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**Report No. 10245**

PROJECT COMPLETION REPORT

REPUBLIC OF MALI

POWER/WATER PROJECT  
(CREDIT 1282-MLI)

DECEMBER 27, 1991

Industry and Energy Operations Division  
Sahelian Department  
Africa Regional Office

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### CURRENCY EQUIVALENTS (1982)

Currency Unit	=	Malian Franc (MF)
US\$1.00	=	MF 500
MF 1	=	US\$0.0020
MF 1000	=	US\$2.00

### ABBREVIATIONS AND ACRONYMS

CCCE	-	Caisse Centrale de Cooperation Economique
DHE	-	Direction de l'Hydraulique et de l'Energie
EDM	-	Energie du Mali
FAC	-	Fonds d'Aide et de Cooperation
OERHN	-	Office pour l'Exploitation des Ressources Hydraulique du Haut Niger
OPEC	-	Organization of Petroleum Exporting Countries
PCR	-	Project Completion Report
PPF	-	Project Preparation Facility

### FISCAL YEAR

January 1 - December 31

THE WORLD BANK  
Washington, D.C. 20433  
U.S.A.

Office of Director-General  
Operations Evaluation

December 31, 1991

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Project Completion Report on Mali  
Power/Water Project  
(Credit 1282-MLI)

Attached, for information, is a copy of a report entitled "Project Completion Report on Mali - Power/Water Project (Credit 1282-MLI)" prepared by the Africa Regional Office with Part II contributed by the Borrower. No audit of this project has been made by the Operations Evaluation Department at this time.

A handwritten signature in black ink, appearing to be 'J. P. ...', is located in the lower right quadrant of the page.

Attachment

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**PROJECT COMPLETION REPORT**

**REPUBLIC OF MALI**

**POWER/WATER PROJECT**  
**(Credit 1282-MLI)**

**PREFACE**

This is the Project Completion Report (PCR) for the Power/Water Project in the Republic of Mali, for which Credit 1282-MLI in the amount of SDR 20.4 million (US \$24 million) was approved on July 6, 1982. The Credit was closed on December 31, 1988 and the last disbursement took place by June 30, 1989 when a remaining balance of SDR 6,063 was canceled. The Credit, which represented the first Bank operation in the two sectors, was extended to the Government of the Republic of Mali for on-lending to Energie du Mali (EDM), a parastatal water and power utility which has been operating since 1961 under a thirty year concession covering the production and distribution of power and water over most of the country.

Parts I and III of this PCR were prepared by the Industry and Energy Operations Division of the Sahelian Department, Africa Regional Office, and are based, *inter alia*, on the Staff Appraisal Report, the Credit and Project Agreements, supervision reports, correspondence between the Bank, the Borrower and the Executing Agency, other data and information from Bank files and discussions with Bank staff who had been involved in project implementation and supervision. No mission from the Bank visited the country for the purpose of preparing the PCR. Part II was prepared by EDM as a full completion report in compliance with a Development Credit Agreement covenant. It is a comprehensive document containing much technical detail that this PCR has omitted for reasons of brevity, and does not in any way contradict any of its more significant findings. It is reproduced, unedited, and in its entirety.

Parts I and III were sent to the Borrower and to the Co-financiers on April 1, 1991, no reply has been received yet.

**PROJECT COMPLETION REPORT**

**REPUBLIC OF MALI**

**POWER AND WATER/ PROJECT**  
**(Credit 1282-MLI)**

**EVALUATION SUMMARY**

**Objectives**

1. The project had multiple and diverse objectives. In broad terms, it was designed to extend both power and water supplies, to rehabilitate and strengthen the parastatal utility responsible under a concession arrangement with the Government to produce and distribute power and water over most of the country, to recover costs, to train Malians in management and operational skills and to economize on imported fuels. More specifically, it would assist the utility to prepare future works to be carried out as a long term program of rehabilitation and expansion, help to alleviate the utility's managerial and operational constraints and ensure extended, more cost effective and reliable services primarily to urban, but also to some rural inhabitants (paragraph 3.01).

**Implementation Experience**

2. There were delays in signing the Credit and Project Agreements because of a temporary depletion in IDA funds and the originally planned date for Effectiveness had to be postponed because of delays in the fulfillment of conditions precedent to disbursement by one of the Cofinanciers. Altogether, start-up of the project was delayed by some nine months through no fault of the beneficiaries (paragraph 5.01).

3. The project was originally scheduled to be completed by December 31, 1987, but the Closing Date had to be postponed and the project was eventually completed and the Credit closed a year later. There were numerous causes; delays in recruitment of individual experts who were to make up the technical assistance team; dilatoriness on the part of the Government in approving terms of reference for various studies and in allocating land for those project components that required sites; retendering of the conventional thermal station that replaced the biomass generating plant following the receipt of unresponsive and unacceptable bids and lengthy delays in the completion of extensions to the Bamako water supply distribution system following a suspension of disbursements by the OPEC Fund. For most of these delays there was little the Bank could have done beyond exhortation and persuasion to expedite matters, other than, perhaps allocate additional staff resources to a more intensive level of supervision than the size and nature of the project warranted or the expectation of results deserved (paragraph 5.02).

4. Procurement of the physical components of the project proceeded satisfactorily once the various studies had been finalized. And disbursement, although falling far behind the estimates at appraisal, was completed by the revised Closing Date, other than for a minor sum which was canceled. In aggregate, project cost remained very much in line with appraisal estimates. Only relatively minor reallocations had to be made between categories (paragraphs 5.03-5.05).

## **Project Results**

5. The physical components of the project, although somewhat delayed, were successfully completed, the only major alteration in scope being the substitution of a conventional thermal plant for a biomass plant. The quality and reliability of both the electricity and water supplies were improved by the additions to the systems, and by the work of rehabilitation and extension and many new customers were able to be accommodated. However, few significant changes took place in the organizational structure of the sectors, and the low level of managerial autonomy and initiative prevailing in Energie du Mali (EDM) failed to improve significantly, Government interference remaining a negative factor. No consensus was achieved on the organization of the power sector, and there was persistent violation by Government of important financial covenants, especially those covenants relating to the arrears owed by the public sector to EDM. As a result, EDM's financial situation remained extremely difficult. There were some improvements relating to the separation of water and electricity accounts, the collection of accounts receivable from the private sector, the introduction of computerization and auditing. Tariffs were raised on a number of occasions and in overall magnitude were in line with the recommendations of the consultants, but no restructuring of tariffs took place. Internal cash generation remained below covenanted levels (paragraphs 6.06 to 6.09).

5. There were shortcomings in the performance of the technical assistance team, some of its members being less effective than others. The team failed to achieve cohesiveness and the effort lacked leadership. In sum, a costly technical assistance program failed to produce commensurate results. Early problems associated with the training component were partly resolved, but EDM's management remained less than fully convinced of its value. Problems were encountered in the provision and retention of counterparts. For the most part, the consultants retained for studies, detailed engineering and supervision of construction performed satisfactorily, displayed good expertise and exercised sound judgement, although there were a few whose performances were deemed to be less than satisfactory (paragraph 6.11).

6. The extent to which the results were judged to be below planned achievement is reflected in the degree to which technical assistance had to be perpetuated and redirected and training intensified, institutional objectives replicated and critically important financial covenants repeated in the follow-up and other related projects.

## **Sustainability**

7. The institutional and infrastructural weaknesses which permeated project arrangements and the deteriorating economic and financial environment undermined prospects for sustainability. On balance, the physical components are capable of being sustained and will be, provided EDM retains its capacity for maintenance, but the institutional, organizational and policy achievements per se, which were minimal, are not. However, since what little progress was made is being strengthened and elaborated by further project activity, in the longer haul sustainability remains a live possibility (paragraphs 7.01 and 7.02).

## **Findings and Lessons**

8. Although the physical components of the project have been successfully completed and are providing facilities important for the quality of life of many Malians and for the future development of the two sectors, the institutional objectives were not achieved during the life of the project, and the technical assistance and training components produced results not commensurate with the cost and



effort put into them. The experience strongly suggests the need to plan technical assistance for institutional development within the context of a long term, country specific institutional development strategy rather than to expect dramatic improvements to be accomplished through individual projects of relatively short duration. Changing a corporate structure, as was attempted in this project, requires a long term investment in patience and intensive supervision. A lack of commitment on the part of the recipient can vitiate the impact of a technical assistance program regardless of its size, cost and the care with which it may have been structured. The institutional objectives were eventually subsumed in other projects, especially a Public Enterprise Adjustment project and that was for the good, since it was initially somewhat unrealistic to expect a wholesale redressing of the institutional framework of the sector in isolation from improvements in the Government's overall policy towards public enterprises. The measures to be taken to improve the financial performance of the utility were appropriate and in part successful, but those to be taken to remedy its financial situation were dependent to an overwhelming extent on the fiscal cooperation of the Government at a time when its own financial situation was in a parlous state and which, as a result, was not forthcoming. The state of the economy is a factor which must be taken into consideration when attempting to rehabilitate a sector or a major public enterprise (paragraphs 8 and 9).

## MALI

### POWER/WATER PROJECT (Credit 1282-MLI)

#### PROJECT COMPLETION REPORT

#### PART I: PROJECT REVIEW FROM BANK'S PERSPECTIVE

##### 1. Project Identity

Name	Power/Water Project
Credit Number	1282-MLI
RVP Unit	Africa Region
Country	Mali
Sector	Power / Water

##### 2. Background

2.01 The power sector in Mali at the time of appraisal of the project was typical of most power sectors in Sub-Saharan Africa. Installed capacity and consumption were extremely low, consumers were mainly households and the public sector since industrial and commercial use was limited, power utilities were small, power losses high, supplies unreliable and much demand unmet. Expenditures on distribution facilities and maintenance were insufficient, tariffs were too low to generate adequate revenue for basic operations, collection rates were low and arrears excessive. At the time of a Bank basic needs mission in 1978, total installed generating capacity was 35MW with annual generation of 135 GWh. Other than for a 5MW hydro electric plant at Sotuba and a small 500 KW hydro plant at Felou all generation was diesel electric. Consumption was among the lowest in the world at 23KWh per capita per annum. Only 30% of the urban population had access to electric power and less than 5% of the whole population. A public supply existed only in Bamako, the capital, and eleven secondary urban centers, ten of which were isolated supply systems with their own small generating plants. Bamako was supplied by the 5MW Sotuba plant and a 14.7 MW diesel electric plant at Dar-Salam. Distribution covered only a fraction of the city's area. Peak demand in Bamako had grown in the 1970s by an annual average of 12%, well above existing generating capacity until a 48MW hydroelectric power plant built at Selingue commenced producing power in 1981, substituting for diesel electric generation in Bamako and southern Mali, reducing oil imports and saving foreign exchange.

2.02 The water supply sector suffered from very much the same catalogue of deficiencies as the power sector, water supply systems adequately serving only 20% of the urban population. There was no sewage disposal system and the limited drainage system in Bamako was clogged through lack of maintenance. An estimated 25% of the rural population were served by boreholes and water wells, although many rural water supply projects were, and still are, being implemented with foreign aid.

2.03 Three institutions had responsibilities in the power and water sectors; Energie du Mali (EDM), the project implementing agency, a parastatal water and power utility which has been operating since 1961 under a 30 year concession covering the production and distribution of power and water over most of the country; the Directorate of Hydraulics and Energy (DHE) which, in theory, was responsible for the planning and implementation of water supply projects and large power schemes but which, in fact, did limited planning and implemented only water projects; and L'Office

pour l'Exploitation des Ressources Hydraulique du Haut Niger (OERHN) which was established to operate the Selinque hydropower project, as a bulk supplier, principally to EDM.

**2.04** The organization of EDM did not segregate power and water activities, responsibility for all its activities was heavily concentrated in the General Manager who was appointed by the President, and there was no overall technical direction and little coordination between services, delegation of authority or adequate evaluation of sector specific problems. EDM suffered from a serious shortage of competent, qualified staff and a lack of adequate training facilities. Operations were also hampered by poor and difficult communications. Financial constraints had resulted in inadequate maintenance and a scarcity of spare parts and tools. These factors plus poor salaries and working conditions resulted in low staff morale.

**2.05** In both sectors there was an urgent need for institutional restructuring, for asset rehabilitation, for investment planning and for the articulation and implementation of measures to restore financial health to EDM. The project resulted in the Bank taking a leading role in these remedial measures and, most importantly since virtually all public sector investment was financed externally by foreign aid, in organizing donor meetings for the purpose of optimizing coordination among the many aid and development organizations active in the two sectors.

### **3. Project Objectives and Description**

**3.01 Project Objectives.** Objectives were diverse and multiple. In the broadest terms, the project was intended to extend the power supply, to rehabilitate and strengthen EDM, to recover costs, to train Malians, to economize on imported fuels and to supply water. More specifically, it would assist the parastatal power utility to prepare future works to be carried out as part of a long term program of rehabilitation and expansion. It aimed at alleviating EDM's managerial and operational constraints and at ensuring extended, more reliable and cost effective, services, primarily to urban, but also to some rural, inhabitants. On reflection, it is apparent that the perceived need for Bank leadership in, especially, the power sector in this its first intervention, contributed to the structuring of a project with such basic and all-encompassing objectives; and it was somewhat unrealistic in the particular circumstances of Mali to expect significant realization of these far-reaching institutional, organizational, policy and training objectives within the time-frame of the project. From the outset there had to be an explicit assumption that such prospects were remote and that a longer time-frame, including successive loans and additional technical assistance, would be required. And this, indeed, proved to be the case. In the Second Power Project that followed, technical assistance continued with especial emphasis on training. Changes were made in scope and approach based on past learning experience.

**3.02 Project Description.** The project consisted of:

- a) a power component, comprised of reinforcement and extension of Bamako's distribution system, construction of a biomass power plant at Mopti/Sevare, rehabilitation of the Dar Salam power plant and extension of the powerline communication system;
- b) a water supply component to resolve the main bottlenecks in distribution and production facilities in Bamako;
- c) construction of facilities and supply of vehicles and equipment for EDM's operations, including the extension of its training center; and

- d) technical assistance to strengthen EDM management, to carry out operational and sector policy studies, and to complete preparatory studies and designs for future work.

**3.03 Changes in Project Scope.** The only major change in project scope was the substitution of a conventional diesel electric plant for the proposed biomass plant at Mopti/Sevare, following problems experienced with a prototype biomass plant in Cameroon. This change resulted in savings in investment cost to the OPEC Fund which was financing this component; savings which the Fund subsequently allocated to further extensions and rehabilitation of the Bamako water distribution system in order to meet 1990 estimated demand and to supply an additional 3,000 domestic connections. The legal documents were amended to permit some minor disbursement against procurement in local currency, a contingency which had not been foreseen at appraisal and to establish a Revolving Fund under the Special Action Program to help overcome the constraints of the Government in prefinancing goods and services ultimately to be financed from the Credit. A strengthening US dollar during project implementation (the dollar equivalent of the SDR 20.4 million Credit amount was reduced from US \$24 million to little over US \$20 million) caused some modifications to be made to the size of the various reticulation systems in order to remain within the original cost estimates. The detailed engineering and preparation of bidding documents for the second phase of Sotuba was terminated after the draft feasibility report had been received when it became apparent that Sotuba would no longer be a least cost solution until early in the next century once the Manantali hydro-electric project then under construction was completed and generating power.

#### **4. Project Design and Organization**

**4.01** A Project Preparation Facility (PPF) advance of US \$0.83 million, which was repaid from the proceeds of the Credit, funded much of the preparatory work required for project definition and appraisal. Three other organizations - Caisse Centrale de Cooperation Economique (CCCE), the Fondes d'Aide et de Cooperation (FAC) and the OPEC Special Fund - participated in the project, CCCE and FAC together financing 50% of the combined cost of the technical assistance component and the rehabilitation of the Dar Salam power plant and OPEC the thermal plant at Mopti/Sevare. While coordination and supervision of implementation was provided by the Bank, the complications introduced for the Government by this necessary and appropriate quadrilateral financing did not enhance the efficiency of Government's control of overall operations.

**4.02** The project centered around a core of technical assistance to address EDM's managerial and operational problems and was so designed that a total of some 52 work-years of expert services to EDM were included, a component which represented over 30% of total project cost and which, when combined with the 155 work-months of additional technical assistance needed for engineering design, preparation of tender documents and supervision of construction, amounted to more than 40% of project cost. Technical assistance was no stranger to EDM; it had been provided in the past in varying quantities by, primarily, French aid agencies, but always in the form of limited, discrete expertise adopting advisory roles and postures. Under the project, however, there was to be a cohesive team of 12 expatriate experts possessing broad management and in-line functions and an expatriate coordinator, all of whom were also to provide on the job training for Malian counterparts. This approach was a scaled down version of an original concept in which the team was to be made up of double the number of experts, a concept which, at the time, clearly offended against national pride and triggered Government concerns for integrity and references to "re-colonization". Indeed, it took a high-level post appraisal mission to allay some of these sensitivities and to eradicate some of the Government's manifest uncertainties. Despite Government's wariness over the issue, however,

some fairly drastic measures were necessary and justified. The fact that, at the time, the Government was contemplating the abandonment of its ownership of EDM to a foreign firm strengthened that conviction on the part of Bank staff. Nevertheless, even the diminished application of direct technical assistance was a brave option to adopt. Past experience in Mali had shown that there was resistance to such an approach, which had often sponsored hostilities between experts and counterparts, and there were few assurances that appropriate, suitable counterpart staff who would stay the course could be found in sufficient numbers. The recruitment of the Project Coordinator from a different consulting firm than the other members of the technical assistance team was, in retrospect, a serious mistake since it contributed to much of the tension that was engendered and the institutional implementation difficulties that ensued. This mistake was only corrected in 1987 when a member of the team of twelve took over, creating much better relationships.

4.03 The physical components of the project were appropriate in concept, design and timing given the priority which the development of the two sectors deserved.

## 5. Project Implementation

5.01 Credit Effectiveness and Project Start-up. Although the Credit was approved on July 6, 1982 it was signed only on October 14, 1982 when temporarily depleted IDA funds again became available. Conditions of Effectiveness of the Credit were relatively straight forward, requiring the execution of a Subsidiary Loan Agreement whereby the proceeds of the Credit were to be passed by the Government to EDM, the hiring of the Project Coordinator, the contracting for the services of the team of experts and the fulfillment of the conditions precedent to disbursement by the cofinanciers. The originally planned date for Effectiveness was in September 1982 and the Credit was actually declared to be effective on May 13, 1983, a delay occasioned mainly by the need to meet the cross effectiveness clause in respect of the other donors. The need for notification of the effectiveness of the FAC involvement was waived when cumbersome administrative procedures within FAC and Government continued to pose unacceptable delays. In all, the start-up of the project suffered some nine months delay through no fault of the beneficiaries. Indeed, both the Government and EDM appear to have acted promptly to fulfil their part of the Conditions of Effectiveness.

5.02 Implementation Schedule. The project was originally scheduled to be completed by December 31, 1987, but the Closing Date was postponed and the project was eventually completed by December 31, 1988. The main reasons for the postponement were:

- (a) delays in recruitment of individual experts, the last of them not arriving until April 1984. The implementation of most project components were affected in varying degrees by the initial absence of the full range of expertise to be made available. For example, the late arrival of the Chief of Finance resulted in new and later dates being determined for compliance with many of the financial covenants.
- (b) dilatoriness on the part of the Government in approving the terms of reference for various studies. Approval of the terms of reference of the Power Sector Master Plan was eventually delayed to such an extent that approval became a condition of appraisal of the follow-on power project.
- (c) a decision to revise the terms of reference of the tariff study to include Selinque generation.

- (d) the retendering of the Mopti/Sevare thermal station when bids substantially exceeded the estimate. It subsequently transpired that one of the reasons why the bids had been so unsatisfactory was that the list of firms invited to tender had not been expanded and the specifications had been only marginally altered, even though the specialized biomass plant had been superseded by a conventional one. This effort to save time proved to be shortsighted.
- (e) problems apparently encountered by Government in allocating land for the various components needing new sites, especially the new computer center.
- (f) serious delays in completion of the OPEC financed portion of the Bamako water supply distribution system following a lengthy suspension of disbursements by OPEC when Mali failed to meet its repayment obligations to the OPEC Special Fund.

Apart from sub-paragraph d) above there was little beyond exhortation and persuasion that the Bank could have done to expedite matters, other than to allocate additional staff resources to a more intensive level of supervision than perhaps the size and nature of the project warranted and the expectation of results deserved, given the constraints on the Government.

**5.03**        Procurement. Although there were delays in the recruitment of individuals for the team of experts, procurement of physical components proceeded satisfactorily once the various studies and detailed engineering had been completed.

**5.04**        Disbursement. Disbursement fell far behind the profile estimated at appraisal. In 1986, for example, disbursements lagged at less than half the estimate as a result of the delays in implementation. However, by the revised Closing Date, virtually all disbursements against commitments had been achieved and the last payment was made by 6.30.1989 when the sum of SDR 6,063 remained and was canceled.

**5.05**        Project Cost. Apart from the Mopti/Sevare plant which was altered in scope and thereby reduced significantly in cost (the balance saved being utilized by the OPEC Fund under parallel financing to augment the Bamako water supply distribution), project costs overall remained much as had been estimated at appraisal. There was no cost over-run in the aggregate and only relatively minor reallocations of funds between disbursement categories to match actual disbursements and the dispersal of unallocated funds was necessary at the closing of the accounts.

## **6.     Project Results**

**6.01**        Attainment of Project objectives. The physical components of the project yielded satisfactory results. In Bamako, there is no doubt but that the quality and reliability of both the electricity and the water supply systems were greatly improved by the additions to the systems, by the work of rehabilitation and extension and by the removal of bottlenecks. Power generated more nearly met demand, new customers were accommodated and thousands of households enjoyed the benefits of electricity and treated, piped water for the first time. At appraisal, the rate of return on the Bamako power distribution system investment was calculated to be 21% and 11% on both the water supply investment and the biomass thermal plant. Unfortunately, the time lapse since completion, the fact that the planned completion supervision mission did not take place, and that the power sector physical works were to a great extent subsumed in the follow up second power project has resulted in insufficient data being available at this stage on which to base fresh estimates which

would have any real validity. It would seem to be most unlikely, however, given the increases in sales and tariff levels (which the earlier calculations took as proxy for benefits) and the degree of realism of the original cost estimates, that the rates of return at completion could have been less than those estimated.

**6.02** The same, relatively favorable assessment, unfortunately, cannot be given to the rehabilitation and strengthening of EDM, the recovery of costs and the training of Malians. Few significant changes took place in the organizational framework of the sector. Little improvement in communications between the different supervising bodies or reduction in their hostility towards each other occurred and the low level of managerial autonomy and initiative prevailing in EDM failed to improve significantly. Government interference in management remained a negative factor as did a general lack of motivation on the part of EDM management, a condition not helped by the fact that the technical assistance team and the project coordinator came from different agencies. The continuation of the program to strengthen EDM became a major component of the second project, which established specific targets.

**6.03** The institutional study when it was finally submitted in 1986 predictably recommended that two separate utilities should be created to be in charge of electricity and water, that the concession system should be abolished, that a new regime of State supervision over the utilities should be introduced and that the operation of Selinque should be transferred to the new utility. Although the Government appeared to concur, other than in the matter of the creation of a national power utility, reservations were expressed and foot-dragging ensued. When it became apparent that no consensus on the future organization of the power sector had been reached, follow up once again became a part of the second project and the finalization of the institutional/legal framework became a condition of Board presentation of a Public Enterprise Institutional Development project then being appraised.

**6.04** EDM's financial position remained critical throughout the life of the project, to a great extent because of the Government's persistent violation of the vitally important covenants calling for prompt reduction in the arrears owed to EDM by the public sector to no more than three months billings and the provision of budgeted funds on a regular and annual basis for the meeting of such liabilities. In some years, Government arrears exceeded nine months of billings. Only in May 1989, just before the approval by the Bank of the second power project, was a significant portion of the arrears paid by the Government. In view of the very difficult state of the Government's own finances during the period of implementation, this performance deficiency can be understood but, given the priority attached to the project, cannot be condoned. These issues also had to be highlighted and relegated to the Public Enterprise Institutional Development Project for correction. Although some improvement was achieved in the collection of private sector billings, accounts receivable remained unacceptably high as did power losses. The consultancy costing nearly US \$3 million designed to update customer files and accounts, review billing systems and organize a Customer Department failed to make much impact and the benefits derived from this consultancy were not commensurate with the efforts made and the funds expended. It is difficult to allocate responsibility. There were metered supplies not recorded and many supplies found to be without meters. Meter reading was deplorably bad. The second power project includes a component for further improvement of EDM's commercial operations. Limited progress was, however, made in separating power and water accounts, in introducing computerization, in data processing and in the annual audit of accounts. Although the Credit provided for a tariff study to be completed by the end of 1983, a draft report was not submitted until 1985 and then had to be reviewed to incorporate the tariff charged to EDM for Selinque power. Tariffs were raised on several occasions, precipitously by 35% for retail tariffs in November 1985 but, although the overall magnitude of the increases was in line with the

recommendations of the consultants, the structure of the tariffs remained unchanged. However, the power market continued to grow at a high rate and revenues in 1985 and beyond were higher than the appraisal estimates because, in part, of the tariff increases.

6.05 Among other financial covenants was a provision that EDM's internal cash generation each year, power and water being taken separately, should not be less than 10% of its direct and indirect capital expenditures. Since, for most of the period of implementation of the project, separate accounts were not prepared for water and electricity, the determination of compliance by sector was not possible and, eventually, the auditors had to be specifically requested to prepare separate source and application of funds statements to ascertain the true position. Because of the continuing, and in some years increasing, levels of public sector arrears, it is most unlikely that compliance was achieved.

6.06 The problems linked to the technical assistance and training components are essentially those which pertained to earlier efforts in the sectors and, to this extent, should have been more clearly foreseen. The caliber of the assistance was not always adequate and some of the individuals not always very effective; the team failed to achieve cohesiveness and the effort lacked leadership. The quality of local staff appeared often to be too low to assume senior responsibilities and qualified local personnel appeared to be disinterested in working for EDM because of the inadequate salaries offered. Motivation was lacking, the determination and commitment of senior local management was questionable and their rapport with the expatriate staff ambiguous to say the least. Salary and benefit differentials, as was to be expected, remained a source of resentment and antagonism. As far as the training component was concerned, early problems regarding the lack of trainees were partly resolved, although extensive and concentrated efforts had to be made on a continuing basis by the training center management to convince senior EDM management of the importance of releasing staff for training. Throughout the project, problems were encountered in the provision and retention of appropriate counterparts to work with the technical assistance team, although there is no doubt but that some Malian engineers benefitted by working in close proximity with the experts.

6.07 Impact. The immediate positive impact of the project is represented by the sectoral growth it achieved in the physical dimensions of both the power and water sectors, in terms of increased generation of power and treatment of water supplies and in the rehabilitation and extensions provided to both systems. The beneficial effects on productivity, on health and on the quality of life in general of the numerous beneficiaries must have been considerable. The rehabilitation, debottlenecking and extension of distribution systems coupled with some positive advances in investment planning, opened avenues for future growth which only time can properly assess. The institutional impacts of the project, however, were minimal. The best that can be said is that a foundation for the reorganization of the public utilities and the improvement of their performance in some aspects of their functions was laid, and that a basis on which further sectoral rationalization could take place was provided. In all these aspects, however, real progress remained contingent on the successful implementation of other, related project activity.

## 7. Project Sustainability

7.01 This assessment of the extent to which an acceptable net flow of benefits can be maintained throughout the economic life of the project relies on a qualitative examination of project activities derived, after a lapse of several years, from the documentary and anecdotal evidence available. Sustainability in the context of this project depends on beneficiary participation, which was less than fully committed to the larger objectives, on technology adoption and adaptation which posed no great problems and which, from the experience of substituting a conventional for a largely



experimental biomass thermal plant at Mopti/Sevare, showed the necessary flexibility and was unexceptional, from recurrent cost financing and cost recovery and from human resource development. Tariff increases more or less equated recurrent cost requirements, even though the tariff structure remained disappointingly unaltered, but poor collection and persistent customer arrears well in excess of the stipulated three month billings perpetuated a very poor financial performance. Technical assistance and training, although provided in well structured quantities and of not unacceptable quality, failed to make discernible inroads against the lack of motivation and the shortages of qualified staff, so that the human resource development that had been expected did not materialize. Overall, the policy environment remained incompatible.

7.02 These features are systemic to the wider environment in many countries in the Region, especially the institutional weaknesses which permeate both project arrangements and much of the basic institutional infrastructure, as do the deteriorating economic and financial conditions that act to undermine the best arrangements for project sustainability. On balance, it can be said that the physical components erected under the project are capable of being sustained provided, of course, that the capacity for maintenance remains with the utility; the institutional, organizational and policy achievements per se, which were minimal, are not. The saving grace is that what progress was made is being strengthened and elaborated by further project activity which, in the course of its implementation, may enhance the prospects for and the degree of sustainability. That remains to be seen.

## 8. Bank Performance

8.01 On the whole, the Bank's performance was satisfactory in that it made a positive contribution to the physical and institutional development of the power and water sectors in Mali and, even though the results failed to reach expectations, opened and delineated the route to future progress. The Bank's role in organizing and coordinating other multilateral and bilateral aid for Mali in general, and the water and power sectors in particular, was commendable and its influence in these regards meaningful. In retrospect, however, some shortcomings are evident. In the design of the project, undue confidence was placed on the efficiency of technical assistance to overcome institutional and policy weaknesses. In retrospect, with the benefit of relevant experience in other African countries, expectations would have been lower. The proportion of the project's consultancy cost, even though provided on IDA terms to the Government were high (about 50%). These were further complemented by technical assistance financed by FAC and CCCE. The credit financed much of the engineering costs for the Bamako Segou transmission line and the distribution in Bamako and the rehabilitation of the isolated centers. The usefulness of these consultancy services, including the technical assistance for institutional strengthening should be measured in terms of cost of delays avoided and better operational efficiency of EDM, which are hard to quantify. On the whole it is felt that technical assistance of this scale was justified given the circumstances.

8.02 In terms of frequency and numbers of missions, supervision was more than adequate, 20 supervision missions during the period December, 1982 and May, 1989 being carried out by experienced staff at less than 6 monthly intervals. However, the water supply component was supervised separately, five of the 20 missions being devoted to that small component, and it would appear from the records that the first of such missions did not take place until early in 1985, almost two years after the Credit became effective. None of these five missions have left behind a Form 590 detailing their evaluations as a part of their back-to-office reports. A final full mission planned for October 1989 to evaluate project completion did not take place, leaving a number of archival gaps. More importantly, the last two missions charged with the supervision of the main project were, to a considerable extent, preoccupied with the preparation and appraisal of the second power project,

the components of which were to subsume much of the content of the project being supervised. The final sequences of supervision may have been disrupted by the 1987/88 reorganization of the Bank and the subsequent transfer of the staff members principally concerned with project execution and supervision, but that provides little in the way of excuses for the failure to complete fully the last stages of supervision. The omission from the supervision missions of a technical training specialist when it became obvious that the training component was meeting with resistance was unfortunate. The component was reviewed briefly and separately by such a specialist on two occasions but this level of supervision was insufficiently intensive to be of real assistance.

**8.03** The violation by the beneficiaries of many of the financial covenants was a constant matter for discontent. It was sufficiently serious for the Project Coordinator to warn the Bank towards the end of the project that non-payment of arrears by the Government, municipalities and state enterprises was bankrupting EDM, making a farce of the budgeting system put in place in 1984, resulting in totally inadequate resources for the implementation of the planned work program and nullifying any possibility that the 10% level of internal financing required by the Bank could be met. As is usually the case in these events, the Bank's only real weapon of coercion was the threat of suspension and eventual cancellation, which was apparently deemed to be too draconian in the particular circumstances of Mali. Nevertheless, firmer measures might have been taken. The constant exhortation by successive supervision missions could have been elevated to higher executive levels both in Government and the Bank before, in effect, deferring the issue by making the appraisal and approval of future projects in the sector conditional upon compliance. There can be little doubt that the failure to impose the financial discipline called for by these covenants will redound unfavorably on the smooth implementation of successor projects.

**8.04** In designing the technical assistance component, the Bank acted somewhat unrealistically and over-ambitiously. It failed to take due cognisance of previous problems in the area of technical assistance in Mali, did not address the tensions which inevitably arose between the expatriate technical team and local management and counterparts if only on the question of remuneration and other discriminations, and acted imprudently, as it transpired, in permitting the Project Coordinator to be recruited from one consulting organization and the team of twelve from another.

## **9. Borrower Performance**

**9.01** The performance of the Government of Mali, due consideration being given to its formidable constraints, its parlous finances, the deteriorating economic state of the country, the complexity of the project itself and the complications arising from the multiplicity of donors, cannot be described as satisfactory. Much of the responsibility for failure to achieve stated objectives must rest with it. The virtual emasculation of EDM by the Government's prolonged failure to meet its financial obligations to the organization preordained the continued disarray within EDM and severely limited any possibilities of meaningful institutional improvement. Its constant interference in the management of EDM was also a negative factor. The continual delays in project execution following, for example, dilatoriness in approving terms of reference of various studies and in allocating sites for development must also be laid at Government's door. Within EDM, performance was mixed. Although there was much sincerity displayed by its senior staff in their relationship with the Bank, their problems were overwhelming and to have accomplished as much as they did is to their credit. Nevertheless, many remained insufficiently motivated and their failure fully to support the training component compounded their problems. The performance of the utility in diminishing electricity losses and improving billing and collection was also unsatisfactory.

## **10. Performance of Consultants**

**10.01** With few exceptions, the performance of the consultants engaged for feasibility and other studies, for detailed engineering and for supervision of contracts varied from satisfactory to good. The exceptions were limited to; the tariff study which was heavily criticized by Bank staff and was deemed to be below average; the institutional study, the first draft of which did not meet either the Government's or the Bank's approval and which had to be revised and reissued; and the major study of billings and collections where the results were disappointing and did not match the funds spent and the efforts made, although the poor results were due not only to the poor performance by the consultant but also to inadequate supervision by EDM. For the most part, the consultants displayed good engineering expertise and the exercise of sound judgement.

**10.02** As far as the technical assistance team is concerned, the overall caliber was not always adequate, nor some individuals very effective. There was a failure to work as a cohesive group and the effort lacked leadership. There was an understandable frustration over their efforts to transfer skills and improve institutional performance. In sum, however, a costly technical assistance program did not bring commensurate results.

## **11. Project Documentation and Data**

**11.01** The Legal Documents were adequate and appropriate for achieving project objectives in the key organizational and financial areas and the Appraisal Report provided a useful framework for the review of project implementation. No PCR mission took place and the task of compiling this report two years after project closing was exacerbated by incomplete records in the files and a system of supervision (the production of Forms 590) not designed to be of much assistance to an ex post facto evaluation.

## PART II: PROJECT REVIEW FROM BORROWER'S PERSPECTIVE

### PREFACE

This is the project completion report for the First Energy Project implemented in Mali from 1983 to 1989.

The First Energy Project was financed by the International Development Association, the Caisse Centrale de Coopération Economique, the Fonds d'Aide et de Coopération and the Organization of Petroleum Exporting Countries Fund for International Development, for a total initial cost of \$US 43.36 M, including preliminary project study costs.

The credits, loans and subsidies were granted to the Mali Government and on-lent to Energie du Mali, a parastatal company, the concession holder for electricity and water production and distribution on the territory of the Republic of Mali.

The following agreements were entered into:

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<u>Cofinancers</u>	<u>Agreement No.</u>	<u>Date</u>	<u>Amount</u>
IDA	Credit 1282 MLI	10/14/82	SDR 20,400,000
CCCE	Agreement 58.255.00.050.T	6/2/83	FF 31,000,000
OPEC Fund	Loans 241 P 376 P	6/81 6/85	\$US 3,700,000 \$US 2,750,000
FAC	Agreement 65/C/DLP/83/MLI	6/3/83	Subsidies

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The IDA and CCCE funds were fully disbursed on 6/30/1989. Projects financed by the OPEC Fund were fully completed on 6/30/1989: only the last disbursements on final balances remain to be paid. FAC subsidies cover training and technical assistance which will continue beyond 1989.

Rollover projects are covered by new agreements:

- . CCCE agreement signed on April 4, 1987 for CFAF 150 M
- . IDA advance of August 1988: Second Electrical Project preparation
- . CCCE agreement signed October 15, 1988 for CFAF 1 125 M
- . IDA agreement signed on May 30, 1989 for SDR 24.2 M.
- . ACDI, KFW, BEI financing agreements in 1988, BKO - Ségou HT line.

PROJECT DATA

Government request to IDA for the electricity sector .....	1977
IDA Mission justifying intervention in the water sector .....	June 1978
Project identification mission .....	beginning of 1979
Project preparation advance agreement .....	October 1979
IDA appraisal mission .....	June 1980
Mali Energy Rehabilitation Plan (CCCE - FAC - EDF Mission) .....	October 1980
IDA postappraisal mission .....	April 1981
Signing of Credit and Project Agreements with IDA: Credit 1282 MLI .....	October 14, 1982

**ROLLOVER PROJECTS:**

Signing of Agreement CCCE 58 255 00 072 OG: CFAF 150 M .....	April 4, 1987
Signing of Agreement CCCE 58 225 00 084 OM and 0830B: CFAF 1.125 B .....	October 15, 1988
Signing of Credit and IDA Project Agreements: Credit 1988 MLI (electricity) .....	May 30, 1989
ACDI, KFW, BEI financing agreements for construction of the Bamako - Ségou HT line .....	1988

Borrower: Republic of Mali

Beneficiary and executing agency: Energie du Mali (EDM)

TOTAL ACTUAL DISBURSEMENTS FOR CREDIT 1282 MLI

(in millions of SDRs)

<u>December 31</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>—</u>
<u>Estimated</u>							
annual disbursements	2,1						
total disbursements	2,1	6,6	11,4	16,2	20,4		
percentage per year %	10,3	22,1	23,5	23,5	20,6		
total percentage in %	10,3	32,4	55,9	79,4	100,0		
<u>Actual</u>							
annual disbursements	0,8	2,9	5,2	6,0	2,1	2,2	1,2
total disbursements	0,8	3,7	8,9	14,9	17,0	19,2	20,4
percentage per year in %	3,9	14,2	25,5	29,4	10,0	10,8	5,4
total percentage in %	3,9	18,1	43,6	73,0	83,3	94,1	100,0

**FIRST ENERGY PROJECT**  
**PROJECT COMPLETION REPORT**

**I. INTRODUCTION: EDM'S ENVIRONMENT BEFORE PROJECT START-UP**

1. This report examines the First Energy Project which took place during the period 1983-1989. The beneficiary of this project was Energie du Mali, which also served as the executing agency. EDM's environment before the project start-up is described below.
2. Energie du Mali is a parastatal company, and is the concession holder for electricity and water production and distribution throughout the territory. EDM's capital, which amounted to CFAF 50 M before the project start-up, was 55 percent owned by the Mali Government and 45 percent by outside partners (39 percent by CCCE and 6 percent by EDF).
3. Public electricity distribution was divided among 10 independent electrical systems in 1982.
  - The Bamako - Kati - Koulikoro interconnected system, alone accounting for 90 percent of total production;
  - And nine remote systems (approximately 10 GWH of production in 1982).

In 1979, production was distributed as follows:

- Hydroelectric production: 34.6 GWH (Sotuba to Bamako for 5 installed MW and Félou to Kayes for 0.6 installed MW);
- Thermal production: 66.7 GWH (Dar Salam to Bamako and remote systems).

Peak power at Bamako increased from 7 MW in 1971 to 15.4 MW in 1978. Electricity users numbered 10,800 and 18,500 respectively for these years.

The commissioning of the Sélingué plant in 1981 (44 installed MW) liberalized supply and established the main source of production, allowing a 60 percent increase in production for the Bamako system during the 1981-1984 period. This production was 100 percent hydroelectric in 1982; the Dar Salam thermal plant was used as a backup for the system after the renovation, which was scheduled for 1984 in the project.

Less than 1 percent of Mali's hydroelectric potential is exploited. Firewood is the main source of energy. Petroleum products are imported, and thermal energy production costs are high, primarily because of Mali's landlocked position.

Less than 5 percent of the country's total population has access to electricity, and less than 30 percent has access in urban areas.

4. Public water distribution was divided among 9 independent systems in 1982:
  - The Bamako - Kati system, which accounts for nearly 60 percent of total production;
  - Eight remote systems.

In 1979, total water sales amounted to 8.7 million m<sup>3</sup> for 14,060 customers, including 9,500 in Bamako.

The Master Plan for the Bamako drinking water supply, developed in 1980 by the consulting firm SAFEGE, brought to light the high levels of investments needed in the water sector.

5. In 1979, the main problems EDM faced were essentially due to the 1973 oil shock, and the collection of receivables.

We note that there was no customer management service, and that all of the functional and operational services reported directly to the General Manager.

Likewise, there was no segregation between water and electricity activities within the company.

At the end of 1980, the company had 806 permanent employees, including only 20 managers, which is less than 3 percent of its work force. The college of supervisory technical specialists is also under-represented, with 145 employees, or 18 percent of the company's overall work force.

Where the personnel function is concerned, only current individual management is covered. The basic tools for initiating collective management and planning studies are most often lacking.

Personnel training was recognized as important. The EDM development center was rejuvenated in 1979, and provides training for supervisory and executing employees. However, it does fall short of expectations due to insufficient resources and the extent of the needs. There is also no coverage for the water component.

EDM uses a simplified analytical operating system for accounting. The need has arisen for a new accounting system and the formalization of methods and procedures, to ensure that information is accurate, that it is distributed in a timely manner, and to ensure that the company is managed efficiently.

Furthermore, the precarious cash situation provides little impetus for the development of an operating and investment budget. Expenditures are made on an individual basis, and the different budget centers do not have full authority.

Although wage levels are not the essential motivating factor in employment, they cannot justify employee commitment to the company.

6. In 1979, EDM was under the authority of the Supervisory Ministry for State Enterprises and Corporations, essentially responsible for administrative and management supervision. The Minister acted as Chairman of the Board of Directors. The Ministry of Industrial Development and Tourism (MDIT) was responsible for technical supervision, acting through the National Water and Energy Administration, which indeed essentially handled water supply projects.

The Office pour l'Exploitation des Ressources Hydrauliques du Haut Niger (OERHN) was created with the commissioning of the Sélingué multi-purpose dam. It is under the authority

of the MDIT. In addition to the site's electrical operations, its activities include irrigation, fishing, navigation and tourism.

7. Water and electricity tariffs were raised 30 percent across the board on March 1, 1980 and 11 percent on February 1, 1982.

After these increases, average prices net of taxes were CFAF 43/KWH for electricity and CFAF 47/m<sup>3</sup> for water.

Costs for access to the two forms of energy were still very high in comparison with household revenue (an average of CFAF 100,000 for connection alone).

Water is still relatively inexpensive for major consumers, whereas, for electricity, the MT/BT price ratio for electricity is 0.82.

## II. PROJECT PREPARATION AND APPRAISAL

### 1. Project origin and preparation

11. In 1977, Mali requested financing from IDA for an electricity sector investment program.

In June 1978, an IDA health mission found that investments were also justified in the water sector.

The water and electricity projects were identified in early 1979. Based on the project preparation, the IDA granted an advance of \$US 970,000 in October 1979. CCCE also granted a study credit of FF 0.8 M.

A joint IDA - CCCE - FAC appraisal took place in June 1980. The report on the EDM Rehabilitation Plan was filed in October 1980, and an IDA postappraisal mission was held in April 1981.

All information collected in this manner was reflected in the IDA appraisal report of June 10, 1982.

12. The agreements were signed between October 1982 (IDA) and June 1983 (CCCE and FAC).

The advance granted by IDA made it possible to begin the study for a biomass plant in Mopti. The OPEC Fund loan signed in June 1981 was intended to finance the work on the plant.

13. The program to strengthen, extend and improve EDM was intended to be conducted in two phases:

- Phase one involves the project covered by this report. From 1983 to 1987, the Project covers rehabilitation of EDM operation and management, elimination of bottlenecks, extension of networks and preparation for phase two.
- Phase two consists of execution of the projects identified in phase one, during the period 1984-1987.



2. **Project objectives** (excerpts from the 06/82 IDA appraisal report)

- i) Reinforcement of institutions by easing EDM operation and management constraints.
- iii) Improvement of and increase in the water and electricity supply for the population of Bamako.
- iii) [sic] Extension of the zone supplied by the Sélingué hydroelectric plant to replace thermal energy.
- iv) Electricity supply for rural areas in the Ségou region.
- v) Use of agricultural waste to produce electricity in the Mopti/Sévaré region and thus to economize on diesel fuel imports.

3. **Project description**

The project included the following components:

i) **"Technical assistance" component**

- Secondment of technical assistants to reinforce EDM management: 1 Coordinator and 12 employees distributed among the main positions not including supply and administration;
- Studies and measures to be assigned to specialized firms under short-term contracts:
  - . User survey
  - . Study on strengthening accounting methods
  - . Tool for optimizing electrical production in the Bamako interconnected system
  - . Organization of a preventive maintenance service
  - . Electrical network planning study
  - . Studies on water and electricity tariffs, unification of the electrical sector (EDM and OERHN) in charge of investment planning and finance.

ii) **Civil engineering component**

- Construction of offices for the Bamako operations service
- Extension of the EDM Professional Development Center (CPP)
- Construction of 10 villas to house the technical assistants.

iii) **Electricity component**

- Rehabilitation of the diesel plant, Dar Salam to Bamako
- Installation of communication system between plants and distribution stations of Bamako
- Reinforcement and extension of Bamako distribution network
- Construction of a biomass plant at Mopti - Sévaré.

iv) **Water component**

- Elimination of the main bottlenecks in the Bamako production - distribution system.

v) Equipment and vehicle component

- Supply of vehicles, tools and instruments for EDM operations throughout Mali.

vi) Technical studies component

- Engineering for extension of hydroelectric plant from Sotuba to Bamako
- Engineering for Bamako - Ségou THT line
- Engineering for extension of Bamako water facilities

vii) Project preparation advance refinancing

III. PROJECT COST

1. Project effectiveness and start-up

Below are the only conditions for IDA Credit 1282 MLI effectiveness:

- Hiring of the Coordinator in charge of project management and the technical assistance team.
- Effectiveness of CCCE and FAC funds.

Credit 1282 MLI was effective in March 1983 when the Coordinator arrived.

CCCE and FAC loan and subsidy effectiveness depended essentially on approval from these organizations of the technical assistance project management agreement signed on 2/15/1983.

The Project had already started thanks to advances for some preparatory studies provided by the CCCE and IDA. The amounts disbursed were respectively FF 614,314 at end 1982 for the CCCE and SDR 628,623.81 in June 1983 for the IDA.

2. Project cost

The tables below list the estimated project costs per investor at the time the financing agreements were signed, and the actual costs.

The exchange rate of \$US 1 = CFAF 250 was used to prepare the project financing plan, with CFAF 1 = SDR 0.0034.

The US dollar fluctuated widely during the disbursement period. Below are some individual exchange rates for the US dollar and the SDR for disbursements made during the following months:

	<u>US dollar value</u> <u>in CFAF</u>	<u>CFAF value</u> <u>in SDRs</u>
August 1983	408	0,00234
March 1984	398	0,00236
October 1984	479	0,00211
January 1985	486	0,00211
June 1985	469	0,00213
December 1985	386	0,00238
May 1985	349	0,00243
June 1986	365	0,00234
August 1986	335	0,00248
November 1986	337	0,00249
February 1987	310	0,00261
July 1987	309	0,00258
November 1987	285	0,00261
January 1988	282	0,00259
April 1988	285	0,00256
November 1988	301	0,00246
May 1989	319	0,00242
June 1989	337	0,00239

In this way, the US dollar remained much higher than the initially-estimated rate of CFAF 250 (+ 13 percent using the minimum value from the above table reached in November 1987; + 94 percent using the maximum value reached in January 1985).

On the other hand, the Loan Agreement drawn up in US dollars with the OPEC Fund for the urgent work for the Bamako drinking water supply under phase two (Loan 376 P for \$US 2,750,000) was signed on 6/23/1985 when the US dollar was worth approximately CFAF 400. The initial disbursements began in late 1986 when the US dollar dropped to around CFAF 300. Consequently, the contracts were CFAF 70 M short of completion. Disbursements were suspended at that time, to be resumed in May of 1989 with an exchange rate of approximately 1 US dollar = CFAF 330, which finally made it possible to finance all of the scheduled work.

Annex 1 lists the actual costs of each contract per investor, giving the breakdown of disbursements for IDA made directly and locally.

Below are the collection rates registered for individuals in Bamako (collections for Month M on issues from month M - 1).

<u>1st half - 87</u>	<u>end Sept 87</u>	<u>total 1987</u>	<u>1st qtr 88</u>	<u>total 1988</u>	<u>1st qtr 89</u>
% 75.3	80.0	81.4	92.2	84.9	91.4

Customer credit in numbers of months evolved as follows:

<u>on 12/31</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
Administrative customers	10.0	5.5	6.5	-
Individual customers	5.1	4.2	4.6	-
Total EDM	6.8	4.7	5.4	-

It must nonetheless be pointed out that the reduction in the amount of arrears is due to structural adjustment loans granted plus the fact that some arrears were posted in losses and profits.

### Network yield

With more effective collection and cost control, this component is and will remain a priority action for EDM. Despite the actions that were taken, yields in water and electricity have still respectively stagnated.

The yield problems have been arranged sequentially.

In the outstations, reliable measurements are most often impossible due to the absence of protection. Restoration work must be covered by a special outside financing operation.

The Bamako electricity production yield was analyzed thoroughly in 1987. This evaluation led to the adaptation of reducer caliber and precision categories for more accurate measurements. A theoretical calculation method makes it possible to verify the reliability of energy balance readouts. It was found that production - transportation losses had been overvalued until 1987, which caused the distribution yield to be artificially low.

For Bamako electricity distribution, specific actions were taken for MT customers (business market with 240 customers) and for BT customers (mass market).

**ACTUAL AND ESTIMATED COSTS, CCCE AGREEMENT**  
in thousands of FF

<u>Component</u>	<u>Agreement estimate</u>	<u>Actual cost</u>
Rehabilitation of Dar Salam plant	16,780.0	19,131.5
Villas for the technical assistance team	6,750.0	3,491.9
Technical assistance and training	6,020.0	5,596.1
Miscellaneous and incidental	650.0	2,158.9
Study credit refinancing	800.0	614.3
	_____	_____
<b>Total</b>	<b>31,000.0</b>	<b>30,992.7</b>

<b>Agreement signing date</b>	<b>June 2, 1983</b>
<b>First disbursement request</b>	<b>February 1984</b>
<b>Last disbursement request</b>	<b>June 1989</b>
<b>Fund availability deadline</b>	<b>Extended from 12/31/87 to 6/30/89</b>

**ACTUAL AND ESTIMATED COSTS OF CREDIT 1282 MLI - IDA**

<u>Category</u>	<u>Estimated costs in thousands of SDRs</u>	<u>Actual costs in thousands of SDRs</u>	<u>EDM's participation in projects in millions of CFAF</u>
1. Civil engineering work	1,420	1,656	79
2. Supply and installation			
a. reinforcement, extension of Bamako electric and tele-communications network	5,170	6,218	2
b. Urgent work Bamako water supply	1,530	1,869	-
3. Restoration of Dar Salam plant	420	657	-
4. Expert, consulting and training services	6,430	5,966	3
5. Equipment: tools, vehicles, office equipment	770	1,221	17
6. Technical, tariff, institutional, planning studies and consumer survey	1,820	2,175	-
7. Advance refinancing	830	629	-
8. Incidental	2,010	-	-
	<hr/>	<hr/>	<hr/>
<b>TOTAL in thousands of SDRs (Total in thousands of dollars)</b>	<b>20,400 (24,000)</b>	<b>20,400</b>	<b>101</b>

Signing date for credit 1282 MLI    October 14, 1982  
 First disbursement                    8/12/1983  
 Last disbursement                    6/30/1989  
 Credit closing date            Extended from 12/31/1987 to 12/31/1988

**NB: Estimated costs reflect the amendment letter of 9/28/1984 which changes the amounts allotted to categories 3 and 8.**

### 3. Disbursements

#### IDA

- . The baseline data include the comparison of the projected and actual disbursement profiles.
- . Disbursements were spread out from 1983 to 6/30/1989, as against the projected 1983 to 1987 period.
- . The first disbursements actually began in 1984, with a one-year delay (of the SDR 811.9 thousand disbursed in 1983, SDR 628.6 thousand represents the advance) and essentially involve technical assistance and the use of consultants to prepare the bidding documents.
- . Disbursements accelerated a great deal in 1985 and 1986, reaching 73 percent of the credit at end 1986, in comparison with the projected 79.4 percent. They corresponded to the virtual completion of the work covered by the Project.
- . A considerable deceleration began in 1987, when new actions were undertaken, with the resulting gap in disbursements due to their preparation:
  - Renovation and reinforcement of the Bamako electrical network
  - Customer management action for more effective collection
  - Construction of a water activity building.

#### CCCE

- . The fund availability date was postponed from 12/31/1987 until 6/30/1989, or a delay of 1.5 years.
- . Nonetheless, on 12/31/1987, 94.0 percent of the credit funds were ordered and 97.6 percent were committed.
- . The balance of the credit was absorbed during the period 1988-1989 by isolated activities for training and improvement of the customer management function.

#### OPEC FUND

- . As indicated in paragraph 2 above, OPEC Fund disbursements were suspended around the end of 1986.
- . The following amounts were disbursed at that time:
  - \$US 3.0 M for Loan 241 P (Sévaré Plant: \$US 3.70 M)
  - \$US 0.1 M for Loan 376 P (BKO DWS \$US 2.75 M)
- . Disbursements for the balances of virtually all of the contracts resumed in May 1989 when the Bamako drinking water supply sites were completed, with delays in excess of one year over the contractual periods.
- . In light of the exchange rate for the dollar beginning in May 1989, Loans 241 P and 376 P will generate an effective balance of nearly \$US 250,000, contrary to what was feared in early 1989 when there was insufficient financing. Nonetheless, orders from the Bamako drinking water supply enterprises were reduced in the meantime by nearly CFAF 34 M in comparison with the base contracts.

#### 4. Change in the scope of the project

The essential spirit of the project was followed. Below are the only significant events that changed its scope.

- i) The study for extension of the Sotuba plant was discontinued in 1985 at the end of phase one (feasibility study). Consequently, phase two, pertaining to the execution studies, did not take place. The extension of Sotuba, whose commissioning was scheduled for 1989, was actually abandoned in favor of the Manantali project for the following reasons:

- . The extension of Sotuba (5 to 7 MW) only made it possible to cover Bamako demand increases for 2 to 3 years at the growth rate registered in 1985.
  - . The cost per KWH produced by the extension of Sotuba was found to be excessive: CFAF 31, in comparison with CFAF 14 for Manantali plant output (Cost of Sotuba 2 investment: CFAF 10 to 12 billion).
  - . The Manantali project, with its 200 installed MW and 800 GWH of productible, should be able meet demand until the year 2000. Furthermore, it was scheduled for commissioning by 1992.
- Finally, the investment for the Manantali dam was already undertaken at the time: complete flooding was expected to occur in 1987.

Since that time it was noted that:

- . Use of Dar Salam plant thermal power was increasing as of 1987;
- . Energy demand increased at relatively high rates (8 to 9 percent per year from 1984 to 1988) despite the expected softening;
- . Mali's hydraulicity is average: 60 GWH of productible for Sélingué during the difficult months of the first half of the year, as compared to the projected average hydraulicity of 90 GWH.
- . The Bamako - Manantali connection could not be made until 1995 at the earliest.

Although the investment cost is high, it can be concluded a posteriori that the extension of Sotuba recommended by EDM turned out to be a judicious choice in an uncertain future: hydraulicity, evolution of demand, commissioning date for Manantali. At least several supplementary 6 MW thermal units will be needed at the Dar Salam plant in the nineties, with a corollary of diesel fuel imports, which are costly in terms of foreign exchange for a landlocked country.

- ii) Voluntary actions were undertaken in 1987 to make collections more effective, primarily through the structural reform implemented for the customer management function and its computerization.
- iii) Construction on a building for water activities was started in 1988 to make this sector more autonomous.
- v) [sic] The high value of the US dollar directly influenced the cost of the project, primarily the values of IDA and OPEC Fund credit.



iv) [sic] EDM rejected the biomass solution for electricity production at Mopti for the following reasons:

- . The prototype aspect of the solution at this power level
- . The high investment cost
- . The permanent risk of an insufficient supply of rice husks.

The conventional thermal variation was thus chosen. The balance of 241 P financing which the OPEC Fund granted in 1981 for the Mopti plant led to loan 376 P signed in June 1985 and intended for urgent work under phase two of the Bamako water supply.

v) [sic] Due to cost overruns in the rehabilitation of the Dar Salam plant, the number of villas to be built for the technical assistance team was reduced from 12 to 6 (CCCE Credit).

vi) The technical assistant for electrical production left a position vacant upon departure in February 1986 (CCCE financing), and the water instruction officer left the CPP to operate the Bamako pumping station (FAC financing).

## 5. Execution schedule

The project execution schedule calls for the following specific comments:

- i) Technical assistants were hired between March 1983 and April 1984.
- ii) The construction of villas to accommodate the technical assistants on their arrival was completed in 1987.
- iii) The award and execution of contracts for reinforcing and extending the Bamako electrical network were delayed due to problems in coordinating 7 different service providers.
- iv) The contract for the Mali Electricity Sector Master Plan was signed in February 1985. The final report was not filed until February 1988, or 2 years late, and thus lost a great deal of its importance for the preparation of the Second Electricity Project. Indeed, by end 1985, EDM had engaged in identifying and partially justifying future investment projects.
- v) Studies pertaining to the institutional reform and sector manpower were late in starting, primarily because of differences of opinion between IDA and the beneficiary.
- vi) The user survey operation was a few months late primarily due to problems in assessing the work to be done for this type of operation.
- vii) The construction of a new Computer Service building, covered by a contract signed in January 1985, was not completed until 1988. The main reasons were delays in securing land, and the choice of the type of foundations, which had to be negotiated with the company. The type of foundations also had to be selected based on a soil study that was conducted after the competitive bidding for the construction began.

- vii) [sic] The Phase Two the Bamako drinking water supply sites were completed over one year late, partially because OPEC Fund disbursements were suspended after the contracts were signed. Disbursements resumed in May 1989 after the work was accepted.
- viii) The contract for the construction of a building to house water activity technical services was signed in 1988. The work will be completed after June 30, 1989, the deadline for availability of IDA Credit funds. The work not covered by Credit 1282 MLI disbursement will be refinanced by a new 1998 MLI credit.
- ix) The execution of the telecommunications contract was delayed considerably, partially because of the supplier and partially because of the changes in frequency made during the life of the contract. The equipment will be assembled after 6/20/1989 and will be refinanced under the new 1998 MLI credit.

## 6. Contracting

There is no need for specific comments on contracting.

## V. PROJECT EXECUTION

EDM was the executing agency for the project, which was based primarily on the supply, institutional technical assistance and the use of consultants for short missions.

### 1. Institutional technical assistance

Thirteen Technical Assistants (one Canadian and 12 French citizens, a variety of statuses, 4 different suppliers) were hired between March 1983 and April 1984, in a firm that had only about twenty managers at the time. EDM did not have the capacity then to manage a team of this size. The initial project, which stipulated a supply of 24 consultants, fortunately had been rejected.

Although negotiated with the beneficiary company, the supply of technical assistance was perceived as imposed because it was a condition for Project effectiveness. Furthermore, investors supply financing to a Government and not directly to the company.

The absence of housing for the technical assistance team on their arrival and the lack of professional equipment added to the integration problems inherent in expatriation. A minimum amount of operating resources is required. On the other hand, for the action to be sustained, the expatriates must be able to upgrade the company's own means. Finally, because they are guests, expatriates must be flexible and understanding in approaching a culture different from their own. This takes time. They must above all feel that they are an integral part of the host company, rather than outsiders. It ensues that the role entrusted to expatriates (in the organizational structure, under substitution or as advisers) is not a fundamental problem.

The results expected of EDM and technical assistance were too ambitious, on the one hand, and were expected immediately, on the other hand. The Company's multiple partners also did not facilitate matters. Of course, management charts and performance indicators are necessary, but must be developed using means that are available or that can be reasonably

implemented and developed. Indicators must also be measurable. We now know how difficult it is to measure an organizational change.

An organizational change cannot be ordered, and the methods used to make the change are as important, if not more important, than the intended change itself. The preparatory phase for the change is thus vital: it requires time, establishment of a confident environment that does not give rise to conflicts, support from all persons involved, and the permanent willingness to achieve the goal. In this respect, the structural reform EDM conducted for the customer management function beginning in 1987 is a good example.

The aspects discussed above can explain the problems encountered during project start-up. A negotiated conception of technical assistance, clear objectives for terms of reference covering a specific period, their flexible implementation and a catalyzing role for investors and external partners are all necessary to ensure the success of such an operation.

At the end of the project, the overall result was quite satisfactory: higher-quality water and electricity service in Bamako, improved production throughout the country, implementation of budgets, EDM actions beginning in 1987 to improve collection, management, network yield, the creation of an internal audit division, computer development, etc. The above-mentioned actions must be reinforced.

Privileged relationships have been cultivated progressively since 1984 between EDM and an EDF Center. This resulted in the signing of an exchange agreement between two firms having the same concerns, and at the human level. This type of collaboration can be very beneficial for both parties.

## 2. Improved management

### Budget

A budgetary system was rapidly implemented at the start of the Project with the active participation of all functional and operational services.

**Advantages:** the realization that optimal use must be made of limited resources in terms of capital base, combined purchases of spare parts for thermal units and distribution equipment, progress-oriented actions primarily in outstations that underwent constant and programmed gains in service continuity.

**Limits to the system established:** due to the absence of significant cash resources, operators cannot always be hired, and operating procedures cannot be effectively applied. Moreover, the considerable delay between the decision to make a purchase and the actual purchase makes it difficult to monitor progress efficiently and dynamically without an appropriate information system.

The new accounting system, with its auxiliary applications (implementation undertaken during the project) will partially relieve the above-mentioned constraints.

## **Planning**

Beginning in late 1985, EDM had identified and partially justified all investments included in the Second Electricity Project, although the final report on the Master Plan study was not filed until 1988.

Supply and demand projections for the Bamako interconnected system have been regularly prepared. In 1984, EDM projected a hydroelectric energy deficit in the late eighties. Studies conducted in 1987 and 1988 by EDM indicated that at least one supplementary 6 MW thermal unit would be needed in Dar Salam in 1991 pending the commissioning of a new hydroelectric source. These conclusions were confirmed by "the study of transition thermal power for the Bamako system" conducted by a consultant in 1989.

### **Personnel (recruitment, training, combined nature of activities)**

A hiring freeze was effective until 1987. After that time, considerable efforts were implemented to upgrade employee qualifications and to restore school balances.

On 6/31/1989, the overall work force included 1157 employees, in comparison with 806 permanent employees in 1980 (not including temporary staff). There have been no temporary employees since January 1, 1989.

Management school personnel increased from 20 in 1980 to 61 on 6/30/1989. Their share in the overall number almost tripled during that period. Supervisory school accounted for 577 employees on 6/30/1989, or 50 percent of the overall number. The manpower study conducted in early 1989 indicates the projected flows for the next few years and recommends hiring at the minimum Professional Aptitude Certificate level.

A progressive segregation was applied to water and electricity technical activities beginning in 1986. The water sector was given material resources, although still insufficient, and its management was reinforced considerably (7 managers on 6/30/1989, in comparison with 2 in 1985).

The customer management function is and will remain the company's priority. Created in 1986, the customer management division, a functional and operational organ of General Administration, had 35 employees on 6/30/89, including 5 managers and 17 supervisors. It also oversees the 149 employees distributed among 9 customer service offices in Bamako.

The activities of the CPP, a development and training organ for the company's supervisory and executing employees, were expanded during the period. Performance for 1988 was satisfactory: 339 company employees attended the CPP, representing a volume of 4,000 employee weeks.

Outside training focused initially on managers and was found to be inadequate given the scope of the project. The program was financed by the FAC (counterparts of technical assistants and water sector technical specialists), by IDA (approximately CFAF 150 M, including a considerable share for ESIE tuition) and CCCE (about CFAF 60 M in the thermal production sector).

Training should be a future project priority, on the one hand, to improve qualifications, and, on the other hand, to ensure that the planned organizational changes will be successful. Furthermore, the creation of a Human Resources Administration will make it possible to initiate collective personnel

management and to make optimal use of the tool the CPP constitutes, based on more effective identification of training needs.

### Customer management activity

The decision to perform the Bamako user survey, which was conducted by a consultant, was undoubtedly made prematurely, especially because very few fraudulent connections were found. Indeed, this survey was taken in 1984 - 1985 before the current organization of the customer function was in place. As a result, the company did not have the resources to benefit optimally from this operation.

As the result of EDM's inefficient energy invoice collection operations, especially for individual invoices, the company decided in 1987 to have an outside consultant study the customer management function.

A profound structural reform ensued, based on the following principles:

- Creation of a single organization responsible for all customer management operations. The customer management division of the General Administration plays a functional and operational role with respect to the subdivisions, which are the points of contact for household customers;
- Computerization of customer functions
  - . Collection operations on microcomputers during phase one (operational at the beginning of 1989), on the one hand, to ensure that they are reliable, and, on the other hand, to make adjustments (daily and systematic comparison of cash movements, customer accounts, computers and accounting);
  - . Other functions during phase two requiring a complete revamping of the customer file structure.
- Giving subdivisions, which are close to the customers, more responsibility through the progressive decentralization of activities such as statements, connections, transfers, meter changes and, at the same time, formalization of procedures in favor of short and reliable circuits.

We note that the organizational change was successful and sets a good example in several respects:

- The change was not ordered. It required a minimum of consensus, and time prior to implementation. The dynamics created as the result of the reorganization alone made it possible to obtain high collection rates from individuals.
- The change was backed by considerable investments (microcomputers), as well as material resources necessary to achieve the goals (vehicles, furniture, etc.).
- At each stage of computerization, time had to be allowed for assimilation and reinforcement of learning before proceeding to the subsequent stage.

A "zero point" was reached at the end of 1987 for MT customers based on a detailed analysis of all invoices. The anomaly statement led to an action plan intended to restore the meters to par: calibration, verification of readout coefficients, checking of installed condensers and measurement of reagent, identification of materials needed for meter replacement and standardization. During phase two, the equipment ordered under IDA financing was installed. Procedures were developed to maintain technically-reliable metering operations. A customer management division manager was also assigned the task of overseeing contractual and administrative matters. Internal liaison procedures still must be formalized between the partners involved with MT customers. As the result of these actions, the Bamako network's productivity increased 1.2 points.

For BT customers, a vast operation was undertaken in 1987. This effort requires consistency and time. A vehicle was made available to the metering service for systematic calibration of all BT meters. All meters in existence must normally be verified approximately every 4 years. Nearly 1,500 meters must be replaced annually. The search for fraud also is an ongoing activity, and readout quality has been monitored since 1989. Significant results in network productivity will not be visible for this type of customer for a few years.

Problems in metering water production in Bamako persisted until 1988. Additional meters will be necessary for the accurate monitoring of operating values. Float cocks were rehabilitated in storage areas, improving the service in the neighborhoods involved.

For water distribution in Bamako, an action plan was developed in early 1988, and is in the process of execution: identification of valves, updating of maps, monitoring of consumption by neighborhood. For each user, there is a check for proper connection, registration and billing, and the meter is checked to ensure that it is suitable for the user's needs. As is the case for electricity, these activities require time and resources.

#### Accounting system, internal audit, computers

A technical assistant was hired at the end of 1987 to establish an internal audit division responsible for conducting ongoing checks on the accuracy of information supplied to the General Administration and to third parties.

Priority activities are in the financial and accounting fields: account justification support, development of procedures, primarily concerning cash, consulting and recommendations.

The Division was reinforced in 1988 with two managers, a supervisory employee and a secretary, making it possible to develop a medium-term action plan. Still, not all of the procedures could be implemented and applied at the same time. It will take an estimated 2 to 3 years for the division's financial and accounting audit functions to become fully developed.

The Chief Accountant position, vacant since 1987, was filled in July 1989. This coincides with the new accounting system which was received over one year late because of internal problems with the consultant and inaccurate specifications. Some computer and accounting aspects were reviewed with the consultant during the contract execution period.

The computer work load increased considerably beginning in 1988, although the work force remained unchanged, with the new accounting system, collection software package, installation of microcomputers in the subdivisions, auxiliary accounting applications such as suppliers and fixed asset files, as well as maintenance.

This load will continue to be heavy in 1990 and 1991 with phase two of customer management computerization (customer file consultation in the subdivisions), continuation of activities under way (discharge of supplier application, procedure for fixed asset records) and implementation of new applications (inventory, budget) which, in the long run, will lead to analytical accounting.

Computer guidelines are being developed and will be sent to the investors. These guidelines recommend, in the near future, acquisition of a more powerful computer and reinforcement of the existing microcomputers; they also emphasize the importance of the appropriate training for computer service staff. The structure recommended for this service in the manpower study must be implemented for maintenance on these tools.

### 3. Material components

#### Dar Salam Plant (CCCE and IDA financing)

For the mechanical equipment, additional work was identified following the disassembly of the thermal units. The cost for the rehabilitation alone came to FF 15.4 M, in comparison with the FF 13.6 M projected initially in the contract, or a 14 percent overrun.

Additional supplies not covered by the contract were delivered for the Dar Salam plant: a lot of spare parts, a centrifuge and an oil purifier. The actual final cost of the lot of mechanical equipment was FF 16.7 M, or an overrun of 23 percent over the initial contract.

The purchase of spare parts for the regional thermal units and the transfer of one 1 MW unit from Dar Salam to Kayes for a total cost of FF 1.4 M also constituted additional costs.

Because these overruns substantially changed the projected costs of the CCCE agreement components, it was decided to reduce the number of villas to be built for the technical assistance team to 6.

The control room equipment for the Dar Salam plant was built under IDA financing at a total cost of FF 5.1 M as against initial contract projections, or a 19 percent overrun. An amendment for this purpose was signed for the additional work: outgoing metering 15, transfer of orders from the 30 KV station to the control room, metering on the Kati line and miscellaneous minor work.

The work was monitored for a total of FF 1.1 M as against the non-revised amount of FF 1.0 M.

The total rehabilitation thus amounted to FF 19.1 M, or CFAF 955 M for 18 installed MW.

#### Mopti - Sévaré plant

The deadlines for this work were virtually met, taking into account the incident that occurred while the step-up transformers were being transported by truck.

There was a 2 percent cost overrun for the lot of generating units, due partially to the purchase of additional measuring equipment (actual cost: CFAF 865 M).

Costs for the lot including site development and construction of various buildings were exceeded by 4 percent, which is acceptable for this type of work (actual cost: CFAF 260 M).

Engineering and monitoring costs were overrun by 28 percent because the consulting engineer had to extend his stay on site due to a transformer incident (actual cost: \$US 240,000, equivalent to nearly CFAF 90 M).

In addition to the fuel allocation of CFAF 33 M, the Mopti plant cost a total of CFAF 1.125 M for 2,250 installed KW, plus engineering and monitoring costs. The total US dollar equivalent amounts to \$US 3,662,557.42, yielding a final balance of \$US 37,442.58 for loan 241 P.

Finally, the construction of a new plant at Mopti is the first thermal energy investment made under outside financing in a region in over 25 years.

#### Reinforcement and extension of Bamako electricity distribution (IDA)

The main lesson to be learned from this component is how complex the task of coordination was, because each of the 8 lots of the competitive bidding were awarded to the lowest bidder. Indeed, 7 contracts were signed with different service providers, including 5 supply contracts. For example, there were contingencies in the supply of concrete supports for the installation company from the beginning, resulting in a work stoppage. The provisional acceptance of the work was thus announced in early 1987, although virtually all of the contracts had been signed at the end of 1984. The cost of this component was included in the initial package, i.e., approximately CFAF 970 M in supplies and CFAF 630 M in assembly.

The supply of connection equipment completed the electrification of seven peripheral neighborhoods for just under CFAF 80 M.

The purchase of network equipment for CFAF 430 M made it possible to continue the most urgent renovation work, either with the company's own means, or using outside enterprises.

In this way, contracts were signed in 1987 for the renovation of the Badalabougou 30/14 KV station, about one hundred MT/BT stations and some MT lines. The work performed cost to nearly CFAF 250 M.

In this case, the flexibility of the IDA credit which made it possible to perform this type of urgent operation must be mentioned, because it led to substantially improved service quality and continuity for the capital.

The acquisition of various tools and equipment also helped provide employees with the resources they needed.

#### Bamako water component (IDA - OPEC Fund - CCCE)

- i) The first urgent phase of the Bamako drinking water supply work (DWS) was financed by IDA and concerned:
  - Complete rehabilitation of the drainage station equipment and partial rehabilitation of operating treatment units;
  - Rehabilitation of various recovery stations (Senou, Missira, Camp des Gardes) and equipment of reservoirs.



- Supply and installation of mains (700 mm and DN 400 mm) which gave customers in the Northeast of the city better service by eliminating bottlenecks and improving reservoir operations;

The work was covered by 4 lots (treatment station, recovery stations, network supply, network pipeline installation). The contracts were signed in early 1985, and all of the work was completed in early 1986 at a total cost of approximately CFAF 800 M. Network installation was slightly late in starting due to the delay in the pipeline supply: both installation and supply could have been covered by a single lot.

The above-described work was described as urgent in a report filed in 1981 as a follow-up to the Bamako drinking water supply Master Plan submitted in 1980. Accordingly, it was performed 4 years later, increasing treatment capacity to 54,000 m<sup>3</sup> per day.

- ii) The second urgent phase of the Bamako drinking water supply work was decided on in 1985, following phase one. The purpose of this phase was to increase drinking water production to 72,000 m<sup>3</sup> per day to improve customer service and meet demand until 1990.

The work was covered by 3 lots:

- Lot B1: development of production structures based on OPEC financing.

This lot covered the supply and installation of pumping equipment by reinforcing the capacity for drainage and treatment, MT and BT electrical equipment, arrangement of water station intake manifolds and pump discharge leaders and the supplies needed to rehabilitate the accelerator [sic].

- Lot B2: assistance in rehabilitating the accelerator [sic] using IDA financing, with an EDM team performing the work.
- Lot A: supply and installation of secondary and tertiary pipelines and accessories, as well as the supply of connection equipment under OPEC Fund financing.

The contracts were signed at the end of 1986 when the OPEC fund suspended its disbursements. The company only collected the start-up advance for Lot B1. The work was completed at beginning 1989 with a considerable delay, while OPEC Fund disbursements resumed.

The means the companies implemented were found to be insufficient, primarily for Lot B1, in which pipeline DN 1000 was connected by another firm. The latter service was self-financed by EDM.

The engineering and monitoring mission for this project was financed by IDA and extended until May 1988, when EDM assumed responsibility for the follow-up.

Final payments were as follows on 6/30/89, on a provisional basis:

- Lot A: CFAF 639 M, including CFAF 134 M in connection equipment;
- Lot B1: CFAF 217 M under the contract and CFAF 12 M for additional work;

- Lot B2: CFAF 11 M;
- Connection 0 1000: CFAF 9 M all taxes included, or a total of CFAF 888 M.

The exchange rate for the US dollar when the disbursements were suspended threatened a considerable overrun in the financing package. This exchange rate recovered in May 1989, when the disbursements were resumed, generating a provisional balance for loan 376 P of approximately \$US 210,000. The installed pipeline was shortened from 55.1 km to 45.8 km.

- iii) Still in the spirit of ensuring consistent investments in the water sector and preparing for a future specific project, a feasibility study costing CFAF 64 M began in 1987 for the rehabilitation and extension of the drinking water supply for Bamako and the 5 outstations: Mopti, Tombouctou, Niore, Kati and Sikasso.

Investment needs are great, considering the delays in the water sector: CFAF 4 to 5 billion for Bamako and nearly CFAF 9 billion for the 5 outstations during phase one.

The amount indicated for Bamako was deemed acceptable in light of the needs, and was deemed excessive the provinces. EDM thus reduced the investments in the 5 outstations.

For progress to be made in the studies, geophysical surveying had to be performed, and drilling work had to be done in the outstations to ensure available flows.

An advance was thus requested from IDA in April 1988 for the preparation of the detailed studies and competitive bidding documents for Bamako, as well as for the geophysical surveying work. No response was received for this request. Furthermore, IDA, which initially piloted the preliminary work for a future project, had not scheduled a preappraisal mission on 6/30/1989.

- iv) Other investors expressed interest in participating in financing of a future water project: Danish cooperation (Sikasso), ADB and CCCE.

The CCCE will supply initial financing of CFAF 950 M during the second half of 1989, to cover the following components:

- Work to double the pipeline over the Bamako bridge, an absolute priority for improving service for customers on the right bank, which is a heavily expanding area. The detailed preliminary project and preparation of bidding documents, the files for which were available on 6/30/1989, were financed partially by IDA.
- For Bamako, engineering studies including support for drafting of contracts, investment work as follows:
  - . Increase in treatment capacity: 750 m<sup>3</sup> per hour
  - . Construction of a 3,500 m<sup>3</sup> reservoir on the right bank
  - . Reinforcement of primary and secondary networks
  - . Miscellaneous supplies (connections, radios, etc.).

- For Mopti - Sévaré and Tombouctou, geophysical surveying work, non-equipped exploitation drilling and engineering for the rehabilitation and extension of the DWS of these cities.
- Tariff study.

An expert appraisal conducted in May 1989 by an operator - consultant at the Bamako treatment plant yielded a plant treatment capacity of 3,000 m<sup>3</sup> per hour, i.e., a maximum of 72,000 m<sup>3</sup> per day without a sufficient reserve for day-to-day maintenance operations. It was also found that these rates cannot be increased by using a flocculation additive. Finally, the perspective of 75,000 m<sup>3</sup> per day in 1991 led to the decision to extend treatment capacity immediately. The first CCCE financing was granted on this basis.

### Civil engineering component

For the new office construction, the largest projects were the "operations," "computer" and "water" buildings in Bamako.

The old offices of the electricity operations services were run down and unsuitable for public service. The construction of a new building was begun in 1984 at a cost of CFAF 121 M, or a 9 percent overrun of the initial contract amount due to the partial air conditioning of the offices and the development of the approach.

The computer service was located in the tiny offices of the General Administration. A new building was started on the site in 1986, also intended to house some technical departments cramped into the existing building. The construction cost was CFAF 233 M, or a 55 percent overrun of the initial contract amount (CFAF 150 M).

This overrun is due:

- . 31 percent to the choice of well foundations recommended by the soil study for land prone to flooding (rather than floating foundations as requested in the competitive bidding documents);
- . 15 percent to outside developments (parking lots, septic tank and fence) not stipulated in the contract;
- . 30 percent to work connected with the outside of the building: multi-layer seal and self-washing surface;
- . 23 percent to inside developments: additional plumbing and lighting, computer room, aluminum frame.

This new building has already turned out to be too small due to the reinforced management of General Administration services under the management improvement effort: creation of a project division, an internal audit division, reinforcement of the Studies and Programs, Production and Distribution Services and the Customer Management Division, planned reinforcement of the Administrative and Social Service.

The experience gained during the construction of these buildings has made it possible to pay special attention to the architectural studies for the future water sector building. The degree of detail obtained has allowed a better control of costs during execution.

Nonetheless, an overrun of nearly CFAF 25 M over the initial contract (CFAF 300 M) is projected as of 6/30/89, CFAF 14 M of which is due to the construction of outside rain gutters, and CFAF 11 M of which is due to the redesign of foundations according to the soil study recommendations.

It was consequently found that soil studies should always be performed before the competitive bidding process is initiated for the construction.

The work on the water complex (4 buildings for the headquarters, distribution operating services, a warehouse and a major maintenance shop) will be completed after 6/30/1989 and refinanced under the new 1998 MLI credit.

In addition to the projects listed below, other civil engineering work was financed with IDA credit amounting to nearly CFAF 130 M:

- . Development of CPP, water laboratory for training and CPP fence;
- . Construction of a building for the electricity meter service;
- . Construction of 2 new subdivisions to accommodate customers in Bamako;
- . Development of the Bamako subdivisions with a view towards computerization.

This work has largely contributed to reinforcing the management of these services.

The construction of 6 villas for the technical assistance team was financed by the CCCE for a total cost of CFAF 175 M. The actual work amounted to CFAF 151 M as against the CFAF 142 M projected in the initial contract, or an overrun of 6 percent. The villas were delivered late, in early 1987. Other work amounting to CFAF 13 M was required to facilitate the accommodation of the future occupants: air conditioning, garages and outside developments.

An institutional study was conducted in 1985 on the feasibility of a unified electrical system and the creation of two separate companies for water and electricity.

A manpower study was begun in early 1989, primarily covering training and technical assistance needs for the next 5 years for the entire electrical and water sectors. The final report was filed in June 1989 and was issued to investors for opinions.

#### Technical study components

The contract for the extension of the Sotuba hydroelectric plant (addition of 5 to 7 MW) included the feasibility study during phase one and execution studies during phase two. This contract was interrupted at the end of phase one even though the extension was justified, for the following reasons:

- i) The commissioning of Manantali was scheduled for 1990;
- ii) The extension of Sotuba only covered the increase in demand in Bamako for 2 to 3 years at the rates observed at that time (8 to 9 percent per annum);

- iii) **The price per KWH produced by the extension of Sotuba was not competitive in comparison with Manantali.**

If this increase appeared to be justified in 1985, it was not in 1989 due to the observed facts. Furthermore, despite the high cost of the extension (approximately CFAF 12 billion), we can reasonably doubt the need for an immediate undertaking considering the thermal investment programming for the upcoming years (for the adjusted stock of existing facilities, one 6 MW unit in 1990, 1992, one unit every year beginning in 1994 pending the commissioning of a new hydroelectric source, and under the assumption of a 6 percent increase in demand in Bamako.

The engineering for the Bamako - Ségou THT line started in 1984. A report on the feasibility of the project has been available since 1979. After seeking financing, the competitive bidding for the studies and construction follow-up was launched at end 1987, and those for construction, at the beginning of 1988. The financing agreements with ACDI, KFW and BEI were signed in 1988. The contract for the supply and assembly of the stations was entered into in July 1989. The awarding process was under way for the line assembly contract on 6/30/1989.

EDM is responsible for the execution of the line as the delegated implementing agency. An ad hoc committee was created to analyze the bids, chaired by the General Manager of EDM.

The Director of DNHE and a Government Commissioner are members of the Committee.

#### General studies component

The Bamako user survey, the implementation of a new accounting product and the reinforcement of methods were covered in the chapter on improving management.

The organization of a preventive maintenance system should be continued during the future project, provided that the various services, metering and operation, have sufficient resources.

The implementation of a division in charge of specialized maintenance (150 - 30 - 15 KV protection) will also be necessary. This may be initiated with the coordination study projected for late 1989 - early 1990.

A product was available on microcomputer since the beginning of 1989 to optimize electrical production in the Bamako system, in light of the increasing reliance on thermal production at Dar Salam to meet demand. The cost will be CFAF 37 M including the supply of the microcomputer.

The Final Report on the Mali Electricity Sector Master Plan was filed in 1988, with a significant delay. It took stock of potential hydroelectric sites: Manantali, extension of Felou, Kenie, and pointed out the risks of failure of the Bamako supply beginning in 1990. On the request of the investors at the December 1988 meeting, an additional study on transition thermal power at Bamako was deemed necessary. The conclusions, submitted in June 1989, indicated a high rate of return (45 percent) for the installation of 2 additional 6 MW units at Dar Salam beginning in 1990, under the assumption of a 6 percent growth in demand. The commissioning of additional thermal power in 1990 is justified by the partial shutdown of Sotuba for renovation. The latter only accounts for 5 MW of Bamako's total of 77 installed

MW, which clearly shows how fragile the system is. Moreover, as of the writing of this report (7/24/1989), Sélingué is still at the critical level and only turbines on a supplementary basis (8 MW during peak hours). Under these conditions, the installation of an additional unit at Dar Salam is more than aleatory for 1990.

The tariff study conducted at the start-up of the project led to a tariff increase in November 1985: + 35 percent for electricity and + 200 percent for water to the final consumer. The sale price at Sélingué increased at the same time from CFAF 20 to CFAF 25.2 per KWH essentially to cover debt servicing (arrears and outstanding debts).

This price was expected to decrease subsequently with the increased purchases at Sélingué and the settlement of the debt, and, over time, to become aligned with economic cost prices.

The feasibility study for the renovation of the Felou hydroelectric plant was financed by IDA at end 1985 - beginning 1986. The execution studies and the dam work were financed under a new CCCE agreement signed in April 1987 for CFAF 150 M.

The rehabilitation work on the dam was completed in July 1987 with exemplary speed. The flooding after the openings at Manantali indeed risked compromising the project. Renovation work on Felou and the Paparah thermal plant is in progress under a CCCE agreement signed in October 1988.

The execution studies for the renovation of Sotuba are also in progress under a study fund established by the CCCE under the Ministry of the Plan. The feasibility study was initially financed by IDA in 1987. The renovation work is scheduled to be completed on April 1, 1990 under CCCE financing.

## V. INSTITUTIONAL REFORM

There were differences of opinion between the Government and IDA, not on the principle of segregating water and electricity activities, but on the application schedule.

Energie du Mali wanted a progressive and coherent segregation process in line with resources available and those that could reasonably be expected. During the project execution period (1983 - 1989), the following notable progress can be cited:

- The water section was made into a division within Bamako operations in 1985. Its authority is limited to Bamako distribution.
- The water service was created in 1986: it has operational and functional authority over the entire territory, for both production and distribution.
- Progressive reinforcement of the management and training program from 1985 to 1989.
- Leasing of a building in 1987 to accommodate all water sector employees, and to establish the physical segregation from the Bamako electricity services.
- Construction in 1988 of a functional complex for the water service: headquarters, distribution employee base, major maintenance shop and warehouse.

The technical segregation of activities was thus effective at the end of the project. The segregation was also ensured on the accounting level through a choice of distribution codes.

A study was conducted on the viability of the water sector. In any event, the creation of two separate companies would only be desirable if the following prerequisites were met:

- Continued reinforcement of EDM as recommended by the organizational structure and manpower study;
- Continued reinforcement of the technical water sector;
- Continued improvement of EDM management, decision aids, to have reliable tools, primarily inventory management, fixed assets, customer management and accounting;
- Study of the feasibility of maintaining combined activities.

The Supervisory Ministry of State Enterprises and Corporations, in charge of administrative and management supervision for EDM, was eliminated in June 1988. The organizations involved in the electricity and water sector (EDM, OERHN and DNHE) will now be coordinated solely by the Ministry of Industrial Development and Tourism, which in June 1981 became the Ministry of Industry, Water and Energy.

The EDM company's terms of reference for the construction work on the Bamako -Ségou THT line were signed in October 1987 with the Ministry of Industrial Development and Tourism. EDM is consequently acting as the delegated implementing agency. It is responsible for project follow-up, through a project division created within its own organization for this purpose, and will operate the works once transferred.

OERHN and EDM signed a letter of understanding in August 1988 for the transfer of personnel. The EDM/OERHN management contract for operation of the Sélingué works and multi-purpose facilities was signed in June 1989. EDM is primarily responsible for major maintenance and equipment renewal.

Under this contract, the sale price per KWH will for the time being remain at CFAF 25.2. According to the new measures, the transfer of personnel will be effective on or before January 1, 1990.

A set of modified draft bylaws has been examined since 1989 at the Government level. The main changes under consideration are the election of the General Manager and the reinforcement of the Company's autonomy (a posteriori control). A draft program contract with the Government is also being examined. Draft water and electricity codes were amended to reflect various observations from the partners.

## **VI. OPERATING RESULTS**

The project efforts were devoted essentially to Bamako.

The supply was liberalized with the commissioning of Sélingué in 1980.

Growth rates in demand fluctuated around 20 percent per year in Bamako until 1983. From 1984 to 1988, these rates stayed at an average of 8 or 9 percent per annum, and can be expected to soften because existing customers have progressively reached their specific target consumption levels. Nonetheless, planned connections in progress and extensions for the Second Electricity Project should generate higher rates of increase than the averages observed in the sub-region.

The quality and continuity of electrical service have improved considerably as the result of the renovation work undertaken in Bamako during the course of the project. The restructuring of the MT network and renovation of the BT network planned during the Second Project should further improve performance, primarily by reducing technical losses.

The use of Dar Salam thermal power to help meet Bamako's demand levels has been necessary since 1987, which is earlier than the various partners had planned. This use of Dar Salam, due to a productible of only 60 GWH for the first seven months of the year for Sélingué during dry years, increased in 1988 and 1989 (respectively 14.2 GWH and 21.2 GWH in 1987 and 1988), substantially bidding up the cost per KWH produced for Bamako. EDM's management results were thus absorbed by fuel expenditures.

The quality of water service in Bamako has also increased considerably thanks to the renovation of the production facilities and the elimination of the bottlenecks in the primary network. The urgent work performed during the course of the project increased production capacity to 54,000 m<sup>3</sup> per day, then to 72,000 m<sup>3</sup> per day. Investments in the water sector were delayed considerably. The future project will promote development in sales, with present connection rate being close to 20 percent.

The progress made in management has allowed a substantial and regular increase in thermal production in the outstations. Indeed, sales increased from 9.5 GWH in 1983 to 12.6 GWH in 1987 with no change in the distribution networks. Water sales, on the other hand, stabilized at about 4.5 million m<sup>3</sup> during the course of the project.

## VII. FINANCIAL RESULTS

Revenues grew at a regular rate: CFAF 5.7 billion in 1983 to CFAF 12.3 billion in 1988, all taxes included, nearly 20 percent of which represented the water sector. Tariff increases were implemented in November 1985: + 35 percent for electricity and + 200 percent for water, on the average.

The main expenditure categories are as follows:

- Energy purchases at Sélingué (half of purchases for the fiscal period);
- Fuel purchases, approximately 30 percent of purchases for the fiscal period, up sharply due to the use of thermal power at Dar Salam).

The problems in energy invoice collection also created a difficult cash situation, despite the efforts to reduce costs and the progress that has been made in collecting from individual customers.

On 12/31/1988, receivables provisionally amounted to:

- Administration: CFAF 4.8 billion (12.4 billing months)
- Other CFAF 3.6 billion ( 6.4 billing months)



**This situation reflects structural adjustment loans granted during the project, and the fact that some arrears were posted in profit and loss accounts (1981-82 fiscal periods).**

**For the upcoming years, fuel expenditures will increase, primarily bidding up the cost per KWH produced in Bamako.**

**On the other hand, improvement in the financial situation will depend to a large extent on the following three factors:**

- **The OERHN purchase price of electricity. The increase in the sale price per KWH in November 1985 (from CFAF 20 to CFAF 25.2 per KWH) should allow OERHN to repay the debt according to the regular schedule and to settle its liabilities, which totalled CFAF 7 billion in 1/1/86. Since the relaxation of OERHN's cash constraints, accelerated by the drop in the exchange rate for the dollar on the one hand, and the increase in sales to EDM on the other hand, it should be possible to lower the sale price per KWH.**
- **Performance levels registered on collection from individual customers: progress must be sustained and improved.**
- **Reduction of uncollected administrative receivables through the program contract signed between the Government and EDM.**

**PART III: STATISTICAL INFORMATION**

**1. Related Bank Loans and Credits**

<b><u>Loan/Credit Title</u></b>	<b><u>Purpose</u></b>	<b><u>Year of Approval</u></b>	<b><u>Status</u></b>
Credit 1998-MLI Power II project	To correct deficiencies in the power sector, to finance part of its investment program, to coordinate other donor activity and to develop and implement a household energy strategy.	1989	Ongoing
Credit 1938-MLI Public Enterprise Institutional Development project	To support the public enterprise sector adjustment program of the Government aimed at improving the performance of the sector and reducing its burden on public finances.	1988	Ongoing

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**2. Project Timetable**

<b><u>Item</u></b>	<b><u>Date Planned</u></b>	<b><u>Date Revised</u></b>	<b><u>Date Actual</u></b>
- Identification			01/79
- Preparation	10/79	-	5/80
- Appraisal	06/80		06/80
- Post Appraisal			04/81
- Negotiations	12/81		05/82
- Board Approval	07/82		07/82
- Credit Signature	07/82		10/82
- Credit Effectiveness	09/82		05/83
- Loan Completion	12/87		06/89
- Loan Closing	12/87		12/88

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3. Credit Disbursements

Disbursements  
(\$ million)

Bank Fiscal Year and Quarter	Estimated Cumulative	Actual Cumulative	Actual as % of Estimated
1983			
1	1.0	-	-
2	1.2	-	-
3	1.7	-	-
4	2.5	0.67	26.8
1984			
1	3.8	0.82	21.6
2	5.1	0.86	16.9
3	6.4	2.03	31.7
4	7.8	2.44	31.3
1985			
1	9.2	3.02	32.8
2	10.6	3.85	36.3
3	12.1	4.73	39.1
4	13.5	6.05	44.8
1986			
1	14.9	8.26	55.4
2	16.3	9.06	55.6
3	17.1	11.07	64.7
4	19.1	12.61	66.0
1987			
1	20.5	13.82	67.4
2	21.8	16.14	74.0
3	23.0	16.80	73.0
4	24.0	17.66	73.6
1988			
1	-	18.41	76.7
2	-	18.86	78.6
3	-	20.07	83.6
4	-	20.79	86.6
1989			
1	-	21.55	89.8
2	-	21.77	90.7
3	-	22.44	93.5
4	-	23.36	97.3

4. Project Costs and Financing

A. Project Financing

<u>Source</u>	<u>Planned</u>	<u>Final</u>	<u>Comments</u>
IDA	SDR 20,400,000	SDR 20,393,964	SDR 6,036 cancelled.
FAC	US \$4,800,000	-	A grant to be disbursed as an ongoing subsidy to training and technical assistance activities continuing beyond 1989.
CCCE	US \$6,000,000	US \$6,000,000	
OPEC Fund	US \$6,450,000	US \$6,450,000	Savings when a conventional plant was substituted for the biomass plant were used for water supply.

B. Credit Expenditures by Category (SDR '000)

<u>Category</u>	<u>Description</u>	<u>Planned</u>	<u>Actual</u>
1	Construction of office space in Bamako and expansion of training Center	1,420	1,671
2(a)	Supply and installation of reinforced and extended electrical distribution system in Bamako and extension of communication system.	5,170	6,218
2(b)	Water supply	1,530	1,869
3	Rehabilitation of Dar-Salam power plant	370	657
4	Consultants, experts, fellowships	6,430	5,924
5	Vehicles, equipment, tools	770	1,235
6	Studies	1,820	2,192
7	Refund of PPF advance	830	629
8	Unallocated	2,060	-
<b>Total</b>		<b>20,400</b>	<b>20,394</b>

**5. Status of Covenants**

<u>Covenant</u>	<u>Subject</u>	<u>Compliance</u>	<u>Status</u>
<b><u>Credit Agreement</u></b>			
Section 3.02	The Borrower shall furnish to the Company appropriate values, e.g. book values, for all public assets operated in the water sector by the Company.	12.31.82	Complied with but only in late 1987.
Section 3.03	The Borrower shall take steps to ensure the soundness of the water and power operations of the Company and ensure that:		
	(a) for 1982 and onwards its budgets will allocate sufficient funds for the payment of water and electricity services	1982	Budget allocations remained inadequate.
	(b) Municipalities, State agencies and enterprises have adopted procedures to ensure prompt payment of such bills.	9.30.82	Failed to pay on time
	(c) arrears by such entities will not exceed three months billings.	-	Failed to comply.
Section 3.05	(a) The Borrower shall exchange views with the Association before contracting any investment debt exceeding US\$1 million.		Complied with.
	(b) The Borrower shall furnish its program of capital investment showing sources of funds.	By March 31 each year.	Complied with.
<b><u>Project Agreement</u></b>			
Section 2.08	The Company shall ensure that the tariff studies shall be completed.	12.31.83	Complied with in 1985.
Section 3.01	The Company shall take out and maintain appropriate insurance and furnish a plan to update coverage to meet current real values of insured assets.		Not complied with in full. Updating of fixed asset register not completed until late 1988, and insurance coverage remained too low.

Section 4.01	The Company shall put into operation a complete system of cost accounting designed for separate power and water financial management and maintain the value of assets.	1.1.84	Keeping of separate accounts delayed to late 1988. Fixed asset register completed end 1988.
Section 4.02	The Company shall have all its accounts audited and furnished to the Association within four months after the end of the fiscal year.	Starting FY1983.	Draft audit report for FY85 received January 1988.
Section 4.03	The Company shall complete a proforma revaluation of fixed assets appropriate to be a basis for rates of return calculations following Association approved methods.	12.31.83	Not complied with until fixed asset register completed.
Section 4.04	The Company shall carry out a satisfactory program for improvement of commercial operations and take steps to reduce consumer arrears to not more than three months billings.	1983	Not complied with. Full reorganization of commercial department still in progress.
Section 4.05	The Company shall not incur debt in excess of US\$1 million for any investment in either the water or the power sector and will furnish each year its three year program of capital investment showing proposed sources of funds.		Complied with.
Section 4.06	(a) The Company shall provide itself with funds from internal sources sufficient to finance not less than 10% of capital expenditures for its water and power operations taken separately;		Not complied with in most years due to high level of arrears.
	(b) increase electricity tariffs by 8%;	7.1.82	Complied with. No automatic clause in the tariff schedule but average tariff level probably sufficient.
	(c) automatically adjust tariffs to cover changes in the cost of power purchased and in increases in operating costs due to inflation.		
	(d) increase water tariffs by 10%.	1.1.83	Complied with.

**6. Use of Bank Resources**

**A. Staff Inputs**

Stage of Project Cycle	Staff Weeks	Comments
Through Appraisal	118.4	
Appraisal through		3.5 staff weeks were spent on post-appraisal activities.
Board Approval	43.5	
Board Approval through Effectiveness	19.4	
Supervision	117.6	
<b>TOTAL</b>	<b>289.9</b>	

**B. Supervision Missions**

Date	No of Persons	Staff Days in Field	Specialization	Performance Rating 1/	Types of Problems 2/
12/82	2	7	Fin. Analyst Power Eng.	2	F, M, T.
05/83	1	2	Power Eng.	2	F, M, T.
06/83	1	10	Power Eng.	2	M, T.
11/83	1	16	Power Eng.	2	M, T.
03/84	2	21	Fin. Analyst Power Eng.	2	M, T, P.
06/84	2	9	Fin. Analyst Power Eng.	2	F, M, T,P
11/84	1	-	Training Spec.		

02/85 <sup>4</sup> /	1	7	Sanitary Eng.		
05/85	2	9	Fin. Analyst	2	F, M, P.
06/85 <sup>5</sup> /	1	-	Training Spec.		
11/85 <sup>4</sup> /	1	12	Sanitary Eng.		
11/85	2	9	Fin. Analyst Power Eng.	3	F, M
04/86	4	14	Fin. Analyst Power Engineer Economist Consultant	3	F, M.
10/86 <sup>5</sup> /	3	9	Fin. Analyst Power Eng. Economist		
10/86 <sup>4</sup> /	1	14	Sanitary Eng.		
05/87 <sup>4</sup> /	1	7	Sanitary Eng.		
07/87 <sup>6</sup> /	2		Fin. Analyst Power Eng.		
11/87 <sup>4</sup> /	1	7	Sanitary Eng.		
11/88	2	10	Fin. Analyst Power Eng.	2	F.M.
05/89	2	6	Fin. Analyst Power Eng.	2	F. M.

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1/ 1. Problem free or minor problems.

2. Moderate problems.

3. Major problems.

2/ F. Financial.

M. Managerial.

T. Technical.

P. Political.

3/ Training component only. No Form 590 on file.

4/ Water component only. No Form 590 on file.

5/ No Form 590 on file.

6/ Supervision mission took place but BTO Report missing.

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