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MOZAMBIQUE

**ELECTRICITY II PROJECT
PROJECT PERFORMANCE EVALUATION REPORT**

FINAL DRAFT REPORT

OPERATIONS EVALUATION DEPARTMENT

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This evaluation report was prepared by Operations Evaluation Department's (OPEV) Evaluation Experts: Mrs. G. Yirga-Hall and Mr. F. Botes following the mission to Mozambique. Mr. J. Quintana (Environmental Specialist and Consultant) carried out an environment audit on the project for which a separate report is available. Any further matters relating to this report may be referred to Mr. D. Barnett, Acting Director, OPEV, extension 2041 or to the two experts, extension 2263 and 2349 respectively.

CURRENCY EQUIVALENTS

| Currency Unit – Mozambican Meticaís (MT) | | |
|--|---|---|
| At Appraisal (June 1996) | At Project Completion (September 2004) | At Operations Evaluation (June 2006) |
| 1 UA = USD 1.44219 | USD 1.46073 | USD 1.49418 |
| 1UA = MT 16 219.40 | MT 33 021.90 | MT 39 009.60 |

WEIGHTS AND MEASURES

| | |
|-------------------------|--|
| 1 km (kilometre) | = 10 ³ meters (m) |
| 1 kV (kilovolt) | = 10 ³ Volts (V) |
| 1 kVA (kilovolt Ampere) | = 10 ³ Volt Amperes (VA) |
| 1 kW (kilowatt) | = 10 ³ Watts (W) |
| 1 kWh (kilowatt hour) | = 10 ³ Watt-hours (Wh) |
| 1 MWh (megawatt hour) | = 10 ³ kWh = 10 ⁶ Wh |
| 1 GWh (gigawatt hour) | = 10 ³ MWh = 10 ⁶ kWh |
| 1 TWh (terawatt hour) | = 10 ³ GWh = 10 ⁹ kWh |
| 1 MVA(megavolt ampere) | = 10 ³ kVA |
| 1 MW (megawatt) | = 10 ³ kW = 10 ⁶ Watts (W) |

FISCAL YEAR

1 January - 31 December

ABBREVIATIONS AND ACRONYMS

| | | |
|--------|---|--|
| ADF | : | African Development Fund |
| BoM | : | Bank of Mozambique |
| CNELEC | : | National Electricity Council (Independent regulator, Mozambique) |
| CREE | : | Commission for External Economic Relations |
| DNCH | : | National Coal and Hydrocarbon Directorate |
| DNE | : | National Directorate of Energy |
| DNFFB | : | National Directorate of Wildlife and Forests |
| EBIT | : | Earning Before Interest and Tax |
| EdM | : | Electricidade de Mozambique |
| EIA | : | Environmental Impact Assessment |
| EIRR | : | Economic Internal Rate of Return |
| ENH | : | National Hydrocarbon Company |
| ESI | : | Electricity Supply Industry |
| ESKOM | : | South African Power Utility |
| FE | : | Foreign Exchange |
| FIRR | : | Financial Internal Rate of Return |
| FUNAE | : | The Energy Fund |
| GoM | : | Government of Mozambique |
| HCB | : | Hidroelectrica de Cahora Bassa |
| ICB | : | International Competitive Bidding |
| LC | : | Local Costs |
| LTMC | : | Long Term Marginal Cost |
| MoE | : | Ministry of Energy |
| MIREME | : | Ministry of Mineral Resources and Energy |
| MICOA | : | Ministry for Coordination of Environmental Affairs |
| NDC | : | Nordic Development Cooperation |
| PC | : | Performance Contract |
| PCR | : | Project Completion Report |
| RMC | : | Regional Member Country |
| ROA | : | Return on Assets |
| ROI | : | Return on Investment |
| ROE | : | Return on Equity |
| PPP | : | Private Public Partnership |
| SADC | : | Southern Africa Development Community |
| SAPP | : | Southern Africa Power Pool |
| STMC | : | Short Term Marginal Cost |
| TOR | : | Terms of Reference |

RATINGS (out of 4)

| No. | Evaluation Criteria | PCR | PPER | Remark |
|------------|---------------------------------------|------------|-------------|---------------|
| 1. | Relevance | 4.0 | 2.7 | Satisfactory |
| 2. | Achievements of objectives “Efficacy” | 4.0 | 2.9 | Satisfactory |
| 3. | Efficiency | - | 3.3 | Satisfactory |
| 4. | Institutional Development Impact | 3.0 | 3.0 | Satisfactory |
| 5. | Sustainability | 3.0 | 2.8 | Satisfactory |
| 6. | Aggregate Performance Indicator | 3.5 | 2.9 | Satisfactory |
| 7. | Borrower Performance | 2.8 | 2.8 | Satisfactory |
| 8. | Bank Performance | 3.0 | 2.9 | Satisfactory |

Note: PPER Ratings for the different components are the average based on the detailed ratings of the sub-components of evaluation criteria. Refer to Annex 6.

PREFACE

1. This Project Performance Evaluation is aimed at assessing the relevance, efficacy and efficiency of the Bank's lending activities and the effectiveness of the project financed. It is the result of an independent assessment of the specific action taken by the Bank Group. This includes an objective statement of the outcomes and results achieved by the project compared with expectations at appraisal; a critique of these expectations in the light of that comparison; an evaluation of how the Bank could have been more helpful and a judgement whether in retrospect the project has achieved its objectives or is likely to achieve them and the outcomes or results achieved are sustainable or likely to be sustainable.
2. The reasons why this project was chosen for a Project Performance Evaluation is because, firstly, the Bank has invested heavily in the electricity sector of Mozambique over the past decade and it is willing to invest even further in future. Secondly, the Bank is undertaking a review of the electricity sector in 2007, followed by a Country Assistant Evaluation. This PPER can be considered as a building block evaluation of these high-level evaluations.
3. The target audience can broadly be divided into two diverse groups are. Firstly there are those who generally only require an overview of the project performance and lessons learnt in order to make executive decisions. This group typically includes Board Members of the African Development Bank, as well as government officials in Mozambique and other interested parties. The Executive Summary of the Report provides a succinct summary of all the salient aspects for the specific benefit of this group. Secondly, the report provides technical details of the project's performance to professionals in the Bank's operations complexes, as well as to professionals at the Government of Mozambique (the borrower) and at EDM (the executing agency). The main body of the report contains technical details for the benefit of this group, as well as for anyone else who is interested in the technical details.

BASIC PROJECT DATA

A. PRELIMINARY DATA:

Country : Mozambique
 Project : Mozambique Electricity II Project
 Loan Number : 2100150000717
 Borrower : The Government of Mozambique (GoM)
 Guarantor : The Government of Mozambique (GoM)
 Beneficiary : Electricidade De Mozambique (EdM)
 Executing Agency: Electricidade De Mozambique (EdM)
 Date of Appraisal: June 1996

B. LOAN

| | <u>APPRAISAL ESTIMATE</u> | <u>ACTUAL</u> |
|--------------------------|----------------------------------|----------------------|
| Amount (UA/Million) | 16 650 000 | 14 750 267.52 |
| Interest Rate | - | - |
| Service Charge | 0.75% | 0.75% |
| Repayment Period | 40 years | 40 years |
| Grace Period | 10 years | 10 years |
| Appraisal Date | June 1996 | June 1996 |
| Loan Negotiation Date | October 1996 | October 1996 |
| Loan approval date | December 1996 | 12-12-1996 |
| Loan signature Date | February 1997 | 16-04-1997 |
| Date of Entry into Force | June 1997 | 30-04-1998 |

C. PROJECT DATA

| | <u>APPRAISAL ESTIMATE</u> | <u>ACTUAL</u> |
|-------------------------|----------------------------------|----------------------|
| Total Cost (UA/Million) | 19.68 | 17.31 |

Financing Plan (UA/Million)

| Source | Appraisal Estimate | | | | Actual | | | |
|--------------|--------------------|-------------|--------------|------------|--------------|-------------|--------------|------------|
| | FC | LC | Total | % | FC | LC | Total | % |
| ADF | 16.64 | | 16.64 | 85 | 14.75 | | 14.75 | 85.2 |
| EdM | | 3.04 | 3.04 | 15 | 0.22 | 2.34 | 2.56 | 14.8 |
| Total | 16.64 | 3.04 | 19.68 | 100 | 14.97 | 2.34 | 17.31 | 100 |

| | | |
|--------------------------------------|---------------|------------|
| Effective Date of First Disbursement | January 1998 | 30-04-1998 |
| Effective Date of Last Disbursement | 31-12-2001 | 31-12-2003 |
| Date of Start of Implementation | November 1997 | 30-07-1998 |
| Date of Completion | October 2000 | 31-12-2003 |

D. PERFORMANCE INDICATORS

| | <u>APPRAISAL ESTIMATE</u> | <u>ACTUAL</u> |
|-------------------------------|----------------------------------|----------------------|
| Cost savings | - | UA 2.37 million |
| Time overrun | - | 38 months |
| Slippage on effectiveness | 10 months | |
| Slippage of completion date | 38 months | |
| Slippage on last disbursement | 24 months | |

| | | |
|-------------------------------|------------|----------------|
| Number of Extensions of | | 2 |
| Last disbursement | | 31-12-2003 |
| Completion Date | 30-10-2000 | |
| Project Implementation Status | | Completed |
| Institutional performance | | Satisfactory |
| Contractors' Performance | | Satisfactory |
| Consultant Performance | | Unsatisfactory |

E. MISSION SKILL MIX AND DURATION

| Mission | Composition | Man/days |
|-----------------------------|--|----------|
| Appraisal (March 1994) | Power Eng. + Fin. Analyst. | 20 |
| Re-appraisal (June 1996) | Power Eng. + Fin. Analyst. | 20 |
| Supervision (1997) | Power Eng. | 7 |
| Supervision (April 1998) | Power Eng. + Fin. Analyst. | 10 |
| Supervision (January 1999) | Power Eng. + Fin. Analyst. | 10 |
| Supervision (December 1999) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (March 1999) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (December 1999) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (March 2000) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (December 2000) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (April 2000) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (April 2001) | Power Engineer, Financial Analyst and Environmentalist | 21 |
| Supervision (October 2001) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (January 2002) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (October 2002) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (July 2003) | Power Eng. + Fin. Analyst. | 14 |
| Supervision (December 2003) | Power Eng. + Fin. Analyst. | 14 |
| PCR (September 2004) | Power Engineer, Financial Analyst and Environmentalist | 24 |

F. DISBURSEMENT OF ADF LOAN

| | |
|----------------------------|---------------|
| Total Disbursed (UA) | 14 750 267.52 |
| Undisturbed Balance (UA) * | 1 899 732.48 |
| Level of Disbursement (%) | 88.59 |

* Balance cancelled after notifying the borrower.

G. IMPLEMENTATION PERFORMANCE AND PROJECT OUTCOME

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

| Internal Rates of Return | Appraisal | PCR | PPER |
|--------------------------------------|-----------|-------|---------------------------|
| Financial Internal Rate of Return | 11.3% | 10.1% | 3.7% |
| Economic Internal Rate of Return (%) | 13.8% | 14.0% | 16.7% |
| Sensitivity Analysis - FIRR (High) | | | 7.4% |
| - EIRR (High) | | | 19.7% |
| Sensitivity Analysis - FIRR (Low) | | | 0% (project makes a loss) |
| - EIRR (Low) | | | 11.6% |

EVALUATION SUMMARY

1. The Sector and Project Context

1.1 The hydro-power potential of Mozambique is estimated at 12 500 MW, which is considered to be the largest in Africa. Despite the extent of this resource, most of the country's energy requirements are currently met by biomass. This is due mainly to the fact that the level of accessibility to electric power is only about 6%, the lowest in SADC region, and the fact that only about 2 200 MW of the hydropower resource has been developed. Given the substantial hydropower resources, the GoM has a policy to develop its hydropower potential and expand the national network to supply adequate and reliable electric power to the various parts of the country. However, Mozambique has access to only about 300 MW of the 2 200 MW produced by Hidroelectrica de Cahora Bassa (HCB), a company that is jointly owned by the governments of Mozambique and Portugal. The balance is exported to mainly South Africa in terms of a long term contract.

1.2 At the time of appraisal the peak demand in Mozambique was still comfortably below 300 MW, with the result that the Government's priority was to expand the national grid network to supply electric power to the rural areas. Thus, as was the case with Electricity I in 1991 (a Bank financed project), Electricity II Project (the subject of this evaluation) was conceived with the objective of extending the national grid network through medium and low voltage lines to the southern provinces of Maputo and Gaza.

1.3 It was the project's aim to provide reliable electric power to serve primarily as a catalyst for the resettlement of the displaced persons from the prolonged civil wars. The project was expected to meet the energy requirements for industrial and domestic applications and gradually reverse the degradation of the environment. The main components of the project comprised medium and low voltage transmission lines and distribution systems including the associated substations, materials for customer connections and operating logistics.

1.4 An ADF Loan of UA 16.65 million was approved in December 1996 to cover the total foreign exchange cost of this project. The total cost of the project was estimated at UA 19.68 million. The borrower was the Government of Mozambique and the beneficiary and executing agency of the project was Electricidade de Mozambique (EdM). EdM met the full local costs of the project.

1.5 The project was executed between 1997 and 2003. A loan saving was recorded due to competitive bidding results. Part of the saving was used to extend the transmission lines for optimizing the benefits and the final balance of UA 2 million was cancelled. The Bank's Project Completion Report (PCR) was prepared in 2005 following submission of the Borrower's PCR. The PCR concluded that the project had achieved its primary objective of economically meeting the power demand of the areas served in the Maputo and Gaza regions. The quality of the PCR was rated **satisfactory**.

2. The Evaluation

2.1 The project performance evaluation was based mainly on project and policy documents obtained from primary sources. It was complemented with findings from two field missions to Mozambique. During the field missions, various stakeholders such as EdM (the executing

agency), several other government ministries and agencies (representing the borrower) and other development partners such as the World Bank were consulted. Information was also obtained during site visits through both visual inspections and interviews with beneficiaries.

2.2 A considerable amount of the information in the logical framework relates to input and output of project components. Only some of the outcomes are accompanied by verifiable indicators. Although most of the outcomes were discussed in qualitative terms elsewhere in the Appraisal Report, there are a number of instances where outcomes were covered in neither narrative nor quantitative terms. In cases where the logical framework did not provide specific key performance indicators, outcomes were derived retrospectively from the expectations raised from the discussion in the Appraisal Report, Country Assistance Strategy and well as Bank policies and guidelines on specific issues.

2.3 The project registered an overall delay of 38 months compared to the appraisal estimates. The time overrun was mainly due to delays in fulfilment of loan conditions for loan effectiveness and delays in custom clearance, as well as contract and disbursement approval processes within Mozambique. Environmental concerns during construction contributed to further implementation delays.

2.4 There was a loan savings of the loan after all contracts were awarded. The Bank allowed the use of the uncommitted funds to undertake additional network extensions in order to maximize the benefits of the project. This was done through a contract addendum to the existing contractors. The final unused loan balance of about UA 2 million was cancelled. There was a disbursement slippage of almost 4 years, which meant that the deadline of the last disbursement had to be extended twice.

2.5 The Bank supervised the project at least once a year and it prepared its PCR following receipt of EdM's PCR. As per the Appraisal Report, the GoM was the borrower and EdM the executing agency responsible for the implementation of the project. A Project Implementing Unit (PIU), headed by a project coordinator and supported by three network engineers and a project accountant, was set up by EdM for managing the Electricity II project. EdM regularly forwarded progress reports and audit reports to the Bank as per the requirement of the loan agreement. Government processing of approval for and awarding of contract and disbursement documents was reported to be cumbersome and time consuming. In addition, customs clearance modalities were time consuming and EdM lacked capacity to process and monitor these promptly. The loan agreement included covenants that had to be met before entry into force of the loan, whilst others were to be met during project implementation. Loan effectiveness conditions were not fulfilled on time resulting in delaying project start-up by 10 months. A flood during the 1995/96 rainy season was given as the main reason for this delay.

2.6 On the whole the project's goals and objectives were found to be consistent with Mozambique's overall development strategy and national plans, as well as with the Banks country strategy and policies. Physical project objectives and outputs were mostly clear, realistic, important for the electricity sector in Mozambique and responsive to the borrower's circumstances and development priorities. However, clear targets were not set for many of the other objectives and outputs, including financial targets, institutional capacity building, social objectives and environmental objectives. Targets were set retrospectively for these in order to perform the efficacy analysis. Overall the project achieved its objectives and outcomes (efficacy) **satisfactory**.

2.7 Although the project was rated satisfactory in terms of efficiency, the results of the specific criteria varied significantly. Project benefits include wealth generation, improved social services, foreign investment, industrial development, improved social interaction, contribution to poverty reduction, sustainable energy use, small business development, increased tourism and improvements in the reliability of water supply. Whilst the economic rate of return was **highly satisfactory**, the financial rate of return was well below the on-lending rate. The low financial return can be justified by the fact that the project is aimed at mainly rural poor communities where full LTMC recovery would be impossible. Significant discrepancies were observed between the EIRR and FIRR calculations at appraisal and PCR on the one hand and the PPER on the other. A number of logical checks confirmed that the AR and PCR overestimated the financial income and underestimated the total project benefits.

2.8 Due to the fact that the project design did not include a specific institutional development component it is impossible to isolate the project's specific contribution to this aspect. The contribution of the project to institutional development was therefore assessed in the context of the Bank's sustained involvement in Mozambique's electricity sector. In this respect the project was rated **satisfactory** as it supported and contributed to the overall achievements.

2.9 In respect of sustainability the scores of the individual criteria were mostly satisfactory, which resulted in an overall **satisfactory** rating.

2.10 Despite some specific areas where the project scored highly unsatisfactory, the projects overall performance is regarded as **satisfactory**.

2.11 Both Bank and Borrower performance was rated **satisfactory**. However, there were a number of specific criteria that scored unsatisfactory.

3. Main Findings

3.1 Overall, the project has been a success and contributes to the socio-economic development of the rural southern areas of the Mozambique. Electricity II reflects several good practices. However, the project has performed less than satisfactory in a number of specific areas.

3.2 There were significant delays in the implementation of the project. Although a natural disaster contributed to the delays, there are also other reasons, including:

- (a) Staff at the Executing Agency's implementation unit was not fully familiar with all the Bank procedures prior to commencement of the project.
- (b) There was not sufficient capacity at the Executing Agency's implementation unit to deal with a number of similar projects simultaneously.
- (c) The implementation timeframe might have been overly optimistic given that Mozambique was a fragile state emerging from prolonged periods of strife and instability. Its capacity limitations in dealing with a number of similar projects from multiple donors, as well as a severe flood, meant that delays were inevitable.
- (d) A temporary suspension of construction due to environmentally damaging construction techniques.

3.3 It should be recognised that economically viable projects does not necessarily have a high financial rate of return to the operator or public utility. However, the financial sustainability of the project is threatened by the following:

- (a) EdM's high debt burden.
- (b) EdM has to absorb the difference between the ability of the community to pay and the LRMC. Despite the fact that the public utility is able to cross subsidise, countries like Mozambique that are eligible for ADF funding usually does not have sufficient wealthy users to perform cross subsidisation, with the result that public utilities become more indebted.
- (c) It is Bank policy that the third party on-lending rate of the ADF loan is in terms of market prices. Consequently, the benefits of the low interest ADF loan do not automatically reach the beneficiaries.
- (d) Although the staff per unit of output at EdM has improved, there is no evidence that high staff cost is completely under control.

3.4 The project has significant secondary spin-offs that cannot easily be reflected in the socio-economic analysis. These benefits include the following:

- (a) Since completion, the line has been extended to a number of tourist lodges through a private-public-partnership agreement. A significant number of rural households could be electrified because of this.
- (b) The provision of electricity had a significant impact on the voluntary resettlement of people that were displaced during the civil war. The Electricity II project encouraged displaced communities to resettle in towns that they deserted during the civil war and attracted communities to the vicinity of the electricity line where they can get electrical connections.

3.5 Given the number of new connections due to the expansion of the electricity grid, as well as the fact that there are no immediate plans to add additional generating capacity, there is a potential for future electricity shortages. Under these circumstances, it would be unwise to undertake further large-scale rural electrification projects without specific plans to cope with the increase in demand.

4. Lessons

4.1 Lessons are not allocated to Bank, Borrower or Executing Agency, as all parties involved should take joint responsibility for the project and should work together towards ensuring that projects are implemented successfully. The following lessons can be learned from the project:

4.2 Delays at start-up can be minimized/avoided if:

- (a) The Bank ensures appropriate and timely training in Bank procedures for staff at the Executing Agency.

- (b) An implementation capacity assessment should be made taking into account all current and future projects that will be commissioned during the implementation period of the investigated project
- (c) A realistic implementation timeframe is set, particularly in the case of fragile states.

4.3 Financial sustainability of rural public utility projects where local residents are unable to afford the full commercial tariff (long term marginal cost tariff) can be improved if the following principles are adhered to:

- (a) Services cover at least the short term marginal cost and should not be provided at an outright loss or for free.
- (b) The borrower develops an appropriate financial package to compensate the public utility company for the social services that it provides in areas where full cost recovery is not possible.
- (c) Electricity supply/generating capacity keeps up with the long term growth in the combined demand of all electricity projects.
- (d) Institutional development remains an integral component of the project.
- (e) Loan conditions specify staff productivity in terms of both staff cost and staff numbers.

4.4 Rural electrification projects have significant secondary spin-offs and opportunities that should be investigated and promoted as part of project appraisal process. These include the following:

- (a) Public-private-partnerships to extend the line and connecting additional users.
- (b) Positive impacts on rural settlement patterns and land-use.

4.5 Possible negative environmental consequences can be minimized or avoided altogether if an environmentalist is included in the appraisal and monitoring processes, even if there are no obvious environmentally sensitive issues at the time of categorisation.

1 INTRODUCTION

1.1 Country and Economic Context

1.1.1 Mozambique, with a population of about 19.8 million in 2005, occupies an area of 802 000 km² and has a 2 700 km coastline providing sea-access for several land-locked countries of southern and central Africa. It has considerable hydro-power potential and its non-renewable energy resources consist of coal, natural gas and uranium.

1.1.2 Agriculture contributes 25% to the GDP and provides employment for 80% of the population. Women account for 55% of the labour force of Mozambique's agriculture based economy. Crops, livestock and forestry and wildlife account for 20.5%, 2.5% and 2.5% respectively of GDP. About 75% of the cultivated area is taken up with food crops, mainly maize, cassava, rice and beans. The remaining 25% of cultivated land is used for the production of export crops such as cotton, cashew, copra, sugar cane and tobacco. The manufacturing sector represents 13% of GDP and its growth has been driven by local resource based mega-projects such as metals and minerals extractive industries. Tourism is another important sector that is on the rise in recent years as the country is well endowed with natural resources and its biodiversity include numerous wildlife species, rich marine life and an extensive coastline with unspoiled beaches. All major economic sectors face high operational and transaction costs due to lack of adequate and reliable infrastructure, electricity supply, labour market rigidity and bureaucracy. Although Mozambique is still a relatively inward-oriented economy, regional integration and cooperation is developing gradually in the area of transport, power and water resource management. Given the land-locked status of some of its neighbours and its hydropower potential, Mozambique's strategic location and resources can be exploited to meet its economic growth and poverty reduction objectives. It can also fulfil an important regional function.

1.1.3 The country went through a series of major transformations from 1975 to 2005 marked by the era of socialist regime following independence, two periods of prolonged civil war, and several natural disasters. Since the early 1990s, the country has transited from centrally planned economy to market led economic policy, embraced democracy and created the enabling environment for private sector development. Although the country has been affected by several natural disasters, the Government policies and reforms undertaken in recent years, together with substantial donor support, have contributed to improving the economy and bringing about macroeconomic stability, growth and socio-economic transformation and to some extent poverty reduction. Real GDP growth averaged 8% over the past decade. Over the past three years, prudent monetary and fiscal policies have further stabilized the economy. However, trade deficits are still high, but taking into account donor and private capital inflows, the foreign currency reserves amounts to about 4 months of imports. Debt sustainability is being achieved through the HIPC debt relief initiative.

1.1.4 In spite of the high economic growth of the past decade, about 54% of the population still lives in poverty. Most of the poor lives in the rural areas. GDP per capita is estimated at US\$345, which is among the lowest in the continent. The overall economic growth has, however, helped to decrease the poverty level from 69% in 1996 to 54% in 2003, surpassing the 2005 target of 50% which was set by the Government in its 2001 Plan of Action for the Reduction of Absolute Poverty (PARPA). This Plan covers different priority areas, including economic reform, public sector reform and legal and judicial reform. Overall, the Government's performance on PARPA's five-year plan goals was satisfactory, although with significant variations across sectors.

1.2 Sector and Project Context

Energy resources and power generating potential

1.2.1 Mozambique's potential energy resources include hydropower, natural gas, coal, biomass, solar and wind. The hydro-electric potential has been estimated at about 12 500 MW with a corresponding annual energy generation potential of 60 000 GWh. It is estimated that about one third of this potential can be developed at a relatively low cost. The largest potential is in the Zambezi River basin at the proposed Cahora Bassa North and Mphanda Nkuwa sites. Only about 2 200 MW of this potential has been developed thus far. HCB currently produces 2 075 MW of which it allocates 300 MW to Mozambique for meeting its domestic demand. The remainder is exported to mainly South Africa via the Southern African Power Pool (SAPP), but also to Zimbabwe and Swaziland.

1.2.2 In 2004, about 30% of the power was used by industry, 45% for transport, 12% in commercial and agriculture and the remaining 13% in households and other sectors. The current level of accessibility to electricity is only about 6%, compared to the average of 27% for the SADC region. It is thus Government policy to develop the hydroelectric potential in order to increase the availability of hydro-electricity to the population at large in order to enhance environmentally sustainable development. This is based on a study which was carried out in the late 1980s which established that the extension of the hydro-generation dominated national grid was the least cost energy for domestic supply in general and the southern provinces of Maputo and Gaza in particular. These provinces have significant agriculture, mining and tourism potential that permits the resettlement of the displaced population from the prolonged civil wars.

1.2.3 Despite its substantial power generating potential, most of Mozambique's energy needs, which is estimated at 7.9 million tons of oil equivalents (toe), are met by biomass and traditional fuels. Biomass fuels, which are used mainly for cooking, account for almost 90% of all power needs, whereas petroleum products and natural gas account for 8%. Hydro-electricity and coal make up 2% of the total energy consumption. The extensive usage of biomass fuel has both environmental and health consequences, including pollution, smoke inhalation, and destruction of natural forest.

Institutional framework

1.2.4 The functions of the Ministry of Energy used to be undertaken within the Ministry of Minerals and Energy. In August 2005, after the implementation of the Electricity II project, the Ministry was split into the Ministry of Mineral Resources that deals with the upstream activities and the Ministry of Energy (MOE) that deals with the downstream utilisation of energy resources. The MOE has three focus areas, namely renewable energy, fuel oil (from where the bulk distribution system terminates) and electricity. Each of these is handled within a separate national directorate. There are also non-core (support) directorates within the ministry such as General Inspection, Human Resources, Study & Planning, International Resources and Management & Finance.

1.2.5 The electricity sector is managed within the policy framework of the Energy Master Plan which was funded by the AfDB. The Ministry is currently negotiating with the World Bank to fund a strategy study for each of the three energy sub-sectors mentioned above.

1.2.6 The electricity sub-sector is organized under two distinct segments, namely the generation segment, which is dominated by HCB, and the transmission and distribution segment dominated by EdM and the Mozambique Transmission Company (MOTRACO). MONTRACO transmits electricity to the MOZAL aluminium smelter. The shareholding of HCB, of which the GoM holds 18% and the Government of Portugal 82%, is currently under review, with GoM in the process of taking outright control of the company.

Legislative framework

1.2.7 There are a number of acts that governs the electricity sub-sector of which the most important is the 1997 Electricity Act. This act allows a substantial degree of private sector investment to generate, distribute or transmit electricity.

Independent Electricity Regulator

1.2.8 The 1997 Electricity Act also makes provision for the establishment of an Independent Electricity Regulator (CNELEC) that is responsible for the following:

- Procedures and competence for award of generation and distribution concessions.
- Hearing of customer complaints.
- Setting of specific rules for each electricity segment, namely generation, distribution and transmission.
- System of operation.
- Approval of tariffs increases if it is not consistent with the concession agreement.

1.2.9 Although CNELEC had been established, it is currently neither truly operational nor independent as it is dependent on the GoM for funding. In order to set it on a path of independent funding, the World Bank has agreed to provide budget support in terms of the Operational Plan 2006 – 2008 over the short term. In the long term its sustainable independent funding will be derived from revenue that is raised through a levy on electricity sales and concession agreements. In terms of the Operational Plan CNELEC will focus on the following specific areas:

- Monitoring of the EdM performance contract. (A new performance contract, which includes a new set of performance indicators, will become effective in June 2006.)
- Review the current tariff formula and methodology.
- Monitoring of compliance.

1.2.10 In the longer term when CNELEC has proved to be sustainable, its functions will be expanded to the extent that it could also make strategic recommendations, including suggesting changes to legislation. It will also be responsible for conducting public hearings where e.g. consumer issues are discussed.

EdM's Internal Reform Process

1.2.11 The reform process of EdM is being addressed in the following phases:

- Phase 1: Separation of the company into business and support units in order to ring fence management responsibilities (“separation of accounts”). This helps to identify where losses occur. (See organisational chart in annex 2).

- Phase 2: About 200 specific commercial and financial problems were identified that needs to be addressed. These issues will be addressed in the next 18 months.
- Phase 3: The billing system will be revised.

Environmental Management

1.2.12 Although Mozambique has now comprehensive environmental legislation, which includes environmental guidelines and standards, the institutional capacity for enforcement and monitoring is still weak. The Ministry (MICOA) lacks funds, technical means and staff to fully carry out its mission in environmental management and monitoring. Considering its limited resources, the GoM appears to be following the recommendations made in the Energy Reform and Access Program (ERAP) regarding to the strengthening of its environmental management capacity promoting the creation of environmental units in the relevant ministries.

Bank Intervention in the Electricity Sector

1.2.13 The total intervention of the Bank in Mozambique's electricity sub-sector currently stands at about UA80 million, which is close to 10% of the total interventions of the Bank in Mozambique. This demonstrates the Bank's sustained assistance to the sector. The Bank participated in the development of the electricity sub-sector in Mozambique through the following operations:

- The Electricity I project was financed in 1991 with an ADF loan of UA14.55 million.
- The Electricity II project (the subject of this report) was financed in 1996 with an ADF loan of UA16.65 million.
- The Electricity Master Plan and Feasibility Study was financed in 2000 with an ADF/TAF grant of UA0.99 million.
- The Electricity III project was financed in 2001 with and ADF loan of UA11.12 million.
- The Electricity IV project was financed in 2006 with an ADF loan of UA25million.
- Energy Reform and Access Program was co financed with the World Bank in 2003 with an ADF loan of UA9.02 million and an ADF/TAF grant of UA1.97million.

1.3 Project Formulation

The project formulation was based on a 1991/92 study prepared by EdM with technical assistance from SIDA of Sweden to determine the most cost effective way of extending and strengthening the national power grid to the rural and peri-urban areas of the Maputo and Gaza provinces. The southern provinces of Maputo and Gaza was chosen as the

project area because it has significant agriculture, mining and tourism potential, as well as a need to resettle a large number of people that were displaced during the civil wars. In this respect Electricity II project was intended as a follow-up to the Electricity I project. In January 1994 the GoM formally requested the Bank's assistance with the funding of Electricity II, following which the project was appraised in March 1994. Due to a lack of ADF resources at the time, the project was delayed for two years until ADF VII was ratified. In order to fit the available concessionary financing for the country, the project was redefined to exclude the technical assistance for capacity building at HCB. The redefined and revised project was appraised in June 1996 and an ADF loan of UA16.65 million was approved in December 1996 to the GoM for on-lending to EdM.

1.4 Objectives and Scope at Appraisal (Logical Framework)

1.4.1 At appraisal the goal of the energy sector in Mozambique was to make sufficient energy available to the community at economic cost, to promote efficient use of energy by consumers in order to conserve limited energy resources and to build capacity in the sector.

1.4.2 Prior to the Electricity II project, availability of commercial electricity in project areas were either non-existent or were limited to isolated diesel generators, which were very expensive to run, unreliable and inadequate. Electricity II was thus initiated with the objective of providing for the energy needs of the population in the region, thereby reducing the reliance on fuel wood energy. Specific objectives of the project included the provision of cost effective and reliable electricity to the inhabitants of the Maputo and Gaza Provinces to meet their energy requirements for domestic lighting and other services, to promote the growth of small and medium industries, as well as to encourage development of commercial and tourism activities in the region. It was expected that the project would provide electricity to 7 new rural centres (Bela Vista, Salamanga, Ponta do Ouro, Inhaca, Ponta Malongane, Zitundo and Porto Henrique) and to improve the reliability of the national grid supply in 9 towns (Macia, Bilene, Xinavane, Magude, Manhiça, Palmeira, Catembe, Namaacha and Timanguene) through strengthening of the existing transmission and distribution networks. It was foreseen that by providing reliable electricity to these centres, the displaced people will be resettled, irrigated agriculture production will be revamped, tourism in resort places will be restored and enhanced, and industries, which were rehabilitated after the civil war, will be put back in operation.

1.4.3 The project components at appraisal consisted of 66kV lines, 110 and 66kV substations, distribution networks, service connections, consultancy services for preparation of detailed design and supervision of works and project audit. The expected outputs of the project at completion were as follows:

- Construction of 64 km of fully operational 66 kV transmission lines.
- Construction of 360 km of fully operational 33 kV medium voltage line.
- Construction of 105 km of fully operational low voltage lines.
- Setting up of one fully operational 110/33 kV (10 MVA) substation.
- Setting up of four fully operational 66/33 kV (10 MVA) substations.
- Connection of 3 000 consumers.
- Consultancy services recruited and services delivered
- Project audit carried out.

1.5 Financing Arrangements – Bank and Others

Total project cost at appraisal amounted to UA 19.68 million which was financed jointly from ADF and EdM resources. No co-financing was involved. ADF was to cover the entire foreign exchange cost of the project to the extent of UA 16.64 million (84.6%) and EdM was to meet local cost of UA 3.04 million. The Borrower was the GoM and the loans were on-lent to EdM, the beneficiary and Executing Agency on the specified terms and conditions in the loan agreement.

2 THE EVALUATION

2.1 Evaluation Methodology and Approach

2.1.1 The evaluation was based primarily on project documents obtained from independent sources. It was complemented with findings from two field missions to Mozambique. During the field missions, various stakeholders such as EdM (the executing agency), several government ministries and agencies (representing the borrower) and other development partners such as the World Bank were consulted. Information was also obtained during site visits through both visual inspections and interviews with beneficiaries.

2.1.2 The PPER was based on the standard evaluation benchmarks such as relevance, efficiency, efficacy, sustainability and institutional development impact. A ‘before and after’ approach, as apposed to a ‘with and without’ approach, was followed to examine the socio-economic development induced by the project¹. The Bank and Borrower performance was assessed throughout the project cycle, i.e. from project identification through PCR, on the basis of the contribution that the project has made to socio-economic development. Special attention was given to assessing the appropriateness of the intervention, the implementation performance and the sustainability of the project to meet developmental goals of the sector over the project’s lifecycle. The overall outcome of the project was rated in terms of the benchmarks and targets that were set either at appraisal or in retrospect during post evaluation. The Project Performance Ratings are provided in annex 6 and the factors affecting implementation performance and outcome is listed in annex 9.

2.2 Key Performance Indicators

2.2.1 A considerable amount of the information in the logical framework relate to input and output of project components. Only some of the outcomes are accompanied by verifiable indicators. Although most of the outcomes were discussed in qualitative terms elsewhere in the Appraisal Report, there are a number of instances where outcomes were covered in neither narrative nor quantitative terms. In cases where the logical framework did not provide specific key performance indicators, outcome expectations were derived from the expectations raised from the discussion in the Appraisal Report, Country Assistance Strategy and well as Bank policies and guidelines.

2.2.2 As the project was classified environmentally as Category II, the Appraisal Report indicated only a few negative environmental impacts that can be mitigated through the

¹ A ‘with and without, approach is usually followed when evaluating projects *ex ante*, as well as in *ex post* where the counterfactual is known, such as Impact Evaluations. Usually, however, ex post evaluations follow a ‘before and after’ approach.

preparation of environmentally sound design and appropriate construction regime. However, a plan of action was not provided. The project's positive contribution to environment was qualitatively discussed with respect to its contribution to reducing the deforestation and gaseous emissions from the burning of fuel wood, which in turn was expected to reduce the damage to household health and hardship associated with the gathering of bio-fuel and applying traditional cooking methods.

2.2.3 The objectives and scope of the indicators are discussed in subsequent sections. The quantifiable indicators considered in the Appraisal Report are 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 became effective in April 1998, 10 months after loan approval. The delay was due to the fact that the Borrower was slow in fulfilling the loan conditions prior to entry into force. The loan effectiveness was contingent upon the following main conditions:

- Provision of undertakings for committing itself to attain key performance indicators and tariff increases by specified periods.
- Conclusion of a subsidiary loan agreement between Borrower (GoM) and Implementing Agency (EdM) for on-lending of the entire proceeds of the loans at an interest rate not exceeding 7.5% per annum for a repayment period of 20 years with 5 year grace period.
- Submission to the Bank for approval of the curriculum vitae of an engineer to be appointed in the then existing Project Implementation Unit.

3.1.2 The main reason that was given for the delay is the floods of 1995/96. The delay also had a knock-on effect which resulted in delaying the appointment of the engineering consultant by 8 months. Following loan effectiveness, the engineering consultant was appointed in July 1998, and the preparation of detailed engineering design was concluded by December 1998 instead of May 1998. The first works contract was awarded in April 1999. Further delays occurred during construction, which took 45 months compared with an estimated 20 months. The project was ultimately completed in December 2003 instead of October 2000, an overall delay of 38 months. Cumbersome Government contract approval processes customs clearance processes, EdM's inability to process and follow up customs clearances promptly, a temporary stoppage in construction due to environmental concerns, as well as the poor performance of the engineering consultant in overseeing the work of the contractors contributed to this delay in one way or another. Appropriate modifications were made to the project during implementation in order to maximize the benefits and to ensure its environmental sustainability. Procurement was undertaken in accordance with AfDB's rules.

3.1.3 As was mentioned above, environmental concerns during implementation contributed to implementation delays. A lack of professional environmental monitoring during construction left the contractor unchecked, which led to the use of heavy equipment to clear

the right of way in sensitive areas of the Maputo Elephant Reserve. It was only when environmental lobby groups used their international network to stop construction that the issue came under the attention of the Bank. This prompted the Bank to undertake an unscheduled mission with an environmental expert in order to resolve the issue. Although the environmental concerns were resolved amicably, the situation could have been avoided if appropriate environmental monitoring was undertaken in the first place.

3.2 Adherence to Project Costs, Disbursements and Financial Arrangements

3.2.1 Total project cost at appraisal amounted to UA 19.68 of which the Bank financed components were UA 17.31. The actual amount used was UA 14.75 million out of an approved loan of UA 16.64 million. EdM's contribution of UA 3.04 million was fully utilised when all outstanding payments were cleared. EdM has financed all front-end activities of the project and it increased its contribution to the project by financing additional components. After all contracts were awarded the Bank allowed the use of the uncommitted funds to undertake additional network extensions in order to maximize the benefits of the project. This was done through a contract addendum to the existing contractors. The final unused loan balance of about UA 2 million was cancelled.

3.2.2 At appraisal, disbursements were scheduled to start in mid-1997 and end in 2000. However, due to initial delays in start-up and other implementation delays, actual disbursements started in 1998 and ended in 2004. This resulted in a disbursement slippage of almost 4 years, which meant that the deadline of the last disbursement had to be extended twice. As reported earlier, much of the disbursement delays emanated from within Mozambique.

3.3 Project Management, Reporting, Monitoring and Evaluation

3.3.1 As per the Appraisal Report, EdM was the executing agency responsible for the implementation of the project. At the time of appraisal there was an AfDB desk in the Bank Popular de Desenvolvimento (BPD) which was made responsible for the overall supervision of the project. A Project Implementing Unit (PIU), headed by a project coordinator and supported by three network engineers and a project accountant, was set up by EdM for managing the Electricity I project. This unit continued the direct management of implementation activities of Electricity II. A Consulting Firm was appointed to assist EdM in the preparation of design and tender documents and carrying out the tendering process and supervision of construction works as well as the preparation of quarterly reports and project completion report. The progress reports were to include the status of physical implementation of the various contracts, the disbursement status and the implementation of environmental mitigating measures. Separate accounts were to be maintained for the project for tracking the various components' expenditure in local and foreign currency and the account was to be audited annually. The Bank supervised the project at least once a year and it prepared its PCR following receipt of EdM's PCR.

3.3.2 EdM had forwarded progress reports and audit reports regularly to the Bank as per the requirement of the loan agreement. During implementation EdM reported that the engineering consultant's performance was unsatisfactory, while the contractors had by and large met their obligations. Government processing of approval for and awarding of contract and disbursement documents was reported to be cumbersome and time consuming. In addition, customs clearance modalities were time consuming and EdM lacked capacity to

process and monitor this promptly. EdM had carried out its own PCR following which the Bank prepared its PCR, however it failed to undertake the environmental audit as per the EIA report. Although the Bank carried out regular field supervisions during implementation, the skill mix did not include an environmental expert. It was only when the environmental problems arose during construction that an environmental expert accompanied Bank staff on an unscheduled mission.

3.3.3 The loan agreement included covenants that had to be met before entry into force of the loan, whilst others were to be met during project implementation (see para. 3.1.1). Loan effectiveness conditions that were not fulfilled on time resulted in delaying project start-up by 10 months. The other conditions had been complied with but with some delays. At the time of the PCR, the outstanding conditions that were not fulfilled were those relating to the reduction of accounts receivables and tariff adjustments. At the time of this evaluation, the collection period has significantly improved but still falls short of the government's target. Tariffs had been increased by 17.8% and 7.4% in 2004 and 2005 respectively. The current average tariff is now USD 0.081/kWh. The long run marginal cost of supply is estimated at USD 0.091/kWh.

4 PERFORMANCE EVALUATION AND RATINGS

4.1 Relevance and Quality at Entry

Relevance of Project Objectives

4.1.1 On the whole the project's goals and objectives were found to be consistent with Mozambique's overall development strategy and national plans. They were also consistent with the Bank's Country Strategy Paper 2002 – 2004 for Mozambique, as well as with the Bank's policies on poverty reduction, environmental sustainability, gender equality, institutional capacity building, private sector expansion and regional integration promotion. The project goals and objectives conform to the Bank's assistance strategy and policies both at the time of project approval and at the time of the PPER. The relevance of the stated goal to reduce electricity losses in the national grid from 40% to 12% is irrelevant to this specific project, as the project would have very little impact on the overall losses on the grid.

Quality at Entry

4.1.2 Physical project objectives and outputs were mostly clear, realistic, important for the electricity sector in Mozambique and responsive to the borrower's circumstances and development priorities. An exception is the objective to "...provide least cost and reliable hydropower supply..." which was neither realistic nor responsive to the borrower's circumstances. Despite the fact that HCB's production capacity is about 2 000 MW of which 300 MW is currently allocated to EdM, it is unrealistic to expect vast additional amounts of this electricity to be allocated to EdM in the short term. In the long term it may even be undesirable for EdM to rely exclusively on this source. A detailed discussion of the reasons for this is provided in paragraph 4.5.17 and 4.5.18 below.

4.1.3 No specific financial targets, such as the average tariff level or cost recovery, were set at appraisal. This should be seen in the context of EdM's practice to apply cross-subsidisation to fulfil its social function and that it is obliged to charge a minimum average

tariff level based on long run marginal cost principles. EdM is also heavily indebted and the extension of further loans to the parastatal company had a further negative impact on its liquidity which should have been recognised and fully addressed at appraisal.

4.1.4 The project design lacked an institutional capacity building component notwithstanding the fact that the sector goal stated that there should be capacity building in the electricity sector. There are a number of concerns about the institutional and operating environment that were present at the time of appraisal and which continue to threaten the project's sustainability (see section 4.5). The complexity of these issues were apparently not realised and they were not dealt with adequately at appraisal. Consequently, the assumptions and analysis of project risks are weak and inadequate. Judging from recent appraisals of electricity projects in Mozambique, many of the risk issues that were present at the appraisal stage are still present today and are still not fully addressed.

4.1.5 A narrative description of social objectives and targets are provided in the report, but, other than the number of new connections, no specific targets were set.

4.1.6 The main environmental concerns were identified at appraisal. However, construction of the electrical line through the Maputo Elephant reserve was briefly suspended due to environmentally damaging construction techniques. Although this issue was subsequently resolved, it could have jeopardised the successful implementation of the project.

4.1.7 Although the quality at entry was not rigorous in some areas, the project's overall relevance assessment is rated **satisfactory** (Annex 6).

4.2 Achievement of Objectives and Outputs: "Efficacy"

4.2.1 Efficacy describes the extent to which the project had achieved its stated goals, objectives and outputs. Goals, objectives and outputs thus have to be clearly formulated at appraisal in order to be able to make a reasonable assessment of a project's efficacy. In a number of instances no specific targets were set at appraisal. Retrospective targets were set in these instances based on expected outcomes at appraisal. Overall the project achieved its objectives and outcomes (efficacy) **satisfactory** (Annex 6). Following in sections 4.2.2 through 4.2.11 is a discussion of the project's efficacy in terms of the standard categories.

Policy Goals

4.2.2 The project achieved its stated goals of making sufficient energy available to the community at economic cost and to promote efficient use of energy by consumers thereby conserving limited energy resources. However, it failed to reach the goal of building capacity, particularly institutional capacity, in the electricity sector, as the project did not include such a component. It should also be noted that capacity building could be considered as an objective rather than a goal. This sub-component is rated **satisfactory**.

Physical Outputs

4.2.3 All the stated physical outputs of the project at appraisal were either met or exceeded. This sub-component is therefore rated **highly satisfactory**. A summary of the specific outputs are provided in section 4.2.4. Section 4.2.5 through 4.2.7 is a description of the most significant physical project outputs that were verified from documents as well as through visual inspections during site visits.

4.2.4 The physical outputs of the project include the following:

- Construction of 88 km length of 66 kV overhead line. (Exceeded by 24 km.)
- Construction of 398 km length of 33 kV overhead line. (Exceeded by 38 km.)
- Construction of 223 km low voltage lines (Exceeded by 118 km.)
- Connection of 4 600 consumers. (Exceeded by 1 600 customers.)
- Setting up of one 110/66 kV substation.
- Setting up of four 66/33 kV substations.
- Erection of 57 33/0.4 kV transformer stations.
- Purchasing of six vehicles.

4.2.5 A 10 MVA transformer was installed under the Electricity II project at the existing Matola Rio 66/33 kV substation to supply the area, which is also the main water supply source for Maputo city. Electricity consumption in the area is growing at such a rate that the current peak load is around 8 MVA compared to the installed capacity of 10 MVA. This means that there would soon be a need to install an additional transformer.

4.2.6 An outgoing bay at the Boane substation was installed to serve the 66/33 kV line between the Boane and Salamanga substations was financed as part of the Electricity II project. This line passes through the Maputo Elephant Reserve to Inhaca Island. An undersea cable connects Inhaca to the mainland. A 33 kV line was constructed from Salamanga substation to transmit electricity to Ponta de Ouro, Ponta Malongane and Ponta Mamoli further south. A 33 kV line also supplies power to Bela Vista. The project included the replacement of the old 33 kV line and low and medium voltage distribution lines of Catembe, the district capital of the Maputo Province.

4.2.7 To the north of Maputo city the distribution lines in Marracuene were rehabilitated and expanded under the project. This 33kV lines supply power to the Ponta da Macaneta across the river. A new 10 MVA substation, which replaced a mobile substation, was constructed at Manhica and the distribution lines were rehabilitated. As with the other substation that were constructed under the project, housing is provided for the workers at the substation since there is no reliable transport to Maputo. Two sugar factories were connected to the substation with rehabilitated 33kV lines. Two other lines from Maputo to Manhica, 66kV and 33kV respectively, as well as a 110kV line that goes to Inhamban (500 km) via Xai-Xai also feeds into the Macia substation. This has created a mini interconnected network, thus ensuring reliable supply of power to the sugar estate (as irrigation is used to grow sugar cane) and the factory.

Financial Targets

4.2.8 The logical framework of the Appraisal Report did not include specific financial targets. Financial outcomes were derived from the loan conditions, as well as from the financial analysis. The following retrospective financial targets were set:

- The FIRR should exceed 10%.
- The tariff should reflect the LTMC of USD 0.091 kWh and losses should not exceed 12%.

None of these targets was met. This sub-component is therefore rated **highly unsatisfactory**.

Institutional Development Objectives

4.2.9 The logical framework of the Appraisal Report did not include specific institutional development objectives. Institutional development outcomes were derived from the Appraisal Report, the Mozambique Country Strategy Paper and the Bank's policy in this regard. The following retrospective institutional development targets were set:

- Undertake restructuring of the energy sector.
- Complete the internal reform process of EdM.
- Creation of an independent regulator.
- Capacity building.
- Creation of environmental management structures and processes.

The project did not include a specific institutional development component. This sub-component is therefore rated **unsatisfactory**. However, the project contributed satisfactorily to the good progress that is being made in this respect (see discussion under section 4.4 below and point 4 in annex 6).

Social Objectives and Targets

4.2.10 Only one social target were set, namely to provide reliable electricity supply to 3 000 rural households, four factories and eleven tourist lodges. The Electricity II Project has contributed positively to improving and enhancing the electricity infrastructure in the areas covered under the project. The project exceeded the set social target by connecting 4 600 new rural (mainly poor) customers, four factories and eleven tourist resorts. The factories and tourist resorts created many new employment opportunities. In addition a number of schools and clinics were also served with electricity. This sub-component is therefore rated **satisfactory**.

4.2.11 The project benefited women in a number of ways. Firstly, the fact that many individual households were electrified means that women could benefit from the following:

- (a) Increased use of labour saving household appliances. This will free up time which they can use for other productive tasks such as starting a home business or furthering their education.
- (b) Lighting provides an opportunity for women to perform handicrafts and educate themselves further after sunset when they have completed their household chores.
- (c) Women can set up home businesses that require electrical tools and appliances.

Secondly, many of the businesses that are expanding as a result of the project are in the hospitality industry, including tourist lodges and restaurants. Not only are these businesses very labour intensive, they usually offer ideal formal employment opportunities for women.

Environmental Objectives

4.2.12 The logical framework of the Appraisal Report did not include specific environmental objectives. Environmental outcomes were derived from the Appraisal Report, the EIA and the Bank's environmental policies. The following retrospective environmental targets were set:

- Reduce reliance on biomass for lighting and cooking.
- Improve health through reduced air pollution and smoke inhalation.
- Ensure that the electricity line conform to environmental standards.

4.2.13 The environment aspect in particular had been a major issue during design and implementation as the lines had to pass through the Maputo Elephant Reserve. This necessitated conducting an Environment Impact Assessment (EIA) Study, a copy of which is provided to the mission. The Bank's project completion report has recommended an environmental audit to be done by the Government. Although, according to EdM, compensation was paid to all affected by the transmission lines, no consultation was made among local communities, and the level of social awareness about environmental issues is still low. Out of nearly 300 NGOs, only one is dealing with environmental problems, which neither seems to be a top priority among international donors. This sub-component is therefore rated **satisfactory**.

4.2.14 The project reduced reliance on biomass for lighting and cooking, but not to a great extent. It also cannot be claimed that the project had a major effect on health improvement through reduced air pollution as there were only limited use was made of diesel generators for lighting. Wood is also still used for most household cooking, which means that the negative effects of smoke inhalation have not reduced substantially. With the exception of visual intrusion in the Maputo Elephant Reserve the line conforms to environmental standards. The damage caused to vegetation during construction were also minimised and will recover. There is some concern about the protection provided for birds, particularly in the Maputo Elephant Reserve. However, the project also had a positive impact on the reserve by enabling an electrified fence to be erected to ensure that the elephants do not wander out of the reserve where they would be vulnerable to poaching.

Private Sector Development

4.2.15 The logical framework of the Appraisal Report did not include specific private sector development objectives. Private sector development outcomes were derived from the Appraisal Report, the Mozambique Country Strategy Paper and the Bank's policy in this regard. The following retrospective private sector development targets were set:

- Industrial development
- Increase foreign investment
- Small business development
- Increase tourism

4.2.16 The Electricity II Project has contributed positively to improving and enhancing the rural electricity infrastructure in the areas covered under the project. The project met and exceeded its private sector development objectives and targets by connecting 4 600 new customers, four factories and eleven tourist resorts. Additional connections to a number of tourist resorts private dwellings were made possible by connecting a branch line to the Salamanga Ponta do Ouro line. This was funded through a public-private partnership arrangement between the lodge owners and EdM and illustrates the indirect socio-economic benefits of the Electricity II project. Availability of the power supply was increased from the previous four to six hours per day to 24 hours per day. Reliability of the supply has also increased substantially. Records kept by the sugar mill shows that power outages which totalled 200 hours per annum and which lasted for up to 5 days were eliminated. If outages occur it rarely lasts longer than a few minutes. These improvements have enhanced the private sector development in the areas served. This sub-component is therefore rated **highly satisfactory**.

Regional Integration

4.2.17 Even though the Electricity II project was not intended to have a regional integration function, and therefore no specific targets were set for this in the logical framework, South Africa is interested in acquiring up to 4 MVA from an extension of the line that currently terminates at Port de Ouro near the border of South Africa. The northern part of the Kwazulu-Natal province of South Africa which borders southern Mozambique is fairly isolated and undeveloped. It would be expensive to supply electricity to these isolated communities in these rural parts from the main power grid in South Africa. The availability of an electricity connection now makes it cost effective to provide electricity to this part of South Africa. This will not only be of benefit to South Africans, but there is already substantial established informal trade between these remote parts of South Africa and Mozambique. Extension of the electricity line across the border is likely to further strengthen and expand this trade.

4.2.18 EdM is currently reviewing the demand and the options as to how best to supply this remote part of South Africa. In the short term up to 2 or 2.5 MVA could be supplied from the existing 33kV lines as the current peak load in Salamanga is only 2 MVA while the capacity of the substation is 10MVA. If the demand increases in the long term, other option is to meet the South African demand through constructing new 66kV lines from Salamanga to Port de Ouro.

4.3 Efficiency

Implementation Cost and Time

4.3.1 Although there has been some cost savings on the components of the project financed by the Bank, EdM reported in its PCR that it incurred cost overrun on local costs of the components, thus increasing its financing contribution from 15% determined at appraisal to 24.8% at project completion. This cost overrun should be seen that the project outputs also increased substantially – in the case of the number of new connections by 53%. The cost overrun is therefore considered to be justified.

4.3.2 Time overrun has been a chronic problem with the implementation of electricity projects in Mozambique. All on-going and recently completed electricity projects in Mozambique are characterised by long implementation delays. Electricity I and II were delayed by 47 months and 38 months respectively in comparison to what was planned at appraisal. ERAP and Electricity III, both of which are on-going, are also experiencing delays. In this respect delays in project start-up means that the benefits of the project are also delayed and diminish as they become effective further in the future. Following is a summary of the reasons for the delays in the project execution:

- (a) The EdM Project Implementation Team is an ad hoc team comprising members from different departments. The team is reformed with every new AfDB project depending on the skills required. This means that some of the members of the Project Implementation Team had to go through the same learning curve to acquaint themselves with the Bank's procurement and disbursement procedures. Although a certain level of experience was carried over from the Electricity I project, which reduced the learning curve for the Electricity II project, it was not sufficient to prevent delays from occurring.

- (b) Cumbersome and lengthy government approvals process. All contracts which exceeds USD 1 million must be approved by the Commission for External Economic Relations (CREE), a Council of Ministers, after it has been approved first by the Ministry of Energy and then by the Ministry of Finance. The approval by CREE alone may take two to three months.
- (c) Customs clearance of equipment that is exempt from duties usually takes a considerable time to process.
- (d) EdM may have a number of projects and activities on-going with the result that the procurement department gets overloaded. Consequently documentation could not always be completed in time. This problem has subsequently been solved by including the preparation of the relevant documents and follow-up as part of the contract agreement with the contractor.

4.3.3 It is expected that the newly opened country office of Bank in Mozambique could facilitate to streamline the implementation of projects in the future. However, the delays on the part of the GoM remain to be addressed fully.

Project Benefits

4.3.4 Significant benefits had resulted from the project. The benefits of and beneficiaries from the availability of reliable electricity supply (see annex 3 for annual growth projections) as a consequence of the Electricity II project are summarised below:

- (a) *Wealth generation:* Land value is reported to have increased significantly after electrification. Near Matola a typical free holding plot of land measuring 1 500 m² would have been valued at USD 100 before the electrification. After electrification the price has gone up to about USD 5 000.
- (b) *Social services:* A number of schools have been supplied with electricity and more will be supplied in the near future. A prison in Maputo has been relocated to the area between Matola and Salamaga. It will soon be supplied with electricity from the Salamanga substation. This would enable prisoners to be engaged in small scale farming and technical activities in order to facilitate their rehabilitation into the society when they finish their prison terms. A number of clinics were supplied with electricity from the implemented electricity line.
- (c) *Foreign investment:* The provision of electricity has attracted foreign investors. An example of this is the Maragra sugar factory that was in poor condition before 2000. It was sold to a foreign company who rehabilitated it. At the time the factory was using only about 3 MVA. Electricity power cuts were frequent and lengthy. Company records show that the factory was normally without electricity for about 200 hours per year and power outages typically lasted for four to five days at a time. After the implementation of the Electricity II project EdM is able to meet the peak needs of the factory, particularly during the irrigation period, which is the peak load season. Power outages have reduced to almost zero and last for a few minutes at most. Due to the increased reliability and availability of power the company is now confident and ready to make further investment in its facilities.

In addition to the big investors, there are also numerous small investors, mainly in the tourism industry. Some of these have even made further investments in extending the 33 kV line to serve lodges. These lodges not only provide employment to the local community, but the extension of the line has enabled EdM to electrify additional dwellings near the electrical line. This has provided synergy between the lodges or restaurant owners with that of the local communities in various forms supply of labour, services and even provision of fresh vegetables from cottage farms run by the local communities.

- (d) *Industrial development:* Electricity II provides power to large factories at medium voltage (33 kV) in the form of bulk sale through one bulk meter. Internal distribution is the responsibility of the companies. Some factories, such as the sugar factories, also produce part of their power from steam generators by using the bagasse (by product of the sugar cane) and coal (to make up for any shortage in bagasse) to run the turbines. The factory at Maragra for example complements the 7 to 8 MVA that it receives from EdM through a 10 MVA transformer, with its internal generation of another 5 to 7 MVA depending on its needs during peak season (irrigation period). The molasses is sold to different customers such as beverage producing plants and as cattle feed. The sugar is sold to the National Sugar Supply Distribution Co., which is responsible for sale in the domestic and external markets. Nearly 60% of the production is sold for external market mainly in Europe. One of the sugar factories employs about 300 permanent workers and over 1 000 seasonal workers during the harvesting season.
- (e) *Social interaction:* As a result of provision of street lighting in the villages the communities are now able to move around and congregate in the streets after dark. Prior to electrification some villages, as well as tourist lodges and camping facilities were supplied with electricity from diesel generators. These generators were usually switched off at 10 p.m. with the result that the quality of stay at these lodges and camping areas were sub-standard due to the limited hour of electricity supply as well as the attendant noise of the generators in the area. The availability of electricity also made the extension of the mobile phone network possible, which is often the only means of communication in areas which lacks a landline based telephone network.
- (f) *Poverty reduction:* Local communities has greatly benefited from the Electricity II project. In addition to the direct and indirect employment opportunities that the tourist lodges and factories provide, there are also direct benefits to poor communities. Where possible, the benefits of the electricity are provided to communities close to the line. One or two room dwellings located in small villages are supplied with electricity through a system that provide single bulb connection (without having the need to use wiring) and installation of prepaid meters. Electrical appliances such as freezers, fridges and air conditioners are being used widely and without lengthy disruption from use of a generator set.
- (g) *Sustainable energy use:* The use of electricity has reduced the reliance on large scale firewood consumption, particularly at lodges and restaurants. However, domestic wood consumption will continue as many poor people cannot afford electrical stoves and the electricity consumption of stoves cost considerably more than firewood. The main advantage in the supply of electricity in terms of sustainable energy use is the elimination in the use of diesel generators. The

supply of electricity from the grid is considerably less expensive than running a generator. The initial investment together with the running cost makes supply from a generator very costly.

- (h) *Small business development:* A number of restaurants, artisan shops, mobile phone service kiosks and car repair workshops have opened in the areas where electricity supply has been provided for the first time or where reliability has improved. The petrol filling station in Porta de Ouro, which used to operate manually, is now operating with electricity. A tourist operator that was interviewed indicated that his family started three businesses during the past five years, including a restaurant, a Scuba diving school and a camping lodge. He employs about 70 people in these facilities. If each employee has a family of 5 to 6 persons, his business alone is providing income for 400 persons. Moreover, he uses local food products in the area or Maputo although he could get imported food products at cheaper prices. Thus, his business supports local market as much as possible. One of the local bakeries is now using electricity to bake the bread. This shows that there is economic integration that was made possible by provision of electricity in the area and development of small scale businesses.
- (i) *Increased tourism:* Availability of electricity has facilitated the expansion of tourist lodges and restaurants thus encouraging small scale private sector development. There are now several lodges in the Ponta de Ouro, Ponta Malongane and Ponta Mamoli as a result of electricity supply in these centres. The growth is evident from the fact that at the time Ponta de Ouro was provided with energy in 2002, there were only 50 customers. Now there are more than 700 private customers and 11 lodges. On average EdM collects about USD 600 per month from each lodge. A typical lodge with 50 rooms or more can provide employment for 30 to 40 people. More than 80% of the tourists in the area are used to come from South Africa but in recent time the number of visitors from Mozambique and elsewhere has increased. The proportion now is 70% and 30% respectively. The region is particularly attractive for Scuba diving.
- (j) *Water supply:* Before the Electricity II project the back-up water supply pumping station at Matola used to be powered by a diesel generator. Now it is supplied 100% from the Matola substation (which has a capacity of 10 MVA and a peak load of 8 MVA) as well as Salamanga substation (which has a capacity of 10 MVA and a peak load of 2 MVA). As the electricity supply is now from two sources, the supply can provided without interruption, even during maintenance of the power lines.

Financial Performance of the Project

4.3.5 For the purposes of the Project Performance Evaluation the calculation of the FIRR was based on independently collected and verified data. A FIRR of 3.7% was calculated for the project (see annex 4). The low FIRR results from the fact that the LTMC cannot be recovered due to the large number of poor residential users that are served by the project who are unable to pay the full cost recovery tariff. This sub-component is therefore rated **unsatisfactory**.

4.3.6 FIRRs of 11.26% and 10.1% were recorded at appraisal and PCR respectively. Both of these returns are substantially higher than the FIRR that was calculated by the Project

Performance Evaluation, despite the fact that there are no major apparent differences between the input data of the different calculations. A logical check that was performed on the cash flow series of the financial analysis in the AR and PCR however shows unexplained discrepancies in the data of the cash flow series. If the ratio of total income to total energy cost is compared with the ratio of unit price of sales to unit cost of energy, the ratio based on unit cost should be higher than the ratio based on actual cost due to the fact that technical and commercial losses occur between purchase and income collection. The income-cost ratio of the PCR is 7.74 in 2008 (the year in which LRMC tariff of USD 0.091/kWh is charged), which is impossible considering that the income-cost ratio based on unit cost is only 3.03. The income-cost ratio of the PPER is 2.35.

4.3.7 Given a FIRR of 3.7% the project is not viable at an on-lending interest rate of 7.5%. This, however, does not necessarily mean that the financial performance of the project would be highly unsatisfactory under all circumstances. The financial performance of the Electricity II project should be considered in terms of the following two factors:

- (a) The GoM's on-lending rate to EdM, which is prescribed in the loan agreement, far exceeds the very favourable terms of the ADF loan to the government. Had the terms of the on-lending rate corresponded to that of the ADF loan, the project would have been financially viable. Due to the fact that the GoM extends the loan that it received at favourable terms from the AfDB to EdM at close to market rates, the project is in practice not financially viable and is operating at a financial loss to EdM. It is thus contributing to the poor financial situation of EdM.
- (b) Full cost recovery should not be an objective of a rural electrification project of this nature. The low FIRR therefore does not contradict the policy of the GoM to provide electricity in rural areas for social reasons and to cross subsidise between urban and rural electricity users and between small and large consumers.

Economic Performance of the Project

4.3.8 As is the case with the financial evaluation, independently collected and verified data was used in the calculation of the EIRR. In addition, the Project Performance Evaluation followed a different methodology to calculate the project benefits. Project benefits in the economic analysis of the PCR were calculated by applying a factor of 1.7 to the financial tariff in an attempt to reflect the consumer surplus of the project. This incorrectly implies that there is a linear relationship between financial income of a public utility company and the economic benefits of the wider community. The Project Performance Evaluation based its approach on the user cost of current electricity consumption compared to the potential cost that users would have incurred if they had to generate the same amount and quality of energy by available means. This methodology takes account of both the resources saved on current energy consumption and the fact that users benefit from the greater amount of energy they use.

4.3.9 An EIRR of 16.7% was calculated for the project during the Project Performance Evaluation (see annex 5). The EIRR that was calculated at Project Performance Evaluation is substantially higher than those which recorded at appraisal (13.79%) and at project completion (14.00%). This means that the project is economically viable at a cut-off rate of return of 10%. It should be considered that the project has the following additional positive economic impacts:

- (a) The project could be considered as a means of redistributing income to rural residents. Electricity used by low volume rural users is subsidised. The fact that they do not pay the full financial cost of electricity means that individuals derive considerable additional social benefits from the electricity project.
- (b) Small and medium business benefits substantially from the project. This supports the GoM policy of encouraging such business in order to diversify the economy and to make economic growth less reliant on mega projects, which has up to now been the major driving force behind Mozambique's rapid economic growth.

This sub-component is therefore rated **highly satisfactory**.

Sensitivity Analysis

4.3.10 The sensitivity of the financial and economic performance of the project was tested in respect of the following input parameters:

- Achievement of the loss target of 12%.
- Changes in the growth of electricity sales.

4.3.11 The sensitivity analysis shows that financial viability will not be achieved even if losses are reduced to the target of 12%. A growth in electricity sales of 8% p.a. would also have to be achieved over the project life, i.e. up to 2037, for the project to achieve the on lending interest rate of 7.5% to EdM. Given that the growth in electricity consumption in developing countries roughly follows the growth of GDP, this means that a growth in GDP of 8% p.a. would have to be maintained over the next 30 years in the areas served by the project for the project to be financially viable. It also means that in 2037 the total electricity transmitted through the project lines would have to be close to 345 000 MWh. Such a scenario is very optimistic, but, given that Mozambique's economy has grown at 8% p.a. over the past decade, not entirely unlikely.

4.3.12 The results of the economic viability are sufficiently robust for the project to remain economically viable even if there is no growth in electricity sales. The economic viability of the project is not affected by commercial losses as the cost of electricity was based on the opportunity cost of resources, which equal the LTMC without any commercial losses.

4.3.13 Thus, in spite of the implementation delays and variations in the scores for the sub-components, the overall efficiency is rated **satisfactory** (Annex 6).

4.4 Institutional Development Impact

Due to the fact that the project design did not include a specific institutional development component it is impossible to identify the project's specific contribution to this aspect. The contribution of the project to institutional development should therefore be assessed in the context of the Bank's sustained involvement in Mozambique's electricity sector. The discussion in paragraph 1.2.3 through 1.2.11 highlights the progress that has been made with the restructuring of the electricity sector since the implementation of Electricity II. It will be clear from the discussion that overall the project has made a positive contribution to institutional development in the electricity sector. This sub-component is therefore rated **satisfactory** (Annex 6).

4.5 Sustainability

4.5.1 The project's overall sustainability is assured in view of the commitment of the Government and EdM to improve and increase the electricity coverage in the country. However, the assessment of the sub-components underscores areas that need to be further improved to enhance sustainability of the project and the overall performance of EdM. The sub-components assessment is covered from 4.5.2 to 4.5.20.

Technical soundness and maintenance

4.5.2 The equipment that was installed generally appears to be of a good quality and appropriate for the operating conditions and the terrain and therefore pose no threat to the sustainability of the project. Examples of technical soundness include the extensive use of concrete poles in areas where there is a greater fire hazard that could damage wooden poles, installation of heavy duty steel girders at river crossings to reduce the risk of flood damage, the use of aluminium wiring in order to reduce the risk of theft and the construction of housing for supervisors at the substations in order to ensure that monitoring of equipment is continuous. Two instances were observed where the integrity of the electricity supply is threatened through insufficient equipment, bad design, poor construction, insufficient maintenance or a combination of these. These are the exposure of the undersea cable that links Inhaca Island to the mainland at the point where it enters the sea and severe corrosion of the steel girders of the pylon on the beach at the same location.

4.5.3 Although Electricity II Project up to now experienced only minor maintenance problems, there are a number of potential threats to the proper maintenance of the facility itself, as well as to the distribution network that supplies electricity via the Bank financed facility. These threats can be classified under either (i) the availability of funds for implementing effective maintenance regime and (ii) appropriate skills to perform maintenance tasks effectively. Specific maintenance issues are summarised as follows:

- (a) The current focus of the maintenance programme is on investment to reduce maintenance and to reduce outages. The expressed need for maintenance is in the order of USD 7 million, but the budget allocation is in the order of only USD 2 million. It is reported that the maintenance needs is particularly acute in the case of high voltage lines. These lines are the feeders for Electricity II and power interruptions on these lines will have an inevitable effect on Electricity II.
- (b) Older spares are difficult to replace as these are mainly analogue equipment, whereas new equipment is digital. These are mainly in protection, control and telecoms.
- (c) EdM finds it difficult to optimize its maintenance function as a result of a lack of standardisation of equipment and systems installed in the various projects. This is due to the fact that bilateral donors often specify the use of that country's products. As a result EdM has no choice but to accept non-standard equipment. The fact that many of EdM's projects are funded by bilateral donors had led to a situation where EdM has to content with a large number of different suppliers and equipment manufacturers. Lack of standardisation affects mainly control equipment, telecommunications and protection and it has the following consequences:

- It increases the cost of stock. Different brands of the same item have to be kept in stock.
 - It increases the cost of training. Technicians have to be trained in the unique troubleshooting software and repair procedures of each product brand. This also has a negative effect on productivity as technicians have to be skilled in several product brands with which they do not work with on a daily basis. It is thus difficult to become a specialist in a specific make.
 - It affects regional integration. Other utility companies in the region, such as ESKOM, use different component suppliers.
- (d) Lack of heavy equipment, (bulldozers, truck mounted cranes and testing equipment) and special tools (plant to filter transformer oil and infrared scanners to detect hot-spots in equipment) to perform predictive maintenance.
- (e) Lack of access roads for regular inspection and maintenance.
- (f) Appropriate vehicles for inspection in remote areas. Lines have to be inspected more frequently due to theft of equipment.
- (g) Due to project funding limitation there is a tendency to leave out essential components, such as protection for relays. This results in the network's premature need for maintenance as the cost of maintenance is affected by the design and equipment. When funding on a project is reduced it is often items which have a direct impact on maintenance, e.g. protection of the lines, which is reduced or left out altogether. Funding limitations can be the result of either the government's goal to have a certain percentage of the country electrified by a certain date or limitations on the size of the Bank's loan. Reduction of the funds available for a specific project thus has major implications for future maintenance cost, as well as the performance of the system (number of power cuts and duration of outage).

This sub-component is therefore rated **satisfactory**.

Government commitment, including supportive legal, regulatory framework

4.5.4 The GoM remains committed to the electricity sector. This is demonstrated through the following:

- (a) Subsequent to the completion of Electricity II, the GoM has committed itself to a number of additional electricity projects in order to achieve its target for rural electrification.
- (b) The GoM has created an enabling environment through the 1997 Electricity Act. This act provides a framework for EdM to operate on commercial principles and to enhance its institutional development.
- (c) The ongoing Energy Reform and Access Program (ERAP), which is co-financed by the AfDB, NDF and the World Bank, includes a sector reform component to further address many of the outstanding sector reform issues. One of the objectives of the ERAP was to unbundle and privatise EdM. However, this was suspended due to the low level of access to electricity and the non-viable nature of the existing national grid extension programme. Until this is resolved, electricity

distribution projects in Mozambique are unlikely to attract private investors. Consequently the emphasis of ERAP has shifted to improving the performance of EdM as a public utility. In order to facilitate this, the loan conditions were designed to improve the technical, operational and financial performance of EdM by setting targets for (i) the reduction of power loss, (ii) improvement of the system load factor, (iii) tariff adjustment, (iv) reduction of the collection period of accounts receivables; and (v) reduction of the number of EdM staff. The fulfilment of the loan conditions (albeit some of them were delayed) is having a positive contribution to the improvement of the operational and financial performance of EdM.

- (d) Several measures are being undertaken towards streamlining the responsibilities of the sector institutions such as the Ministry of Energy, CNELEC (the regulator body) and EdM under the revised ERAP action plan.

4.5.5 Notwithstanding the considerable progress that has been made, reform of the electricity sector remains slow. One of the main reasons for the slow pace of reform is the critical lack of institutional capacity in the electricity sector in Mozambique, which further underlines the impact of the lack of institutional capacity in the electricity sector, which should be seen as a threat to the sustainability of the project if it is not addressed amicably. This sub-component is therefore rated **highly satisfactory**.

Socio-economic sustainability

4.5.6 There is a risk that EdM may in future not be able to perform its social function due to one or a combination of the following reasons:

- (a) EdM is currently the primary national distribution and transmission authority in Mozambique. This arrangement enables EdM to perform a social function partly through cross-subsidisation with its financially viable services. There is a risk that if EdM's operations are unbundled along geographical lines or business functions it will be unable to perform social function effectively.
- (b) If concessions are allocated indiscriminately to other private concessionaires in competition with EdM, these firms would want to invest in those areas with the highest return. The fact that these firms would be likely to "skim the cream" pose a risk to the ability of EdM to cross-subsidise and thus to maintain their support for projects that are socially beneficial but financially constrained.
- (c) EdM has limited scope for attracting partners from elsewhere due to (i) a relatively small consumption market, and (ii) the fact that its priority is electrification of rural communities which are mostly not financially viable. Although the government obtains low interest loans and grants from bilateral and multilateral funding sources, not all of these benefits are passed on to EdM. EdM is therefore burdened with the repaying the loans on full interest bearing terms and shorter repayment period to government. In addition, EdM has to contribute up to a third of the cost of new projects, many of which has primarily social objectives, from its own sources. Given that it has to fulfil its social function by providing affordable electricity to the poor, in an environment where the opportunities for cross-subsidisation are limited, it is not surprising that it is left with an unsustainable debt burden. The high debt burden prevents it from operating under

“normal” business principles. An inherently sound balance sheet and cash flow situation will provide EdM with more options to raise capital. Operating as a financially viable business unit in terms of sound business principles does not necessarily mean privatisation.

This sub-component is therefore rated **unsatisfactory**.

Financial sustainability

4.5.7 It is clear from the financial assessment that the project is not financially viable as a commercial enterprise. The financial sustainability of the project thus hinges on (i) continued support from the GoM to socio-economically justified financial loss-making electricity services and (ii) the continued ability of EdM to cross-subsidise between financially viable services and loss-making social services. On the first account, EdM has in the past always been supported financially by the GoM and there is nothing to suggest that it will withdraw that support. From this perspective the project is expected to be financially sustainable during its lifespan. However, there are a number of financial risk factors that threaten the financial sustainability of the project should there be a change in the policy of the GoM in its support for EdM. These issues are summarised as follows:

- (a) EdM’s debt burden is unsustainable in the long term (see supporting discussion in paragraph 4.5.7).
- (b) EdM may not be able to increase average tariff levels to the long term marginal cost of USD 0.091, particularly not if it focuses increasingly on rural electrification projects where customers are not able to pay the full commercial price (see supporting discussion in paragraph 4.5.8).
- (c) EdM may not be able to further reduce commercial (non-technical) losses, or, in a worse case scenario these losses may increase (see supporting discussion in paragraph 4.5.9).
- (d) Staff cost per unit of electricity distributed may continue to increase at a high rate, thereby increasing the long run marginal cost of electricity (see supporting discussion in paragraph 4.5.10).
- (e) EdM may not have sufficient capacity to manage, operate and maintain a rapidly expanding rural electricity network (see supporting discussion in paragraph 4.5.11).

4.5.8 *Debt burden:* The debt burden of EdM is one of the major financial threats to the sustainability of the project. EdM’s financial position is highly leveraged, as is evident from the poor acid test ratio (current assets minus stock divided by current liabilities) of 0.35 in 2004 (down from 0.59 in 2000). If it was not for the financial support of its only shareholder, the GoM, EdM would almost certainly have been liquidated during the project’s lifespan. There are two reasons for the debt burden. Firstly EdM is obliged to fulfil a social function which means that it provides certain services at a financial loss. Secondly, the Government of Mozambique extends the loans that it receives from the AfDB to EdM at close to market terms despite the fact that it obtains these funds from ADF resources at zero interest and long term capital redemption terms. EdM’s debt burden is currently receiving attention through a process whereby (i) loans would be bundled in order to rationalise repayments, and (ii) a

debt-for-equity swap with debt owed to the Government of Mozambique being turned into equity. Although this may improve EdM's balance sheet in the short term, it would not address the structural reasons for the liquidity problems of EdM. In the long term the intention is to ring-fence commercial and social activities. Social activities can then be financed through cross-subsidisation or through the most appropriate type of government subsidies. Without extensive structural reforms EdM would be unable to implement good practice financial standards and sustain its financial performance.

4.5.9 Tariff level: EdM is able to adjust tariffs independently within the boundaries of their concession agreement with the GoM. Tariff adjustments that fall outside the agreement have to be approved by cabinet. The current national average tariff is US 8 cent per MWh, whereas the long term marginal cost (LTMC) tariff is US 9.1 cent per MWh. In order to be able to fulfil its social function EdM practices two types of cross-subsidisation between individual consumer groups. Firstly, geographical cross-subsidisation takes place between the rural (particularly northern) areas and the urban areas (mainly Maputo). This occurs through the fact that it costs considerably more to serve the rural areas than the urbanised areas, but that all households pay the same basic tariff. Secondly, cross subsidisation takes place through a stepped variable tariff system. Consumers that have higher usage (normally more affluent households) pay more per unit of electricity than poorer households with lower usage. Secondly, EdM makes a tariff distinction between low/medium voltage (mainly households and small business) and high voltage (business and industry) users. High voltage users can negotiate individual tariffs depending on the amount of usage and the time (peak or off-peak) of the usage. It also has a programme for attracting private investment through a system of incentives and special prices to businesses and industries, e.g. agro businesses. A tariff study was recently undertaken and a new performance contract will be closed with the government in June 2006. Details of this agreement were not available at the time of this report as negotiations were at a delicate stage.

4.5.10 Tariff collection/losses: It was EdM's target at project appraisal in 1996 to reduce losses to 12% by 2003. Good progress has been made in the early years of the loss reduction programme, but the 2003 target were missed by eight percentage points. Moreover no further reduction in losses was recorded in the past three years. About 30% of customers are currently provided with prepaid meters. This is part of an ongoing loss reduction project for which there is full government and political support. The focus has been on Maputo where 70% of income is generated. Although this effort has contributed to reduce losses from 40% to 20% currently, it does not provide an absolute solution to the problem. Other forms of fraud and theft start to occur when personnel does not visit sites regularly to check meters. It also restricts regular customer contact to build the image of EdM.

4.5.11 Staff costs: After a reduction in staff from 2719 in 1998 to 2625 in 2002, it has again increased to 3168 in 2005 and is expected to increase to 3448 in 2009. Although the number of clients per staff is expected to improve from 107 in 2006 to 180 in 2009, staff costs have increased at an average rate of about 16% in USD terms over the last three years. Such increases are clearly unsustainable in the long term.

4.5.12 This sub-component is therefore rated highly **unsatisfactory**.

Institutional, organisational and management effectiveness

4.5.13 There is nothing to suggest that institutional, organisational or management arrangements will threaten the project's future sustainability. EdM is a public utility company that is under full government control. Its board members are nominated by the following institutions:

- Cabinet appoints the chairperson.
- Ministry of Energy nominates four members.
- Ministry of Finance nominates one member.
- Workers nominate one member.

4.5.14 EdM operates in terms of a negotiated concession contract. An Electricity Regulator monitors EdM compliance to performance indicators in contract. The Regulator reports this to Ministry of Energy who in turn reports it to Cabinet. The GoM has committed itself to reform in the electricity sector and support efforts to secure the independence of the regulator. Such a contractual relationship and the involvement of a regulatory body would, through compliance monitoring, contribute positively to the effectiveness and sustainability of EdM as a well managed and effective public utility. This sub-component is therefore rated **satisfactory**.

Environmental Impact

4.5.15 During appraisal (1994), the Bank classified the project as Category II ("projects with limited environmental impacts") and therefore no EIA was prepared. During re-appraisal (1996), considering that the transmission line crossed two protected areas, the GoM required some itinerary changes and mitigating measures to avoid damage to two protected areas (Maputo Special Reserve and Inhaca Island Reserve). Based on this assessment the second Appraisal Report additionally proposed four mitigation measures, namely (i) to align transmission lines with existing roads or to route them through non-forest areas, (ii) to harmonize substations with the surrounding environment and to limit transformer noise level, (iii) to limit the magnetic field from the transmission line, and (iv) to compensate farmers for loss of crops, lands and trees. The executing agency (EdM) prepared an EIA, which included recommendations for damage mitigation and an alternative study. Unfortunately, the EIA was not duly followed by the construction companies, and, as a result, some damages were inflicted to vegetation, soil, fauna and landscape in the Maputo Special Reserve. After some criticism from conservationist NGOs, the Bank sent a supervision mission that included the Principal Environmental Officer. The PCR, completed in 2005, recommended an environmental audit to critically assess the environmental impacts of the project, and also the compliance of the Bank's policies and guidelines on environment.

4.5.16 Although the recommendations to mitigate environmental damage mentioned in the reappraisal were relevant, only one measure (point (i) in paragraph 4.5.13 above) was clearly designed to avoid environmental degradation, while the other three were related to human well-being and needs. This recommendation was only partially satisfied. The application of the mitigation measures recommended on the EIA can be assessed as partially satisfactory. Main non-fulfilments include the use of heavy machinery and loaded trucks on fragile soils and valuable woodlands during construction phase, the opening of right of way in closed forest, and the failure to install signalling devices or deflectors on lines to avoid bird

collision. The EIA also proposed measures for the operational phase, mainly related to planning for sustainable development in the area and awareness campaigns to avoid electrocution which has not been carried out. No major negative environmental impact was found or reported. Impacts caused were in general minor in size, localized, and most of them temporary in nature. There are no indications of impacts affecting adversely and/or irreversibly the areas surveyed, and most of the impacts (erosion and vegetation clearing) caused during construction are disappearing. The only long-term impact that can be mentioned is visual, provoked by the transmission lines crossing through specific areas of the MSR. On the contrary, it is patent that the electricity supply is bringing many benefits to the project areas that considerably overtake those pitfalls. All stakeholders interviewed highlighted the advantages of electricity (general welfare, better research, areas monitoring improved, livelihood support, etc.), although there is also consensus in that development has to be respectful with nature. In this part of the country, good quality of environment and landscape is seen as a big opportunity for socioeconomic development (ecotourism, ecological activities and sustainable use of natural resources). This sub-component is therefore rated **satisfactory**.

Resilience to exogenous factors

4.5.17 Although Mozambique scores better than the African average in terms of its business environment, macroeconomic performance, debt sustainability and AfDB Group specific dept, it remains a fragile state which is emerging from a long period of civil war with a high level of poverty. Many of the socio-political issues may realistically not even be fully addressed during the operational lifespan of the project. However, the general mood in the country is positive and the government has positive policies in place to address the issue.

4.5.18 Mozambique is prone to natural disasters caused by climatic conditions, mainly floods and droughts. Not only can floods damage or destroy the physical infrastructure, but droughts and flooding could also have a severe impact on the socio-economic wellbeing of the population. This may affect their ability to take full advantage of the potential benefits offered by the project.

4.5.19 There is a constraint on the current generating capacity in the region. Despite a considerable electricity generating potential, the sustainability of this and other similar electricity projects in Mozambique is hinged on the availability of generation capacity, combined with the fact that little planning has been done to increase the capacity in the medium and long term. Availability of electricity in Mozambique should be viewed from a regional perspective. Mozambique takes up about 280 MW, whereas South Africa takes up 40 000 MW. HCB' current production capacity is 2 075 MW and it allocates 300 MW of this to Mozambique, and the remainder is sold to mainly South Africa, but also to Zimbabwe. There is thus an opportunity cost of increased local consumption. Generation should also be seen as a water issue. Although South Africa has vast coal resources for generation, it has a scarcity of water (coal fired power station consumes vast amounts of water for cooling purposes). South Africa (who has a scarcity of water) will therefore increasingly have to import either electricity or water from water-rich countries such as Mozambique. If new large generation facilities could be developed in Mozambique for supply to South Africa, consumers in Mozambique will also benefit from the economies of scale that large plants offer. In addition to developing hydro-power sources in Mozambique, there is also an opportunity to construct a coal fired power station at the CVRD (Brazilian) mine near HCB.

4.5.20 There is a need to invest in generation capacity in Mozambique. A number of pending industrial investments are on hold due to the constraints in electricity generating capacity. EdM could develop only smaller generating plants in the order of USD 100 to 120 million. It cannot raise the capital to construct large power plants. Through the Short Term Energy Market, which includes twelve countries, access capacity is channelled into the grid. This generates a small amount of foreign income. The World Bank is not currently involved in the financing of generation projects and there are no new projects of this kind in the pipeline. However, it recognises the issues surrounding electricity generation in the region. As such it has had discussions with the South African Department of Minerals and Energy as well as ESKOM, but South Africa appears to be hesitant to rely too heavily on Mozambique (or for that matter on any of its neighbours) for their power supply. Without South African buy-in it would be impossible to justify another major generation facility on the scale of HCB. If too many lines are linking to South Africa it will also weaken the opportunity for interconnections between Mozambique and other neighbouring countries. The ownership problems of HCB is about to be resolved and a new agreement between the Governments of Portugal and Mozambique is expected soon. SIDA and a Norwegian company are involved with two smaller hydro power stations, which is in a preliminary planning phase. The World Bank has been approached to make a contribution to these projects from their carbon fund. This sub-component is therefore rated **satisfactory**.

4.6 Overall Outcome Ratings on Project Performance (Aggregate Performance Indicators)

The project's overall performance can be summarised as follows:

- (a) On the whole the project's goals and objectives were found to be consistent with Mozambique's overall development strategy and national plans, as well as with the Banks country strategy and policies. Physical project objectives and outputs were mostly clear, realistic, important for the electricity sector in Mozambique and responsive to the borrower's circumstances and development priorities. However, clear targets were not set for many of the other objectives and outputs, including financial targets, institutional capacity building, social objectives and environmental objectives. Targets were set retrospectively for these in order to perform the efficacy analysis. Overall the project achieved its objectives and outcomes (efficacy) **satisfactory**.
- (b) Although the project was rated satisfactory in terms of efficiency, the results of the specific criteria varied significantly. Project benefits include wealth generation, improved social services, foreign investment, industrial development, improved social interaction, poverty reduction, sustainable energy use, small business development, increased tourism and improvements in the reliability of water supply. Whilst the economic rate of return was **highly satisfactory**, the financial rate of return was well below the cut-off rate. The low financial return can be justified by the fact that the project is aimed at mainly rural poor communities where full LTMC recovery would be impossible. Significant discrepancies were observed between the EIRR and FIRR calculations at appraisal and PCR on the one hand and the PPER on the other. A number of logical checks confirmed that the AR and PCR overestimated the financial income and underestimated the total project benefits.

- (c) Due to the fact that the project design did not include a specific institutional development component it is impossible to isolate the project's specific contribution to this aspect. The contribution of the project to institutional development was therefore assessed in the context of the Bank's sustained involvement in Mozambique's electricity sector. In this respect the project was rated **satisfactory** as it supported and contributed to the project's overall achievements.
- (d) In respect of sustainability the scores of the individual criteria were mostly satisfactory, which resulted in an overall **satisfactory** rating.
- (e) Despite some specific areas where the project scored highly unsatisfactory, the projects overall performance is regarded as **satisfactory**.

4.7 Borrower Performance

4.7.1 The Borrower (Government and EdM) performance was assessed at two levels, namely that of the GoM, who contracted the loan, and that of EdM, the beneficiary of the loan and the executing agency of the project. Borrower performance was **satisfactory** overall considering the sustained support and commitment, as well as the successful implementation of the project (see annex 7).

Government

4.7.2 The GoM's performance in macroeconomic restructuring has been impressive and the economy has largely been transformed from a centrally based war economy to a more market-oriented private sector driven economy. Following the end of the civil war in 1992, the GoM has paved the way for socio-economic development by providing the enabling environment for private sector participation through implementing socio-economic reforms that transformed the centrally planned economy to market-oriented economy. In the aftermath of the civil wars the major challenges for the GoM has been a high level of poverty, which was aggravated by the returning refugees, internally displaced persons and demobilized soldiers. The main constraints for economic growth and poverty reduction are a lack of human capital and inadequate infrastructure. These constraints are being addressed through implementing projects and programs with the assistance of the donor communities including the Bank. Despite the setbacks caused by major natural disasters, the macroeconomic conditions have improved considerably since the early 1990s.

4.7.3 The GoM's continued support and commitment to the electricity sector are **satisfactory**. The electricity sector is considered to serve as catalyst for economic growth and poverty alleviation. The most notable successes of the GoM in this regard are as follows:

- (a) The sector institutions and policies have been reviewed, and the regulatory and execution functions have been separated to permit check and balance and accountability. It has implemented legislative and institutional reforms in sector to give effect to these policies.
- (b) Studies that were carried out in the late 1980s established that the extension of the hydro-generation dominated national grid was the least cost option for household, industrial and commercial energy supply. Increased coverage of the network and improvement in the reliability of supply was needed to kick start the economy, to resettle the displaced population and to facilitate economic activities in the rural

areas. The first two power electricity projects (Electricity I and Electricity II) were initiated in the 1990s to fulfil these objectives. The Electricity II project was a follow-up to the first project to reach out the rural population in the southern provinces of Maputo and Gaza. After the completion of Electricity II, the government has continued to secure the support of the Bank and other donors to further develop the electricity infrastructure in other parts of the country. As a result the improved supply of electricity has contributed to the country's economic growth and poverty reduction over the past decade. The GoM has sustained the allocation of its own resources and has secured funding from the donor communities over a prolonged period to achieve its goals for the electricity sector.

However, there are a few remaining areas where government performance could improve. The following issues should be the focus over the coming years:

- (a) Mozambique has a substantial hydro-power potential (some reports claim that it is the highest in Africa). Efforts by the GoM were thus far aimed at obtaining the share of the Government of Portugal in HCB, rather than to allocate funds to develop resources through new hydro-power projects. This is constraining the expansion of the hydro-electricity generating potential of Mozambique.
- (b) The reform process of the electricity sector is not complete. For example CNELEC, the independent regulator, does not function as a self-funding independent regulator.
- (c) The poor financial performance of EdM is largely the result of the GoM insistence that EdM finances expanding social, loss making projects from their internal sources, despite the fact that EdM has limited opportunities for cross subsidisation. The GoM also has a policy of extending loans obtained at very favourable terms from the Bank to EdM at inflated rates. As a result EdM has to be rescued financially by the GoM through debt-for-equity swaps, which is preventing EdM from building up a good financial record on which it can independently raise capital on the open market.

4.7.4 With respect to the implementation of the Electricity II project, the government's performance was **unsatisfactory**. It has contributed significantly to the overall implementation delays of 38 months. While the government has been facilitating EdM to meet its investment needs through donor support, it has been slow in meeting conditions of the loan for entry into force and giving its approval for the different stages of the process required for bidding of works, supply of goods and services, customs clearance on imported goods and disbursement of the loan amount.

EdM (the beneficiary and executing agency of the loan)

4.7.5 On the whole EdM's performance is rated **satisfactory** and it has managed to fulfil all loan conditions, albeit with some delay. However, it had neglected to fulfil all the requirements of the EIA that was undertaken prior to project implementation. EdM's commitment and continued efforts to expend the electricity supply to the rural population have contributed to expanding access to electricity from 4% at the time of appraisal to the present 6.3%.

4.7.6 EdM was responsible for carried out its feasibility study with the assistance of bilateral funding. The main purpose of the project was to extend the hydro-electricity supplied national grid in the southern provinces of Maputo and Gaza. This conforms to GoM's national energy planning to provide electricity to rural areas. Detailed engineering design was included as a component of the project, as is the norm for engineering projects of this nature. While EdM has successfully prepared the technical requirement of the project, environmental aspects were not covered well, particularly considering that the medium voltage line transverses the Maputo Elephant Reserve. In addition, EdM also failed to identify adequate indicators for the purpose of monitoring the intermediate and overall outcomes of the project.

4.7.7 In 1995, EdM was restructured based on a Transformation Decree (No.28/95) that transformed EdM into a commercially oriented utility. A Financial Restructuring Study on EdM was carried out through which the Government and EdM entered into a three-year (1996-1998) Performance Contract. The contract was aimed at creating conditions that will enable EdM perform its functions in an autonomous and sustainable way. This arrangement had improved EdM's performance to implement the project. Thus, the institutional arrangement and the provision of counterpart funds for the project are assessed to be **satisfactory**.

4.7.8 EdM's performance in the actual implementation of the project was mixed. Although the Project Implementation Unit (PIU) set up for Electricity I project had been successful in reducing implementation delays compared to Electricity I, there was still a lack of understanding of the Bank's procurement and disbursement procedures due to high turnover of staff in the unit and a shortage of capacity to deal with a number of projects simultaneously. Although the project was implemented within budget (considering that a number of additional connections were made), poor supervision of the contractors' work and delays in processing the formalities for customs clearance had contributed to a considerable time overrun.

4.7.9 Maintenance at medium and low voltage levels has been satisfactory. However, there is a need to ensure that the maintenance regime for high voltage lines are well funded and the required training of maintenance technicians, particularly in software, is enhanced given the fact that most of the projects financed through bilateral sources come with different equipment specifications that call for stocking different spare parts and acquiring different skills to maintain them.

4.7.10 In general, EdM abode by the national environmental regulations and prepared an EIA for the project. However, during the first part of the construction phase (2000-2001) EdM did not implement the mitigation measures established by the EIA and it failed to properly monitor the environmental impact of the project during construction. The issues that were raised by conservationists who witnessed the heavy equipment in clearing tress for the right of ways in the Maputo Elephant Reserve could have been dealt with more swiftly if an environmental officer were monitoring the construction in this sensitive area. The situation only improved after an unscheduled mission by the Bank made certain recommendations. However, no environmental monitoring or audit reports were prepared.

4.8 Bank Performance

4.8.1 Bank performance is summarised in annex 8. The Bank responded quickly to GoM's request for support of the energy sector after the end of the protracted civil wars in early 1990s by re-aligning its strategy with that of the Government development strategy to ensure sustained peace, overall socio-economic development and poverty reduction. Infrastructure featured as one of the top priorities in the government's investment strategy. Although the Bank did not carry out Economic and Sector Works or Master Plan Study at the time, the poor state of infrastructure was obvious enough to warrant the selection of infrastructure financing as a major priority.

4.8.2 Bank intervention in the electricity sector started in 1991 with the financing of the Electricity I Project. The low rate of electrification in rural areas however prompted the provision of resources on a sustained basis, with the result that Electricity I was followed by Electricity II, the Energy Master Plan Study, Electricity III Project, the Energy Reform and Access Program (co-financed with the World Bank) and the Electricity IV project. Several bilateral donors are also involved to assist with meeting the major investment requirement in the electricity sector.

4.8.3 Although the Bank responded quickly to the Government request in 1994 to finance Electricity II, the project had to be delayed until 1996 due to the delays in the ratification of ADF resources. ADF ratification was delayed by restructuring of the Bank following the election of a new President of the Bank. When the project was reappraised in 1996 the components were redefined due to shortage of funding, thus eliminating the capacity building component earmarked for HCB. In retrospect, the capacity building assistance should have included institutional capacity building for EdM which is crucial for the sustainability of the system.

4.8.4 Given the country's poor economic performance and credit exposure at the time of the project's appraisal, the Bank provided financing from ADF resources to ease the debt burden on the part of the Government. However, because Electricity II is a rural electrification project which has a low financial return, and because the GoM's on-lending terms to EdM were not concessionary², the project has contributed to EdM's high debt burden. Under these circumstances the Bank should have been more proactive in raising EdM's debt burden with the Borrower during project preparation in order to secure a more reasonable financing package for the utility. Even though EdM is allowed to practice cross subsidization, the high proportion of users that are unable to pay the LRMC tariff means that it is unable to support an ever expanding rural electricity network. The Bank failed to address this issue in its appraisal of this project as well as subsequent electricity projects in Mozambique.

4.8.5 Bank performance with respect to the monitoring function is mixed. Although the overall monitoring function was carried out well and the environmental issues that presented itself during construction were addressed effectively, the lack of monitorable indicators to quantify the outcomes effectively was not satisfactory. Lack of full monitorable performance indicators and environmental action plan limited the monitoring function to verification of the project inputs and outputs. The logical framework did not fully capture the outcomes of the project, partly because result based monitoring system was not a requirement at the time.

² It is Bank policy that the on-lending interest rate of the borrower to the executing agency shall be at market rate regardless of whether a nominal interest rate is charged to the borrower.

Although the frequency of field missions was adequate (roughly two per year), the skills mix did not include an environmental expert despite the fact that an EIA was prepared and that part of the project transverses a proclaimed nature area. It was not until concerns were heightened from the conservationists that the Bank included an environmental expert in a scheduled field mission. Although the environmental concern might have been blown out of proportion at the time, the inclusion of environmental expert in the scheduled field missions would have helped to observe more closely the environmental conditions during the construction of the lines in the Maputo Elephant Reserve. However, the Bank complied with the environmental policies in force at the time (Bank Group's Environmental Policy, adopted in 1990), but monitoring of the project environmental performance during the construction phase (2000-2003), was insufficient. An environmental specialist participated only in one out of fifteen supervision missions carried out between 1997 and 2003.

4.8.6 EdM, the executing agency, expressed its satisfaction with the Bank's frequent presence to resolve technical implementation issues.

4.8.7 The Bank's PCR mission failed to notice that EdM has not fulfilled all the EIA recommendations although an environmentalist is included on the mission team. It also failed to notice the technical problems with the exposure of the undersea cable and the corrosion if the pylons near the sea near Inhaca Island. However, it recommended that an environmental audit be carried out by the Borrower.

5 MAIN FINDINGS AND LESSONS

5.1 Main Findings

5.1.1 Overall, the project has been a success and contributes to the socio-economic development of the rural southern areas of the Mozambique. Electricity II reflects several good practices. However, the project has performed less than satisfactory in a number of specific areas. The indigenous and exogenous factors affecting implementation performance and outcome are presented in Annex 9.

5.1.2 There were significant delays in the implementation of the project. Although a natural disaster contributed to the delays, there are also other reasons, including:

- (a) Staff at the Executing Agency's implementation unit was not fully familiar with all the Bank procedures prior to commencement of the project.
- (b) There was not sufficient capacity at the Executing Agency's implementation unit to deal with a number of similar projects simultaneously.
- (c) The implementation timeframe might have been overly optimistic given that Mozambique was a fragile state emerging from prolonged periods of strife and instability. Its capacity limitations in dealing with a number of similar projects from multiple donors, as well as a severe flood, meant that delays were inevitable.
- (d) A temporary suspension of construction due to environmentally damaging construction techniques.

5.1.3 It should be recognised that economically viable projects does not necessarily have a high financial rate of return to the operator or public utility. However, the financial sustainability of the project is threatened by the following:

- (a) EdM's high debt burden.
- (b) EdM has to absorb the difference between the ability of the community to pay and the LRMC. Despite the fact that the public utility is able to cross subsidise, countries like Mozambique that are eligible for ADF funding usually does not have sufficient wealthy users to perform cross subsidisation, with the result that public utilities become more indebted.
- (c) It is Bank policy that the third party on-lending rate of the ADF loan is in terms of market prices. Consequently, the benefits of the low interest ADF loan do not automatically reach the beneficiaries.
- (d) Although the staff per unit of output at EdM has improved, there is no evidence that high staff cost is completely under control.

5.1.4 The project has significant secondary spin-offs that cannot easily be reflected in the socio-economic analysis. These benefits include the following:

- (a) Since completion, the line has been extended to a number of tourist lodges through a private-public-partnership agreement. A significant number of rural households could be electrified because of this.
- (b) The provision of electricity had a significant impact on the voluntary resettlement of people that were displaced during the civil war. The Electricity II project encouraged displaced communities to resettle in towns that they deserted during the civil war and attracted communities to the vicinity of the electricity line where they can get electrical connections.

5.1.5 Given the number of new connections due to the expansion of the electricity grid, as well as the fact that there are no immediate plans to add additional generating capacity, there is a potential for future electricity shortages. Under these circumstances, it would be unwise to undertake further large-scale rural electrification projects without specific plans to cope with the increase in demand.

5.2 Lessons

5.2.1 Lessons are not allocated to Bank, Borrower or Executing Agency, as all parties involved should take joint responsibility for the project and should work together towards ensuring that projects are implemented successfully. The following lessons can be learned from the project:

5.2.2 Delays at start-up can be minimized/avoided if:

- (a) The Bank ensures appropriate and timely training in Bank procedures for staff at the Executing Agency.

- (b) An implementation capacity assessment should be made taking into account all current and future projects that will be commissioned during the implementation period of the investigated project
- (c) A realistic implementation timeframe is set, particularly in the case of fragile states.

5.2.3 Financial sustainability of rural public utility projects where local residents are unable to afford the full commercial tariff (long term marginal cost tariff) can be improved if the following principles are adhered to:

- (a) Services cover at least the short term marginal cost and should not be provided at an outright loss or for free.
- (b) The borrower develops an appropriate financial package to compensate the public utility company for the social services that it provides in areas where full cost recovery is not possible.
- (c) Electricity supply/generating capacity keeps up with the long term growth in the combined demand of all electricity projects.
- (d) Institutional development remains an integral component of the project.
- (e) Loan conditions should specify staff productivity in terms of both staff cost and staff numbers.

5.2.4 Rural electrification projects have significant secondary spin-offs and opportunities which should be investigated and promoted as part of project appraisal process. These include the following:

- (a) Public-private-partnerships to extend the line and connecting additional users.
- (b) Positive impacts on rural settlement patterns and land-use.

5.2.5 Possible negative environmental consequences can be minimized or avoided altogether if an environmentalist is included in the appraisal and monitoring processes, even if there are no obvious environmentally sensitive issues at the time of categorisation.

RETROSPECTIVE LOGICAL MATRIX

Prepared by: G Yirga-Hall and F Botes

| HIERARCHY OF OBJECTIVES | OBJECTIVE VERIFIABLE INDICATORS | | | MEANS OF VERIFICATION | ASSUMPTIONS AND CRITICAL RISK FACTORS |
|---|---|---|--|---|---|
| | At Appraisal | At PCR | At PPER | | |
| 1. Sector Goals and other Developmental Objectives | | | | | |
| 1.1 Sector Goals 1.1.1 Make available sufficient energy at economic costs; promote efficient use/conservation of energy by consumers; capacity building in the sector | 1.1 Reduction of Electricity losses in the national grid from 40% to 12% by end of 2003; and increase load factor from 64% to 70% by end 1998 1.2 Increase in reliability of supply of networks, and better financial and consumer service performance | 1.1 National grid electricity losses reduced to 17% (11% technical and 6% non-technical), and load factor increased to 71% by end 1999; 1.2 Increased supply services from 4-6 hours to 24 hours | 1.1 Losses reduced from 40% to 20% due mainly the introduction of pre-paid meters. But further reduction was not achieved since other forms of fraud and theft start to occur as meters are not checked regularly 1.2 Increased supply services and reliability in most project areas | EdM reports | Lack of enabling environment and government commitment. |
| 1.2 Financial Objectives 1.2.1 Achieve satisfactory financial performance: the FIRR should exceed 10% , tariff should reflect the LTMC of US\$0.091/kWh and loss should not exceed 12% | | | 2.1 The recalculated FIRR is 3.7%; the tariff currently being applied is US\$0.08/kWh and loss is at 20% | EdM financial reports and findings during mission | Unfavourable on lending terms and conditions |
| 1.3 Institutional Development Objectives 1.3.1 These were to include restructuring of the energy sector; completing the internal reform process of EdM; creation of an independent regulator; capacity building and creation of environmental management structures and processes | Not set | Not assessed adequately | 3.1 Satisfactory progress has been achieved in meeting the institutional development objectives but future Bank financing needs to access the institutional development needs of EdM such as generation and maintenance capacity | EdM reports and findings during missions | Failure to address the institutional development needs of EdM |

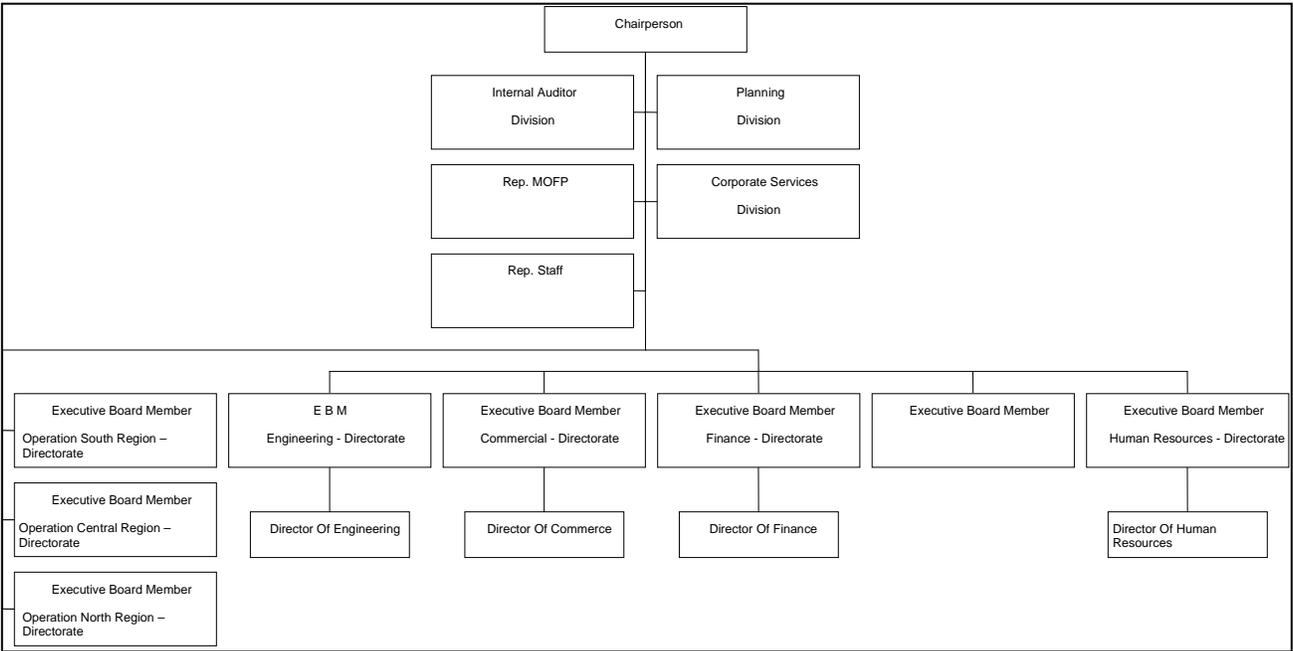
| HIERARCHY OF OBJECTIVES | OBJECTIVE VERIFIABLE INDICATORS | | | MEANS OF VERIFICATION | ASSUMPTIONS AND CRITICAL RISK FACTORS |
|---|---|--|---|---|--|
| | At Appraisal | At PCR | At PPER | | |
| 1.4 Social Objectives 1.4.1 Provision of reliable electricity supply to rural households, services and production industries in the areas served | 4.1 a total of 3,000 rural households, 4 factories and 11 tourist loges to be connected | 4.1 a total of 4,600 new rural households, 4 factories and 11 tourist loges were connected | 4.1 This has been achieved and much more such as schools, clinics, workshops, garages, petrol stations, to site a few. In addition the project has created direct and indirect employment opportunities in the area. Women have benefited significantly from the supply of electricity. | Findings during missions; interviews with beneficiaries | Natural disasters can adversely affect the reliable supply |
| 1.5 Environmental Objective 1.5.1 This was to be achieved through implementing sound environmental project. This was to be achieved through reduction in the reliance on biomass for lighting and cooking; improvement in health through reduced air pollution and smoke inhalation; and ensuring that environmental standards were met in mounting the lines | No target set in the appraisal logical framework | No retrospective target considered in the PCR logical framework | 5.1 The project has reduced the intake of biomass to a limited extent thereby also limiting the health impact from smokes; the environmental standards have been observed; and the vegetation damaged during construction was minimal and are recovering | Environmental expert's findings during mission | Discontinuation of supply could increase the intake of biomass |
| 1.6 Private Sector Development Objective 1.6.1 This was to be achieved through industrial development; increase foreign investment; small business development and increased tourism. | No target set in the appraisal logical framework | No retrospective target considered in the PCR logical framework | These objectives have been achieved because of increased and reliable supply in the project areas. | Findings during mission | Discontinuation of supply could adversely affect the development of private sector |
| 1.7 Regional Integration Objectives 1.7.1 In view of the comparative advantage of Mozambique in hydrogenation potential and its location, this can be encouraged through the | No target set in the appraisal logical framework | No retrospective target considered in the PCR logical framework | South Africa has expressed interest to acquire up to 4 MVA from an extension of the line from Ponta do Ouro to supply the northern part of | | Government commitment to regional integration needs to be sustained |

| HIERARCHY OF OBJECTIVES | OBJECTIVE VERIFIABLE INDICATORS | | | MEANS OF VERIFICATION | ASSUMPTIONS AND CRITICAL RISK FACTORS |
|--|---|--|--|--|--|
| | At Appraisal | At PCR | At PPER | | |
| project to meet the needs of neighbouring countries such as South Africa | | | Kwazulu-Natal province of South Africa. Thus the project has regional impact if effectively implemented. | | |
| 2. Project Objectives | | | | | |
| 2.1 Provide least cost and reliable hydropower supply to new rural centres to improve the quality of life of the population | 2.1 Supply connection to 3,000 new consumers and 4 existing factories by end 2003 | 2.1 Supply connection was made to 4,600 new consumers, 4 factories and 11 resort centres hooked into the national grid by end 2003 | 2.1 Supply connection increased by at least 4,600 new consumers, 4 factories and 11 resort centres (current actual figures not provided) | EdM Operating Statistics Project area visits and Beneficiary interviews | Electricity will increase industrial and commercial activity. Increased Industrial activity will increase incomes and raise living standards |
| 2.2 Improve the quality and reliability of supply in some existing supply centres so as to increase economic activities in the centres | 2.2 Increased reliability of supply and economic activities by end 2003 | 2.2 Reliability of supply increased-supply period increased from 4-6 hours/day to 24 hours/day by end 2003 | 2.2 Reliability achieved with 24 hours supply in the project areas | EdM Past Financial reports Interviews response from various stakeholders. | Electricity availability will lead to a switch from fuel wood to electricity for domestic cooking. Risk: Affordability and Tradition. |
| 3. Project Outcomes | | | | | |
| All the developmental objectives set up in 1 above have been assessed to determine the outcomes | Not separately identified as objectives in the logical framework | Not separately identified as objectives in the PCR logical framework | The achievement of the developmental objectives set out in I above have been made possible through the following outcomes: increased wealth generated, social services enhanced, increased foreign investment; increased industrial outputs from the rehabilitated industries in the region, increased social interaction, increased small businesses and creation of direct and indirect jobs that contributed to poverty reduction, sustainable energy use, increased tourism, and reliable water supply | Information gathered during the PPER mission | Risk: Reliability of supply for the businesses and industries; affordability and tradition for domestic consumers. |

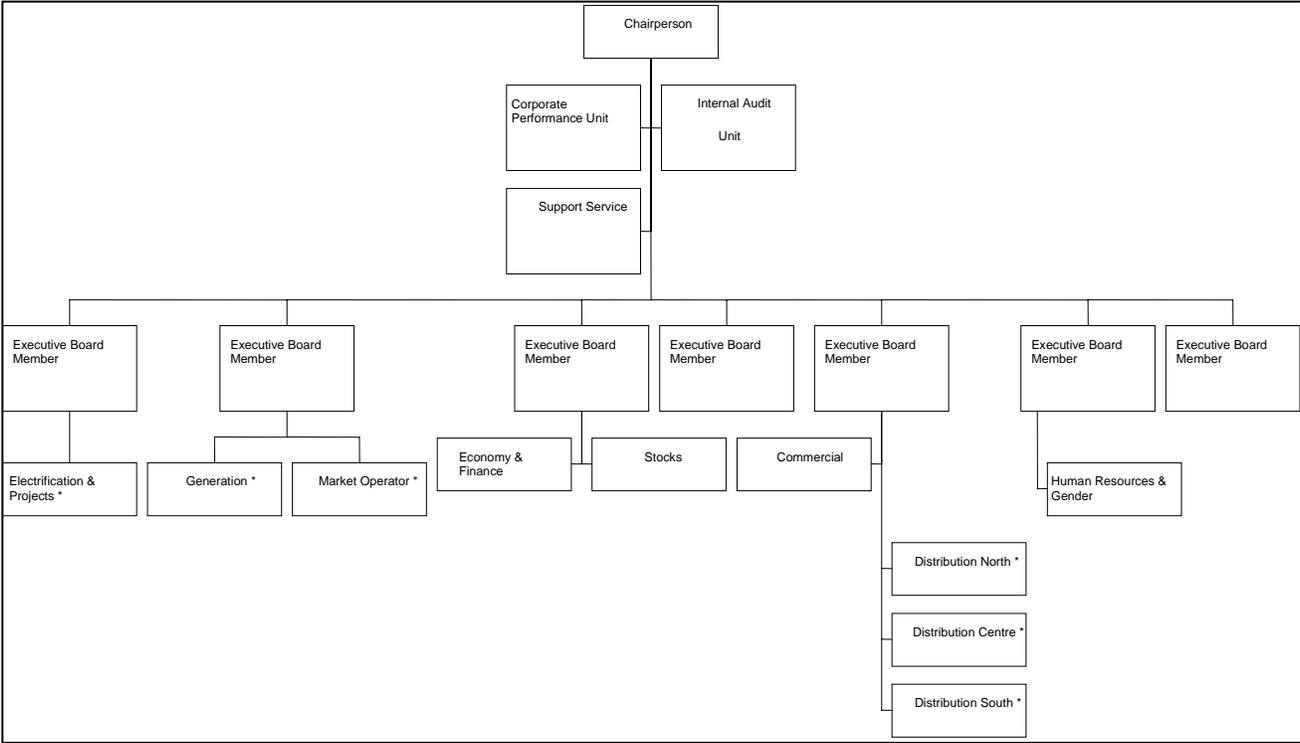
| HIERARCHY OF OBJECTIVES | OBJECTIVE VERIFIABLE INDICATORS | | | MEANS OF VERIFICATION | ASSUMPTIONS AND CRITICAL RISK FACTORS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|-----------------------------|---|---|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-----|--------|-----|-------|--|-----|-----|-------|-----------|-------|-------|-----------|-------|-------|-----------|-------|-------|-----------|-------|-------|-------|-------|-------|--------------|-------|--------|-----|--------|-----|-------|--|---------------------------|--|
| | At Appraisal | At PCR | At PPER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Project Outputs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.1 Extension of 66 kV overhead line 4.2 Construction of 110/33kV substation 4.3 Construction of 66/33 kV substation 4.4 Construction of 33 kV overhead line 4.5 Construction of 33/0.4 kV transformer stations 4.6 Construction of low voltage lines 4.7 Service connection to consumers 4.8 Procurement of vehicles | 4.1.1 a total of 64 km of 66 kV overhead line constructed; 4.1.2 10/33kV, 10 MVA substation erected; 4.1.3 one 66/33 kV, 10 MVA substation erected; 4.1.4 360 km of 33 kV overhead line constructed; 4.1.5. fifty 33/04 kV (with aggregate capacity of 6.250 kVA) transformer stations erected; 4.1.6 a total of 105 km low voltage lines constructed; 4.1.7 a total of 3,000 consumers connected; and 4.1.8 a total of 6 vehicles procured. | 4.1.1 a total of 88 km of 66kV lines constructed; 4.1.2 one 110/66 kV, 10 MVA substation erected 4.1.3 a total of 4 of 66/33 (1X10MVA plus 3X5MVA) substations erected 4.1.4 a total of 398 km of 33 kV lines constructed 4.1.5 a total of 57 of 33/0.4 kV (aggregate capacity of 9,900 KVA) transformer stations erected 4.1.6 a total of 223 km of low voltage lines constructed 4.1.7 a total of 4,600 consumers connected and 4.1.8 a total of 6 vehicles purchased. | Same as reported in the PCR | Appraisal Report, PCR and Information gathered during the PPER mission. | Delay in award of contract and construction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Project Inputs (Activities) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1 Construction of 66 kV overhead line and 110/33 kV substations; 5.2 Construction of distribution networks; 5.3 EdM/BoM supervision and compensation; 5.4 Consultancy Services (Engineering and Audit) | Project financing plan (in million UA) <table border="1"> <thead> <tr> <th>F.E</th> <th>L.C</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>6.210</td> <td>1.096</td> <td>7.306</td> </tr> <tr> <td>8.812</td> <td>1.555</td> <td>10.367</td> </tr> <tr> <td>0.156</td> <td>0.247</td> <td>0.413</td> </tr> <tr> <td>1.465</td> <td>0.127</td> <td>1.592</td> </tr> <tr> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>16.643</td> <td>3.035</td> <td>19.678</td> </tr> </tbody> </table> Sources of Finance <table border="1"> <tbody> <tr> <td>ADF</td> <td>16.643</td> </tr> <tr> <td>EdM</td> <td>3.035</td> </tr> </tbody> </table> | F.E | L.C | Total | 6.210 | 1.096 | 7.306 | 8.812 | 1.555 | 10.367 | 0.156 | 0.247 | 0.413 | 1.465 | 0.127 | 1.592 | ----- | ----- | ----- | 16.643 | 3.035 | 19.678 | ADF | 16.643 | EdM | 3.035 | 5.1.1 Project financing plan <table border="1"> <thead> <tr> <th>F.E</th> <th>L.E</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>5.1 6.221</td> <td>1.721</td> <td>7.942</td> </tr> <tr> <td>5.2 7.537</td> <td>0.427</td> <td>7.964</td> </tr> <tr> <td>5.3 0.118</td> <td>0.098</td> <td>0.216</td> </tr> <tr> <td>5.4 1.092</td> <td>0.095</td> <td>1.187</td> </tr> <tr> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>Total 14.968</td> <td>2.341</td> <td>17.309</td> </tr> </tbody> </table> Sources of Finance <table border="1"> <tbody> <tr> <td>ADF</td> <td>14.751</td> </tr> <tr> <td>EdM</td> <td>2.558</td> </tr> </tbody> </table> | F.E | L.E | Total | 5.1 6.221 | 1.721 | 7.942 | 5.2 7.537 | 0.427 | 7.964 | 5.3 0.118 | 0.098 | 0.216 | 5.4 1.092 | 0.095 | 1.187 | ----- | ----- | ----- | Total 14.968 | 2.341 | 17.309 | ADF | 14.751 | EdM | 2.558 | | Appraisal report PCR PPER | Bank financing and counterpart funds will be availed in time |
| F.E | L.C | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.210 | 1.096 | 7.306 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8.812 | 1.555 | 10.367 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.156 | 0.247 | 0.413 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.465 | 0.127 | 1.592 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ----- | ----- | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16.643 | 3.035 | 19.678 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ADF | 16.643 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EdM | 3.035 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F.E | L.E | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1 6.221 | 1.721 | 7.942 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.2 7.537 | 0.427 | 7.964 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.3 0.118 | 0.098 | 0.216 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.4 1.092 | 0.095 | 1.187 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ----- | ----- | ----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total 14.968 | 2.341 | 17.309 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ADF | 14.751 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EdM | 2.558 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

ORGANISATIONAL STRUCTURE OF EdM

Organization Chart of Eletricidade De Mozambique (EDM) - (At Appraisal)



Organization Chart of Eletricidade De Mozambique (EDM) - At PPER.



FORCASTED ELECTRICITY SALES

| <i>Year</i> | Annual Growth Rate Scenario | | |
|-------------|------------------------------------|------------|------------|
| | 0% | 5% | 8% |
| | <i>MWh</i> | <i>MWh</i> | <i>MWh</i> |
| 2003 | 18408 | 18408 | 18408 |
| 2004 | 18408 | 19328 | 19881 |
| 2005 | 18408 | 20295 | 21471 |
| 2006 | 18408 | 21310 | 23189 |
| 2007 | 18408 | 22375 | 25044 |
| 2008 | 18408 | 23494 | 27047 |
| 2009 | 18408 | 24668 | 29211 |
| 2010 | 18408 | 25902 | 31548 |
| 2011 | 18408 | 27197 | 34072 |
| 2012 | 18408 | 28557 | 36798 |
| 2013 | 18408 | 29985 | 39741 |
| 2014 | 18408 | 31484 | 42921 |
| 2015 | 18408 | 33058 | 46354 |
| 2016 | 18408 | 34711 | 50063 |
| 2017 | 18408 | 36447 | 54068 |
| 2018 | 18408 | 38269 | 58393 |
| 2019 | 18408 | 40182 | 63065 |
| 2020 | 18408 | 42191 | 68110 |
| 2021 | 18408 | 44301 | 73559 |
| 2022 | 18408 | 46516 | 79443 |
| 2023 | 18408 | 48842 | 85799 |
| 2024 | 18408 | 51284 | 92663 |
| 2025 | 18408 | 53848 | 100076 |
| 2026 | 18408 | 56541 | 108082 |
| 2027 | 18408 | 59368 | 116728 |
| 2028 | 18408 | 62336 | 126067 |
| 2029 | 18408 | 65453 | 136152 |
| 2030 | 18408 | 68725 | 147044 |
| 2031 | 18408 | 72162 | 158808 |
| 2032 | 18408 | 75770 | 171512 |
| 2033 | 18408 | 79558 | 185233 |
| 2034 | 18408 | 83536 | 200052 |
| 2035 | 18408 | 87713 | 216056 |
| 2036 | 18408 | 92099 | 233341 |
| 2037 | 18408 | 96704 | 252008 |

NOTES AND CASH FLOW SERIES OF THE RETROSPECTIVE FINANCIAL EVALUATION

| <i>Prices in 2006 USD '000</i> | | | | | |
|--------------------------------|--------------|-------------|----------|-------------|----------------------|
| Year | Capital Cost | Energy Cost | O&M Cost | FIRR NPV | 3.7% (\$9,391.49) |
| | | | | Income | Net Revenue |
| 1997 | 3.450 | | | | -3.450 |
| 1998 | 380.358 | | | | -380.358 |
| 1999 | 44.650 | | | | -44.650 |
| 2000 | 3357.753 | | | | -3357.753 |
| 2001 | 7843.493 | | | | -7843.493 |
| 2002 | 9131.404 | | | | -9131.404 |
| 2003 | 3496.818 | 552.240 | 148.036 | 1295.923 | -2901.171 |
| 2004 | 1360.874 | 579.852 | 155.438 | 1298.868 | -797.296 |
| 2005 | | 608.845 | 163.210 | 1364.421 | 592.366 |
| 2006 | | 639.287 | 171.371 | 1432.642 | 621.984 |
| 2007 | | 671.251 | 179.939 | 1504.274 | 653.084 |
| 2008 | | 704.814 | 188.936 | 1731.727 | 837.978 |
| 2009 | | 740.054 | 198.383 | 1818.314 | 879.876 |
| 2010 | | 777.057 | 208.302 | 1909.229 | 923.870 |
| 2011 | | 815.910 | 218.717 | 2004.691 | 970.064 |
| 2012 | 2.562 | 856.705 | 229.653 | 2104.925 | 1016.005 |
| 2013 | | 899.541 | 241.136 | 2210.172 | 1069.495 |
| 2014 | | 944.518 | 253.192 | 2320.680 | 1122.970 |
| 2015 | | 991.744 | 265.852 | 2436.714 | 1179.119 |
| 2016 | | 1041.331 | 279.145 | 2558.550 | 1238.074 |
| 2017 | | 1093.397 | 293.102 | 2686.477 | 1299.978 |
| 2018 | | 1148.067 | 307.757 | 2820.801 | 1364.977 |
| 2019 | | 1205.471 | 323.145 | 2961.841 | 1433.226 |
| 2020 | | 1265.744 | 339.302 | 3109.933 | 1504.887 |
| 2021 | | 1329.031 | 356.267 | 3265.430 | 1580.132 |
| 2022 | 2.562 | 1395.483 | 374.081 | 3428.702 | 1656.576 |
| 2023 | | 1465.257 | 392.785 | 3600.137 | 1742.095 |
| 2024 | | 1538.520 | 412.424 | 3780.144 | 1829.200 |
| 2025 | | 1615.446 | 433.045 | 3969.151 | 1920.660 |
| 2026 | | 1696.218 | 454.697 | 4167.608 | 2016.693 |
| 2027 | | 1781.029 | 477.432 | 4375.989 | 2117.527 |
| 2028 | | 1870.081 | 501.304 | 4594.788 | 2223.404 |
| 2029 | | 1963.585 | 526.369 | 4824.528 | 2334.574 |
| 2030 | | 2061.764 | 552.687 | 5065.754 | 2451.303 |
| 2031 | | 2164.852 | 580.322 | 5319.042 | 2573.868 |
| 2032 | 2.562 | 2273.095 | 609.338 | 5584.994 | 2699.999 |
| 2033 | | 2386.749 | 639.805 | 5864.243 | 2837.689 |
| 2034 | | 2506.087 | 671.795 | 6157.456 | 2979.574 |
| 2035 | | 2631.391 | 705.385 | 6465.328 | 3128.552 |
| 2036 | | 2762.961 | 740.654 | 6788.595 | 3284.980 |
| 2037 | | 2901.109 | 777.687 | 7128.025 | 3449.229 |

NOTES AND CASH FLOW SERIES OF THE RETROSPECTIVE ECONOMIC EVALUATION

| <i>Prices in 2006 USD '000</i> | | | | | |
|--------------------------------|---------------------|--------------------|---------------------|-----------------|---------------------|
| Year | Capital Cost | Energy Cost | O&M Cost | Benefits | Net Benefits |
| 1997 | 2.932 | | | | -2.932 |
| 1998 | 323.304 | | | | -323.304 |
| 1999 | 37.953 | | | | -37.953 |
| 2000 | 2854.090 | | | | -2854.090 |
| 2001 | 6666.969 | | | | -6666.969 |
| 2002 | 7761.694 | | | | -7761.694 |
| 2003 | 2972.295 | 552.240 | 46.940 | 3294.818 | -276.658 |
| 2004 | 1156.743 | 579.852 | 49.287 | 3459.559 | 1673.677 |
| 2005 | | 608.845 | 51.752 | 3632.537 | 2971.941 |
| 2006 | | 639.287 | 54.339 | 3814.164 | 3120.538 |
| 2007 | | 671.251 | 57.056 | 4004.872 | 3276.565 |
| 2008 | | 704.814 | 59.909 | 4205.116 | 3440.393 |
| 2009 | | 740.054 | 62.905 | 4415.372 | 3612.412 |
| 2010 | | 777.057 | 66.050 | 4636.140 | 3793.033 |
| 2011 | | 815.910 | 69.352 | 4867.947 | 3982.685 |
| 2012 | 2.178 | 856.705 | 72.820 | 5111.344 | 4179.641 |
| 2013 | | 899.541 | 76.461 | 5366.912 | 4390.910 |
| 2014 | | 944.518 | 80.284 | 5635.257 | 4610.455 |
| 2015 | | 991.744 | 84.298 | 5917.020 | 4840.978 |
| 2016 | | 1041.331 | 88.513 | 6212.871 | 5083.027 |
| 2017 | | 1093.397 | 92.939 | 6523.515 | 5337.178 |
| 2018 | | 1148.067 | 97.586 | 6849.690 | 5604.037 |
| 2019 | | 1205.471 | 102.465 | 7192.175 | 5884.239 |
| 2020 | | 1265.744 | 107.588 | 7551.784 | 6178.451 |
| 2021 | | 1329.031 | 112.968 | 7929.373 | 6487.374 |
| 2022 | 2.178 | 1395.483 | 118.616 | 8325.842 | 6809.565 |
| 2023 | | 1465.257 | 124.547 | 8742.134 | 7152.330 |
| 2024 | | 1538.520 | 130.774 | 9179.240 | 7509.946 |
| 2025 | | 1615.446 | 137.313 | 9638.202 | 7885.443 |
| 2026 | | 1696.218 | 144.179 | 10120.112 | 8279.716 |
| 2027 | | 1781.029 | 151.387 | 10626.118 | 8693.701 |
| 2028 | | 1870.081 | 158.957 | 11157.424 | 9128.386 |
| 2029 | | 1963.585 | 166.905 | 11715.295 | 9584.806 |
| 2030 | | 2061.764 | 175.250 | 12301.060 | 10064.046 |
| 2031 | | 2164.852 | 184.012 | 12916.113 | 10567.248 |
| 2032 | 2.178 | 2273.095 | 193.213 | 13561.919 | 11093.433 |
| 2033 | | 2386.749 | 202.874 | 14240.014 | 11650.391 |
| 2034 | | 2506.087 | 213.017 | 14952.015 | 12232.911 |
| 2035 | | 2631.391 | 223.668 | 15699.616 | 12844.556 |
| 2036 | | 2762.961 | 234.852 | 16484.597 | 13486.784 |
| 2037 | | 2901.109 | 246.594 | 17308.827 | 14161.123 |

EIRR
NPV

16.7%
\$11,624.70

PROJECT PERFORMANCE RATINGS

| No. | Component Indicators | Score (1 to 4) | REMARKS |
|-----------|---|-------------------|--|
| 1. | Relevance and quality at entry assessment | 2.69 | Satisfactory |
| i) | Consistency with country overall development strategy | 3 | Goals are consistent with development strategy, except for reduction in losses which has no specific relevance in this context. |
| ii) | Consistency with Bank Assistance Strategy | 4 | Conforms to assistance strategy that was prepared after implementation. |
| iii) | Macro-economic policy | 4 | Supports policy of economic development and poverty reduction. |
| iv) | Sector Policy | 3 | Supports sector policy. Mention of hydro power not relevant as other sources of power may be more appropriate. |
| v) | Public Policy Reform | 1 | Lacked institutional development component. |
| vi) | Poverty reduction | 4 | Focus on rural electricity supply to poor households. Poor receives subsidised electricity and there is indirect job creation. |
| vii) | Social and Gender equality | 4 | Substantial benefits to women. |
| viii) | Environmental Concerns | 2 | Construction temporarily suspended due to environmental concerns. |
| ix) | Human Resources Development | 1 | No training component was included. |
| x) | Institutional Development | 1 | No institutional development component was included. |
| xi) | Private Sector Development | 3 | Small, medium and large private developments benefited. |
| xii) | Regional Economic Integration | 4 | Electricity line to be extended to South Africa. |
| xiii) | Quality at entry (including demandingness, complexity, riskyness, etc.) | 1 | Failed to include institutional development and staff training components. Did not address issue of EdM debt burden. Failed to recognise potential environmental concerns. Lacks specific targets in some key areas. |
| 2. | Achievement of objectives & outcomes (“Efficacy”) | 2.87 | Satisfactory |
| i) | Policy Goals - Make sufficient energy available - Promote efficient use of energy - Build institutional capacity in the electricity sector | 3 4 4 1 | Two out of the three goals were achieved. |
| ii) | Physical objectives (outputs) | 4 | |

| | | | |
|-----------|--|------------------------------|---|
| iii) | Financial Targets - Financial viability - Cost recovery - Restructuring - Other (Specify) | 1 <i>1</i> <i>1</i> | The assessment is based on expected outcomes as no specific targets were set at appraisal. It should be noted that a lower rating was given to this compared to point 3 (ii) due to the fact that the appraisal report created an expectation of financial viability which did not materialise. |
| iv) | Institutional Development Objectives Government Executing Agency | 2 3 <i>1</i> | No specific targets were set at appraisal. Only a general assessment was possible. Government performed satisfactorily in terms of their own restructuring, but underlying reasons for EdM's debt burden has not been addressed. |
| v) | Social Objectives and Targets - Poverty Alleviation - Reduction in income disparities - Access & quality of services - Settlement/Resettlement - Health Improvement | 3.4 4 4 4 3 2 | The assessment is based on expected outcomes as no specific targets were set at appraisal. The project connected 4600 poor households. It also electrified a number of small, medium and large rural businesses. Most of these are in the tourist and agriculture sectors which employs large numbers of people in rural areas. Income disparities were reduced as the provision of electricity to poor households is subsidised. Poor households also benefited from access to facilities, not only in terms of the electricity supplied to households, but also from communication, health care and schooling which was made possible due to the availability of electricity. The availability of electricity attracted displaced communities back to villages and towns. The improvement in health occurred as a result of a reduction in the use of firewood. |
| vi) | Environment Objectives - Natural Resource Management - Maintenance of biodiversity - Maintenance of soil, air, water quality | 2.7 2 3 3 | The assessment is based on expected outcomes as no specific targets were set at appraisal. Natural resource management suffered as a result of the inappropriate monitoring during construction. The reduction in use of firewood and fossil fuels contributed to biodiversity and had a positive impact on air quality. |
| vii) | Private Sector Development Objectives | 4 | The assessment is based on expected outcomes as no specific targets were set at appraisal. At least four factories and eleven tourist lodges were served with reliable electricity. PPP to extend network and serve even more customers. |
| 3. | Efficiency | 3.33 | Satisfactory |
| i) | Economic Rate of return Appraisal estimate 13.8% PCR estimate 14.0% PPER estimate 16.7% | 4 | Project more viable than at appraisal and at PCR, possibly due to an underestimation of benefits. Economic performance is robust. AR and PCR used questionable methods to calculate benefits. |

| | | | |
|-----------|--|-------------|--|
| ii) | Financial Rate of Return Appraisal estimate 11.3% PCR estimate 10.1% PPER estimate 3.7% | 2 | Project not financially viable at market related interest rates. However, this is acceptable for a rural electrification project whose main aim is to benefit the poor. There are major anomalies in the financial analysis of the AR and PCR. |
| iii) | Cost-Effectiveness Indicators | 4 | This was the least cost option to serve the intended purpose. |
| 4. | Institutional Development Impact (ID) | 3 | The project did not include a specific institutional development component, but it contributed to the ongoing institutional development process in the electricity sector. |
| 5. | Sustainability | 2.75 | Satisfactory |
| i) | Technical soundness (including O&M facilitation, availability of recurrent funding, spare parts, workshop facilities etc.) | 3 | Good quality equipment installed. Integrity of the line threatened in one place. Potential future maintenance problems. |
| ii) | Continued borrower commitment (including legal/regulatory framework) | 3 | GoM remains committed through continued investment and reform. |
| iii) | Socio-political support (including beneficiary participation, vulnerable groups protection, political stability) | 4 | High level of socio-political support for rural electrification which benefits poor. |
| iv) | Economic resilience | 2 | Highly dependent on continuing government financial support for loss making projects. |
| v) | Financial resilience | 1 | EdM financial position is unsustainable. |
| vi) | Institutional arrangements (organisational and management) | 3 | Ministry and EdM have stable and competent leadership. Reform process continuing. |
| vii) | Environmental resilience | 3 | Most environmental issues were resolved. Minor impact on declared natural areas. |
| viii) | Resilience to exogenous factors | 3 | No immediate threats to political stability. Future shortage of generating capacity. Climatic conditions always a threat. |
| 6. | Aggregate Performance Indicator | 2.93 | Satisfactory |

BORROWER PERFORMANCE RATINGS

| No. | Component Indicator | Score | REMARK |
|-----|--|-------------|---|
| 1. | Quality of Preparation: | 3.20 | |
| | - Availability and quality of studies | 2 | EdM prepared the feasibility study and the detailed engineering design was part of the project financing. Adequate indicators were lacking and the environmental aspect was not well covered at preparation stage |
| | - Ownership, beneficiaries participation | 3 | EdM has shown ownership throughout the project cycle. Beneficiaries were not consulted directly, but the need for electricity was obvious in the areas affected by civil war and repeated floods. The provision of electricity at subsidized tariff was welcomed by the beneficiaries |
| | - Government commitment | 3 | Government commitment was demonstrated in its submission of the loan request to the Bank for financing |
| | - Macroeconomic & Sector Policies | 4 | The macroeconomic conditions have improved over the years and sector institutions and policies have been reviewed and the regulatory and execution functions have been separated to permit check and balance and accountability. |
| | - Institutional Arrangements (counterpart funding) | 3 | EdM is a well organized utility and the creation of PIU was a condition of the loan. Counterpart funds were earmarked to cover all local cost components of the project. |
| 2. | Quality of Implementation | 2 | |
| | - Assignment of Key Staff | 2 | Key staff was appointed to form the Project Implementation Unit as programmed at appraisal. However, the unit lacked continuity and capacity to deal promptly with issues. |
| | - Managerial Performance of executing agency | 3 | EdM performs well with respect to its management function. Overall implementation was successful barring delays in start up. |
| | - Use of Technical Assistance | N.A. | No technical assistance was included under the project although training for maintenance is highly needed |
| | - Mid-course adjustments | 2 | Environmental issues arose during implementation for which solutions were sought. This created some delays in the completion of construction. There should |

| | | | |
|----|--|-------------|--|
| | - Adherence to time schedule & costs | 1 | have been closer environmental monitoring during construction. Costs were adhered to leading to a cost under-run. Project commissioning was delayed by 38 months due mainly to internal delays in contract awards and processing of disbursement documents and clearance of goods from the port |
| 3. | Compliance with covenants | 3 | EdM has complied with many of the loan covenants, though some were fulfilled with delays. |
| 4. | Adequacy of Monitoring and Evaluation Reporting | 2 | EdM has complied with its reporting to the Bank. But its monitoring with respect to environmental issues was not adequate |
| 5. | Satisfactory Operations (if applicable.) | 4 | The project has fully met its objectives and the operational performance of the various components is satisfactory |
| | Overall Borrower Performance | 2.84 | Satisfactory |

BANK PERFORMANCE RATINGS

| No. | Component Indicator | Score | REMARKS |
|-----|---|---|---|
| 1. | <p>At Identification</p> <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 | <p>3.5</p> <p>4</p> <p>4</p> <p>3</p> <p>3</p> | <p>Satisfactory</p> <p>This has been consistent and the project was and still is relevant.</p> <p>Project was found consistent with Bank's strategy for the country.</p> <p>Government initiated the project to address the acute shortage of electricity supply in the country. Although beneficiaries were not actively involved, the need for the project was obvious.</p> <p>Project was a least cost solution to meet the needs of the population by extending the network fed from the hydropower source. It was a follow-up of the Electricity I Project financed earlier.</p> |
| 2. | <p>At Preparation of Project</p> <ul style="list-style-type: none"> - Relevance of Bank support - Timely Bank support | <p>3.5</p> <p>4</p> <p>3</p> | <p>Satisfactory</p> <p>Bank involvement with concessionary funds was important given that the project caters for the needs of the rural population.</p> <p>Bank involvement in the preparation and appraisal was constrained due to delays in ratification of the ADF resources</p> |
| 3. | <p>At Appraisal</p> <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 | <p>2</p> <p>1</p> <p>2</p> <p>2</p> <p>3</p> <p>N.A.</p> | <p>Unsatisfactory</p> <p>Measurable outcomes were not provided for all the outcomes. Financial and economic results did not reflect financial and economic performance. Bank failed to recognise potential environmental issues.</p> <p>All loan conditions were relevant to the successful implementation of the project and viability of the utility. However, the concessionary benefits were not passed on to the executing agency and beneficiary despite the fact that it was a rural electrification project with social benefits but little prospect for high income from tariff. EdM's debt situation was not addressed.</p> <p>The ADF resources were inadequate and the training and institutional development components were excluded.</p> <p>All the foreign cost was financed by the Bank. This was adequate for the size of the project</p> <p>No other financiers were not involved</p> |

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| | <ul style="list-style-type: none"> - Implementation & Supervision plans (including performance indicators, M&E requirements) | 2 | Project implementation plan was provided but the supervision and monitoring plan was not adequate and performance indicators were not fully spelt out in the appraisal report particularly with respect to environmental issues. |
| 4. | <p>At Supervision</p> <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 PCR - Attention to likely social development impact - Attention to sustainability issues | 2.57 | <p>Satisfactory</p> <p>Frequency of field supervision was adequate, but the skill mix did not include environment expert until environmental issues were exposed by foreign NGOs.</p> <p>Bank was quick to respond to the environmental issues raised by fielding a mission with environment expert.</p> <p>This was handled effectively.</p> <p>This was handled effectively.</p> <p>Some ratings at PCR were not realistic.</p> <p>Social developmental impacts were anticipated but no measurable performance indicators were identified.</p> <p>Sustainability was considered mostly in financial terms without providing details on issues relating to maintenance requirements and institutional capacity.</p> |
| | Overall Assessment of Bank Performance | 2.89 | 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 | | + | | | Actual cost of foreign exchange component was lower than anticipated due to competitive bidding. |
| 1.2 Natural events | | - | | | A severe flood that affected parts of Mozambique was given as a reason for delays in the fulfilment of loan conditions. |
| 1.3 Bank Performance | - | | | | Lack of an environmentalist had contributed to delays. Loan conditions did not address EdM debt. The high on-lending interest rate that the Bank agreed to, means that the project is not financially viable. |
| 1.4 Performance of contractors | | - | | | Delays during construction caused by environmentally damaging construction techniques. |
| 1.4b Performance of consultants | - | | | | Consultant's performance was sub-optimal contributing to delays in project implementation. |
| 1.5 Civil war | | | | * | Project was implemented during the peace period. |
| 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 EdM autonomy resulting in improved operational efficiency. |
| 2.3 Government commitment | + | | | | Government commitment as shown by continuing expansion of the electricity network. |
| 2.4 Appointment of key staff | | + | | | Competent PIU ensured successful implementation despite delays caused by lack of knowledge of Bank rules and capacity constraints. |
| 2.5 Counterpart funding | + | | | | Counterpart funds were released when needed even in excess of anticipated local expenditure. |
| 2.6 Administrative capacity | | - | | | Internal processing such as custom clearance and approval of contract and disbursement processing delayed implementation. |
| 2.7 Other - | | | | | |
| 3. Subject to Executing Agency Control | | | | | |
| 3.1 Management | | + | | | PIU management of implementation was adequate except some delays in processing clearance formalities due to workload. Agency management during performance has been adequate and has been improved over time |

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| 3.2 Staffing | | - | | | PIU staffing was inadequate considering total workload. Agency staffing at performance is adequate. |
| 3.3 Use of technical Assistance | | + | | | No TA was attached to project but EdM has employed technical assistance through financing from bilateral sources which is contributing to improving the performance of EdM. |
| 3.4 Monitoring & Evaluation | | + | | | Monitoring at implementation ensured successful completion within the overall budget. Lack of environmental expert during monitoring. |
| 3.5 Beneficiary Participation | + | | | | End user demand at project operation has exceeded forecast values. PPP with new developers. |
| 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 and environmentally sound project outcome. Additional connections were made. |
| 4.2 Deficiency in estimating physical inputs, the base unit costs | | | * | | No deficiency was recorded in estimating inputs and costs of the project. |
| 4.3 Inadequacy of price/physical contingencies | | | * | | Adequate physical and price contingencies were made at appraisal. |
| 4.4 Changes in exchange rates, in financial and institutional arrangements | | - | | | Exchange rates burdens EdM in repayment of foreign currency denominated loans. Financial performance also affected as a result. The institutional arrangement improved separating regulatory body from executive functions. |
| 4.5 Unrealistic implementation schedule | | - | | | Implementation schedule was realistic but internal processing need to be streamlined to minimized delays. |
| 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 complied with. |
| 4.9 Other | | | | | |