rural electrification project for a total of UA5.00 million. In 1985, the Bank Group financed the Chemoga Yega Hydro Study for a total of UA 0.55 million. One of the Bank Group's major contributions to the electricity sub-sector in Ethiopia was the financing in 1986 of the Koka to Dire Dawa Power Transmission Line Project for a total of UA10.00 million and UA 25.05 million. In 1990, the Bank Group financed the Aleltu Hydro Feasibility Study for a total of UA 1.58 million through TAF resources. A grant for a multinational study amounting to UA 2.6 million for the Ethiopian Sudan Power Interconnection was approved in 1992. The Northern Ethiopia Power Transmission Project, the subject of this PPER was also financed in 1992 with blend ADB/ADF resources of UA52.03 million.

1.2. Project Formulation

1.2.1 The original basis for the project was a feasibility study prepared by EELPA in 1991 to determine the most cost effective means of extending electric supply from the national grid to the northern parts of the country to serve the Tigray Administrative region and its environs. The Government requested in May 1992 the Bank's financial assistance for the project. The Bank Group considered the project to have merit and include it in its 1992 lending program for Ethiopia. Preparation mission was carried out in July 1992, which redefined the project to fit into the available concessionary financing for the country. The redefined and revised project was appraised in September 1992. The ADB loan of UA24.39 million and ADF loan of UA27.64 million was approved on 14 December 1992. The loan agreement was signed on April 14th 1993. The loan became effective on November 23, 1993.

1.2.2 There had been adequate consultation between the Bank and the Borrower all through the project cycle from identification, preparation, appraisal and implementation ensuring that the project design was the least cost option. This was evident in the re-definition of scope, the re-routing of the transmission and distribution lines during project implementation. However, the Bank may need to do detail design scrutiny in its effort at arriving at the most optimal technical and cost effective design during preparation and appraisal stages to avoid implementation delays and possible cost overruns.

1.3 Objectives and Scope at Appraisal (Logical Framework)

1.3.1 The goal of the Energy Sector in Ethiopia was to develop the country's hydroelectric potential and transmit power from the generating stations to different regions of the country for socio-economic development. The objective of the project was to provide cheap and reliable electric power to the inhabitants of the northern region of Ethiopia to meet their energy requirements for domestic lighting and other services, and to promote the growth of small and medium scale industries as well as commercial activities in the region. It was expected that the project would make possible the implementation of about 460 newly licensed industries of all sizes that will require about 40MW of power for an annual consumption of about 80GWh. The project was also to provide the area with cheap, reliable and renewable hydro energy, which will replace fuel wood and thereby help to halt the environmental degradation that was taking place. It was expected that, three years after the completion, the project would allow about 30,000 new connections, and make electricity available to about 140,000 people. The Retrospective Logical Framework Matrix is presented in Annex 1.

1.3.2 The project outputs at appraisal consisted of (i) 500 kilometers (km) of 230-kilovolt (kV) single circuit power transmission line from the newly constructed substation at Bahir Dar to the regional capital of Mekele, through the town of Alamata; (ii) 100 km of 132 kV transmission line from Mekele to Adigrat and a 140 km 132 kV transmission line from Mekele to Adwa (iii) a total of 367km of 66kV transmission line from various substations to various towns (iv) a total of 327km of 15 kV distribution lines (v) 140 km of low voltage distribution network employing some 123 different distribution transformers in the various towns and villages (v) the construction of 230kV, 132kV and 66kV substation facilities (vii) provision of logistic and (viii) Consultancy Services.

1.4. Financing Arrangements – Bank and Others

The estimated total project cost at appraisal was UA71.89 million, with a foreign exchange component of UA52.03 million. An ADB loan of UA24.39 million and ADF loan of UA 27.64 million was to be used to finance the entire foreign exchange cost, including UA1.53 million for consulting services. The local currency cost of UA19.86 million was to be funded by the Government/EELPA. The Borrower was the Government and the loans were on-lent to EELPA/EEPCo, the beneficiary and Executing Agency, on the same terms and conditions.

2. THE EVALUATION

2.1. Evaluation Methodology and Approach.

2.1.1. The evaluation was primarily based on project and policy documents and interviews with Bank's project staff complemented with findings of the field mission to Ethiopia. During the field mission, consultations were made with various stakeholders such as EEPCo (the Executing Agency) and several other government ministries and agencies. Other development partners such as the World Bank were also consulted. The Industry Desk at the Tigray Regional Administration in Mekele, the major benefactors of the project, provided information on the socio-economic impacts of the project in the region based on surveys conducted in 2003. Information was also obtained through direct observation and participation in the social setting as well as from local newspapers.

2.1.2 An objectives-based evaluation approach was followed using the standard evaluation benchmarks such as relevance, efficiency, efficacy, sustainability, institutional development impact was made. A before and after approach was used to examine the socio-economic development induced by the project. The Bank and Borrower performance was also assessed. Special attention was given to assessing the appropriateness of the intervention and its configuration and implementation for meeting developmental goals of the sector. The socio-economic developments induced by the project, sufficiency of technical design for meeting project objectives and overall impact of the intervention was critically examined.

2.2 Key Performance Indicators

Some project performance indicators were used during appraisal of the project. These include: i) Sector/Area development goals and impacts; ii) Physical project outputs/outcomes; and iii) Socio-Environmental impacts. While quantitative indicators were provided for the technical, operational and financial objectives, the socio-environmental indicators, however, were stated generally in the appraisal document in terms of the extent of substitution of electricity for fuel wood and its impact on the rate of decline in the depletion of land cover and land degradation. In spite of the pivotal role environmental concerns played in setting the objectives of the project, no specific baseline data was provided in the appraisal document to indicate the extent of degradation in the region to serve as a basis for measuring the success or otherwise of achieving the project goals of halting the degradation. This evaluation used national statistics to serve as a proxy for this measure. The achievement of these goals and targets will be analysed in chapter 3 on implementation performance. The achievements of these indicators were shown in the retrospective project matrix set out in Annex 1.

3. IMPLEMENTATION PERFORMANCE

3.1 Loan Effectiveness, Start Up and Implementation

3.1.1 The loan effectiveness was contingent upon two main conditions namely:

- the conclusion of a subsidiary loan agreement between the Borrower and EELPA the implementing agency for on-lending of the entire proceed of the loans on the same terms and conditions on which it had received from the Bank Group.
- the submission to the Bank for approval curriculum vitae of the Project Coordinator.

3.1.2 The loans became effective 11 months after loan approval, due to delays on the part of the Borrower in executing the subsidiary loan agreement. This resulted in the late start up of implementation. Considering the above limited and necessary conditions for effectiveness, *a time bound for rendering the loan effective could have been agreed between the parties with appropriate sanction for non-fulfilment on time to safeguard early loan effectiveness and project implementation. In future, conditionality that may take reasonably longer time to be fulfilled and are not hinged on loan approval should be handled up front during preparation of Country Strategy Paper (CSP).*

3.1.3 The consultant was finally appointed in January 1994, nine (9) months after the appraisal schedule of April 1993, and the review of designs was concluded by 15th April 1994. Several modifications in tower structures and conductor configurations were introduced by the consultant to optimize the project design for least cost, and were approved by the Bank. The PCR attributes additional delays to the late selection of the consultant, the review of project designs, the bidding process and construction works. The 66 kV line contractor for instance had to re-survey the terrain to modify the number and tower span lengths required. *In future, design scrutiny should be thorough for transmission projects in mountainous topography to avoid major design changes during implementation.*

3.1.4 Procurement was undertaken in accordance with ADB's rules. There were some procurement issues on one of the contracts only, which resulted in delays due to disagreement and the ensuing decision processes between the Borrower and the Bank, which culminated in selecting the best-evaluated bidder in compliance with the bidding documents and the Bank rules. The project was completed in June 1998 after 28 months delay compared to appraisal estimates for reasons explained above.

3.2 Adherence to Project Costs, Disbursements and Financial Arrangements

3.2.1 Financing was provided by ADB (UA24.39 million), ADF (UA27.64 million), and the Government of Ethiopia represented by EELPA (UA19.86 million) for a total project of UA71.89 million at Appraisal. The actual project cost was UA70.28 million (accounted by ADB loan of UA20.12 million, ADF loan of UA26.53 million and Government contribution of UA23.63 million). The ADB and ADF loans financed 66.38% of the total project cost and 100% of the foreign exchange cost. There was a saving in foreign exchange cost amounting to UA5.38 million, but a cost overrun on local cost for UA3.77million. The loan balance of UA 5.38 million was cancelled. The physical contingency provision in the appraisal estimate was 10%, given the nature of the terrain over which the transmission line was to be constructed, and the potential for variation in technical specifications. Price contingencies of 5% and 21% were used for foreign cost and local cost components respectively. Both

the physical and price contingencies on local cost were fully utilized (because of the several modifications resulting from the terrain; additional works; and higher costs on local goods and delivery services; claims due to bad weather conditions; etc).

3.2.2. At appraisal, disbursements were targeted to start in mid-1993 and end in 1996. However, due to initial delays in start-up and implementation, actual disbursements started in 1994 and ended in 1999. This resulted in a 36 months slippage in the disbursement schedule compared with the appraisal estimates.

3.3 Project Management, Reporting, Monitoring and Evaluation Achievements

3.3.1 Project management and supervision were satisfactory. The executing agency through its Project Implementing Unit (PIU), headed by a competent project coordinator, managed implementation activities. Progress reports were submitted promptly, and supervisory responsibilities over contractor activities were discharged effectively. EEPCo reported that, aside the delays encountered during implementation, the international and domestic contractors and suppliers for the project performed satisfactorily. The PCR prepared by the Borrower concluded that this 'project is one of the most successful in Ethiopia... and EEPCo, the Contractors and the Consultants are to be congratulated.'

3.3.2 The Bank provided adequate monitoring during implementation. The loan agreement for the project included covenants relevant to strengthening EELPA's accountability and operating performance. At project completion, all covenants had been complied with, except those relating to the tariff study and the re-valuation of fixed assets in operation aimed at bringing tariffs to ensure a 5% minimum rate of return, as well as the reduction of EELPA's accounts receivables and settlement of arrears. Bank's monitoring relating to fulfill the remaining loan conditions particularly those relating to the revaluation of fixed assets was not strong. The need for a Technical Assistance Fund from the Bank to help EEPCo in this regard would have been commendable. At the time of this evaluation, all conditions have been fulfilled although implementation of the recommendations of the tariff study was still pending.

4. PERFORMANCE EVALUATION AND RATINGS

4.1 Relevance of Objectives and Quality at Entry Assessment

4.1.1 The project's rationale to extend the availability of cheap and reliable electricity generated from existing hydropower resources to the northern region of the country was consistent with the Transitional Government's Emergency Recovery and Reconstruction Program for the rehabilitation of the rural economy to contribute to the growth and development of the country, and for addressing the long-term structural problems of underdevelopment. It was also consistent with the Bank's country assistance strategy to reduce poverty, protect the environment and develop the human and institutional resources of the country. Significant in the Government's decision for selecting the project were the high prevalence of poverty in the region as a result of frequent and severe droughts, and environmental degradation exacerbated by the excessive dependence on fuel wood due to the absence of adequate and reliable electrical energy.

4.1.2 The project is based on a feasibility study. The project was appropriately scaled down to fit into the financing package and the country's absorptive capacity. The Bank carried out preparation and appraisal missions effectively. Except that some revision was made on the design during

implementation for optimisation, the project was well prepared and the quality at entry was satisfactory. The project's 230 kV transmission line component has become a vital backbone in the national grid for further extending electricity to other rural communities for promoting economic development and poverty reduction. In consideration of these factors, the project rationale, purpose, and outputs were highly relevant.

4.2 Achievement of Objectives and Outputs: "Efficacy"

a) Policy Goals

4.2.1 The project helped support the Government's policies for economic and social development. The government is particularly committed to reversing the deteriorating economic conditions of the war-affected regions such as the Tigray region. The stated policy goal of the sector at appraisal was to develop the country's hydroelectric potential and transmit power from the generating stations to different regions of the country for economic development. And the aim was to encourage the development of small, medium and large-scale industries and promote commercial activities. These objectives have been achieved with great success as evidenced in the number of new industries that has sprung up in the Tigray administrative area since project completion. The PCR reported that, small and medium scale industries with 11 MW potential demand and 1000 domestic users that had already paid the connection fees were still awaiting connection. At the time of this evaluation, statistics provided by the Tigray Regional Administration indicate that between 1997/98 and 2003, a total of 66 new manufacturing industries were issued Investment Certificates (Table 2) and have started operation. The objectives of promoting industrial and commercial activities in the region have been met successfully following the implementation of the project.

Table 2 Manufacturing Industries (1997/98 -2003)^a

S.No	Zone	Total No. of Industries	Total Investment Capital (Birr)	Total Annual Power Consumption (kWh)
1.	Mekelle Zone	41	681,762,162.12	15,860,349.25
2.	Eastern Zone Adigrat	7	22,658,461.00	539,600.00
3.	Central Zone (Axum)	5	47,771,828.8	175,488
4.	Central Zone (Adwa)	7	58,627,537.2	126,096
5.	Western Zone (Endaselessie)	5	12,833,956.78	456,660
6.	Southern Zone (Alamata)	1	6,560,000.00	=
	TOTAL	66	830,213,945.9	

4.2.2 The number of towns and villages electrified under the project has increased from 17 at the time of the PCR to 40 as at June 2003, exceeding the targeted 20 towns. About 38,500 consumers have access to cheap and reliable electricity and are consuming some 90,183MWh of energy as at 2002. Projects are also underway to electrify some 6 additional towns by 2005. The towns and villages of the region are bustling with commercial activities. Small and Medium-Scale enterprises have sprung up everywhere in the region and the social and economic well being of the people are improving. Without the project, diesel generation sources in Northern Ethiopia would have been insufficient to meet the load requirements of the project area. Without electrification, village and town households would have been denied access to electricity and the cost savings of switching from diesel generation. The growth in social and industrial structures would not have been achieved, and the increased income benefits from employments in the informal sector and medium to large-scale business would not have accrued.

4.2.3 Even though the policy goal did not explicitly specify the magnitudes of economic benefits to be derived from the project, substantial benefits were implied for those households and businesses expected to switch to electricity. Economic development of Mekelle in particular has been rapid after the project with the injection of about Birr 680 million into manufacturing activities alone. Major economic enterprises in Mekelle include the Mesfin Engineering Company – An Automotive manufacturing and assembling company that employs nearly 500 people and has markets within Ethiopia and the African sub-region, Cement Production Company, and the Garment Manufacturing Company which is targeted to provide employment to some 1000 people in the region with the attendant result of income generation and poverty reduction. Before electrification, gross output was growing at below 1% per annum. Production was not developed and industries and services were observed to be inferior without electricity. After electrification, gross output grew at an average of 7% per year, and production activities changed dramatically. Comparable records for the growth and development of Adwa, Axum, Alamata and Adigrat appear to have followed a similar pattern, though less deeper and less significant. But presently, the regional administration is promoting a program to deepen the industrial link between the rural areas and the urban centers with the identification of small scale wood and metal workshops that will participate in the production of Bee-hives and Treadle pumps for honey making and irrigation respectively to be supplied to rural communities engaged in farming activities. Already some 120 wood workshops and 174 metal workshops have been identified in and around Mekelle Town.

4.2.4 The sudden boom in industrial and commercial activity in the project area attests to the superiority of supplying electricity from the national grid as against supply from isolated sources such as diesels generators. The regime of supply from diesel generators saw a huge suppression of potential demand that has been unleashed with the grid supply. The grid system is cheaper, more reliable and often adequate as compared to supply from isolated diesel generators due to higher fuel costs and inconsistent availability of fuel for generation. However, the merits of mini-hydro systems for very remote locations that will require long transmission lines to reach them cannot be ignored. Each scenario though has to be taken on its own merit based on the results of technical, economic and financial analysis.

4.2.5 Not all developments, however, can be attributed to the increased availability of electricity. The Government has been committed to implement its Agriculture Led Industrialization Strategy throughout the country, and in particular, in once deprived regions like the Northern Ethiopia. This commitment has been translated through public and private investments in other socio-economic sectors as well. For example, paralleling the project's implementation and investments in manufacturing and service industries, some large-scale road construction works have already been carried out and still more are underway. The road between Mekelle and Alamata, Mekelle and Adigrat, Bahir-Dar and Mekelle as well as other feeder roads are being reconstructed and sealed to allow all year-round access and regular transport services. At the same time, improved security in the region, which was the battlefield during the Ethiopia-Eritrea conflict after the cessation of hostilities between the two factions, has contributed to the rapid development of the region. Added to these, Government commitment for availing communications infrastructure in the region has made conditions more conducive for commercial development. It was interesting to find communications infrastructure in most of the towns and villages nested in the clefts and troughs of rugged mountains visited during this evaluation. Furthermore, Axum and Lalibella, towns rich in historical and cultural heritage have received a spur to tourism as a result of availability of reliable electricity and also modern airports which allow quick and comfortable visits by tourists from Addis and elsewhere.

b) Physical Outputs

4.2.6 The objectives and outputs of the project at appraisal consisted of (i) 500 kilometers (km) of 230-kilovolt (kV) power transmission line; (ii) 240 km of 132 kV transmission line (iii) a total of 367km of 66kV transmission line (iv) a total of 327km of 15 kV distribution lines (v) 140 km of low voltage distribution network employing some 123 different distribution transformers; (vi) 230kV, 132kV and 66kV substation facilities (vii) logistic and (viii) Consultancy Services. These expected outputs have been achieved with the potential to deliver 150 MW of power to the project area.

4.2.7 The number of towns and villages electrified under the project has increased from 17 at the time of the PCR to 40 as at June 2003, exceeding the 20 towns envisaged at appraisal. Adi Shohu, Adi Godum and Bizet, 3 out of the initial 20 towns outstanding as at the PCR have all been electrified. Again at PCR, only 2,162 of the targeted 30,000 new connections to residential consumers had been achieved, and the 40MW potential industrial demand envisaged was yet to be surpassed. As at 2002, however, there were a total of 32,194 residential consumers with a total annual consumption of 22,561 MWh, and 247 Industrial Consumers with a total annual energy consumption of 48,835 MWh. The total energy consumption for all categories of consumers in 2002 was 90,183.124 MWh, exceeding the appraisal target of 79,000 MWh annual energy consumption 3 years after project completion by some 14.16%. Peak load figures available also show maximum demand exceeding 61.7 MW in 2001.

4.2.8 General maintenance, including checks at substations and transmission towers, is being undertaken. The transmission towers are well maintained, but regular inspection of tower footings for those towers located on hillsides may need to be intensified. The structures at substations and distribution equipment were in good order, but failings in metering equipment have remained largely unchecked. The absence of an online monitoring system and effective communication has also impaired EEPSCO's capacity to optimally manage its network. Access roads to the Alamata and Mekelle substations need to be provided. General graveling of these stations may also need to be improved. Discussions with EEPSCO regional engineers at Mekelle revealed that *there is the need to intensify training for the maintenance crew of the distribution system and also provide incentives to attract and retain a qualified maintenance engineer at the 230 kV Substation at Alamata since the station is a critical link in ensuring the reliability of the system at Mekelle and beyond.*

c) Financial Targets

4.2.9 At appraisal, the financial operating performance of EELPA over the period FY1985–FY1991 was mixed. Financial remittances to Government in the form of reserves administered by government declined after the tariff increases of 1985 when EELPA began to service its own debts. It was, however, unable to generate enough funds to meet a major portion of its Capital Expenditures. Therefore it was targeted that, over the project period, EELPA should be able to generate enough resources to meet its operational costs, meet its debt service obligations, partially finance its capital investment programs and pay dividends to government. Specifically, EELPA was to achieve a minimum rate of return on re-valued fixed assets in operation of 5%, based on the assumption of progressive tariff increases, growth in sales and reduced operational costs. EELPA was to maintain a minimum current ratio of 1.5 and achieve a maximum debt/equity ratio of 1.0. EELPA was also to ensure that accounts receivables do not exceed three months of annual sales.

4.2.10 The PCR reported an improved financial performance for the FY 1993-1998, barring some qualifications relating to fixed assets, goods in transit, provisions for doubtful debts and contingencies that stood unresolved. Actual real operating revenue increased by 52.3% and 9.7 % between 1996/97 -

1997/98 and 1997/98 – 1998/99 respectively, as a result of increased sales and tariff increases of about 10% in 1997/98 (Table 3). After 1998/99, however, operating revenues have stagnated owing to unchanged tariff levels and the effect of drought, which stagnated hydroelectricity generation and hence sales, and a slow down of the economy. EEPCo's strong liquidity position has continued to improve as shown by all the liquidity ratios. Current ratio recorded a high figure of 8.49 in 2000/01 and has consistently stayed above the appraisal target of 1.5. Self-financing ratio has ranged between 0.3 and 1.03, peaking in 1999/00. Debt/Equity ratio has also shown a consistent improvement by declining from 79% in 1997/98 to 65% in 2001/02 due to a build up in retained earnings. EEPCo's debt service coverage ratio varied between 0.64 in 1997/98 and 3.56 in 2000/01. Except for 1997/98, these figures were well above the appraisal projection level of at least 1.5. The blend ADB/ADF loans have contributed in easing the debt burden of the Company. Receivables turnover was 5.7 in 2001/02 and average collection period has dropped below the three months annual sales target to two months annual sales since year 2000/01. Arrears owed by Government to EEPCo have been fully settled as at this evaluation and Government is currently settling its bills regularly on a monthly basis.

TABLE 3: Key Financial Performance Indicators (Past and Projected)

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Ethiopian Year	1990	1991	1992	1993	1994	1995	1996	1997
	ACTUAL	ACTUAL	ACTUAL	ACTUAL	ACTUAL	PROJ.	PROJ.	PROJ.
FINANCIAL STRENGTH								
Self Financing Ratio	0.3	0.59	1.03	0.43	0.39	0.47	0.37	0.36
Current Ratio ^a	1.73	6.44	8.36	8.49	7.75	5.39	4.98	4.75
Quick Ratio	1.31	4.7	6.09	7.15	5.44	2.89	2.43	2.09
LT Debt to Equity	0.43	0.58	0.56	0.56	0.61	0.53	0.46	0.41
Total Debt to Equity	0.79	0.68	0.63	0.62	0.65	0.55	0.48	0.43
Interest Coverage	7.1	9.65	14.25	16.56	21.76	27.89	11.86	12.47
Debt Service Coverage	0.64	1.17	2.56	1.89	3.56	3.79	3.35	3.56
PROFITABILITY RATIO								
Gross Margin	0.62	0.66	0.61	0.58	0.59	0.51	0.44	0.41
EBITD Margin	0.52	0.5	0.57	0.55	0.55	0.47	0.4	0.37
Operating Margin (EBT)	0.45	0.44	0.53	0.51	0.53	0.46	0.37	0.34
Net Profit Margin	0.17	0.13	0.24	0.31	0.53	0.46	0.36	0.33
Total Expenses Margin	0.55	0.56	0.47	0.49	0.47	0.54	0.63	0.66
MANAGEMENT EFFECTIVENESS								
Return on Total Net Assets	0.04	0.04	0.05	0.05	0.06	0.05	0.04	0.03
Return on Equity	0.08	0.08	0.1	0.1	0.14	0.13	0.11	0.11
EFFICIENCIES								
Revenue Per Employee	79	86	88	89	103	110	119	128
Net Profit Per Employee	28	29	39	39	55	50	44	44
Receivables Turnover	3	3.8	3.6	5.2	5.7	5.7	5.7	5.7
Inventory Turnover	0.9	0.8	0.8	1.4	1.7	1.7	1.7	1.8
Total Assts Turnover	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08
Average Collection Period.	120	95	95	65	60	60	60	60

Source: Ethiopia Electric Power Corporation/World Bank Country Office

4.2.11 The revaluation of fixed assets that was required to form the basis of a tariff study aimed at bringing tariffs to achieve a 5% minimum rate of return on fixed assets in operation has been completed under the World Bank's Energy II project, and has been approved by the Government. The tariff study has also been completed since June-2003, and is currently under discussion by various stakeholders. The government had already agreed that based on the outcome of the discussions, it would implement by 31st December 2003, measures that will enable EEPCo to achieve and sustain a 25% self-financing ratio and to maintain debt service coverage and current ratios of 1.5 times and 2:1 respectively. Hitherto, EEPCo's return on equity grew from 8.0% in FY1997/98 to 14.0% in 2000/2001. Return on total net assets in operation attained the 5% covenanted figure in 1999/00 and

exceeded it to 6% in 2001/2002. It could be seen that the overall financial performance of EEPCo has remained strong in line with appraisal projections and that barring the implementation of the recommendations of the recently concluded tariff study, all the major loan covenants associated with the project have been complied with as at this evaluation. *The long delay in fulfilling the condition on asset revaluation and tariff study to arrive at an acceptable tariff policy could have been avoided with a technical assistance from the Bank on the issue.*

d) Institutional Development objectives

4.2.12 Institutional strengthening objectives have been achieved with the re-establishment of Ethiopia Electric Light and Power Authority (EELPA) as Ethiopia Electric Power Corporation (EEPCo) in June 1997, and the revision of its management structures to give it greater managerial and financial autonomy in accordance with the requirement of the loan covenants.¹ EEPCo has also decentralized its operations to eight regional offices. However as at this evaluation, the regional offices, if they are to be judged by the standards of the Tigray Regional Office in Mekelle, will need adequate human and material resources. The full implementation of the on going management information system, including an accounting module (under the World Bank's Energy II Project), will go a long way in supporting the operation of the regions as distinct profit/cost centres. EEPCo's current management competence however is called into question against the backdrop of publications gleaned from the 30th November 2003 edition of the Ethiopian Herald,² and confirmed by the Ministry of Infrastructure. An article published by this paper, indicates that, a Management Firm has offered to takeover the full or partial management of the Ethiopian Electric Power Corporation. According to the publication, the firm has finalized and submitted its business plan and performance assessment of EEPCo to the Ministry. Discussions are currently underway between the Ministry and the Firm on the various management handover modalities and duration of the contract.

4.2.13 The PCR reported a high turnover among professional staff as a result of lack of adequate motivation, internal training and career progression. A Manpower Planning and Development Division set up to address these concerns has been achieving moderate success. Consultant guidance for dealing with quality control, processing design approvals, contractor problems, and testing equipment also provided EEPCo with valuable experience for improving its implementation efficiency. However, EEPCo will need to redouble its efforts in attracting and maintaining qualified professional staff in the regions. As at December 2003, EEPCo's staff strength stood at 8,704, an increase of about 491 new staff above that at PCR; and comprises 7,411 males and 1,293 females.

4.2.14 The financial covenants have also achieved their aim of creating a self-sustaining commercial entity. Actual tariff adjustments at project completion have been fairly sufficient, thanks to the mild inflationary pressures following project completion, and sales growth following the expansion of EEPCo's distribution network. The Bank's loan condition relating to the appointment of a reputable private accounting firm to audit the annual accounts of EEPCo has helped to strengthen the financial and accounting systems in EEPCo. Audited accounts are now issued on schedule compared to the situation before the project.

4.2.15 The operation and regulatory functions of the power sector have also been delineated and liberalized to promote private investment. Accordingly, proclamation No. 86/1997 has been enacted and the Ethiopian Electric Agency established to regulate the activities of electricity supply. Electricity

¹ See Annex 2 for Current Organizational Structure of EEPCo.

² The Ethiopian Herald. Sunday Edition: 30th November 2003. Vol LX No. 069.

Operation Regulations issued in May 1999 provides details on licensing of power supply operations, rights and obligations of licensees and customers, electricity pricing and standards of safety and quality of services. The enactment of the Investment Proclamation No.37/1997 and 116/1998 provide for the participation of private investors in the production of electric energy. Its provisions embrace the development of small and medium scale capacity from diesel, coal, gas, hydro and other sources. Attractive incentive packages in the form of duty and profit tax exemptions are guaranteed.

e) **Social Objectives and Targets**

4.2.16 Given the socio-economic and environmental conditions prevailing in Northern Ethiopia at the time of project formulation, the objectives set for the project were unequivocal and consistent with the country's developmental aspirations for the region. The targets for availing cheap and reliable electricity to 20 towns in the region for domestic lighting and industrial and commercial activities were realistic. But on hindsight and from evidence on the ground, the second aim of replacing fuel wood with electricity under the project seem to have overlooked several other factors, particularly that of affordability and traditional values. To the average consumer in a country with an average income per capita of US\$100, an average tariff of about US\$ 0.056/kWh (Birr 0.4583/kWh) is still considered extremely high. Hence, most domestic consumers interviewed would rather use electricity for lighting but not for high energy consuming activities such as cooking. This is true even of medium income white-collar residents of Addis. *The issue of affordability coupled with problems of reliability of the electrical system due to the overloading of the distribution network particularly in urban Ethiopia, is contributing to the continuous use of fuel wood for cooking.*

4.2.17 An important social impact of the project is employment creation and income generation. As stated earlier, over Birr 800 million (over Birr 600 million went in the manufacturing industries in Mekele alone) have been injected into the economy of the Tegray region following the completion of the project in 1998. Jobs created by these investments have helped to reduce income disparities and improved the quality of life of the people. Industrial activity in Mekelle in particular has been accompanied with the development of other social infrastructure. New city roads were under construction. In the health sector, the project has facilitated the establishment of new referral hospitals and clinics. As a result, women and children, the most vulnerable of the poor, have benefited from the project in terms of better access to health care facilities. In education, the project has facilitated the Mekele University and colleges that have created opportunities for adults to improve their educational backgrounds through evening classes. The availability of electricity has helped in making potable water available to the population in the major towns of the project area. Tourism in the region has also been given a boost and the number of registered tourist rooms has increased, thanks to the availability of reliable electricity and a modern airport.

4.2.18 There has been rapid urbanization in small towns like Wukro and other villages electrified under the project. Numerous residential houses were under construction in several towns particularly Mekele and Wukro and workmen were seen constructing town roads and schools. In Wukro, brisk commercial activities were observed in the markets and shops as villagers brought their wares on donkeys' backs to market centers. This development is a great relief to the Government who, in the past, had tried to resettle the mountain dwellers in urban communities in order to make relief items accessible to them during periods of drought and famine. Rapid urbanization will now afford the most vulnerable groups, opportunities to access schools, health facilities and other social amenities, which in the past were almost inaccessible to the sparsely populated mountain dwellers of Northern Ethiopia due to the harsh terrain and lack of access roads. Lighting was another significant benefit to the very poor in small villages because it has enabled more activities in the evenings and helped to extend

commercial activities into the night and thus boost their income generating capacity. Electricity has also permitted the use of appliances such as televisions and radios. Households were reported to be paying on average Birr 70 per month for electricity, compared with the alternative cost of using kerosene for lighting of approximately Birr 150 per month.

4.2.19 The project was gender neutral with no stated objective to assist women during or after implementation. The benefits from electricity accrue largely in the form of opportunity labor savings, enhanced social interaction, and broadened work and other activity options. The salient objective of replacing fuel wood with electricity so as to halt the environmental degradation that was taking place held a great social potential especially for the women of Ethiopia in general, and those of the project area in particular. The PCR reported that, the use of electricity operated Injera cookers had picked up due to a fall in price, and was being constrained only by the lack of high capacity energy meters in the houses. This accession at best can be considered an understatement based on the evidence on the ground as at this evaluation, which confirmed that, these high-energy meters have now been installed. Even though no disaggregated statistics were available to indicate the extent to which electricity has replaced firewood in cooking in the region, national statistics released by the Woody Biomass Inventory and Strategic Planning Project indicates that, biomass fuels are still very popular in Ethiopia.

4.2.20 As stated earlier, more than 90 percent of Ethiopia's current total energy consumption is fuel wood; and charcoal comprise 78% with dung, crop residue and biogases comprising a further 16.4%. Within the Ethiopian household sector, biomass fuels contribute a massive 99.4% of the total household energy. The importance of biomass energy in the rural sector is unlikely to diminish in the foreseeable future due to policy issues on electricity tariff of cost recovery and the affordability of electricity by the most vulnerable groups, the rural poor. The social impact of this continuous dependence on fuel wood on the women of Ethiopia was vividly captured by an article titled, "Unable to Tap Power of the Nile, Ethiopia Relies on Fuel Carriers"; written by Roger Thurow in the Wall Street Journal and culled in the Ethiopian Herald edition of 30th November 2003. Quote, " Late every afternoon, as the sun begins to set, the traffic thickens on the roads coming down from the forested hills around the capital city. Not with cars, but with as many as 15,000 women carrying bundles of branches, leaves and twigs weighing between 70 to 100 pounds each. Their pace is slow, stooped trot, propelled by the weight of the load balanced on their shoulders. The bundles are more than six feet wide, wider than the women are tall. By the time the women reach the city markets, it is dark and they have covered as many as 10 miles on foot. If they are lucky, they will receive top price for their bundle: about 70 cents. These are Ethiopia's women fuel-wood carriers," unquote.³ *A more pragmatic approach to resolving issues of accessibility and affordability of electricity by the most vulnerable groups will therefore need to be adopted in order to make an observable impact on the social status of Ethiopia's women and on the environment.*

4.2.21 Even though, the lifeline pricing system inherent in the prevailing tariffs aims at addressing such affordability concerns, *special concessions may need to be designed for low income consumers through an affordable flat rate tariff for a reasonable level of consumption to encourage the use of electricity instead of fuel wood for cooking.* Additionally, *the Government in consultation with other agencies in energy and environment such as the Rural Energy Development and Promotion Centre should (a) continue to design and widely distribute energy saving cookers and furnace to the urban poor and rural population for economy and efficiency and (b) take an aggressive approach to the marketing of the electric Injera cookers in all urban areas giving cognisance to pricing and affordability as a way of encouraging the use of these devices.*

³ Ethiopian Herald, Vol 4. No. 187. Nov 30, 2003.

f) Environmental Objectives

4.2.22 The project generally had no significant adverse impact on the environment. During this evaluation's visit to selected project sites, no adverse environmental impacts were observed. The transmission line was for the most part above minimum height clearances and built over clear areas. Clearance of foliage along the transmission route is a routine maintenance task. Even so, because the transmission route traverses steep hillsides and mountainous country of savannah and semi-desert region, no significant vegetation is affected. The substations are fenced off, and humming noise from transformers is not audible outside the substation fence boundaries. Personnel safety measures against accidental high-voltage electrocution were incorporated into the substation and transmission line designs. The only hazard observed was with respect to the nature of connection in rural domestic premises. Distribution wires supplying most residential premises visited were seen hand twisted with wire coming from meter cables on distribution boards without any insulation whatsoever. These connections were often within reach of the residents and serves as a great danger to their security. The attention of the regional office in Mekelle was drawn to this hazard.

4.2.23 The expected positive environmental impacts related to halting environmental degradation through the substitution of electric Injera cookers for fuel-wood. This impact though will require greater access of electricity to the very poor and a pragmatic solution to issues of affordability by the poor to register any significant impact on the environment. As discussed above under social impacts, fuel wood use is still very common in both urban and rural Ethiopia. Ethiopia's energy sector has and is still dominated by biomass relative to modern forms of energy. The limited supply of modern forms of energy and their high costs relative to the low average income per capita (US\$100) has reinforced the dependence on biomass energy. This pattern of consumption has led to increasing deforestation, shortages of wood fuel and degradation of rural ecosystems. The electricity sub-sector is characterized by (i) low rate of the population's access to power supply (ii) inability to connect large new commercial and industrial customers, due to the overloading of the distribution network; and (iii) high cost of future generation investments. Currently about 13% of the population of Ethiopia has access to electricity (i.e. when all persons living in electrified areas are counted); but the number of people actually connected to electricity supply constitutes about 6% of the population. Constraints include insufficient supply (generation) of power, unsatisfactory supply quality or poor supply reliability and weak customer service.

4.2.24 Perhaps a contributory factor to the failure to attain environmental objectives of the project is the large number of very small settlements nested in the mountains of the northern region along the routes of transmission lines but not connected to the system, obviously for financial and economic reasons. Such settlers with very indigenous ways of life contribute in no small way to the depletion of land cover and degradation of the environment. Fortunately, the shield wire scheme is an evolving technology that is gradually gaining acceptance in many developing countries for addressing the problem of a cost effective means of effective power supply to small villages and communities along HV transmission line routes, up to a distance of 100 km from the HV/MV transformer station. This technology consists of the insulation of the shield wire(s) of an HV line and the energization of the wire(s) at MV (10 to 34.5 kV) from the closest transformer station to supply villages along the line routes by means of standard MV/LV distribution transformers connected between the shield wire(s) and ground. The technology has been used successfully in Northern Ghana for supply of single-phase and 3-phase loads from the two insulated shield wires of a 161 kV line. It has also been used in Laos and other developing countries. However, the shield wire circuits suffer from a high incidence of outages caused by their susceptibility to lightning strikes. Voltage is also variable due to the higher than expected ground resistance and varying ground moisture. Improvements to the reliability of the

shield wire circuits are ongoing and continue to be addressed by researchers. The shield wire system is considered sustainable at the limits of the supplying transformers. *The Bank needs to consider this technology in its subsequent interventions in rural electrification studies and projects.* In addition, *other alternatives of new and renewable energy sources such as mini-hydro, wind and solar energy sources need to be exploited cost effectively to supply remote rural areas at affordable tariffs.*

g) Private Sector Development Objectives

4.2.25 The project has been very successful in promoting the development of the private sector. As analysed under the section on policy goals, over 66 manufacturing industries have sprung up in the Tigray administrative region since the completion of the project, injecting over 800 million Birrs into the local economy. Additionally, numerous small and medium scale industries could be sighted in the towns and villages of the project area and commercial activity is brisk. The project has facilitated the promotion of small-scale industries in the production of Bee-hives and Treadle pumps for honey making and irrigation by the regional administration. Institutional reforms promoted by the project have led to further liberalization of the energy sector in Ethiopia. Power generation, transmission, distribution, and supply in isolated areas have been liberalized in order to complement EEPCo's efforts in the interconnected system. Presently, the government is in discussion with potential investors in the Gojeb hydropower plant – a 102 MW plant slated for commissioning in 2008.

4.3. Efficiency

4.3.1 The project cost was originally estimated at UA71.89 million comprising a foreign exchange component of UA52.03 and a local component of UA19.86. The actual project cost was UA70.28 million. There is a total of UA5.38million unutilised amount in foreign currency costs but a cost overrun of UA3.77 million in local currency costs. Design improvement during implementation has greatly contributed to optimise the cost effectiveness of the project. Implementation followed appraisal guidelines but registered a time overrun of 28 months. Since completion, operational efficiency has been satisfactory. The maintenance regime is also sound, but could be improved with a more regular periodic maintenance discipline.

a) Financial Rate of Return

4.3.2 At appraisal, the Financial Internal Rate of Return (FIRR) was estimated at 11.55% using incremental costs and revenues resulting from the implementation of the project. The estimated FIRR was found to be slightly sensitive to the project cost and to tariff. The PCR recalculated the FIRR to be 11.42% based on actual project cost and actual consumption of the project area in the first year of operation (1998). This PPER has maintained the same assumptions for calculating the annual operating and maintenance costs since actual O & M costs for the project area alone were not available, but has used actual consumption and actual tariffs in the project area for 1999-2002. For 2003 and beyond, an average tariff of US\$0.12/kWh, an equivalent of Birr 1.0334/kWh⁴, is considered as the LRMC of Power in Ethiopia as used at appraisal and in the PCR. Demand forecasts for 2004 and beyond are those provided by EEPCo, and summarized in Annex 3.⁵ The forecasts for 2004 and beyond for the

⁴ The Dec 2003 currency conversion rate of Birr8.612 to US\$1.0 has been used.

⁵ Actual Growth rates in all the load centers far exceeded the forecasts made by EEPCO in 2001, which has not been updated as at Dec 2003. Hence actual consumption is used where available. But the under estimated forecasts for 2004 and beyond are maintained. The FIRR should actually exceed the PPER estimation if realistic demand forecasts based on observed growth rates for the past four years are used.

project area are obviously understated, looking at the growth rates that were registered in the past 4 years. The notes and assumptions used for the recalculation of the FIRR are presented in Annex 4. The post evaluation FIRR was 12.40 % and compares favourably well with those from both the PCR and Appraisal, confirming the financial viability and efficiency of the project (Annex 5).

b) Economic Rate of Return

4.3.3 The appraisal estimates of the EIRR were calculated taking into account the effect of replacing alternative sources of energy with electricity. Electricity sales in the project area were forecasted based on the potential number of new consumer applications likely to be received, and EEPCo's capacity to implement connections. Capital investment cost, local material, transportation and labour costs were converted to economic costs based on conversion factors applicable in the country. Economic benefits were calculated based on accruals to all customers with and without the project. The Appraisal EIRR was 16.00% with slight sensitivity to investment costs and expected benefits. The PCR recalculated the EIRR to be 17.75% using the conversion factors prevailing at the time to convert costs and benefit to economic values. This PPER maintains all the assumptions and conversion factors of the PCR, but uses actual values of consumption and tariffs for 1999-2002, and recent demand forecasts for 2003 and beyond (Annex 4). It is worth noting that, due to the difficulty in gathering detailed project performance data, economic benefits could not be clearly segregated into Economic revenues accruing from the project and Economic consumer savings. Economic consumer savings could have been segregated further on the basis of new connections to consumers who without the project, used electricity from diesel power generators and others who used kerosene & fuel-wood for lighting and other purposes; and economic consumer savings for those representing additional consumption of electricity induced by the cheaper price of electricity relative to other energy alternatives. The PPER's EIRR, calculated with due consideration of the above, is 17.52%, also well within the Appraisal and PCR values (Annex 5).

4.3.4 The resulting FIRR and EIRR reconfirm the financial and economic viability of the project. The estimates are considered reasonably robust since they are calculated 5 years after commissioning of the transmission line, and assume future growth in demand at higher than the historical trend. It should be noted that, externalities have not been quantified in the computation of EIRR due to lack of quantifiable data. The EIRR would definitely be higher if all the socio economic benefits in the region were quantified and computed.

c) Sensitivity Analysis

4.3.5 A sensitivity analysis was carried out and the results raise serious issues that require the close attention of the Bank. All the Appraisal, PCR and PPER estimates of FIRR and EIRR have been based on the LRMC of US\$ 0.12/kWh, and concluded that the project is both financially and economically viable. Five years after project completion and operation, this tariff level has not been attained and from evidence on the ground, its attainment seems a long way away. The World Bank's Rural Electrification Project component of its Energy Access Project based its analysis in 2001 on a US\$ 0.06/kWh tariff rate, which is considered as the observed consumer's willingness to pay. An analysis of the NEPTP using the consumer's willingness to pay of US\$ 0.06/kWh (Birr 0.5167/kWh), yielded a FIRR of 5.04% and an EIRR of 11.30%, indicating that at this tariff level, the project is financially not viable but economically, marginally viable (Annex 6). It could be sufficiently viable if all externalities were factored in the calculation. Meanwhile, the prevailing average tariff of about US\$ 0.053/kWh (Birr 0.4583/kWh) as at December 2003 is still below the observed consumer's willingness to pay.

4.3.6 Hence, even though the government has expressed the willingness to implement the recommendations of the recently completed tariff study following the completion of the revaluation of fixed assets, moving from the present tariff level of Birr 0.4583 to the LRMC of US\$ 0.12 (Birr 1.0334/kWh) requires an increase of over 100%. Such a tariff increase for a population that already considers affordability as an issue will be a difficult feat to achieve from both the political and the social perspective. *It is, therefore, very important for the Bank to proactively monitor the development of an acceptable tariff policy in Ethiopia that will ensure affordability and safeguard the viability of investments. It is also important that the Bank increases its financial assistance and enhances its catalytic role to attract private sector investment for the development of the power infrastructure in countries such as Ethiopia, which has huge hydropower potential.* Such potential should effectively be exploited in the long run with due consideration to regional integration to make the investment viable. Meanwhile, *investments in transmission and distribution systems should be given particular attention in order to improve system reliability and increase the utility's consumer base and achieve economies of scale so that the utility's inefficiencies are not passed over to consumers through tariff increases.*

4.4. Institutional Development Impact

4.4.1 To a large extent the institutional development efforts of EEPCo has been positive as a whole even though there remain a great deal more to be done. The revision of EELPA's charter of incorporation that has led to its creation as EEPCo has helped to rejuvenate the organization into a more managerially and financially autonomous commercial entity that no longer has to wait for government subventions to operate. EEPCo now generates sufficient funds to cover its operations, service its debts without recourse to government, finance at least partially its capital investment programs and pay dividends to government. The organizations capacity for planning, policy analysis and service delivery has been enhanced with the achievement of managerial and financial autonomy. The restructuring of EELPA's management and indeed the whole organizational structure has created clearer organizational roles that reduce role ambiguities and role conflicts. These are all positive impacts that have been made possible by the organizational strengthening objectives of the project addressed through conditionalities. Today the Project Implementation Unit of the NEPTP has been revamped to form the Ethiopian Rural Electrification Project Implementation Unit that is in charge of the Rural Electrification component of the World Bank's Energy Access Project. The restructuring also led to the creation of the Manpower Development and Planning Division under the Human Resources Department that is addressing issues of staff under motivation and succession planning. Decentralization into the regional offices with some degree of operational autonomy, has contributed to improved service delivery as well as billing and debt collection, which also accounts for EEPCo's improved accounts receivables and liquidity position.

4.4.2 With all the improvements registered so far, current access to electricity of 13% (actual connection of less than 6%) of total population continues to be abysmally poor for a country with so much potential in both hydro and thermal resources. Of the reported 30,000MW hydropower potential the country is believed to have, only 528MW, representing about 2% of the total, has been harnessed. Ethiopia's electricity sub-sector continues to be plagued with low rates of access, slow pace of connections of new commercial and industrial consumers due to an overloaded distribution system and high costs of future generation investments. Added to these, the expansive nature of the country and the rugged terrain of the mountainous north and east render transmission and distribution investment costs and indeed any infrastructure development projects such as roads and telecommunications, abnormally high, particularly to populations outside Addis Ababa and other major towns that are sparsely dispersed over the expansive mountains of the north. Perhaps these and other considerations underscore the Government's desire to bring in foreign management contractors to help revamp the

management of the corporation. The Bank should monitor new developments in EEPCo's management structure in order to exploit new business opportunities (such as private sector investment).

4.4.3 The recent reforms in the regulatory and policy environment of the power sector in Ethiopia engendered by the project have both positive and negative impacts. Firstly, given the myriads of challenges faced by the energy sector in Ethiopia, the dismantling of the erstwhile Mines and Energy ministry and the placement of policy and oversight responsibility for energy under the new Ministry of Infrastructure, which also have responsibility for Transport, Construction, Post and Telecommunications, is to say the least, rather incongruous. One would have expected a separate Energy Ministry to address the critical problems faced by the sector. Secondly, where as the establishment of the Ethiopian Electric Agency has a positive impact on the sector by its regulatory and investment promotion functions, the number of players in the sector and the linkages between them seem rather diffused.

4.4.4 Aside the ministry, the regulatory agency and the operator, which is EEPCo, there is also the Ethiopian Rural Energy Development and Promotion Center, the Environment Protection Agency and the Woody Biomass Inventory and Strategic Planning Project. These all have defined roles that sometimes overlap and create unnecessarily long bureaucracies that could hamper the effective operation of the sector. Such functional duplications often lead to human resources, such as knowledge and expertise and other material resources, being so thinly spread across the various sector agencies that the maximum utilization of resources is not achieved. *There is need for a special study to streamline the roles and responsibilities of the various institutions and agencies handling energy related activities in the country.*

4.5 Sustainability

4.5.1 **Government Commitment:** The Government's commitment to the project has been amply demonstrated throughout the project cycle and is evidenced by its compliance with almost all the loan conditions as at this evaluation, relating to EEPCo's formation and restructure, settlement of outstanding arrears, policy and regulatory reforms in the power sector and currently efforts at strengthening EEPCo's management through a management contract. A salient loan condition relating to the implementation of recommendations of a tariff study for tariff adjustments though remains outstanding. Yet assurances given by Government in the recent past gives hope that, it will be resolved soon. Government's commitment to the power sector generally, is further seen in efforts at liberalizing the sector for private sector participation and the creation of an institutional framework for facilitating growth in the sector. Ethiopia now seems poised for private participation in the energy sector. The enactment of the Investment Proclamation No. 37/1997 and 116/1998 provide for the participation of private investors in the production of electric energy. The provision in the proclamations embraces the development of small and medium scale capacity from diesel, coal, gas, hydro and other sources. Council of Ministers regulations No. 7/1996, as amended in No 36/1998, extends attractive package of incentives in the form of duty and profit tax exemptions. The investment law coupled with the new regulatory framework in the energy sector is believed to be conducive for private investments in the sector. The current political stability in Ethiopia will hopefully continue to ensure an uneventful operation of the project for economic development.

4.5.2 **Technical Soundness:** The sustainability of the transmission and distribution components depends on the technical soundness of the solution, generation sufficiency, optimal load management, maintenance, and EEPCo's investment capacity. The technical solution of the project was robust enough to withstand any perceived risk over the life of the project. There is sufficient capacity to

contain the load growth anticipated in the project area. The only cause for concern is the radial nature of the 230 KV Line from Bahir-Dar to Alamata and to Mekelle. This arrangement contributes to lower the systems reliability since any line fault that results in an outage takes out all the rest of the system beyond the fault. Secondly, present power requirements of the project area amount to just about 2% of the total Sales in Ethiopia. Yet during the drought period of 1998/99, EEPCo had to resort to Load-Shedding throughout the country, leading to a slowdown in growth rates and in sales for the two subsequent years. The projects sustainability, therefore, depends very much on hydrological conditions prevailing in the country at any time. EEPCo is now investing in new hydropower plants in Gilge Gibe, Aba Samuel and Tekeze, which are expected to add 184MW in 2004, 300MW in 2007 and 15MW in 2007 respectively. Though these capacity expansions serves to secure supply, the concentration in hydro is a reasonable cause for worry for a country that is so drought prone. The Urban Distribution and Load Dispatch component of the Energy Access Project mentioned earlier which includes the reinforcement of the telecommunication system and installation of a SCADA system will certainly improve load management and contribute to system reliability by way of reducing the number of outages and reducing outage time.

4.5.3 Operations and Maintenance: O&M requirements are being met and power lines and substations are being kept in healthy conditions. The improved financial performance of EEPCo contributes to its investment capacity to meet expansion, upgrading, and maintenance requirements. EEPCo has qualified engineers and technicians but more are needed particularly in the regions. There are continuous capacity building programs to strengthen technical skill. *But appropriate incentive measures are required to assign and retain engineers in regional stations.*

4.5.4 Community Awareness and Owership: The project's sustainability is further guaranteed by the degree of community ownership exhibited by the beneficiary communities and Government. Project benefits accruing to the beneficiary communities have been adequately elaborated under Social and Economic impacts. The growth of industrial and commercial activities, the provision of social infrastructures such as school, hospitals, potable water and the mushrooming of micro-industry in woodworking, metalworking, auto-mechanics and bakeries are developments that will be safeguarded by the community. Indeed the Tigray Regional Administration, reports a barrage of complaints/requests from towns and villages within the projects area who are yet to be connected, signifying the value placed on the project by the beneficiaries.

4.5.5 Financial and Economic Viability: This have been proven by the recalculate FIRR of 12.40% and EIRR of 17.52%, which are higher than the 10% cost of capital prevailing in Ethiopia today. The high profit performance of the corporation is expected to continue following the Government's commitment to implement the recommendations of the recently completed Tariff Study that aims at adjusting tariffs to achieve a 5% rate of return on revalued fixed assets in operation. *There is need to rationalize on costs and improve supply efficiency to avoid passing over the utility's inefficiency on consumers through tariff increases.*

4.5.6 Institutional Strength: Institutional strengthening impacts are likely to be sustained with the continuous emphasis being laid on capacity building in other donor funded projects and the Government's efforts at injecting foreign assistance into EEPCo's management. Results of manpower development efforts are also likely to improve morale and enhance staff performance. Experience of various project implementation units attached to on-going generation and transmission and distribution projects are likely to contribute positively to institutional capacity building.

4.5.7 Social and Environmental Viability: Current reforms to liberalize the economy will hopefully help jump-start the economy by attracting private investments to create employment, reduce poverty and hence create demand for electricity. The Government may need, however, to expedite actions in the liberalization of the economy. Adverse environmental impacts have been negligible. But expected positive environmental impact of reducing fuel wood use and halting environmental degradation is yet to be realized. Pragmatic efforts aimed at rationalizing tariffs for the most vulnerable groups to increase their affordability, and an aggressive marketing of the electric Injera cookers, will be required to make an observable difference in the environment. As stated earlier, *other renewable sources need to be studied to supply remote areas cost effectively and at affordable tariffs.*

4.5.8 Risk Factor: The unusually difficult terrain of the project area is a critical risk factor that seems to have been competently handled by the project formulators and implementers. However another salient risk to the sustainability of the project that seems to have been overlooked, even though external, is the unusually high concentration of Ethiopia's energy resources in hydro generation. For a country that is so prone to drought, such a high concentration of commercial energy sources jeopardizes the energy security of the country. This problem became evident in 1997/98 and 2001/02 when EEPCo had to resort to Load-Shedding because of the impact of drought on the water levels in hydro generating facilities, resulting in the erosion of customer confidence in supply reliability. *The Government may have to consider alternative sources of commercial electricity to diversify its sources of supply.*

4.5.9 Exogenous Factors: Exogenous factors, such as hydrology, political stability and availability of donor support are, therefore, critical for the sustainability of the project and indeed the whole electricity sub-sector. Stability in the political environment to ensure the continuation of current sector policies is also critical. And finally the continuous technical and financial support provided by Ethiopia's development partners in the energy sector is indispensable given the magnitude of assistance donors provide in the sector. The ADB/ADF, the World Bank/IDA, and EIB will continue to be indispensable partners in the energy sector.

4.6 Aggregate Performance Indicators

The project was appropriate for achieving its purpose, and has proved to be a great success in its performance. Difficult terrain impaired implementation and hydrology threats and an economic downturn, impacted on project performance, but did not prevent the overall achievement of project purpose. Based on the positive outcomes, the project is rated satisfactory (Annex 7). The assessment is attributable to the strengthened financial performance of EEPCo and operating performance of the project since its completion in 1998. The focus of evaluation was broadened, and more emphasis was given to the achievement of project purpose and socio-economic and development impacts. Shortcomings were registered mainly in Institutional Development impacts at both the national and Agency level as analysed by government's continuous search for foreign managers; and the achievement of environmental impacts, which seems far from sight. The factors affecting implementation performance and outcome are summarized in Annex 10.

4.7 Borrower Performance

The Borrower's performance is assessed satisfactory (Annex 8). Barring implementation delays, which led to a 28-month time overrun, costs were strictly adhered to leading to a cost under run on foreign costs and a minimized cost overrun on local costs. The Borrower adequately managed project implementation, and produced quarterly reports on time. The stronger performance of the Borrower is attributable more to operational performance and the near fulfilment of all the loan covenants that were outstanding as at PCR.

4.8 Bank Performance

The Bank's overall performance is assessed satisfactory (Annex 9). The technical feasibility of the project was reviewed and project design was consistent with least-cost development considerations. Provision was made for further review of designs by consultants. Procurement and contracting were carried out in accordance with competitive bidding procedures and with appropriate supervision. Monitoring through field missions was adequate. Detracting from the Bank's performance was (i) an error of judgment made at appraisal pertaining to an unspecified time frame for meeting loan effectiveness conditions and the inaction on the part of the Bank during the time of loan ineffectiveness, which was a significant factors affecting implementation schedule; and (ii) the absence of Technical Assistance in meeting the requirement for revaluation of fixed assets and the tariff study which were necessary for streamlining the tariff policy.

5. LESSONS, RECOMMENDATIONS AND ACTION PLAN

5.1 Lessons

The key lessons learned from the Project are:

- (i) A good front end design process could help revise design considerations, including provision for variable tower heights, tower spans, and tower support structures, for major transmission projects in regions with mountainous topography. Detail design scrutiny by the Bank in its effort at arriving at the most optimal technical and cost effective design prior to implementation helps to avoid undue implementation delays (paras. 1.2.2, 3.1.3);
- (ii) An unusually long period between loan approval and loan execution contributes to delays in loan effectiveness and project implementation (para. 3.1.1);
- (iii) The absence of a reasonable time frame for meeting loan conditions required for loan effectiveness with appropriate sanction could potentially impair the implementation with regard to scheduling and the availability of funding (para. 3.1.2);
- (vii) Loan conditions that place undue technical and professional demands on the Executing Agency such as the revaluation of fixed assets and the Tariff Study, stands the risk of non-compliance without the appropriate Technical Assistance package (paras. 3.3.2 and 4.2.11);
- (viii) A strong Government commitment is very critical for the successful implementation and performance of projects (paras. 4.2.5; 4.5.3);
- (ix) Broad project objectives such as improving the economic status of women and halting environmental degradation, whose achievements require multi-sectoral interventions, also require a multi-sectoral collaboration to attain (para. 4.2.20);
- (ix) Achievements of Institutional Development impacts should be considered within the broader national context (para. 4.4.4);

- (x) A more pragmatic approach to resolving issues of accessibility and affordability of electricity by the most vulnerable groups will need to be adopted in order to make an observable impact on the social status of Ethiopia's women and on the environment (para. 4.2.21).

5.2 Recommendations

The main recommendations are:

For the Bank

- (i) Loan conditions that could potentially impair the efficacy of implementation with regard to scheduling and the availability of funding should be given reasonable time bound with appropriate sanction to avoid discretionary compliance on the part of the Government. Loan conditions should be realistic to be fulfilled within a reasonable time bound. Otherwise, conditionality that takes reasonably longer time to be fulfilled and is not hinged on loan approval should be handled up front during preparation of Country Strategy Paper (CSP) (para. 3.1.2);
- (ii) Loan conditions that place undue technical and professional demands on the Executing Agency such as the revaluation of fixed assets and the Tariff Study, should be accompanied with the appropriate Technical Assistance package to acquire the expertise and ensure their realization (paras. 3.3.2 and 4.2.11);
- (iii) The shield wire technology can be considered as a cost effective alternative for supplying small villages and communities located within 100 km along HV and MV transmission line routes in the Bank's subsequent interventions in Rural Electrification (para. 4.2.25);
- (iv) It is very important for the Bank to proactively monitor the development of an acceptable tariff policy in Ethiopia that will ensure affordability and safeguard the viability of investments (para. 4.3.6);
- (v) It is important that the Bank increases its financial assistance and enhances its catalytic role to attract private sector investment for the development of the power infrastructure in countries such as Ethiopia, where access to electricity is only about 13% of the population despite the existence of huge hydropower potential (para. 4.3.6);
- (vi) The Bank should monitor new developments in EEPCo's management structure in order to exploit new business opportunities such as private sector investment (para. 4.4.2).

For the Government

- (i) Appropriate incentive measures are required to assign and retain engineers in regional stations (paras. 4.2.8, 4.5.3);
- (ii) Investments in transmission and distribution systems should be given particular attention in order to improve system reliability and increase the utility's consumer base and achieve economies of scale so that the utility's inefficiencies are not passed over to consumers through tariff increases (paras. 4.2.16, 4.3.6, 4.4.2, 4.5.5);
- (iii) Special concessions may need to be designed for the low income consumers areas through an affordable flat rate tariff for a reasonable level of consumption to encourage the use of electricity instead of fuel wood for cooking as a way of deepening the social impact of the project on the status of women in Ethiopia (paras. 4.2.21, 4.5.7);
- (iv) The government in consultation with other agencies in energy and environment such as the Rural Energy Development and Promotion Centre and the Environmental protection Agency should adopt should (a) continue in devising and distributing energy saving cookers and furnace to the urban poor and rural population for economy and efficiency in the use of firewood; (b) take an aggressive approach to the marketing of the electric Injera cookers in all

urban centers and rural towns giving cognisance to pricing and affordability as a way of encouraging the use of these devices to help curb environmental degradation (paras. 4.2.21, 4.2.23);

- (v) The Government may have to consider alternative sources of commercial electricity to diversify its sources of supply in order to enhance energy security in the country. In addition, other new and renewable energy sources, such as mini-hydro, wind and solar energy, need to be exploited cost effectively to supply isolated rural settlements at affordable tariffs (paras. 4.5.7, 4.5.8, 4.2.24).
- (vii) There is need for a special study to streamline the roles and responsibilities of the various institutions and agencies handling energy related activities in the country (paras. 4.4.3, 4.4.4).

5.3 Action Plan

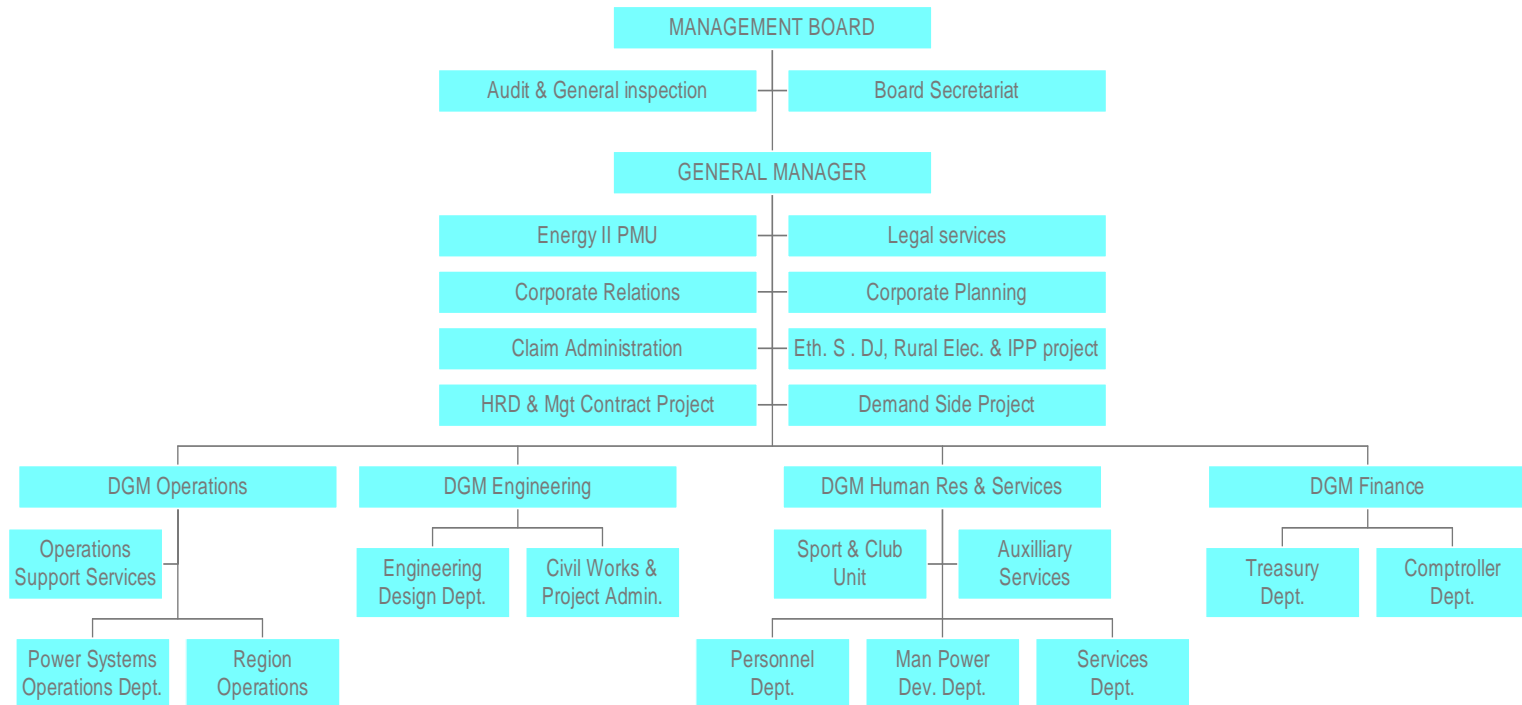
Major recommendations and follow up actions are presented in Annex 11. This project portrays several best practices as evidenced by good performance of all the stakeholders and in particular can serve as success story on the importance of Government commitment for project success and socio-economic development of a region.

RETROSPECTIVE LOGICAL MATRIX

HIERARCHY OF OBJECTIVES	OBJECTIVE VERIFIABLE INDICATORS			MEANS OF VERIFICATION	ASSUMPTIONS AND CRITICAL RISK FACTORS
	Description	At Appraisal	At PPER		
<p>Sector Goals</p> <ul style="list-style-type: none"> ▪ Develop the country’s hydro-electric power potential and transmit power from the national grid to different regions of the country for economic development and growth. 	<ul style="list-style-type: none"> ▪ Hydro-Electric Generation capacity in Ethiopia ▪ Power Transmission Capacity in the northern region of Ethiopia including the region ▪ GDP growth rate in Ethiopia ▪ Expanded commercial and industrial development (in project area). 	<p>371 MW</p> <p>-0.8% average</p>	<p>478.6 MW</p> <p>150 MW line</p> <p>7.7% (2001)</p> <p>66 manufacturing industries in operation.</p>	<ul style="list-style-type: none"> ▪ EEPCo Supply and demand Balances 2000-2015 ▪ PCR and Operations Evaluation Mission ▪ Ethiopia Socio-Economic Indicators ▪ Statistic from Tigray Regional Admin. 	<ul style="list-style-type: none"> ▪ Electricity will boost Economic Activity.
<p>Project Objectives</p> <ul style="list-style-type: none"> ▪ Provide adequate and reliable electricity to the inhabitants of the northern regions to meet their energy requirements for domestic and industrial applications. ▪ Promote economic development to improve living standards ▪ Halt environmental degradation by the provision of cheap and renewable hydroelectric energy to replace fuel wood. ▪ Improve operating performance of Ethiopia Electric Power Corporation. 	<ul style="list-style-type: none"> ▪ Adequate and reliable electricity in northern Ethiopia. ▪ Energy consumption in the project area. ▪ Number of households connected. ▪ Growth in Industrial Activity. ▪ Improved living standards. ▪ Reduced dependency on Biomass. ▪ Reduced rate of Environmental degradation ▪ Improved Financial Performance. ▪ Improved Management ▪ Reduced Staff Turnover. 	<p>20 towns envisaged with 40MW peak load. 79,000 MWh</p> <p>30,000 connections meet requirements for lighting, service activities, cottage and medium scale industries.</p>	<p>40 towns connected with 60 MW. Peak load. 90,183 MWh in 2002.1</p> <p>10% growth per annum</p> <p>32,194 households</p> <p>66 manufacturing industries operating in project area increased & diversified income opportunities increased</p> <p>urbanisation, provision of schools, hospitals, roads and communication</p> <p>99.4% of household energy requirement from Biomass.</p> <p>Financial Indicators Restructured and given more autonomy.</p>	<ul style="list-style-type: none"> ▪ EEPCo. Operating Statistics ▪ Project area visits and Beneficiary interviews ▪ Tigray Regional Administration Woody Biomass Inventory and Strategic planning Statistics ▪ EEPCo Past Financial reports ▪ Interviews response from various stakeholders. 	<ul style="list-style-type: none"> ▪ Electricity will increase industrial and commercial activity. ▪ Increased Industrial activity will increase incomes and raise living standards ▪ Electricity availability will lead to a switch from fuel wood to electricity for domestic cooking. ▪ Risk: Affordability and Tradition.

<p>Project Outputs (Results)</p> <ul style="list-style-type: none"> ▪ 500km of 230 kV Line from Bahir Dar to Mekelle through Alamata ▪ 240km of 132 kV Line from Mekelle to Adigrat and from Mekelle to Adwa ▪ 367km of 66 kV Lines from Alamata-Laliballa; Alamata-Sokota; Alamata-Maychew; and Adwa-Ende Silasi ▪ 327km of 15kV Distribution Lines ▪ 140 km of Low voltage Distribution Lines ▪ 230 kV, 132 kV, 66 kV Substation facilities ▪ Logistics ▪ Consultancy services. 	<ul style="list-style-type: none"> ▪ Length of 230 kV Line ▪ Length of 132 kV Line ▪ Length of 66 kV lines ▪ 15 kV Lines constructed ▪ Length of Low Voltage Distribution Lines ▪ Number of units of 230 kV, 132 kV and 66 kV substations ▪ Logistics acquired ▪ Consultants recruited. 	<p>500km</p> <p>240km</p> <p>367km</p> <p>327km</p> <p>140km</p> <p>3 units 230kV 2 unit 132 kV 4 units 66 kV Various 1 Consultant</p>	<p>489 km</p> <p>202 km</p> <p>320 km</p> <p>257km</p> <p>3 units of 230 kV 2 units of 132kV 4 units of 66 kV Various 1 Consultant recruited</p>	<ul style="list-style-type: none"> ▪ PCR ▪ Operations Evaluation Mission Findings 	
<p>Project Inputs (Activities)</p> <ul style="list-style-type: none"> ▪ Financing ▪ Procurement ▪ Supervision 	<ul style="list-style-type: none"> ▪ Project financing plan <ul style="list-style-type: none"> - ADB: UA 20.12 million - ADF: UA 26.53million - GoE/EEPCo: UA 23.63 million ▪ Project costs ▪ Supervision 	<p>ADB 24.39MUA ADF 27.64 MUA GOE 19.86 MUA 71.89 MUA</p>	<p>- ADB: 20.12 MUA - ADF: 26.53 MUA GoE: 23.63 MUA 70.28 MUA Consultant and PIU provided</p>	<ul style="list-style-type: none"> ▪ PCR ▪ Operations Evaluation Mission 	

ORGANIZATIONAL STRUCTURE OF THE ETHIOPIAN ELECTRIC POWER CORPORATION



ACTUAL & FORECAST SALES FOR VARIOUS SUBSTATIONS IN PROJECT AREA

	Alamata	Mekele	Adwa	Adigrat	Mavchew	Ende	Selassie	Wukro	Sekota	TOTAL (MWh)	EEPCO Total Sales
1999	1,773	16,105	14,785	4,775	1,121	1,588	1,114	215		41,476	1,373,479
2000	1,570	20,951	21,034	4,836	1,323	1,843	1,062	327		52,946	1,410,123
2001	2,259	35,076	26,106	4,914	1,714	2,451	1,587	435		74,543	1,619,565
2002	2,219	47,596	27,519	5,655	1,980	2,793	1,933	488		90,183	1,736,987
2003	1,399	13,438	84,660	5,540	1,455	2,351	1,087	179		110,109	1,910,685
2004	1,558	14,892	91,909	6,135	1,620	2,663	1,214	198		120,189	2,101,754
2005	1,725	16,594	99,194	6,751	1,795	3,010	1,350	219		130,638	2,311,929
2006	1,916	18,372	107,503	7,450	2,092	3,412	1,506	242		142,493	2,543,122
2007	2,128	20,335	116,510	8,218	2,336	3,873	1,681	267		155,348	2,797,434
2008	2,407	22,863	126,273	9,293	2,607	4,400	1,867	295		170,005	3,077,178
2009	2,676	25,338	136,858	10,274	2,909	5,006	2,094	326		185,481	3,384,896
2010	2,974	28,079	148,332	11,356	3,247	5,702	2,340	360		202,390	3,723,385
2011	3,303	31,114	160,773	12,553	3,623	6,505	2,615	398		220,884	4,095,724
2012	3,672	34,501	174,271	13,886	4,048	7,096	2,927	439		240,840	4,505,296
2013	4,083	38,283	188,917	15,370	4,525	7,742	3,214	485		262,619	4,955,826
2014	4,544	42,501	204,717	17,024	5,063	8,449	3,530	536		286,364	5,451,408
2015	5,059	47,238	221,850	18,861	5,670	9,224	3,879	593		312,374	5,996,549
2016	5,636	52,358	240,247	20,911	6,355	10,073	4,264	656		340,500	6,596,204
2017	6,283	58,070	260,572	23,201	7,032	11,005	4,690	726		371,579	7,255,824
2018	7,008	64,445	282,419	25,763	7,784	12,027	5,160	870		405,476	7,981,407
2019	7,774	71,204	306,115	28,399	8,620	13,320	5,679	971		442,082	8,779,547
2020	8,628	78,702	331,817	31,316	9,548	14,594	6,254	1,085		481,944	9,657,502
2021	9,579	87,024	359,870	34,547	10,581	15,999	6,889	1,215		525,704	10,623,252
2022	10,638	96,264	390,157	38,127	11,731	17,552	7,593	1,360		573,422	11,685,577
2023	11,820	106,528	423,021	42,095	13,012	19,267	8,373	1,524		625,640	12,854,135
2024	13,137	117,934	458,686	46,494	14,437	21,164	9,237	1,710		682,799	14,139,549
2025	14,606	130,614	497,395	51,374	16,024	23,267	10,194	1,921		745,395	15,553,504
2026	16,240	144,707	539,077	56,815	17,823	25,554	11,245	2,148		813,609	17,108,854
2027	18,058	160,321	584,251	62,831	19,825	28,066	12,404	2,401		888,158	18,819,739
2028	20,078	177,620	633,212	69,485	22,051	30,825	13,683	2,684		969,639	20,701,713
2029	22,325	196,785	686,275	76,843	24,528	33,855	15,094	3,001		1,058,706	22,771,885
2030	24,823	218,018	743,785	84,981	27,282	37,183	16,650	3,355		1,156,078	25,049,073
2031	27,601	241,542	806,114	93,981	30,346	40,838	18,367	3,751		1,262,540	27,553,980
2032	30,690	267,605	873,666	103,933	33,754	44,853	20,260	4,194		1,378,954	30,309,378
2033	34,124	296,479	946,879	114,940	37,545	49,262	22,349	4,689		1,506,266	33,340,316
2034	37,942	328,469	1,026,228	127,112	41,761	54,104	24,654	5,242		1,645,511	36,674,348

Growth rates

2005-2010	11.50%	11.09%	8.38%	10.96%	12.58%	13.63%	11.62%	10.52%		10.00%
2010-2025	11.19%	10.79%	8.40%	10.59%	11.23%	9.83%	10.31%	11.80%		10.00%

N/b: Alamata Actual Sales includes figures for Korem, Lalibela and Waja.

Adwa Actual Sales includes figures for Axum, Adigrat Actual Sales includes figures for Bizet

Forecast for 2004 onwards are based on figures released by EEPCO on 12/11/2003.

NOTES AND ASSUMPTIONS FOR FINANCIAL AND ECONOMIC REEVALUATION

A. Background

1. The initial Bank Preparatory mission that was launched in June 1992 after the government's feasibility study report found the project to be technically feasible and economically viable as conceived. After a re-definition of scope due to a rather high initial cost estimate, the project was included in the Bank's assistance program for the country. The decision to finance the program placed a high premium on the viability of the project as economically determined. The assumptions used in this determination therefore and how they turn out in reality is a big determinant of the actual viability of the project or other. Salient among these assumptions is the choice of Long-Run Marginal cost used as the basis of future tariffs.

B. Methodology at Appraisal

2. The approach at appraisal was to forecast the demand in the project area based on the likely development that would take place with the availability of adequate and reliable grid power in the area. It was projected that about 30,000 new households without electricity would switch to electricity over 3 years and that proposed industrial concerns with an excess of about 40 MW installed electricity equipment would immediately connect. With commissioning of the Project, electricity consumption was expected to grow to a level of about 80 gigawatt-hours (GWh) three years after completion of the project. An immediate load requirement for a cement factory and an Automobile assembling plant was foreseen. Load demand was projected to grow above 8% per year. On these projections, the Project's maximum load requirement would utilize less than 2% of the total national generation.

3. The economic internal rate of return (EIRR) calculation evaluated the benefits of the Project by applying the expected incremental increases in load demand for the project area to computational formulas to measure the incremental costs, and consumer surplus/benefits by means of conversion factor. An average tariff of Birr 0.64/kWh an equivalent of US\$ 0.12 at the exchange rate of US\$ 1.0 = Birr 5.0 at the time was used. The financial internal rate of return (FIRR) was estimated similarly to the EIRR approach, but excluded resource cost savings and consumer surplus benefits. The EIRR so obtained at appraisal was 16.00%. The FIRR evaluation yielded 11.55%. Both computations were sensitive to Tariff and to project cost.

C. Approach and Methodology of the Project Performance Evaluation Report

4. From both an economic and financial perspective, the cost of generation and transmission has been captured in the Grid Energy cost is 35% of energy sold. The net economic gain to society is the net sum of private and social benefits arising from the sale of electricity to the industrial and domestic consumers and has been captured by a 1.6 factor multiplier of total financial benefits. The net financial gain is similarly calculated, but evaluated at market prices and excluding social benefits. These factors are similar to those used in the PCR computations. This PPER has employed actual consumption for the period 1999 to 2002 where actual figures are available. Beyond 2002, Forecast provided by EEPCo has been used. Actual tariff for 1999 to 2004 has been used. Beyond 2002, the equivalent value of the LRMC used at appraisal and at PCR of US\$0.12/kWh has been used i.e. (Birr 1.0334/kWh) at December 2003 exchange rate of US\$ 1 = Birr 8.612. The Sensitivity of the results have been evaluated for the scenario where tariffs attain the observed consumer willingness to pay of US\$ 0.06/kWh i.e.(Birr 0.5167/kWh) from 2004.

D. Specific Assumptions

5. The EIRR and FIRR estimates revalue investment costs using constant pricing methodology, with 1993 as the base year. Table A7.1 summarizes specific parameter values used in the computations. Other specific assumptions used to calculate the FIRR/EIRR reestimates are as follows.

- (i) The economic life of the project assets is assumed at 35 years. Projections are from 1999 to 2034.
- (ii) All costs and benefits are valued in constant 1993 prices.
- (iii) Electricity sales are calculated as total consumer sales in the project area.
- (iv) Economic and financial tariffs for consumers are a weighted composite of the tariffs for consumer categories.
- (v) Economic costs are evaluated from financial costs for generation and transmission using conversion factors in table A7.1 below.
- (vi) Operating and Maintenance cost is maintained at 2.0% of total investment cost.

Table A7.1: Parameter Values Used in EIRR/FIRR Computations

Year	CPI	Investment Cost at 1993 Constant Prices (Millions of Birr)
1993	849.00	0
1994	858.90	8.01
1995	973.60	130.65
1996	982.60	69.22
1997	919.50	236.53
1998	915.65	126.06
1999	915.65	36.38
Conversion Factors		
Initial Investment Costs		0.932
Operating & Maintenance Cost		0.976
Grid Energy cost		0.976
Benefits		1.6

EIRR = economic internal rate of return, FIRR = financial internal rate of return, CE = operating cost of electricity, GWh = gigawatt-hour, kWh = kilowatt-hour

- (viii) Financial capital costs reflect actual costs incurred and revalued in constant 1993 prices. Economic capital costs are obtained after applying an adjustment factor of 0.932.

E. Sensitivity Analysis

6. Table A7.2 shows the base case results for the EIRR and FIRR re-estimates and sensitivity to changes in assumption and projections.

Table A7.2: EIRR/FIRR Sensitivity

Item	EIRR	FIRR
A. Base Case Tariff at LRMC (US\$0.12/kWh) Equivalent to Birr 1.0334/kWh.	17.52%	12.40%
B. Case Two: With Tariffs at identified Consumer Willingness to Pay (US\$0.06/kWh) Equivalent to Birr 0.5167/kWh.	11.30%	5.04%

NORTHERN ETHIOPIA POWER TRANSMISSION PROJECT

Annex 5

FINANCIAL AND ECONOMIC RATE OF RETURN FOR FUTURE TARIFF AT LONG-RUN MARGINAL COST (US\$ 0.12/kWh or Birr 1.0334/kWh)

Year	Total Electricity Sales (MWh)	Incremental Electricity Sales (MWh)	Financial Investment Cost	Incremental O & M Cost	Grid Energy Cost	Financial Operating Surplus	Total Net Financial Benefits	Project Investment Cost a	Economic O&M Cost	Grid Energy Cost	Incremental Economic Benefits	Total Net Economic Benefits
1994			8.01				-8.01	7.47				-7.47
1995			130.65				-130.65	121.77				-121.77
1996			69.24				-69.24	64.53				-64.53
1997			236.53				-236.53	220.45				-220.45
1998			126.06				-126.06	117.49				-117.49
1999	1,373,479	41,476	36.38	12.00	14.35	18.71	-44.02	33.91	11.85	14.01	29.94	-29.82
2000	1,410,123	52,946		10.58	16.16	21.07	-5.67		11.85	15.77	33.72	6.10
2001	1,619,565	74,543		10.49	22.54	29.76	-3.27		11.85	22.00	47.62	13.77
2002	1,736,987	90,183		11.21	29.14	38.59	-1.76		11.85	28.44	61.74	21.45
2003	1,910,685	110,109		11.25	35.73	47.31	0.32		11.85	34.88	75.70	28.98
2004	2,101,754	120,189		11.25	39.00	115.16	64.90		11.85	38.07	184.26	134.34
2005	2,311,929	130,638		11.25	42.39	125.17	71.52		11.85	41.38	200.28	147.05
2006	2,543,122	142,493		11.25	46.24	136.53	79.04		11.85	45.13	218.45	161.47
2007	2,797,434	155,348		11.25	50.41	148.85	87.18		11.85	49.20	238.16	177.11
2008	3,077,178	170,005		11.25	55.17	162.89	96.47		11.85	53.85	260.63	194.94
2009	3,384,896	185,481		11.25	60.19	177.72	106.28		11.85	58.75	284.36	213.76
2010	3,723,385	202,390		11.25	65.68	193.92	116.99		11.85	64.10	310.28	234.33
2011	4,095,724	220,884		11.25	71.68	211.64	128.71		11.85	69.96	338.63	256.82
2012	4,505,296	240,840		11.25	78.16	230.77	141.35		11.85	76.28	369.22	281.10
2013	4,955,826	262,619		11.25	85.23	251.63	155.15		11.85	83.18	402.61	307.59
2014	5,451,408	286,364		11.25	92.93	274.38	170.20		11.85	90.70	439.02	336.47
2015	5,996,549	312,374		11.25	101.37	299.31	186.68		11.85	98.94	478.89	368.11
2016	6,596,204	340,500		11.25	110.50	326.26	204.50		11.85	107.85	522.01	402.32
2017	7,255,824	371,579		11.25	120.58	356.04	224.20		11.85	117.69	569.66	440.12
2018	7,981,407	405,476		11.25	131.59	388.51	245.68		11.85	128.43	621.62	481.35
2019	8,779,547	442,082		11.25	143.46	423.59	268.87		11.85	140.02	677.74	525.88
2020	9,657,502	481,944		11.25	156.40	461.78	294.13		11.85	152.65	738.85	574.36
2021	10,623,252	525,704		11.25	170.60	503.71	321.86		11.85	166.51	805.94	627.59
2022	11,685,577	573,422		11.25	186.09	549.43	352.09		11.85	181.62	879.10	685.63
2023	12,854,135	625,640		11.25	203.03	599.47	385.18		11.85	198.16	959.15	749.14
2024	14,139,549	682,799		11.25	221.58	654.24	421.40		11.85	216.26	1046.78	818.67
2025	15,553,504	745,395		11.25	241.90	714.21	461.06		11.85	236.09	1142.74	894.81
2026	17,108,854	813,609		11.25	264.03	779.57	504.29		11.85	257.70	1247.32	977.78
2027	18,819,739	888,158		11.25	288.23	851.01	551.53		11.85	281.31	1361.61	1068.45
2028	20,701,713	969,639		11.25	314.67	929.08	603.16		11.85	307.12	1486.52	1167.56
2029	22,771,885	1,058,706		11.25	343.57	1,014.42	659.59		11.85	335.33	1623.07	1275.90
2030	25,049,073	1,156,078		11.25	375.17	1,107.72	721.29		11.85	366.17	1772.35	1394.34
2031	27,553,980	1,262,540		11.25	409.72	1,209.73	788.75		11.85	399.89	1935.56	1523.83
2032	30,309,378	1,378,954		11.25	447.50	1,321.27	862.52		11.85	436.76	2114.03	1665.43
2033	33,340,316	1,506,266		11.25	488.81	1,443.26	943.19		11.85	477.08	2309.21	1820.28
2034	36,674,348	1,645,511		11.25	534.00	1,576.68	1,031.42		11.85	521.19	2522.68	1989.65
					FIRR	=	12.40%		EIRR	=	17.52%	

EIRR = economic internal rate of return, FIRR= financial internal rate of return, MWh = Megawatt-hour, KN = kip.

All Costs and Benefits Figures are in Millions of Ethiopian bill. Exchange Rate used is US\$ 1 = Birr 8.612 (prevailing as at December 2003)

All Costs and Benefits Figures are in 1993 constant prices using CPI values spelt in Assumptions.

NORTHERN ETHIOPIA POWER TRANSMISSION PROJECT
FINANCIAL AND ECONOMIC RATE OF RETURN COMPUTATIONS BASED ON CONSUMER'S
WILLINGNESS TO PAY (US\$ 0.06/kWh or Birr 0.5167/kWh)

Annex 6

Year	Total Electricity Sales (MWh)	Incremental Electricity Sales (MWh)	Financial Investment Cost	Incremental O & M Cost	Grid Energy Cost	Financial Operating Surplus	Total Net Financial Benefits	Project Investment Cost	Economic O&M Cost	Grid Energy Cost	Incremental Economic Benefits	Total Net Economic Benefits	
1994			8.01				-8.01	7.47				-7.47	
1995			130.65				-130.65	121.77				-121.77	
1996			69.24				-69.24	64.53				-64.53	
1997			236.53				-236.53	220.45				-220.45	
1998			126.06				-126.06	117.49				-117.49	
1999	1,373,479	41,476	36.38	12.00	14.35	18.71	-44.02	33.91	11.85	14.01	29.94	-29.82	
2000	1,410,123	52,946		10.58	16.16	21.07	-5.67		11.85	15.77	33.72	6.10	
2001	1,619,565	74,543		10.49	22.54	29.76	-3.27		11.85	22.00	47.62	13.77	
2002	1,736,987	90,183		11.21	29.14	38.59	-1.76		11.85	28.44	61.74	21.45	
2003	1,910,685	110,109		11.25	35.73	47.31	0.32		11.85	34.88	75.70	28.98	
2004	2,101,754	120,189		11.25	39.00	57.58	7.32		11.85	38.07	92.13	42.22	
2005	2,311,929	130,638		11.25	42.39	62.59	8.94		11.85	41.38	100.14	46.92	
2006	2,543,122	142,493		11.25	46.24	68.27	10.77		11.85	45.13	109.23	52.25	
2007	2,797,434	155,348		11.25	50.41	74.42	12.76		11.85	49.20	119.08	58.03	
2008	3,077,178	170,005		11.25	55.17	81.45	15.02		11.85	53.85	130.31	64.62	
2009	3,384,896	185,481		11.25	60.19	88.86	17.41		11.85	58.75	142.18	71.58	
2010	3,723,385	202,390		11.25	65.68	96.96	20.03		11.85	64.10	155.14	79.19	
2011	4,095,724	220,884		11.25	71.68	105.82	22.89		11.85	69.96	169.32	87.51	
2012	4,505,296	240,840		11.25	78.16	115.38	25.97		11.85	76.28	184.61	96.48	
2013	4,955,826	262,619		11.25	85.23	125.82	29.34		11.85	83.18	201.31	106.28	
2014	5,451,408	286,364		11.25	92.93	137.19	33.01		11.85	90.70	219.51	116.96	
2015	5,996,549	312,374		11.25	101.37	149.65	37.03		11.85	98.94	239.45	128.66	
2016	6,596,204	340,500		11.25	110.50	163.13	41.38		11.85	107.85	261.01	141.31	
2017	7,255,824	371,579		11.25	120.58	178.02	46.18		11.85	117.69	284.83	155.29	
2018	7,981,407	405,476		11.25	131.59	194.26	51.42		11.85	128.43	310.81	170.54	
2019	8,779,547	442,082		11.25	143.46	211.79	57.08		11.85	140.02	338.87	187.00	
2020	9,657,502	481,944		11.25	156.40	230.89	63.24		11.85	152.65	369.43	204.93	
2021	10,623,252	525,704		11.25	170.60	251.86	70.00		11.85	166.51	402.97	224.62	
2022	11,685,577	573,422		11.25	186.09	274.72	77.38		11.85	181.62	439.55	246.08	
2023	12,854,135	625,640		11.25	203.03	299.73	85.45		11.85	198.16	479.57	269.57	
2024	14,139,549	682,799		11.25	221.58	327.12	94.28		11.85	216.26	523.39	295.28	
2025	15,553,504	745,395		11.25	241.90	357.11	103.96		11.85	236.09	571.37	323.44	
2026	17,108,854	813,609		11.25	264.03	389.79	114.50		11.85	257.70	623.66	354.12	
2027	18,819,739	888,158		11.25	288.23	425.50	126.02		11.85	281.31	680.80	387.65	
2028	20,701,713	969,639		11.25	314.67	464.54	138.62		11.85	307.12	743.26	424.30	
2029	22,771,885	1,058,706		11.25	343.57	507.21	152.38		11.85	335.33	811.54	464.36	
2030	25,049,073	1,156,078		11.25	375.17	553.86	167.43		11.85	366.17	886.17	508.16	
2031	27,553,980	1,262,540		11.25	409.72	604.86	183.89		11.85	399.89	967.78	556.05	
2032	30,309,378	1,378,954		11.25	447.50	660.64	201.88		11.85	436.76	1057.02	608.41	
2033	33,340,316	1,506,266		11.25	488.81	721.63	221.56		11.85	477.08	1154.61	665.68	
2034	36,674,348	1,645,511		11.25	534.00	788.34	243.08		11.85	521.19	1261.34	728.31	
FIRR =							5.04%	EIRR =					11.30%

All Costs and Benefits Figures are in Millions of Ethiopian Birr. Exchange Rate used is US\$ 1 = Birr 8.612 (December 2003).

All Costs and Benefits Figures are in 1993 constant prices using CPI values spelt in Assumptions.

Aggregate Performance Ratings

No.	Component Indicators	Score	REMARKS
1.	Relevance and quality at entry assessment	3.55	
i)	Consistency with country overall development strategy	4	The Project's rationale was consistent with the country's overall development strategy in general and its strategy for the rural economy in particular.
ii)	Consistency with Bank Assistance strategy	4	It was also consistent with Bank's country assistance strategy to reduce poverty, protect the environment and develop the human and institutional resources of the country.
iii)	Macro-economic Policy	4	To contribute to the economic growth and development of the country, and help address the long-term structural problems of underdevelopment.
iv)	Sector Policy	4	Fitted into sector goal of exploiting the huge hydropower resources of the country and transmitting power to different regions of the country for economic development
v)	Public Policy Reform	3	Creating autonomy in EELPA was to engender reforms in the regulatory and policy environment of the power sector to encourage private participation.
vi)	Poverty Reduction	4	To create employment and generate income. And helped to reduce income disparities and improved the quality of life.
vii)	Social and Gender equality	2	The Social benefit is significant but there is no gender desegregation was made
viii)	Environmental Concerns	4	Clear objective to halt environmental degradation
ix)	Human Resource Development	-	
x)	Institutional Development	4	Organizational restructuring goal were clear and relevant
xi)	Private Sector development	3	Creating autonomy in EELPA was to engender reforms in the regulatory and policy environment of the power sector to encourage private participation.
xii)	Regional Economic Integration	-	
xiii)	Quality at entry (excluding demandingness, complexity, riskiness, etc)	3	Loan condition of Assets revaluation without Bank technical assistance was a strain on EELPA's institutional capacity
xiv)	Other -	-	
2.	Achievement of objectives & outcomes ("Efficacy")	3.25	
i)	Policy Goals	3.5	A market economy is evolving. Substantial industrial growth is diversifying the economy for stability.
	- Macro stabilization	4	
	- Public investments & expenditures	3	Government investment in sector substantial
	- Debt management	4	EEPCo meeting Debt Obligations
	- Private sector regulation and incentives	4	EEA regulating Private sector and providing good incentives
	- Pricing efficiency	3	Tariff increases are adhoc pending implementation of tariff study recommendations
	- Sector regulations	3	EEA regulating sector

Aggregate Performance Ratings

ii)	Physical objectives (outputs)	4	All targeted outputs met at slightly lower cost.
iii)	Financial Targets - Financial viability - Cost Recovery - Restructuring	3.33 4 2 4	Strong financial performance despite tariff stagnation for 4 years LRMC not yet attained Positive Debt/Equity ratio
iv)	Institutional Development Objectives	2.88	Not fully met
	National Capacity - Poverty Alleviation - Support to Private sector - Environment & natural resources - Sectoral capacity	2.75 3 3 2 3	National policies has a strong poverty alleviation and private sector focus, but lacks realism on the ground to address environmental issues. Sector capacity too thinly stretched
	Executing Agency - Financial Management - Skills upgrading - Personnel Management - Management Information systems - Agency restructuring	3.0 3 3 3 3 3	Agency seems to manage its finances and human resources satisfactorily. Formal skills training need to be intensified at all levels.
v)	Social Objectives and Targets - Poverty Alleviation - Protection of vulnerable groups - Reduction in income disparities - Community development and participation - Settlement/Resettlement - Health improvement.	3.2 4 3 3 3 3 3	Employment creation and income generation highly successful. Income disparities are reducing but more needs to be done for very vulnerable groups. Health infrastructure and urbanization improving
vi)	Environment Objectives - Natural Resource Management - Maintenance of biodiversity	2.5 3 2	More will need to be done to achieve environmental objectives
vii)	Private Sector Development Objectives - Restructuring/Privatization of P.E	3	Private sector participation evolving.
3.	Efficiency	4	
i)	Economic Rate of Return - Appraisal Estimate 16.00% - PCR Estimate 17.75% - PPER Estimate 17.52%	4 4 4 4	All estimates point to an economically viable project
ii)	Financial Rate of Return - Appraisal Estimate 11.55% - PCR Estimate 11.42% - PPER Estimate 12.40%	4 4 4 4	All estimates point to a Financially viable project that is slightly sensitive to tariffs.
4.	Institutional Development Impact (ID)	2.88	
i)	National Capacity - Poverty Alleviation - Support to Private Sector - Environment & natural resources - Sectoral capacity	2.75 3 3 2 3	Impact of national institutions in environmental protection is not too visible.
ii)	Executing Agency - Management control & Auditing - Skills upgrading / Training - Technology Transfer - Personnel Management (& staff turnover)	3.0 3 3 3 3	Institutional structuring impacts largely achieved. Control and auditing improved by private auditors. Technology transfer through attachment to projects satisfactory. Satisfactory but can be improved

Aggregate Performance Ratings

	- Management Information systems	3	Satisfactory
	- Financial, Budget, Operations & Maintenance Systems	3	Satisfactory
	- Agency Restructuring (decentralization)	3	Satisfactory but undergoing further improvements.
5.	Sustainability	3.5	
i)	Technical Soundness (including O&M facilitation, availability of recurrent funding, spare parts, workshop facilities etc.)	4	Technical design was robust
ii)	Continued Borrower Commitment (including legal/regulatory framework)	4	Governments commitment shown in continuous sector reviews and improvements including management contracting
iii)	Socio-Political Support (including beneficiary participation, vulnerable groups protection, political stability)	4	Beneficiary support guaranteed through the continuous flow of social and economic benefits
iv)	Economic Viability	4	Sustainable, given Government commitment to implement recommendations of Tariff study.
v)	Financial Viability	4	Sustainable given expected growth in sales and expected increases in tariffs vis-à-vis continuous management improvements
vi)	Institutional arrangements (organizational and management)	3	Undergoing continuous improvements
vii)	Environmental viability	2	Requires more intensive marketing of Injira stoves and more pragmatic solutions for the very vulnerable groups.
viii)	Resilience to exogenous Factors	3	Supply concentration in hydro needs to be addressed.
6.	Aggregate Performance indicator.	3.45	

BORROWER PERFORMANCE RATINGS

No.	Component Indicator	Score	REMARK
1.	Quality of Preparation: <ul style="list-style-type: none"> <li data-bbox="321 401 781 428">- Ownership, Beneficiaries participation <li data-bbox="321 520 646 548">- Government commitment <li data-bbox="321 640 737 667">- Macroeconomic & Sector Policies <li data-bbox="321 703 846 764">- Institutional Arrangements (counterpart funding) 	3.25 3 3 3 4	EELPA prepared the feasibility study and cooperated with the Bank in its revision. It has shown ownership all through the project cycle. Government commitment was demonstrated in its compliance with many of the loan covenants, though some not on schedule Sector institutions and policies undergoing constant reviews and reforms Governments funding of local cost component exceeded its 27.6% share to 33.60% share.
2.	Quality of Implementation <ul style="list-style-type: none"> <li data-bbox="321 829 639 856">- Assignment of Key Staff <li data-bbox="321 919 846 980">- Managerial Performance of executing Agency <li data-bbox="321 982 672 1010">- Use of Technical Assistance <li data-bbox="321 1012 639 1039">- Mid-Course Adjustments <li data-bbox="321 1136 753 1163">- Adherence to time schedule & costs 	3.00 4 3 N/A 3 2	Key staffs were appointed to form the Project Implementation Unit as programmed at appraisal. Overall implementation was successful barring delays in start up. Consultant modification helped to optimize design. Design modification in number and tower span lengths of 66 kV lines helped reduce cost Costs were adhered to leading to a cost underun, but project commissioning was delayed some 28 months
3.	Compliance with covenants	3	Outstanding loan covenants relating to revaluation of fixed assets, settlement of arrears to EEPCo, Reduction in accounts receivables has been complied with as at OEM. Implementation of recommendations of tariff study to the necessary tariff adjustment to achieve 5% return on assets yet to be implemented though assured.
4.	Adequacy of Monitoring and Evaluation Reporting	3	Bank launched 5 supervisory missions during implementation and 12 quarterly reports were issued. Supervisory oversight by consultant was adequate.
5.	Satisfactory Operations (if applicable.)	4	40 towns instead of the 20 targeted have been electrified as at 2003. Transmission and distribution network operating satisfactorily. Financial and operational performance of EEPCO is strong.
	Overall Borrower Performance	3.25	

BANK PERFORMANCE RATINGS

No.	Component Indicator	Score	REMARKS
1.	At Identification <ul style="list-style-type: none"> - Project Consistency with government development strategy - Project consistency with Bank strategy for country - Involvement of government /beneficiary - Project Innovativeness 	3.75 4 4 4 3	Bank preparatory mission of June 1992 identified issues relating to the project and recommended amendments Project was found consistent with Bank's strategy for the country Government initiated the whole project by reviving an old plan to provide electricity to the regions by continuing the line from Bahir Dar with tapping to Mekele. Government agreed and revised scope of project at ADB's request to fit in the financial package. Project was a revision of an old plan
2.	At Preparation of Project <ul style="list-style-type: none"> - Relevance of Bank support - Timely Bank support 	3.5 3 4	Satisfactory Bank involvement led to scaling down to qualify for blend (ADB/ADF) lending. Bank involvement with preparation and appraisal was expeditiously executed. (June – September 1992)
3.	At Appraisal <ul style="list-style-type: none"> - Quality of technical, economic, financial, institutional, social, environmental analyses - Relevance of Conditions and covenants - Adequacy of lending instrument - Financial package adequacy - Quality of coordination - Implementation & Supervision plans (including performance indicators, M&E requirements) 	3.2 3 4 3 3 - 3	Satisfactory Analyses of issues were professionally handled, though bank assistance in technical design was not optimal at appraisal. All loan conditions were relevant to the successful implementation of the project and viability of the utility. A combination of ADB and ADF terms was satisfactory for the country Satisfactory Other financiers were not involved Implementation and supervision plans were adequate baring the absence of a deadline for complying with conditions for loan effectiveness
4.	At Supervision <ul style="list-style-type: none"> - Adequacy of Bank staff (skills, time & continuity) - Problem solving - Responsiveness to changing conditions - Adequacy of Follow up on recommendations/decisions - Realistic rating at Appraisal/PCR - Attention to likely social development impact - Attention to sustainability issues 	3.14 4 3 3 3 3 3 3	Satisfactory Bank Staff competencies were unquestionable and continuity was adequate. Satisfactory Satisfactory Satisfactory Ratings at appraisal and PCR were realistic Social developmental impacts were anticipated but no measurable performance indicators were identified Sustainability was considered mostly in financial and economic terms
	Overall Assessment of Bank Performance	3.34	Satisfactory

FACTORS AFFECTING IMPLEMENTATION PERFORMANCE AND OUTCOME

Factors	Substantial	Partial	Negligible	N/A	Remarks
1. Not subject to Government Control					
1.1 World Market Prices			-		Even though, 72.4% of total project cost was in foreign exchange, variation orders in certified costs were minimal and adequate price contingency had been provide at appraisal. Actual foreign exchange cost was lower than anticipated
1.2 Natural events		-			Drought conditions of 1998/99 partially affected supply leading to load-shedding across Ethiopia. This affected sales and revenues to EEPCo.
1.3 Bank Performance	+				Bank involvement in project preparation and supervision during implementation significantly contributed to successful completion of the project. And Bank conditions has helped to secure the projects viability
1.4 Performance of contractors		-			Delays on the part of most of the contractors contributed to the overall delay in implementation
1.4b Performance of Consultants	+				Consultants involvement helped to optimize the project design and his supervision ensured quality technical implementation
1.5 Civil war				N.A	
1.6 Other-					
2. Subject to Government Control					
2.1 Macro policies			+		A stable macroeconomic environment assured the project's economic viability
2.2 Sector policies	+				Sector liberalization has greatly enhanced EEPCo autonomy and financial and operational efficiency
2.3 Government commitment	+				Government commitment ensured counterpart funding and continues to be shown in efforts at arriving at a sustainable tariff policy.
2.4 Appointment of key staff	+				Competent PIU ensured contractors' compliance to design details and cooperated where amendments were necessary.
2.5 Counterpart funding	+				Counterpart funds were released when needed even in excess of anticipated local expenditure.
2.6 Administrative capacity		+			Capacity of PIU adequately ensured successful implementation.
2.7 Other -					

FACTORS AFFECTING IMPLEMENTATION PERFORMANCE AND OUTCOME

3. Subject to Executing Agency Control					
3.1 Management		+			PIU management of implementation was adequate. Agency management during performance has been adequate though can be improved
3.2 Staffing		+			PIU staffing was adequate. Agency staffing at performance is adequate
3.3 Use of technical Assistance				N/A	No TA was attached to project
3.4 Monitoring & Evaluation		+			Monitoring at implementation ensured successful completion within the overall cost
3.5 Beneficiary Participation		+			End user demand at project operation has been above forecast values
3.6 Other -					
4. Factors Affecting implementation					
4.1 Changes in project Scope/scale/design	+				Changes in scope and design helped achieve optimal cost effectiveness
4.2 Deficiency in estimating physical inputs, the base unit costs				N/A	No significant deficiency was recorded in estimating inputs and costs
4.3 Inadequacy of price/physical contingencies				N/A	Adequate physical and price contingencies were made at appraisal
4.4 changes in exchange rates, in financial and institutional arrangements			-		Marginal changes in exchange rates slightly affected Local component costs only which initially formed 27.6% of total cost but ended up at 33.62%
4.5 Unrealistic implementation schedule	-				Tight implementation schedule led to the late placement of consultant and delays in consultant's review of designs, and the late appointment of project coordinator. Time required for screening procedures were not accounted for in implementation scheduling
4.6 Quality of management including financial management		+			Adequate management at implementation and operation ensured successful completion and operation.
4.7 Delays in selecting staff/consultants/contractors and in receiving counterpart funds		-			There were delays on the part of contractors and in selecting the consultant.
4.8 Inefficient procurement and disbursement procedures			-		Procedures were adequate and fully abide with even in one contract for which disagreement was manifested
4.9 Other					

**ETHIOPIAN ELECTRIC POWER CORPORATION
RECOMMENDATIONS AND FOLLOW UP ACTION MATRIX**

MAIN FINDINGS AND CONCLUSIONS	RECOMMENDATIONS	FOLLOW-UP ACTIONS	RESPONSIBILITIES
<p><u>Formulation and Project Rationale</u></p> <p>1.1 The project rationale was consistent with sector goals and Bank's country strategy. However, design was not optimized, contributing to implementation delays.</p> <p>1.2 A strong Government commitment is very critical for the successful implementation and performance of projects. This project's success is largely attributed to Government commitment for the region's development</p>	<p>The Bank may need to do detail design scrutiny in an effort at arriving at the most optimal technical and cost effective design prior to implementation to avoid undue delays.</p> <p>Borrower commitment to projects should be amply demonstrated before Loan approvals as positively evidenced in this project.</p>	<p>Ensure that future project designs are optimized technically and economically before implementation.</p> <p>Ensure Borrower Commitment to projects.</p>	<p>Operations Department</p> <p>Country Department</p>
<p><u>Project Implementation</u></p> <p>2.1 Delays were registered between loan approval and loan effectiveness, thus delaying the entry into force of the loan.</p> <p>2.2 Standard design solutions for peculiar terrain results in implementation bottlenecks and delays.</p>	<p>The Bank needs to institute measures to reduce the period between loan approval date and date of entry into force of the loan so as to expedite effectiveness and implementation.</p> <p>Non-uniform design considerations, including provision for variable tower heights, tower spans, and tower support structures, should be given to transmission projects in regions with similarly mountainous topography.</p>	<p>Ensure loan effectiveness conditions are time bound avoid un due delays.</p> <p>Peculiarities of project locations should be factored into project designs.</p>	<p>Country Department</p> <p>Operations Department</p>
<p><u>Compliance with Loan Condition</u></p> <p>3.1 The absence of a time frame for meeting Loan conditions required for loan effectiveness potentially impair implementation with regard to scheduling and the availability of funding.</p>	<p>Bank should consider placing a time frame within which any loan conditions required for loan effectiveness should be met.</p>	<p>Ensure loan effectiveness conditions are time bound.</p>	<p>Country Department</p>

**ETHIOPIAN ELECTRIC POWER CORPORATION
RECOMMENDATIONS AND FOLLOW UP ACTION MATRIX**

<p>3.2 Loan conditions that place undue technical and professional demands on the Implementation Agency stands the risk of non-compliance without the appropriate Technical Assistance package.</p>	<p>Such conditions should be accompanied with the appropriate Technical Assistance package.</p>	<p>Technically and Professionally tasking demands should be separated from Loan conditions and supported with Technical assistance.</p>	<p>Operations Department</p>
<p><u>Performance Evaluation and Project Outcome</u></p> <p>4.1 Broad Project objectives such as improving the economic status of women and halting environmental degradation, whose achievements require multi-sectoral interventions, also require a multi-sectoral collaboration to attain.</p> <p>4.2 Achievements of Institutional Development impacts should be considered within the broader national context.</p>	<p>Special concessions may need to be designed for the poor through an affordable flat rate tariff irrespective of the level of consumption, or a subsidized supply for a limited period as a way of encouraging the use of electricity for the achievement of specific broad social or environmental objectives.</p> <p>Institutional development objectives should be accompanied with clear performance indicators that take a holistic view of the entities performance in a national setting.</p>	<p>Assist Government to review and design special concessionary tariffs for Ethiopia's most vulnerable social groups to encourage electricity use for cooking.</p> <p>Monitor anticipated changes in EEPCo's management</p>	<p>Operations Department in consultation with POPR</p> <p>Country Department and Operations Department</p>
<p><u>Sustainability.</u></p> <p>5.1 The project's sustainability is very much linked to periodic tariff increase to reach the level determined by Long Run Marginal Cost.</p>	<p>The Bank should proactively monitor the development of an acceptable tariff policy in Ethiopia</p>	<p>Ensure tariff grows to meet the LRMC of supply.</p>	<p>Operations Department.</p>