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**FOR CONSIDERATION**

**MEMORANDUM**

**TO : THE BOARD OF DIRECTORS**

**FROM : Cheikh I. FALL  
Secretary General**

**SUBJECT : EGYPT : EL ARISH POWER PROJECT**

**PROJECT PERFORMANCE EVALUATION REPORT\***

Please find attached hereto, the above-mentioned document.

**Attch.**

**Cc : The President**

**\* Questions on this document should be referred to:**

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**African Development  
Bank**



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**ARAB REPUBLIC OF EGYPT**

**EL ARISH POWER PROJECT**

**PROJECT PERFORMANCE EVALUATION REPORT**

**(ADB Loan N°: B/EGY/POW/ELC/90/17)**

**OPERATIONS EVALUATION DEPARTMENT**

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## CURRENCY EQUIVALENTS

Currency Unit = Egyptian Pound (LE)=1000 milliems=100piesters

At Appraisal(1989)	At Completion (1999)	At Post-Evaluation (2003)
UA = 3.18LE	UA = 4.54LE	UA = 8.46LE
USD=2.20LE	USD=3.35LE	USD= 5.60LE

## WEIGHTS AND MEASURES

1 metric tonne (t)	=	2,205 lbs.
1 kilogram (kg)	=	2.205 lbs.
1 metre (m)	=	3.281 ft
1 foot (ft)	=	0.305 m
1 kilometre (km)	=	0.621 mile
1 square kilometre (km <sup>2</sup> )	=	0.386square mile
1 hectare (ha) = 0.01 km <sup>2</sup>	=	2.471 acres
1 kilovolt (kV)	=	1,000 volts (V)
1 kilovolt ampere (kVA)	=	1,000 volt amperes (VA)
1 kilowatt (kW)	=	1,000 watts (W)
1 kilowatt hour (kWh)	=	1,000 watt hours (Wh)
1 Gigawatt hour (GWh)	=	1,000,000 kilowatt hours (kWh)

## ABBREVIATIONS

ADB	African Development Bank
ADF	African Development Fund
ARE	Arab Republic of Egypt
CEDC	Canal Electricity Distribution Company
EDEPC	East Delta Electricity Production Company
EEA	Egyptian Electricity Authority
EEHC	Egyptian Electricity Holding Company
EGPC	Egyptian General Petroleum Corporation
EIRR	Economic Internal Rate of Return
FE	Foreign Exchange
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Product
GIS	Gas Insulated Switchyard
LC	Local Cost
LRMC	Long Run Marginal Cost
MEE	Ministry of Electricity and Energy
PIU	Project Implementation Unit
PCR	Project Completion Report
PPER	Project Performance Evaluation Report
UA	Unit of Account
UPS	Unified Power System
UHV	Ultra High Voltage
TSP	Total Suspended Particles

## RATINGS

	<b>Evaluation Criteria</b>	<b>PCR</b>	<b>PPER</b>
1	Relevance of Objectives		Satisfactory
2	Achievements of Objectives 'Efficacy'		Satisfactory
3	Efficiency		Satisfactory
4	Institutional Development Impact	Satisfactory	Satisfactory
5	Sustainability	Satisfactory	Unsatisfactory
6	Aggregate Performance Indicator	Satisfactory	Satisfactory
7	Borrower Performance	Satisfactory	Satisfactory
8	Bank Performance	Satisfactory	Unsatisfactory

## **PREFACE**

1. This Project Performance Evaluation Report (PPER) is on the El Arish Power Project in the Arab Republic of Egypt.
2. The electricity network in Egypt has developed into a complex interconnected system referred to as the Unified Power System (UPS) serving all major load centers in the country. In its effort to meet the electrical requirements of areas not being served through the UPS, the Government has also succeeded to construct many medium and small size gas turbine and diesel generating plants in most of the isolated areas such as El Arish in Northern Sinai.
3. The El Arish Project, the subject of this PPER, was a part of the planned generation development program to phase out isolated diesel plants and extend the UPS networks. In 1982, the El Arish Project was initiated and studies carried in subsequent years to come up with economically feasible power plant that operate with steam turbine generators to supply the Northern Sinai region. An ADB loan of UA53.53 million was granted in 1989 to the Government of Arab Republic of Egypt (ARE) for financing 2X30 MW steam units at El Arish Power Station, to replace the diesel generating plants.
4. The goal of the sector is to make energy available at an economic cost and with high reliability of supply. The main objective of the project was to provide electric energy to Northern Sinai Region including the El Arish town to meet the growing demand of its domestic consumers and socio-economic sectors in particular agriculture, industry and tourism. The main components of the project included the installation of 2X30 MW steam turbine generators complete with control systems and two steam generators (boilers) and auxiliaries; the construction of civil works and transmission networks; and provision of consultancy services for engineering services and supervision.
5. The executing agency was the then Egyptian Electricity Authority, which has since been converted into a wholly government owned holding company named Egyptian Electricity Holding Company (EEHC). The project has been transferred after completion to one of EEHCs newly created eight subsidiary electricity production companies in Egypt, the East Delta Electricity Production Company (EDEPC).
6. The project was implemented fully by 1996, one and a half years behind schedule. There was cost overrun of about 24 percent, which was fully covered by the Government. But there was some unutilized amount on ADB loan, which was later cancelled. A Project Completion Report (PCR) was prepared in 1998/99. The PCR concludes that the project has achieved its primary objective of economically meeting the power demand of the North Sinai area.
7. This Project Performance Evaluation Report (PPER) is prepared in order to complement the findings and lessons drawn in the PCR and review and evaluate all the socio-economic and environmental benefits of the project for the region.
8. This PPER is a result of an intensive desk review of the project files; appraisal and project completion reports and other relevant documents as well as information and data gathered during the field mission.
9. Comments of the Operations Complexes on the Draft Report have been incorporated. No comments have been received from the Government on the Draft sent.

**BASIC PROJECT DATA**

1.	COUNTRY	-	Egypt
2.	PROJECT	-	EL Arish Power Project
3.	LOAN No.	-	B/EGY/POW/ELC/90/17
4.	BORROWER	-	The Government of the Arab Republic of Egypt
5.	BENEFICIARY	-	The then Egyptian Electricity Authority (renamed Egyptian Electricity Holding Company)
6.	EXECUTING AGENCY	-	The then Egyptian Electricity Authority (renamed as Egyptian Electricity Holding Company); Project is transferred to East Delta Electricity Production Company

**A. LOAN**

	<u>Appraisal Estimate</u>	<u>Actual</u>
1.	Request for loan (date)	October 1988
2.	Amount (MUA million)	53.53
3.	Interest rate	7.41%
4.	Commitment charge	1%
5.	Grace period	5 years
6.	Repayment period	20 years
7.	Loan negotiation date	
8.	Loan approval date	18/12/1989
9.	Loan signature date	07/03/1990
10.	Loan effectiveness date	13/03/1991

**B. PROJECT DATA**

	<b>F.E.</b>	<b><u>Appraisal</u></b> <b>(Million UA)</b>			<b><u>PCR</u></b> <b>(Million UA)</b>		
		<b>L.C.</b>	<b>TOTAL</b>	<b>F.E.</b>	<b>L.C.</b>	<b>TOTAL</b>	
1. Total cost	53.53	17.87	71.40	66.57	21.80	88.37	
2. Financing Plan							
ADB	53.53	-	53.53	49.50	-	49.50	
Government	-	17.87	17.87	17.07	21.80	38.87	
3. Deadline for 1 <sup>st</sup> disbursement		1990			31 January 1991		
4. Effective date of 1 <sup>st</sup> disbursement		1990			31 January 1991		
5. Effective date of last disbursement		1994			1998		
6. Commencement of Work		1990			November 1992		
7. Date of completion of work		1 <sup>st</sup> Unit in May 1995 and 2 <sup>nd</sup> Unit in September 1995			1 <sup>st</sup> Unit in October 1996 and 2 <sup>nd</sup> Unit in December 1996		



**C. PERFORMANCE INDICATORS**

1.	Cost over-run (%)	24
2.	Time over-run (month)	30 months
	▪ Slippage on effectiveness	one year
	▪ Slippage of 1 <sup>st</sup> disbursement	one year
	▪ Slippage of last disbursement	4 years
	▪ Number of extension of deadline for last disbursement (number)	
	▪ Slippage on completion date	1 ½ years
3.	Project implementation status	Completed
	▪ Date project started	1991
	▪ Date project completed	1995/96
4.	Implementation Performance and Project Outcome	PCR ratings
	Implementation Performance	Satisfactory
	Bank Performance	Satisfactory
	Project Outcome	Satisfactory

	Appraisal	PCR	PPER
EIRR (%)	9.6	7	11.09
FIRR (%)	12	10	—

<b>D. <u>Missions</u></b>	<b><u>Dates</u></b>	<b><u>No. of Persons</u></b>	<b><u>Man-weeks</u></b>
- Identification/Preparation	Dec. 1987	1	2
- Preparation	March 1989	2	4
- Appraisal	July 1989	2	4
- Supervision	October 1995	2	2
- PCR	October 1998	2	4
- PPER	February 2003	1	2

**E. LOAN DISBURSEMENT (UA million)**

	<b><u>Appraisal</u></b>	<b><u>Actual</u></b>
- Total disbursed	55.53	49.50
- Amount cancelled		6.03
- Unused balance		
- Yearly disbursement		
1990	3.96	
1991	10.78	0.41
1992	18.99	0.40
1993	14.15	5.47
1994	5.65	21.21
1995		15.38
1996		01.11
1997		0.70
1998		4.82
	-----	-----
TOTAL	53.53	49.50

## **EXECUTIVE SUMMARY**

### **1. THE PROJECT**

1.1 In Egypt, the energy sector especially the hydrocarbon sub-sector plays a predominant role in the economy. It is estimated to contribute about 30 percent to the Trade Balance in 2000 with a peak of about 51 percent in 1986. The energy needs coverage ratio of Egypt shows a surplus of 214 percent in 1980, 171.3 percent in 1990 and 137 percent in 2000. Apart from its direct contribution to the GDP, the energy sector also enables other sectors (agriculture, mining and tourism) to generate value addition. Electricity consumption represented 2 percent of GDP in 2000. Electricity production has increased over the years to meet the increasing demand estimated about 6 percent per annum. 80 per cent of the total production is currently from gas turbines and 20 per cent from hydropower. The unified power system of Egypt is connected to some Middle Eastern countries (such as Jordan and Syria) and Libya; and further extensions are planned to facilitate power exchanges and enhance system efficiency.

1.2 The El Arish Project, the subject of this PPER, was a part of the planned generation development program initiated in 1982, and appraised in 1989 having been subjected to several studies.

1.3 The goal of the sector is to make energy available at an economic cost and with high reliability of supply in the country. The main objective of the project was to provide electric energy to the Northern Sinai region including El Arish town to meet the growing demand of the domestic consumers and socio-economic sectors, in particular agriculture, industry and tourism. The main components of the project included the installation of 2X30 MW steam turbine generators complete with control systems and auxiliaries and two steam generators (boilers) and auxiliaries; and the construction of civil works and transmission networks; and provision of consultancy services for engineering services and supervision.

1.4 The PCR reported that the project was implemented as designed. Due to delays, implementation period exceeded the appraisal projection by one and a half years. The time overrun was attributed to delays in fulfilling loan conditions, the late submission of civil engineering design and delivery of materials. At completion, the actual cost of the project was UA 88.37 million, about 24 percent higher than appraisal estimates. The Government covered the full cost overrun of the project. However, there was unutilised amount on ADB loan to the tune of about 6 million, which was later cancelled. The PCR rated the overall performance of the project, the Borrower's and the Bank's performance as satisfactory.

### **2. THE EVALUATION**

2.1 The evaluation exercise was carried out through review of documents at the Bank, interview of project staff and field mission for consultations with GOE and electricity sub-sector officials and experts and for discussions with other stakeholders.

2.2 Evaluation benchmarks such as relevance and quality at entry, efficacy, efficiency, institutional development impact and sustainability have been applied to assess the outcome of the intervention. Retrospective Logical Framework was prepared to complement the one presented in the PCR.

### 3. EVALUATION CONCLUSIONS AND RATINGS

3.1 The project has achieved its primary objective of meeting the electricity needs of the North Sinai region, which used to be supplied by inefficient small diesel generators.

3.2 The overall project outcome was assessed on the basis of rating of individual component indicators such as relevance and achievement of objectives, institutional performance and sustainability. With an average rating of 3.0 out of 4, the project overall outcome is assessed as satisfactory. Technical sustainability of the project is well assured due to availability of qualified personnel and the existence of a well-organized maintenance regime. The project has significant socio-economic benefits for the region. Several factories, tourism villages, work shops have been set up; buildings and roads have been constructed, and the land reclamation program have been implemented due to the availability of adequate and reliable electric power supply. There is no adverse environmental impact from the project since natural gas is used and a well functioning water treatment plant is in place.

3.3 Major reforms have been undertaken in the sector and the service providing companies to enhance efficiency and facilitate private sector participation. While institutional development has been carried out successfully, the issue of tariff and outstanding account receivables remain as major concerns of EEA/EEHC. The last significant increase was made before 1992 when the average rate was closer to the long-run marginal cost supply. But lack of any increase since then has made cost recovery extremely difficult particularly because of the continued devaluation of the Egyptian pound. Situation on receivables improved for a short period of time in 2001/2 when Government settled accumulated bills. However, there is again slippage in the timely payment of bills.

3.4 The sector reforms have helped the utility companies adopt business norms; and in the absence of tariff increases, all efforts are now on cost minimization, efficiency of operations and inventory control. This is commendable but not enough. The financial health of the utilities is at stake unless the issues of tariff and outstanding bills are addressed effectively. The sustainability of the project is, thus, rated as unsatisfactory with an average rating of 2.5.

3.5 The performance of the Government/executing agency as it relates to the physical implementation of the project was satisfactory with an average rating of 3.06. The Government, however, was not committed to fulfill loan conditions. It took over a year even to fulfill conditions for loan effectiveness. Other conditions have not been fulfilled at all. The Government has not yet addressed effectively and in a sustainable manner the issues of tariffs and outstanding account receivables. There is a need to take appropriate measures on these issues in order to improve and sustain the financial viability of the service providing companies.

3.6 The Bank's identification, preparation and appraisal works were satisfactory. However, the Bank's field supervision of the project was inadequate (only one mission during the entire implementation period). The Bank was also detached from the sub-sector reforms and did not follow-up fulfilment of major loan conditions. The Bank's overall performance was, thus, rated unsatisfactory with an average rating of 2.5. The good engineering performance of the executing agency and the supervising consultants had compensated for the Bank's limited monitoring of project implementation.

## 4. LESSONS AND RECOMMENDATIONS

### a) Lessons

#### 4.1 The major lessons learnt are:

- Appropriate reforms could contribute to enhance the efficiency of the sector.
- Effective monitoring could contribute in enforcing fulfilment of major loan conditions.
- Integrated financing and effective implementation of engineering and soft (institutional and capacity building) components could improve the performance of the service providing companies.

### b) Recommendations

#### 4.2 The main recommendations are:

##### **For the Bank**

- The Bank needs to enhance effectively its monitoring activities to ensure implementation of important loan conditions (paras. 3.3; 4.2.9; 4.9);
- The Bank needs to be proactive to take up the issues of tariffs, outstanding receivables of bills, mounting local loans, etc. with the Government before any new interventions in the electricity sub-sector (para. 4.9);
- The Bank needs to concentrate more on enabling environment to make its financial products much more competitive and acceptable for financing projects and programs in the electricity sub-sector of Egypt (para. 4.9);

##### **For the Government**

- The Government needs to take appropriate measures (in areas such as correction of price distortions; revision of tariff structure and levels; clearing outstanding accounts receivables and institutionalising timely payment, converting local debts into equity, etc.) to resolve the issue of financial viability of the service providing companies (paras. 3.1.1; 4.2.7, 4.5.6, 4.5.8);
- In the immediate future, the Government needs to revisit the tariff rates applied for very high voltage consumers, which is currently far below cost of supply (para. 4.3.10);
- There is a need to carry out a comprehensive study to come up with a set of economic parameters and methodology relating to issues of shadow pricing, conversion factors, etc. so that the approach and calculation of Economic Rate of Return of electricity projects in Egypt could be more standardized and precise (para. 4.3.17);
- The issue of adequate water supply for the Northern Sinai Region requires close attention as it deters the socio-economic development of the region. A study needs to be undertaken to determine the least cost solutions of supplying water in the region (para. 4.10.2);
- There is need to install additional generation capacity at El Arish Power Station for economy and efficiency (para.4.10.2).

## 5. FEEDBACK

A follow-up Matrix is presented in Annex 8. The findings of this PPER will be taken into account in the Review of the Bank Group's Experience in financing of Electricity Projects in Egypt.

# 1. THE PROJECT

## 1.1 Country and Sector Economic Context

1.1.1 The Arab Republic of Egypt began a progressive conversion towards economic liberalism in the middle of the 1970s. This has brought some success in terms of macro-economic stabilisation and structural reforms. In particular, with the support of the international financial institutions and a huge programme of cancellation of foreign debt, Egypt made a significant effort to achieve macro-economic stabilisation over the 1990s. The introduction of decisive structural reforms resulted in deregulation, opening many sectors to foreign operators, restructuring public sector companies and encouraging privatisation. However, in recent years, the country has been in a difficult period, as a result of the worsening of the international economic and political environment. In effect, Egypt is currently suffering a slowdown in its rate of growth, a new surge in its budget deficit, pressures on the external accounts and problems in maintaining the stability of the Egyptian pound, which declined by 32 percent within a year in 2001/02 and still declining.

1.1.2 The main constraints to economic development are the low and stagnant domestic savings, the significant and persistent trade deficit in the balance of payments due to stagnation in earnings from traditional exports, and slippages in the implementation of structural reforms as well as financial sector privatisation and trade liberalisation. The challenge posed by this situation is how to find ways of effectively attracting investments into the production of non-traditional exports and generally make the economy more competitive and create jobs. In the long term, the diversification of the Egyptian economy into job-creating areas may require moving to a currency regime that is more compatible with the structure of its trade (gradual shift away from the dollar link towards a link with the Euro).

1.1.3 The Government is cognisant of these constraints and is making efforts to diversify the economic sector and encourage private sector participation. The efforts have been remarkable over the years. Major achievements relate to institutional reforms and strengthen the supervisory authorities for their new role as supervisors of privately owned and managed business environment. In this context, the government has taken steps towards privatisation of major economic sectors including the energy sector and electricity sub-sector.

1.1.4 The energy sector continues to play a major role in the economy. Oil revenue is important to the government, with oil taxes contributing about 3 per cent of the national budget. Petroleum and refined products represent 8 percent of GDP and are an important source of foreign exchange. Crude oil exports provide about 52 percent of foreign exchange receipts from commodity exports. Crude oil production averaged about 630,000 barrel/day in 1998. About 72 percent of oil output was refined domestically. Gas discoveries have encouraged the substitution of gas for oil products in domestic households, industry, and power generation. In 1998, about 80 percent of thermal electricity was generated from natural gas, compared to 20 percent ten years earlier.

1.1.5 Electricity consumption represented 2 percent of the GDP in 2000. Electricity production has also increased over the years in order to meet the increasing demand of consumers, which is estimated to grow at 6 percent per annum. About 80 per cent of the total production is currently heat-generated (gas turbine) and 20 per cent is hydro generated. The national grid called the Unified Power System (UPS) has been connected with those of Libya, Jordan and Syria; and is being connected with Turkey and Iraq. Links are also being considered with other Arab countries, Israel,

the Palestinian Authority and further extension into North Africa. UPS general result is shown in Table 1.

1.1.6 The major issue in the energy sector is the prevailing price distortions both for petroleum products and electricity tariffs. This calls for major Government efforts to correct the price distortions so that they could provide economic signals for resource allocations and use as well as enhance the financial viability of the electricity companies.

**Table 1**  
**Unified Power System General Result**

Items / Year	80/81	90/91	94/95	95/96	96/97	97/98	98/99	99/00	00/01
Peak Load (MW)	3179	7004	8149	8491	9235	9850	10919	11736	12376
Installed Capacity (MW)	4731	11525	12978	13027	13303	13308	13870	14582	15286
Hydro	2445	2715	2715	2805	2805	2810	2745	2745	2745
Thermal	2286	8810	10263	10222	10498	10498	11125	11818	12478
Wind								19	63
Energy Generated	20,75	43,48	51,3	54,5	57,7	62,3	68,3	73,313	77,847
Hydro (TWh)		9,73	11,4	11,6	12	12,2	15,3	14,66	13,7
Thermal (TWh)		33,75	39,9	42,9	45,7	50,1	53	58,63	64,01
Wind (GWh)								23	137
Fuel Consumption Rate (gm/kWh)	344	263	227	223	223,5	224,3	227,8	225,6	223,5
Thermal Efficiency		33,1	38,3	38,9	39,2	39,1	38,5	38,9	39,3
Losses (%)	18,6	15,1	14,2	13,6	13,2	13,1	12,7	14	13,2
Length of Power Lines									
500 kV	1576	1594	1736	1736	1914	2249	2249	2249	2249
400 kV							20	20	20
220 kV	2449	4821	7279	8007	8073	10366	11426	11909	12482
132 kV	20989	2200	2536	2536	2536	2536	2536	2536	2536
Sub Station Capacity (MVA)									
500 kV	1576	5280	6280	6780	7280	8530	9780	10155	10155
220 kV	2211	12430	15810	16230	16815	18020	19125	20810	21265
132 kV	2098	2589	2792	2812	2989	2989	3092	3222	3222

**Source: EEHC and ADB Mission computation**

## 1.2 Project Formulation

1.2.1 The project was originally conceived to be a barge mounted power plant to operate with mazout oil and Maghara coal. Until funding was secured, the power need in the area was eased by the installation of smaller diesel units and gas turbines. The Government launched a study in 1983 to find out the most economical way of supplying power to the region. The study recommended the installation of 2X30 MW units of slow speed diesel engines at El Arish. Later in 1987, the study was revised and it was recommended to construct 2X30 MW steam power plant in El Arish city. This was considered least cost option and superseded the original option of Barge Mounted Power plant since the Barge plant was appropriate where there is acute shortage of land; whereas Northern Sinai was not yet populated. In addition, the expected coal extraction in Maghara did not materialize.

Moreover, from environmental point of view, as the possibility of using natural gas was not distant at the time, the technology was revised to make the power plant burn both mazout and natural gas.

1.2.2 In December 1987, an identification mission of the Bank earmarked the El Arish power project for ADB financing. In October 1988, a revised feasibility study was submitted to the Bank. The project was then included in the Bank's 1989 lending programme. The Bank launched a preparation mission in March 1989 followed by an appraisal mission in July 1989. This project was sufficiently screened through several studies and was processed through the project cycle-identification, preparation and appraisal. It was, therefore, adequately formulated and designed.

### 1.3 Objectives and Scope at Appraisal (Logical Framework)

1.3.1 The Government's long-term goal for the sector is to provide electricity at an economic cost and with high reliability of supply for the entire population of Egypt with the possibility of exporting to neighbouring countries and Europe any surplus power through expanding the interconnection networks. The specific objective of the project was to supply adequate and reliable electricity for the Northern Sinai region including the El Arish city to meet the growing demand of the domestic consumers, tourism and agricultural developments as well as other socio-economic developments in the region. A retrospective logical framework matrix is presented in Annex 1.

1.3.2 The scope of the project comprised the procurement and installation of 2X30MW dual fuel (natural gas/oil) steam units with complete associated auxiliaries. It also involved the construction of civil works, switchyard, and medium and low voltage networks. Consultancy services were also procured for detailed engineering designs and supervision of works.

### 1.4 Financing Arrangements – Bank and Others

The total cost of the project was estimated at UA 71,40 million (comprising of UA53.53 million in foreign currency and UA17.87 million in local currency). An ADB loan of UA53.53 million was extended to the Government of Egypt following Bank's approval on 18 December 1989 to cover the full foreign exchange cost. The Loan Agreement was signed on 07 March 1990 and became effective on 13 March 1991. The Loan was on lent to the then Egyptian Electricity Authority (EEA), which was the beneficiary and executing agency of the project. EEA covered the full local cost of the project in the original financing plan.

## 2. THE EVALUATION

### 2.1 Evaluation Methodology and Approach

2.1.1 This evaluation assesses the performance of the project, the borrower, the executing agency, the Bank and other stakeholders. The evaluation involved document review (Appraisal Report, Project File, Bank's PCR, and other relevant documents available within the Bank) and field mission. This PPER is carried out to complement the findings and lessons drawn in the PCR and highlight the socio-economic and environmental benefits of the project for the region with the view of assessing the project's contribution to poverty reduction in the area served.

2.1.2 The PPER has been prepared based on the evaluation benchmarks such as Relevance, Achievements of Objectives (Efficacy), Efficiency (Effectiveness), Institutional Development Impact and Sustainability as well as performance of the Borrower and the Bank. The project was also assessed using the "with and without project" approach in order to highlight the benefits of the project and draw lessons of experience.

## 2.2 Key Performance Indicators

The logical framework (MPDE) was not yet practised in the Bank at the time of Appraisal. But a retrospective MPDE was included in the PCR, which is updated in this evaluation. The performance indicators included in the appraisal report were mainly financial with respect to the performance of the beneficiary authority (the then EEA) and some financial ratios and assumptions were employed to reflect future performance. A few qualitative socio-environment indicators were also considered in the appraisal report. Loan conditions were stipulated to ensure the financial viability of the project and the authority. The achievement of the performance indicators is assessed as appropriate under Chapter 4- Performance Evaluation and Ratings.

## 3. IMPLEMENTATION PERFORMANCE

### 3.1 Loan Effectiveness, Start Up and Implementation

3.1.1 There was a delay in loan effectiveness due to a lapse of time in fulfilling the condition relating to settlement of the second instalment payment of government's outstanding electricity bills in the sum of LE 50 million. The project start up was set for 1990 with completion in 1994. But implementation started only in November 1992. Due to late submission of civil engineering designs and other procurement delays, the project was completed fully with almost two years delay from the original date. All conditions prerequisite for first disbursements were finally fulfilled. Relating to other conditions, there is no evidence that they have been fulfilled in time; and conditions such as acceleration of the collection of future electricity bills, meeting 26 percent of annual capital investment after servicing long term debts from internally generated funds, and tariff increases have not been fulfilled.

3.1.2 The executing agency has procured goods and services in compliance with Bank rules. The cost over run was a result of market conditions and non-inclusion of cost of insurance. No change of scope was registered on the engineering components.

### 3.2 Adherence to Project Costs, Disbursements and Financial Arrangements

3.2.1 The project was estimated to cost UA71.40 million comprising UA53.53 million in foreign currency and UA17.87 million in local currency. Bidding resulted in an upward revision of cost to UA92.85 million. However, actual project cost was UA88.38 million comprising UA66.58 million in foreign currency and UA21.80 million in local currency.



3.2.2 The ADB loan was to cover all the foreign currency cost of the Turbine Generators and Auxiliaries; the Steam Generators (boiler and auxiliaries); the Civil Works, the Switchyard and Interconnection; and the cost of Consulting Services. The cost overrun was on the Generators due to market price increases well over the appraisal estimates. There was some savings on Civil Works and Consulting Services. Some of the cost overrun in foreign currency and the foreign exchange cost of the Switchyard and Interconnection (components originally earmarked for ADB financing) as well as the cost of insurance (which was not estimated at appraisal) were covered by the Government. Thus, the Government covered foreign exchange cost of some components (including cost overrun) amounting to UA17.08 million. It also covered the full cost overrun in local currency amounting to UA21.79million. The disbursed ADB loan amounted to UA49.50 million registering unutilised balance of UA6.03 million, which was later cancelled. The overall cost overrun was about 24 per cent.

3.2.3 As per the appraisal report, disbursement was to commence in 1990 and run through 1994. However, actual disbursement started only in 1991 and run through 1998, for a total of 8 years as opposed to the estimated 5 years. The delays were registered in start-up, submission of the civil engineering designs and delivery of materials.

### 3.3 Project Management, Reporting, Monitoring and Evaluation Achievements

A Project Implementation Unit (PIU), created under the then executing agency (EEA), was responsible for the implementation of the Project. An engineering consulting firm supervised the work of the various contractors. While the EEA has been overseeing satisfactorily the implementation of the project through the PIU and the consultants reports, it did not submit progress reports or audited annual reports to the Bank; nor did the Bank insisted or followed-up the submission of the required reports. There is no evidence that the Bank had adopted a mechanism for monitoring the project progress and the outcome to oversee the executing agency's performance. Fortunately, the good performance of the executing agency and the supervising consultants has compensated for the limited supervision of the Bank.

## 4. PERFORMANCE EVALUATION AND RATINGS

### 4.1 Relevance of Objectives and Quality at Entry Assessment

4.1.1 The project was formulated within the Government's long-term goal of providing electricity at an economic cost and with high reliability of supply for the entire population of Egypt with the possibility of exporting to neighbouring countries and Europe any surplus power through expanding the interconnection networks. It was envisaged that the socio-economic development of the country would be enhanced through the rapid development of the electricity sub-sector. This was consistent with the country's overall development strategy and the Bank's assistance strategy for the country at the time. It is still relevant as it aims at meeting the basic infrastructure needs for the country and particularly the region, which once lacked adequate and reliable electricity supply.

4.1.2 This project had undergone adequate screening relating to the technological options and the development priorities set at the time. The project has been processed through the project cycle of identification, preparation and appraisal. It was, therefore, adequately formulated and designed making the quality at entry to be rated highly satisfactory.

#### 4.2 Achievements of Objectives and Outputs “Efficacy”

4.2.1 The objectives set out were reasonable and have been realized fully. The project has succeeded to supply adequate and reliable electric power to EL Arish City and the Northern Sinai region. It is currently meeting the growing demand of the domestic consumers, tourism and agricultural developments as well as other socio-economic activities in the region.

4.2.2 The project was not very demanding technological wise since the Executing Agency has a track record of implementing similar projects in the past. The policy of providing continuous training to staff has guaranteed the smooth implementation and operation of the project. Risk factors have been minimal particularly from environmental point of view. In fact, the supply of natural gas has enhanced the environmental benefits of the project.

##### **a) Policy Goals**

4.2.3 The project satisfactorily fits into the policy goals of the country and the sector. It was within the planned generation development programme and government priorities that aim at installing economical sized units as base load use in areas such as Northern Sinai, the development potential of which was to be considerable.

4.2.4 The Government has been engaged in recent years in implementing its privatisation program with the objective of reducing the public sector’s role in economic activities of the various sectors including the power sub-sector. Regarding the power sub-sector, the following steps were taken:

- The Egyptian Electricity Authority (EEA) has been turned into a holding company named Egyptian Electricity Holding Company (EEHC) to enhance its supervisory role;
- The Generation, Transmission and Distribution of electricity have been unbundled to be carried out by 5 Generation Companies, one Transmission Company and 8 Distribution Companies to avoid the potential for an electricity sector monopoly;
- In order to increase the viability of the eight electricity distribution companies, the government has embarked on a program of restructuring of operations and finance. A critical part of the program involved a re-engineering project to enhance cooperation between the service providers based on purchasing agreement contract and conversion of local loans into equity;
- An international firm of accountancy was recruited to carry out valuation process for the eight electricity distribution companies. The valuation exercises were undertaken fully.
- Since 1998/99, the Government has initiated the BOOT scheme and currently three independent power operators for three gas and oil fired steam facilities are in operation;
- The Government continued to enhance the use of renewable energy resources such as wind and solar power generation;

- The Government established the Electric Utility and Consumer Protection Regulatory Agency (EUCPRA) in 2000. The Agency is responsible for regulating, monitoring and controlling all matters related to electricity supply and support lawful competition in the generation, and distribution of electricity. EUCPRA is currently building in house capabilities to undertake its mission effectively. It handles the issuance of licences to power operators and consumer related issues such as contractual and level of services; and develops benchmarks and performance indicators; studies shadow pricing of tariff, etc.

4.2.5 The unbundling of the activities of the former EEA (public utility) through creating a holding company (EEHC) and various affiliated companies (5 Production companies, one transmission company and 8 distribution companies) has facilitated the various companies to be focused and introduce corporate norms in providing services. However, the issues of tariffs and accounts receivables are still to be resolved to make the companies viable.

#### **b) Physical Outputs**

4.2.6 The El Arish Power Plant consisted of 2X30 MW units and is located at 13 kms of the west of El Arish city, North Sinai on the coast of Mediterranean sea. The project's construction started in 1993 and its commercial operation took off in 1995 for the first unit and 1996 for the second unit. The capacity of the implemented units is rated at 2X33.14MW. It is currently operating at a competitive cost to supply North Sinai demand and inject the surplus (since 1998) into the National Grid. At present, the energy generated and transmitted stand at around 370 GWh and 340 GWh respectively at a peak load of 66 MW. Demand wise, 45% of the energy transmitted is for El-Arish City, 43% for the Unified Grid and the remaining 12% for other areas in North Sinai. The plant operates with oil (Mazout) and natural gas, and since 2002 it has being operating with natural gas only, which is environmentally clean and less costly. The plant is running efficiently with a well-programmed maintenance regime.

#### **c) Financial targets**

4.2.7 Some financial targets were set in the Appraisal Report (such as current ratio, debt/equity ratio, rate of return on assets, etc). Tariff increases still require government approval. The government provides no subsidies to the utilities. As a result, companies have taken measures to cut costs as much as possible to maintain at least break-even level of operations. The average tariff rate was reported to have been close to the long run marginal cost by 1992. No significant tariff increases were made after this date. The prevailing price distortions on petroleum products and the unchanged tariff rates since 1992 have negatively impacted on the financial viability of the utility companies. The companies are expected to cover the full cost of operation including servicing of loans for capital investment. The El Arish Power Plant and the Production Company (EDEPC-East Delta) for the region are operating at full cost recovery with very minimum profit margin for the time being.

4.2.8 The Canal Electricity Distribution Company (CEDC) distributes electricity at 22 kV, 11kV and below to customers in the region. This Company serves some 2 million customers in Northern Sinai representing about 12% of the total consumers for Egypt. The number of its customers has

increased by about 150% since 1995/96, the start of operation of El Arish Project. This distribution company is also operating with marginal profit. There is a serious concern that unless tariff rates are increased the financial viability of the companies will be jeopardized. Cash flows are also affected due to mounting outstanding receivables. Conditions relating to tariff and receivables need to be fulfilled in order to ensure the sustainability of the utilities. Bank needs to monitor effectively such undertakings in future interventions in the sector.

#### **d) Institutional Development Objectives**

4.2.9 At appraisal, no institutional development objectives were included and the on-going institutional reforms were not foreseen. The institutional reforms carried out transformed the EEA into a holding company and the generation, transmission and distribution functions were transferred to several affiliated companies. Although currently, the full ownership of the various companies (except the three independent power operators introduced through the BOOT system) is with the holding company/government, the long run aim is to put the shares for sale up to 49%. The institutional reforms and capacity building measures taken over the years and their impact are discussed under section 4.4 (Institutional Development Impact).

#### **e) Social Objectives and Targets**

4.2.10 At appraisal the social benefits were qualitatively analyzed. No quantitative social objectives and targets were set. Before this project, power supply in the region was from isolated diesel generators. The few socio-economic activities were served intermittently (due to operation and maintenance problems) from these generators. Lack of adequate power had curtailed the expansion of socio-economic activities in the region. Moreover, Government's ambitious land reclamation program could not take off due to lack of adequate power supply in the region and the fact that there was no interconnection to the National Grid to get alternative supply when available. Following the implementation of this project, the availability of electricity supply has been assured. As a result, a lot of progress has been made to transport water from the Nile for purpose of irrigation. Plots of land have been and continued to be allocated for purpose of developing small-scale agriculture holdings. This program is being carried out with the view of creating employment opportunities for young graduates and the population in the region. And the El Arish project has impacted positively to the progress made in this regard thus contributing to creation of jobs and reduction of poverty in the region.

4.2.11 The population in El Arish has increased from 190,000 in 1989 to over 400,000 in 2002 that makes up the domestic demand for electricity. In addition industries such as granite and marble quarries; cement, olive oil, and paper factories; wheat-processing mills; fish storage facilities etc. have expanded or new ones have been set up. There are several workshops, garages, and petrol stations in El Arish city. There were few schools, hospitals and colleges, which used to be meeting their electricity needs from diesel generators but now their numbers have increased due to availability of reliable power supply. Several investment projects (hotels, salt making factory, sewage treatment plants, tourism villages, construction of dwellings etc.) have been implemented as a result of this project. The construction of buildings and roads in El Arish is also expanding. All these socio-economic activities have contributed to creation of jobs in the region in general and EL

Arish City in particular. In general, the project has changed the Northern Sinai (mostly desert) into an agriculture (through land reclamation program) and industrial area. Current peak load supply has reached some 66MW for Northern Sinai. More could be supplied by the project had it not been for the limitations of the distribution networks. Currently, about 11MW of demand is not yet satisfied as a result. The Canal Electricity Distribution Company is responsible for the distribution networks in the Northern Sinai and is planning to expand the system to cover the unmet demand. Expansion of the power station in El Arish is also required in order to meet the increasing demand in the region. This is possible since space is available and most of the common services are already in place at the existing power station.

4.2.12 The population of Northern Sinai in general and women in particular have benefited from this project. During implementation of the project, women were engaged in retail activities at construction sites. Tourist villages are expanding because of availability of reliable electricity supply; and these villages retail a lot of handicraft objects made by women. Although these benefits were not foreseen during appraisal, the results on the ground demonstrated the benefits of the project in terms of creation of jobs and economic activities for low-income communities in the region. This has contributed in poverty reduction in the areas served. Electricity tariff in Egypt is at affordable levels for the low-income consumers so much so that it is not uncommon to see electric appliances and satellite dish (for TV channels) even in remote villages. The major beneficiaries of these facilities are women by virtue of their involvement in household activities. The men usually seek employment opportunities in the Gulf region (though declining in recent years) in order to improve their earnings and assist their families at home. Such improved way of life in small towns and rural areas is made possible due to the high rate (over 95 percent) of rural electrification coverage in Egypt; and the Northern Sinai has also benefited following the implementation of El Arish Power Project.

4.2.13 The project is integrated into the National Grid thus enhancing the availability of reliable electric power supply at all times for the region as a whole. The project has also political merits as it has enabled the North Sinai (once occupied by Israel) to be integrated in the unified electricity system of Egypt. The Government's political commitment to develop the whole of North Sinai has been facilitated by the implementation of this project.

#### **f) Environmental Objectives**

4.2.14 The government has renewed its commitment to tackling environmental problems related to development projects. In 1997, an independent ministry, the Ministry of State for Environmental Affairs (MSEA) was created to take over responsibilities widely spread out over a large number of ministries and government bodies. Environmental legislations are promulgated and enforcement is being ensured at various levels.

4.2.15 At appraisal, it was envisaged that the project design was to incorporate recommendations resulting from an environmental impact assessment (EIA) study on aspects concerning the atmospheric emissions and aqueous discharge. The project was envisaged to use fuel oil (mazout) for the first three or four years of its operations and the pollutants of major concern were dust,

sulphur- dioxide and nitrogen oxides. The EIA study was to recommend appropriate mitigating measures against these pollutants in order not to exceed the allowable emission standards.

4.2.16 The EIA study has recommended appropriate mitigating measures for any environmentally negative impacts that may arise during construction and operation of the project. The project is environmentally friendly due to the following facts:

- It is located outside the El Arish Town (12 km west of El Arish Town), thus eliminating the environmental issues relating to traffic, construction dust, etc;
- The atmospheric emissions resulting from using mazout and the aquatic discharges from the cooling water used were scientifically monitored not to exceed the emissions and discharge standards. The chimney height is well over 80 meters and the level of gas emissions were well monitored when mazout was used in the earlier years of operation;
- Natural gas has been used instead of mazout since 1998, which is pollutant free and cost effective;
- Since the power station is located close to the sea, the sea water is used for cooling and discharging back into the sea after appropriate temperature regulation in order not to adversely affect the aquatic life;
- There is well functioning wastewater and sewage treatment plants that effectively meet the discharge requirements into the sea.

**g) Private Sector Development Objectives**

4.2.17 At Appraisal no private sector development objectives were foreseen. The Government of Egypt has gone a long way in creating conducive business environment to enhancing and strengthening the role of the private sector in the economy. This was made possible since 1991, with the assistance of the Breton Woods Institutions and other donors, through implementation of a comprehensive economic-reform program to bring about some macroeconomic stability and structural and institutional reforms. It has restructured the financial sector, privatized several public sector enterprises and undertaken institutional reforms in key economic sectors including the energy sector in general and electricity sub-sector in particular.

4.2.18 As a result, the role of the state in economic sector has steadily declined; and private sector share in GDP has increased from 62 percent in 1992/93 to 73.1 percent in 1999/2000. As stated earlier, the energy sector has also undergone significant reforms preparing in particular the electricity sub-sector to be operated on full commercial lines observing corporate norms with the long-term objective of partial or full privatization. Already, the government has allowed private independent operators through introducing the BOOT system to operate in the electricity sector; and there are currently three international private power operators.

4.2.19 The creation of an enabling business environment through separating the regulatory body from executive functions as well as the removal of subsidies in the electricity sub-sector have made it easier for the various electricity utilities (generation companies, transmission company and distribution companies) to operate on full cost recovery basis. This has further created a sense of competition among the companies to deliver their services more efficiently and cost effectively than

it used to be in the past when only one public service provider was involved. However, the fact that tariffs are still controlled by the government and no clear mechanism for periodic tariff increases even to take account of inflation has been approved yet, the enabling business environment could not be considered to have been realized fully.

### 4.3 Efficiency (Effectiveness)

4.3.1 The El Arish Power Project is under the responsibility of the East Delta Electricity Production Company (EDEPC), which is among the five production companies owned fully by the holding company (the Egyptian Electricity Holding Company - EEHC) that replaced the former Egyptian Electricity Authority (EEA) following the restructuring of the electricity sub-sector. The EDEPC supply the electricity produced through 500, 220 and 66kV lines to the Transmission Company (which is responsible for the National Grid); and through 22kV and 11kV lines to the distribution companies and one of them is the Canal Electricity Distribution Company that serves the Northern Sinai region.

4.3.2 Apart from some cost overrun due to market conditions and delays, the project was completed successfully and has economically replaced the several small diesel generators spread in the region. The El-Arish Power Station was connected to the national grid in 1998 and it has been operating with natural gas since 2002. Each turbine unit is capable of delivering 33.14 MW at 100 percent load when operating on natural gas or mazout. It is cost effective and environmentally friendly. The performance of the El-Arish Power Station since 1995 is presented in Table 2.

**Table 2**  
**Energy Generated and Transmitted from El Arish Power Station (1995-31 January 2003)**

	95/96	96/97	97/98	98/99	99/00	00/01	½	02/Jan.03	Total
Energy Generated (GWh)	24.0724	106.119	154.197	223.226	253.446	359.58	385.3	373	1854.87
Energy Transmitted GWh)	22.0254	97.2235	141.842	199.742	227.38	329.32	355.94	343	1694.45
% increase		340.83	45.31	44.77	59.2	41.88	7.15		
Peak Load (MW)	25	32.6	69	69	65.8	65.5	66	66	66

4.3.3 Energy generated during 2001/02 was 385.3Gwh. Energy consumed in El Arish City was 160.6Gwh at a peak load of 32MW. Energy transmitted to other areas in North Sinai was 41.95Gwh; while energy transmitted to the Unified Power Network was 153.39Gwh and the peak load was 66MW during the same year. In percentage terms 45% was consumed in El Arish City, 12% in other areas in North Sinai and the remaining 43% was fed into the Unified Network.

4.3.4 Energy generation efficiency as measured by fuel used per KWh produced and overall cost of production per KWh has been constantly improving over the years. In particular, there has been a saving in fuel cost since Natural Gas has been used instead of Mazout. The overall production efficiency has been enhanced over the years through cost reduction measures and using Natural Gas. The saving in using Natural Gas is about LE 144,121 per month per unit. Besides, the use of Natural Gas has the added advantage of enhancing longevity of the life of the plant and is pollution free. The overall cost of production has declined from LE 64.15/MWh in 2002 to LE 52.57/MWh as at January 2003. The project is thus very cost effective. However, due to low tariff rates, the financial viability of both the production and distribution companies is not satisfactory as discussed below.

4.3.5 The financial performance of EEA/EEHC has been close to break-even point as reflected in the summarized income statement of EEA/EEHC shown below.

**Table 3**  
**Consolidated EEA/EEHC Income Statement (1000's LE)**

Description	Fiscal Year						
	1996	96/1997	97/1998	98/1999	99/2000	2000/01	2001/02
Operating Revenue	4737662	5060531	4339627	7728456	8228486	8856658	9503469
Operating Expenses	3140779	3387091	3170505	5658036	6067564	665409	7393532
Income from Operations	1596883	1673440	1169122	2070420	2160922	8191249	2109937
Total Interest Expenses	999813	1021392	710554	1423845	1606587	1789572	1922503
Net Operating Income	597070	652048	458568	646575	554335	412577	187434
Net Non Operating Income (Loss)	-457171	-528723	-374106	-204907	-245411	-263711	27020
Net Income	139899	123325	84462	441668	308924	148866	214454

4.3.6 The consolidated net income is quite insignificant to meet one of the loan conditions, which requires EEA/EEHC to cover up to 26 percent of its annual capital investment. The low tariffs and the devaluation of the Egyptian Pound have contributed to the low level of net income after interest. The tariff rates were increased five times between 1987 and 1992. There was also a small increase of 4% in 1993/94. It was reported that long run marginal cost was achieved up to 98% on the average in that year.

4.3.7 Thus, over for almost a decade no tariff increase was made. Moreover, some customers such as very high voltage users (large scale industries) have been paying far below the cost of supply. Medium and High voltage consumers pay the full cost of supply; very high voltage- big industries such as Iron and Steel pay below cost- only 6.8 piesters/kwh while the cost of supply is 9.0 piesters/kwh and they represent 25% of total consumption. So the current cross subsidy is on supply to very high voltage and agriculture (small holders up to 500kV). While the low tariff for agriculture is understandable as it is to encourage fresh graduates and small holders to carry out farming activities, the subsidy to very high voltage consumers could be challenged. The domestic tariffs are set in blocks with progressing tariff rates. There is a lifeline rate for the first 200kwh. The utilities have abandoned the LRMC approach for tariff settings.

4.3.8 Moreover, different tariff rates are used for the private independent power operators under the BOOT system and the public companies, which put the public utilities in unfair competition. Based on the power purchase agreement, the BOOT scheme is operating based on Capacity Charge and Energy



Charge. 70% of the fuel requirement has to be supplied at all times to ensure 70% despatch. If the Transmission Company does not tap the energy, it has to pay the private operator all the same. The tariff paid to the operator was 9piesters/kwh at the start of operation a few years ago. But now it has increased to 14 piesters/kwh due to exchange rate devaluation. Three independent private power generation plants are operating based on BOOT scheme. When the exchange rate was US\$1 to LE3.4, the tariff for the plants in Suez Gulf and Port Sied was 8 piesters/kwh (2.37 UScents/kwh); while that at Sidi Kir was 8.7 piesters/kwh (2.54 UScents/kwh). Now with the exchange rate devaluating to US\$1 for LE5.6 (first quarter of 2003), the payment in Egyptian pounds has increased significantly. It is costing the Transmission Company more than what it pays to public sector providers since the private operator has to be paid in foreign currency. A total of US\$100million/year is required to pay the BOOT operators (US\$40 million for Energy despatched and US\$60 million for Capacity charge). Even the fuel portion of the cost has to be paid in foreign currency despite the fact that this payment has to be reconverted into LE to be paid to the Petroleum Company that sell the fuel. There may be a need to revise the purchasing power agreement in view of the drastic and continued decline of the Egyptian Pound.

4.3.9 On the other hand, for the public production companies such as El Arish Power Plant, the average tariff in 2003 was 7.42 piesters/kwh (1.32UScents/kwh), while cost of production was 7.20 piesters/kwh (1.28UScents/kwh) leaving an operating margin of only 0.22 piesters/kwh (0.04UScents/kwh) before paying interest on loans. For Distribution Companies, the overall current average tariff is about 12.5piesters/kwh (2.23UScents/kwh), which leaves an operating margin of 5.08 piesters/kwh (0.90UScents/kwh) after paying charges of production and transmission companies and other operating costs but before paying interest.

4.3.10 EEHC has undertaken comparative tariff study comparing Egypt's electricity tariff with some Asian, European, Middle Eastern and African countries. In all cases, the electricity tariff in Egypt is the lowest. For example, current average tariff rate in most African Countries ranges from 3.4UScents/kwh to 6.8UScents/kwh. Thus, Egypt's average tariff rate, which is currently 2.23UScents/kwh on the average, is relatively low. There is a need to revisit the tariff structure and levels as a matter of urgency. In particular, there is room to raise the tariff rates for very high voltage consumers since they are charged 6.8 piesters/kwh while the cost of supply is 9.0piesters/kwh and they account for 25 percent of consumption. Regarding the BOOT system, because of the huge foreign exchange payment involved against the devaluation of the Egyptian Pound, there is a hold on any new private generation plants and the Government is approaching multilateral financial institutions such as the Bank for future interventions in the sector.

4.3.11 The financial structure, which has been characterized by poor liquidity position and high debt/equity ratio is reflected in the Balance Sheet summarized below.

Table 4  
**Consolidated EEA/EEHC Balance Sheet (1000's LE)**

Balance Sheet Extract	1996	96/1997	97/1998	98/1999	99/2000	2000/01	2001/02
Total Net Fixed Assets	27055172	28531606	12201409	36061248	37612400	39099002	40852610
Current Assets	7207082	8320738	3138016	17131467	18483500	14052000	18703945
Capital and Reserves	5126455	5337282	5982071	7251677	7569143	7704161	7880357
Long Term Liabilities	17188268	18092092	6572314	21109066	22581534	22594901	21777056
Current Liabilities	11746997	13596713	6092004	24843347	25888648	22576045	29467392
Current Ratio	0,61	0,61	0,52	0,69	0,71	0,62	0,63
Debt/Equity Ratio	3,35	3,39	1,10	2,91	2,98	2,93	2,76

4.3.12 The short-term liquidity position of EEA/EEHC has been by and large unsatisfactory. Ministry of Finance and other governmental offices own a large part of the current liabilities. EEA/EEHC's debt/equity ratio had also been very poor and has been deteriorating since 1998/99. The loan condition requesting GOE to take all necessary measures to improve the long-term liquidity position of EEA/EEHC such that the debt/equity ratio reduces to below 1 by 1992/93 was not fulfilled.

4.3.13 The sources and application of funds of EEA/EEHC summarised in Table 6 depicts poor performance. EEA/EEHC's generated funds have been short of its debt service requirements in 1996/1997, 97/1998 and 2000/2001. EEA/EEHC has continued to depend heavily on borrowings for its capital investment thus failing to meet one of the loan conditions.

4.3.14 The overall financial results of EEA/EEHC were characterised by the rise in Debt/Equity Ratio and outstanding receivables as opposed to the conditions laid down during appraisal. The utilities would not remain financially viable unless the Debt/Liquidity Ratio and the liquidity situation were drastically improved.

Table 5  
**Consolidated EEA/EEHC Sources and Applications of Funds (1000's LE)**

Sources	1996	96/1997	97/1998	98/1999	99/2000	2000/2001
Internal cash Generation	1976792	2066494	1630280	661731	628997	482116
Reserve	50587	80182	52190	91101	-155940	-277327
Overdraft	-115432	-385429	-5777	174216	66168	207220
Borrowings	2120021	2098537	2081185	411521	319507	1001648
Provisions	3807	-728	-9417	5055	40634	11786
Capital			3057219			2160441
Total Sources	4035775	5859056	6805680	1343624	899366	3585884
Applications						
Work in progress	2427550	2390164	3032656	1152543	213294	1359222
Debt Service	2212518	2216104	2080135	467487	520291	573443
Increase in Long Term Debt	-22440	-11602	69324	-30313	-1782	-6401
Investment		450	3058119			12400
Net Change in Working Capital	-581853	-736060	-1434554	-246093	167562	1647220
Total Applications	4035775	3859056	6805680	1343624	899366	3585884

4.3.15 The financial and economic rate of returns are discussed below.

**a) Financial Internal Rate of Return**

4.3.16 The FIRR at appraisal was estimated at 3.2% at bulk supply level and 11.6% at retail level. PCR recalculated a global FIRR at 10%. FIRR is not recalculated in this evaluation because of the inadequate tariff that leaves practically no profit margin.

**b) Economic Internal Rate of Return**

4.3.17 The recalculated EIRR at appraisal and PCR was 9.6% and 7.0% respectively. The recalculated EIRR in this evaluation is 11.09% as shown in Annex 2. The approach used was to apply the cost of not supplying electricity to consumers as determined in the Energy Sector Impact Study carried out by OPEV in December 1997. This is because the utilities have abandoned using the LRMC approach and tariffs have not been increased since 1992. The cost of capital is not known with precision. But as a rule of thumb, even assuming 12%, the EIRR in each case was below the 12% cost of capital. However, a caveat needs to be made in that, the cost of not supplying electricity is not updated to reflect current situation due to lack of adequate data and as such the benefits may have been understated. In addition, it should be noted that due to data limitations, the calculation did not capture all externalities under each calculation (Appraisal, PCR and PPER). There is a need to carry out a comprehensive study to come up with a set of economic parameters and methodology relating to determinations of costs and benefits including shadow pricing, conversion factors, etc. so that the calculation of Economic Rate of Return of electricity projects in Egypt could be more precise and the approach standardized.

**4.4 Institutional Development Impact**

**a) Human and Institutional Development Impact**

4.4.1 Although the project did not have any skills upgrading objectives and benchmarks, the staff attached to the supervising consultant on site participated in all aspects of power station construction contributing to enhance the skill of the Egyptians. But for the overall sector and government owned companies, significant reforms have been carried out and continuous training program are being conducted to enhance the performance of the sector.

4.4.2 EEHC has revised its organization structure following its formation as a holding company (Annex 3). There are 135,000 employees and the female employees represent about 15 percent of the total work force in the holding company and the affiliated companies. Institutional strengthening had been a continuing exercise in EEA/EEHC, and this has been supported through bilateral sources such as CIDA, GTZ, and USAID.

4.4.3 Each Company has its own training requirements and programs, which have been implemented effectively. Unlike at appraisal, when training is mainly engineering oriented, in recent years, the training encompasses all job categories. Thus, training is an on going effort in the power sector in general and the electricity sub-sector in particular, more so now since the companies

have to function with qualified personnel to meet corporate norms. Appropriate incentive and sanction mechanisms are also being introduced. The employees are qualified, motivated and very much performance orientated. A bonus of one month's salary/year is given to well performing staff as an incentive and this has positively contributed to enhancing the performance of the utilities.

4.4.4 The El Arish Power Station has some 270 employees (engineers and chemists=68; technicians=151; unskilled labor=46). The number of female employees is 5, which is usually on the low side at power stations as opposed to Company Headquarters. The EDEPC as a whole has about 7500 staff (the majority being engineers and technicians). The number of female employees represents about 5% of the total work force in the electricity sub-sector.

#### **b) Poverty Lines**

4.4.5 Generally, the government pursued poverty reduction through many channels and the responsibility is shared among Ministries such as Ministry of Insurance and Social Affairs, Ministry of Education and general Authority for Literacy and Adult Education, etc. Access to health and sanitation facilities, pension schemes and other direct subsidies put in place by the government are contributing to mitigate the adverse effects of unemployment, and particularly youth unemployment on social justice and wealth redistribution.

4.4.6 Human Development Index (HDI) of Egypt was improving very slowly; Egypt barely moved from 120<sup>th</sup> rank out of 174 in 1995 to 119<sup>th</sup> in 2000. HDI value for 2000 was estimated at 0.62 showing that 38 percent of Egyptians are living below poverty line. In 1995, about 23 percent Egyptians were living below national poverty line and 52.70 percent were living below international poverty line. For the same period, 31 percent of population were living below 1 USD per day as compared to 45 percent in Africa and 32.2 percent in Developing Countries.

4.4.7 With respect to the El Arish project, although the project was not directly targeted for poverty reduction, the supply of adequate and reliable electric power has contributed in the development of the region and job creation due to the increasing socio-economic activities and the implementation of land reclamation programme for agriculture development.

#### **4.5 Sustainability**

4.5.1 The project is technically sound. There is a satisfactory operation and maintenance regime in place. A combined cycle plant was selected due to high efficiency, less investment costs, quick start and reliability compared to steam or diesel plants. Technical sustainability was reinforced since the station was burning natural gas. Raw materials, particularly fuel oil and natural gas are in large supply in the country. Energy coverage ratio for Egypt continues to show surplus. EEA/EEHC has more than forty-year cumulative experience in operating thermal power stations. Sustainability of El Arish Power project relies also on the condition of Unified Power System and the North Sinai distribution network. To date, UPS did not register any serious breakdown or shortfall and the local distribution power company is performing satisfactorily.

4.5.2 The government is committed to the development of the sector. Legal and regulatory framework of the sector is improving and state monopoly is now limited to power transport activity. The power generation are now open to private investors through BOOT (although new BOOT schemes are not entertained for the time being). The government owned production and distribution companies have been given autonomy to function based on commercial lines and with the view to involve private investors in the long run. The biggest challenge to the government is now to correct the distortions on the prices of inputs and electricity tariffs to provide appropriate economic signal for the supply of and demand for electricity as well as for improving the financial viability of the utilities.

4.5.3 Up until the government approves the mechanism for price adjustments, all possible measures are been carried out to reduce cost of the services including postponing new investments. For example, most of the capital investments in new generations were made to cover peak demand. Time of day tariff is now been applied in selected consumers through double circuits for use during peak and off peak period. A committee is set up to study energy conservation in lighting in Government buildings in order to decrease wasteful consumption-such as type of building, distance of poles, height of poles, etc. Ministry of Finance is actively involved in this since it is the one that picks up the budget for electricity consumption of the public sector. There is also a lot of improvement in maintenance to reduce the reserve margin. The interconnection with Middle East and Europe will also help to reduce the reserve margin. But this requires building confidence among the stakeholders. Egypt has been chosen to set up a dispatch centre for the interconnection between the Arab countries. Agreement has been reached with Jordan to change its power system to use natural gas instead of fuel. Meanwhile, Egypt is to supply 300MW until the conversion of four units to use natural gas is completed. A pipeline is under construction to deliver natural gas when the units are ready. This will bring foreign currency earnings to Egypt in addition to enhancing the efficiency of the network.

4.5.4 A committee has been set up to see to it that unwarranted holding of inventory is avoided and for streamlining purchasing mechanism by the generation and distribution companies. More than LE2 billion was saved in this exercise. The reengineering project financed by USAID, using Alexandria and West Delta Companies as pilot projects, has helped to streamline the operational, maintenance and financial functions of the companies with the aim of enhancing efficiency and cost reduction.

4.5.5 Government has also settled all outstanding bills over the last two years to the tune of LE7.32 billion on instalment bases. But bills are again accumulating since then. Timely payment needs to be institutionalised to avoid a rebuild up of arrears so as to improve and sustain the financial health of the service providers.

4.5.6 The project is environmentally friendly and this has been enhanced since 1998 due to the use of natural gas instead of mazout. There is well functioning wastewater and sewage treatment plants that effectively meet the discharge requirements into the sea. It is expected that these positive achievements would be maintained to ensure the environmental sustainability of the project.

4.5.7 In general, while tremendous efforts have been made in implementing institutional development and cost cutting measures, as well as maximizing the benefits of interconnection, the issues of energy pricing, tariffs, and outstanding bills have yet to be dealt with. Unless these issues are addressed as a matter of urgency, the utilities will have serious financial problems.

#### 4.6 Economic Integration and Regional Co-operation

4.6.1 The project aim to serve the Northern Sinai region with possible integration into the National Grid. This has been achieved. In more general terms, Egypt has good relations with its neighbours particularly Sudan and Libya and with the Nile Basin countries. It had successfully reached trade agreements with Jordan and Lebanon. It is active in economic integration and regional co-operation particularly in the Electricity Sub-sector. Works on the interconnection of the power grid to link Egypt to Jordan were commissioned in July 1999; Egypt is now linked with Syria and Turkey; through that link, Egypt is interconnected to the European electricity network. The feasibility study of a Direct Current Very High Voltage transmission line linking Egypt to Inga Dam facilities in Democratic Republic of Congo (RDC) is completed. The study was financed by ADB. Once implemented, DRC-Egypt interconnection line would become the backbone of a trans-African power interconnection network. However, there is no indication that this project would be realised in the foreseeable future.

4.6.2 The Bank is actively engaged with the World Bank and the countries concerned in tackling issues relating to trans-boundary water resources management and the Nile Basin initiative is one of them. The purpose is to enhance the economical use and advantages for all the countries concerned including Egypt. This may effectively resolve the water shortage problems in North Sinai region.

#### 4.7 Detailed and Aggregate Performance Ratings

The detailed and aggregate performance ratings are given in Annex 4. The aggregate performance rating of the project was satisfactory (rated 3.0). Relevance of objectives and quality at entry, achievement of objectives (Efficacy), Efficiency and Institutional Development Impact are each rated satisfactory. The project was adequately designed and well prepared. However, the sustainability of the project (which is rated unsatisfactory - 2.87) is at stake mainly as a result of low tariffs particularly for very high voltage consumers, which account for 25 percent of consumption. There is a need to review the tariff structure and levels to give appropriate signal for consumers in order to avoid wastages and curtail premature capital investments in the sector.

#### 4.8 Performance of the Borrower/Executing Agency Ratings

The Borrower's overall performance given in Annex 5 was satisfactory and rated 3.06. The Borrower has successfully designed, implemented and operated the project despite some implementation delays with little monitoring input from the Bank. The Borrower has successfully undertaken institutional reforms through bilateral sources. The Borrower, however, failed to meet the conditions of the loan with respect to financial aspects. The Borrower needs to revisit its tariff structure and levels (particularly the rates applied on very high voltage consumers), ensure timely payment of electricity bills and address the issue of mounting local debts.

#### 4.9 Bank Performance Ratings

4.9.1 The Bank's identification, preparation and appraisal works were satisfactory and rated 3. The Bank carried out only one supervision mission throughout the implementation period for this project. The Bank did not enforce fulfilment of major conditions such as tariff increases and settlement of outstanding receivables. The Bank did not engage itself in the sector reforms or in any serious dialogue with the government to improve the financial viability of the utilities. In view of all these, the overall performance of the Bank was unsatisfactory and rated 2.7 (Annex 6).

4.9.2 The Bank's financial products and enabling environment are not very competitive compared to other sources. There is therefore a need to make the financing much more competitive and concentrate more on enabling environment to make Bank's resources more attractive. The Bank needs to continue to effectively dialogue with the Government of Egypt on issues of pricing, tariff and outstanding receivables and local debts, which have all adversely impacting on the viability of the electricity utilities.

#### 4.10 Major Factors affecting Implementation Performance and Outcome

4.10.1 The project suffered from market prices of equipment and delays in performance of the civil works contractor. The benefits of the project were undermined by the permanent gap between the cost of supply and tariffs since the issues on tariffs are not yet resolved. (Annex 7)

4.10.2 The El Arish Power Station, the EDEPC as well as the CEDC are managed satisfactorily. But a few of the issues and concerns that would negatively impact on sustainability of the utilities and development of the region are:

- For El Arish Power Plant, the cost of production (operation and maintenance costs including servicing of loans) is currently 7.20 piesters/kWh, while the tariff rate for selling it to the Distribution Company is 7.42 piesters/kWh giving only a profit margin of 0.22 piesters/kWh. The tariff rate at distribution level is 12 to 13 piesters/kWh giving a margin of 5 to 8 piesters/kWh after cost of distributions are deducted. Against static tariff, cost recovery has been achieved up to now through increased plant operating efficiency and implementation of cost savings mechanisms. The issue of tariff is very critical for the sustainability of the project.
- Demand is increasing in the region, and there is already unmet demand of about 11MW. There is a plan to build additional sub-station east of El Arish to cover the unmet demand. But if the land reclamation program is fully implemented, it may be a least cost solution to expand the generation capacity at the El Arish Power Station (where the site is adequate and all the common services are already in place) to meet the additional load in the region and improve the overall efficiency of the power station.
- The North Sinai is facing with shortage of potable water supply. It is not uncommon to see water tanks on buildings and residential houses to stock water to meet periodic shortages. It

is ironical to see in some small houses along the highway to El Arish city a water tanker and a satellite dish. This indicates that while electricity needs are adequately met that of water supply is still a problem. This could delay the development of the region. The option of desalination technology to meet the North Sinai potable water supply may have to be considered seriously in order to sustain the long-term development of the region.

## 5. **CONCLUSION, LESSONS AND RECOMMENDATIONS**

### 5.1 Conclusion

The Government has undertaken significant sector reforms over the years, which is commendable. The El Arish Power Project has been completed successfully in spite of some delays and cost overrun. The project has not only socio-economic significance but also political merits as it has enabled the North Sinai to be integrated in the unified electricity system of Egypt. The Government's political commitment to develop the whole of North Sinai has been facilitated by the implementation of this project and further commitment to resolve issues such as tariff and outstanding receivables are expected to enhance the performance of the project. The supply of adequate water for the region will contribute to the development of the region thereby optimizing the overall economic benefits of the project.

### 5.2 Lessons and Recommendations

#### a) Lessons

The major lessons learnt are:

- Appropriate reforms could contribute to enhance the efficiency of the sector.
- Effective monitoring could contribute in enforcing fulfilment of major loan conditions.
- Integrated financing and effective implementation of engineering and soft (institutional and capacity building) components could improve the performance of the service providing companies.

#### b) Recommendations

The main recommendations are:

##### **For the Bank**

- The Bank needs to enhance effectively its monitoring activities to ensure implementation of important loan conditions (paras. 3.3; 4.2.9; 4.9);
- The Bank needs to be proactive to take up the issues of tariffs, outstanding receivables of bills, mounting local loans, etc. with the Government before any new interventions in the electricity sub-sector (para. 4.9);
- The Bank needs to concentrate more on enabling environment to make its financial products much more competitive and acceptable for financing projects and programs in the electricity sub-sector of Egypt (para. 4.9);

##### **For the Government**



- The Government needs to take appropriate measures (in areas such as correction of price distortions; revision of tariff structure and levels; clearing outstanding accounts receivables and institutionalising timely payment, converting local debts into equity, etc.) to resolve the issue of financial viability of the service providing companies (paras. 3.1.1; 4.2.7, 4.5.6, 4.5.8);
- In the immediate future, the Government needs to revisit the tariff rates applied for very high voltage consumers, which is currently far below cost of supply (para. 4.3.10);
- There is a need to carry out a comprehensive study to come up with a set of economic parameters and methodology relating to issues of shadow pricing, conversion factors, etc. so that the approach and calculation of Economic Rate of Return of electricity projects in Egypt could be more standardized and precise (para. 4.3.17);
- The issue of adequate water supply for the Northern Sinai Region requires close attention as it deters the socio-economic development of the region. A study needs to be undertaken to determine the least cost solutions of supplying water in the region (para. 4.10.2);
- There is need to install additional generation capacity at El Arish Power Station for economy and efficiency (para. 4.10.2).

### 5.3 Follow-up/Feedback

The recommendations and follow up action are presented in Annex 8. The findings in this PPER will be taken into account as inputs for the ongoing Review of the Bank Group's Experience in financing of electricity projects in Egypt.

**EL ARISH POWER PROJECT**

**RETROSPECTIVE LOGICAL FRAMEWORK**

COUNTRY : Arab Republic of Egypt  
 PROJECT : El Arish Power Project  
 DATE OF PPER : February 2004  
 EVALUATION TEAM : G. YIRGA-HALL and A. SEMANOU (Consultant)

<b>NARRATIVE SUMMARY</b>	<b>OBJECTIVELY VERIFIABLE INDICATORS</b>	<b>MEANS OF VERIFICATION</b>	<b>CRITICAL ASSUMPTIONS</b>
<p style="text-align: center;"><b><u>GOALS</u></b></p> <p>1.1 To promote the overall socio-economic growth and improve the living standard of the population through the provision of one of the basic infrastructure – i.e electricity.</p>	<p>1.1a Service level by population served;            1.1b Quality of service as determined by adequacy and reliability            1.1c Statistics on number of customers connected, voltage level, power supply outages in the area served</p>	<p>National economic review reports on contribution of electricity to GDP, Company reports on level and quality of services</p>	
<p style="text-align: center;"><b><u>OBJECTIVES</u></b></p> <p>2.1 To alleviate the shortage of electricity supply in Northern Sanai in general and El Arish City in particular for domestic, social and economic uses by augmenting the generation capacity in El Arish</p> <p>2.2 To strengthen the interconnection system.</p> <p>2.3 To establish and achieve best environmental standards &amp; practices.</p>	<p><b>At Appraisal</b></p> <p>2.1a Power generation capacity to increase by 60MW;            2.1b Peak demand to increase to 66MW by year 2001/2002</p> <p>2.2 Transmission line – 210 km of 22kV transmission line</p> <p>2.3 EIA in the design</p>	<p>The company’s operational and commercial statistics.</p> <p>Supervision Reports; Project Completion Report</p> <p>Supervision Reports;            Project Completion Report.</p> <p style="text-align: center;">-do-</p>	<p><b>At Appraisal</b></p> <p>Government’s political will and commitment to the provision of basic infrastructure</p> <p>Government’s political will and commitment to granting autonomy to the power utilities</p> <p>National macro economic environment for agricultural and industrial investment remains favourable</p> <p>Timely availability of investment budget; meeting any cost overrun.</p>

			<p><b>At Project Completion and Post-Evaluation</b></p> <p>enabling environment for the sector players has been created and utilities are encouraged to operate on commercial lines; private participation has been encouraged</p> <p>adequate institutional reforms and capacity building measures carried out</p>
<p align="center"><b>OUTPUTS</b></p> <p>3.1a Consultancy services provided 3.1b A 2x30MW dual fuel steam units installed and made operational. 3.1c A 22kV transmission line constructed and made operational 3.1d Civil works carried out, switchyard and all auxiliaries provided</p>	<p><b>At Appraisal</b></p> <p>3.1 launching of bids, Bank approval of procurement process, Contracts awarding; disbursement request processing.</p> <p>3.2 Materials &amp; facilities acceptance reports.</p> <p>3.3 Purchase Invoice and acceptance reports</p> <p><b>At Project Completion and Post-Evaluation</b></p> <p>Carried out as planned but with some delays and cost overrun</p> <p>Bank supervision missions inadequate</p>	<p>Contract documents, Progress reports, acceptance reports, and completion reports.</p> <p>Bank Supervision mission reports.</p> <p>Operation and financial accounting manuals, asset registers.</p> <p>Progress reports, supervision missions reports, completion report.</p> <p>Contract documents</p>	<p>Timely selection of consultants and contractors.</p> <p>Consultants and contractors selected have adequate expertise, capacity and financial resources.</p> <p>Effective monitoring, quality control and supervision by consultants and Bank.</p> <p>The Government and the Bank release funds on timely basis</p> <p><b>At Project Completion and Post-Evaluation</b></p> <p>Major sector reforms undertaken. More autonomy provided for the service providers</p> <p>Service providers became more effective and efficient in their performance</p>

<u>Activities/ Inputs</u>	Financial Plan (in UA Million)					
4.1a Fulfilment of conditions of effectiveness 4.1b Establishment of PIU. 4.1c Procurement of consultancy services. 4.1d Preparation of bid documents. 4.1e Invitation of tenders. 4.1f Evaluation of bids. 4.1g Selection of contractor. 4.1h Mobilisation.	<b>At Appraisal</b>				Periodic progress reports. Disbursement Reports. Supervision and monitoring reports of the executing agency/ consultants and the Bank.	<b>At Appraisal</b>
		Forex	Local	Total		Conditions of effectiveness of loan are fulfilled in time.
	ADB	53.53		53.53	All procurement actions are on schedule.	
	Gov't		17.87	17.87		
	Total	53.53	17.87	71.40	Timely recruitment of competent consultants and contractors.	
	50.67					
4.2a Construction of	<b>At Project Completion and Post-Evaluation</b>					
<ul style="list-style-type: none"> <li>➤ Civil works and Switchyard</li> <li>➤ Installation of 2x30MW dual fuel steam units with auxillaries</li> <li>➤ Interconnection system (22kV lines</li> <li>➤ Design and Engineering Services</li> </ul>		Forex	Local	Total		<b>At Project Completion and Post-Evaluation</b>
	ADB	49.50		49.50*		-1 ½ year time overrun
	Gov't	17.07	21.80	38.87		-24% overall cost overrun
	Total	66.57	21.80	88.37		-some saving on ADB loan
	* The saving on ADB loan was later cancelled					- delay or non fulfilment of loan conditions

**EGYPT**  
**El Arish Power Project**  
**Economic Internal Rate of Return Re-estimate**

Notes and assumptions used for EIRR calculation

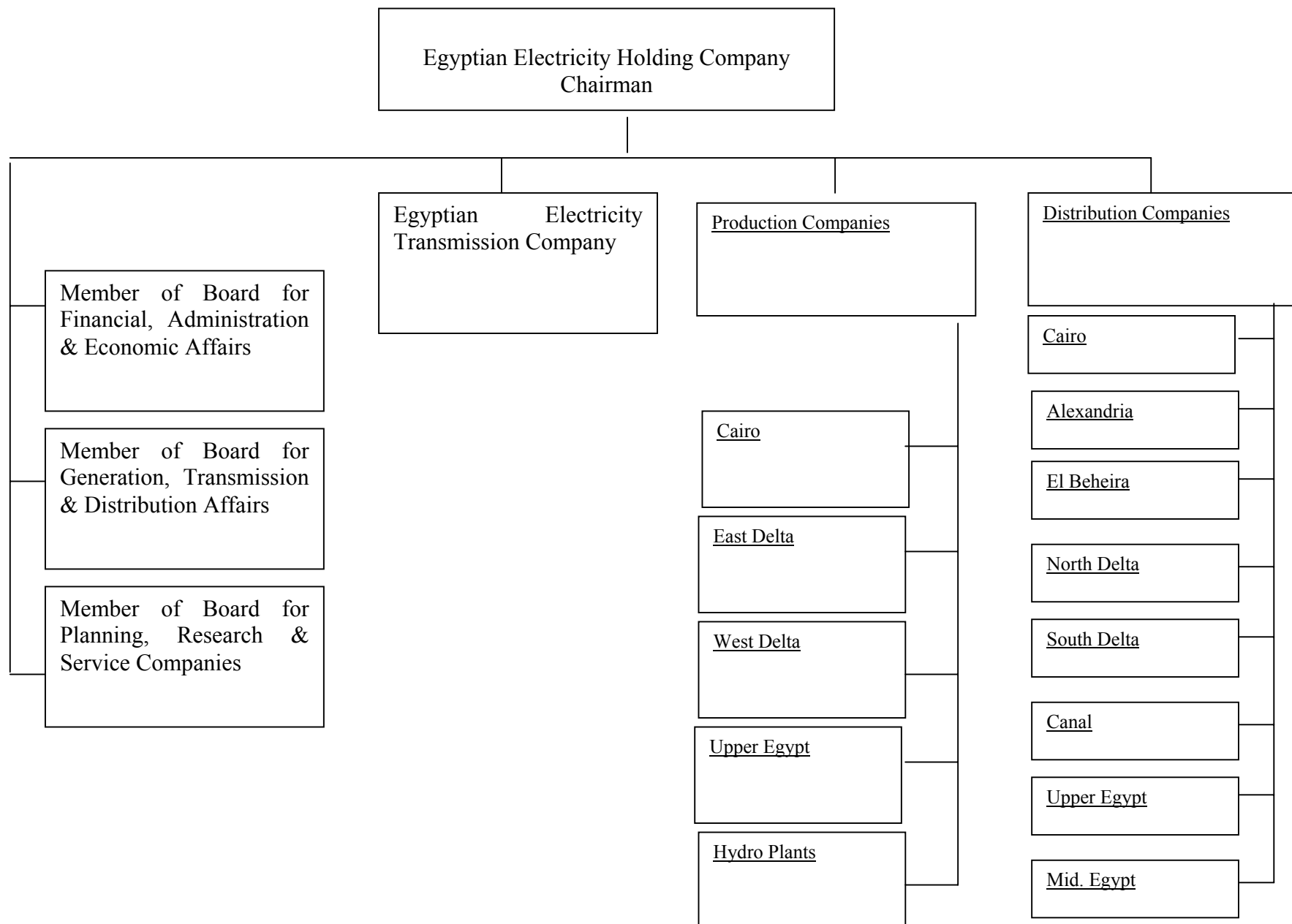
- i) The actual investment cost have been take as a base and the exchange rate of 1 United States dollars (USD) = 5.92 Egyptian Pound (LE) was used for conversion purposes (2003).
- ii) Operation and Maintenance cost was estimated at 239.27 milliems/kWh based on the economic cost of natural gas at a December 2003 border price of 4.738 USD for 1000000 BTU, assuming that fuel represents 40 per cent of total O&M costs, determined from past figures.
- iii) In the absence of long run marginal cost figures, values of USD 0.20 and USD 0.05 for the benefit of unmet industrial and domestic demand respectively met by the project were taken based on the Energy Sector Impact Study prepared by OPEV in December 1997. Since these figures have not been updated, they are likely to understate the benefits. Benefits from old units are not considered since those units were extremely old with no salvage value.
- iv) An investment of 30 percent of the total project cost is considered for major overhaul repairs in 2007/2008 and 2017/2018.

**EGYPT**  
**EI Arish Power Project**

**Economic Internal Rate  
of Return Re-estimate**

Year	Investment Cost (LE Million)	Energy Delivered (GWh)	O & M Cost (LE Million)	Sales Industry (GWh)	Benefit of additional power transmitted by the project				Net Benefits (LE Million)
					Sales Domestic (GWh)	Benefits Industry (LE Million)	Benefits Domestic (LE Million)	Benefits Total (LE Million)	
1991	7,45								-7,45
1992	39,77								-39,77
1993	125,05								-125,05
1994	421,80								-421,80
1995	244,60								-244,60
1996	78,20	22,03	5,27	6,61	15,42	7,83	4,57	12,40	-65,92
1997	44,53	97,22	23,26	29,17	68,06	34,56	20,16	54,72	7,93
1998	119,91	141,84	33,94	42,55	99,29	50,42	29,41	79,84	-44,88
1999		199,74	47,79	59,92	139,82	71,01	41,42	112,43	102,88
2000		227,58	54,45	68,27	159,31	80,90	47,19	128,10	115,71
2001		329,32	78,80	98,80	230,52	117,07	68,29	185,37	159,42
2002		355,94	85,17	106,78	249,16	126,54	73,81	200,35	170,04
2003		391,53	93,68	117,46	274,07	139,19	81,19	220,38	183,70
2004		430,69	103,05	129,21	301,48	153,11	89,31	242,42	198,04
2005		473,76	113,36	142,13	331,63	168,42	98,25	266,67	212,96
2006		521,13	124,69	156,34	364,79	185,26	108,07	293,33	228,35
2007	162,19	573,24	137,16	171,97	401,27	203,79	118,88	322,67	81,85
2008	162,19	573,24	137,16	171,97	401,27	203,79	118,88	322,67	81,85
2009		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2010		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2011		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2012		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2013		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2014		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2015		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2016		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2017	162,19	573,24	137,16	171,97	401,27	203,79	118,88	322,67	81,85
2018	162,19	573,24	137,16	171,97	401,27	203,79	118,88	322,67	81,85
2019		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
2020		573,24	137,16	171,97	401,27	203,79	118,88	322,67	244,04
									EIRR 11,099%

**EGYPT – EL ARISH POWER PROJECT  
EEHC Organisational Structure**



**EGYPT - EL ARISH POWER PROJECT**  
**EVALUATION CRITERIA**  
**Detailed and Aggregate Performance Ratings**

<b>No.</b>	<b>Component Indicators</b>	<b>Score (1 to 4)</b>	<b>REMARKS</b>
<b>1</b>	<b><u>Relevance and quality at entry assessment</u></b>	<b>3.15</b>	<b>Satisfactory. The objectives of the project were relevant and the quality at entry was good</b>
i)	Consistency with country overall development strategy	4	The 1 <sup>st</sup> and 2 <sup>nd</sup> Five Year Development Programme considered electricity as an engine for growth
ii)	Consistency with Bank Assistance Strategy	4	Bank Assistance Strategy was in line with the Government strategy
iii)	Macro-economic Policy	4	The project goal of enhancing economic growth and improving the living standard of the population of Egypt through the provision of reliable electricity was relevant to the overall macro-economic policy in the country.
iv)	Sector Policy	2	The sector policy was very comprehensive encompassing investments and sector reforms. But the issue of pricing is still not resolved
v)	Public Policy Reform	3	Public Policy Reform was and is an on going concern. A great deal has been achieved over the years particularly in the electricity sub-sector
vi)	Poverty Reduction	2	The project prepared under the 2 <sup>nd</sup> Five Year Development Programme indirectly aimed at Poverty Reduction.
vii)	Social and Gender equality	3	The project targeted social outcome particularly from reclamation of more than 100,000 hectares of land for the benefit of the poor. Gender equality was not targeted by the project.
viii)	Environment Concerns	4	Environment Impact Assessment was recommended for the project. Environment concerns were adequately taken into account and mitigating measures were implemented
ix)	Human Resources Development	3	Staff given on the job training by contractors and consultants.
x)	Institutional Development	3	Executing Agency continuously carried out Institutional Development. The project helped in institutional development through the training of the staff attached with the contractors and consultants.
xi)	Private sector Development	3	Government adopted policy to encourage private sector development. The project helped in the creating of private sector activities in the area due to the availability of reliable electricity.
xii)	Regional Economic Integration	3	The Project was designed to contribute to reinforcement of the Unified power System and to impact on the interconnection with neighbouring countries.
xiii)	Quality at entry (including demandingness, complexity, riskiness, etc.)	3	The quality of the project at entry to the Bank Lending Programme was adequate. Preparation and appraisal was carried out adequately.



**EGYPT - EL ARISH POWER PROJECT**  
**EVALUATION CRITERIA**  
**Detailed and Aggregate Performance Ratings**

No.	Component Indicators	Score (1 to 4)	REMARKS
<b>2</b>	<b><u>Achievement of objectives &amp; outcomes ("Efficacy")</u></b>	<b>3.00</b>	<b>Satisfactory.</b>
i)	Policy Goals <ul style="list-style-type: none"> <li>• Macro stabilisation</li> <li>• Monetary Reforms</li> <li>• Private Sector Regulation and Incentives</li> </ul>	3 3 3	<b>Satisfactory</b> The 2 <sup>nd</sup> Five Year Development Programme and the following programmes contributed to the macro-economic stabilisation of the country LE was devaluated during the implementation of the project according to macro-economic reforms. GOE committed themselves to create adequate business climate to attract private investors and finance power generation projects through BOOT packages
ii)	Physical objectives (outputs)	<b>4</b>	Highly Satisfactory. The scope of works was not reduced at implementation stage. All physical expectations were met.
iii)	Financial Targets <ul style="list-style-type: none"> <li>• Financial viability</li> <li>• Cost recovery</li> </ul>	<b>1.5</b> 2 1	<b>Satisfactory</b> The utility's profit margin is minimum. There is a need for tariff increase, since there is a limit to minimizing operating costs. The level of Outstanding account receivables is high. Cost recovery is not adequately achieved due to low tariff
iv)	Institutional Development Objectives	<b>3.17</b>	<b>Satisfactory.</b> Significant efforts were made in meeting this objective through bilateral financing
	National Capacity	3.33	<b>Satisfactory</b>
	• Poverty Alleviation	3	Government is currently committed. It was indirectly targeted at appraisal. The El Arish Power Station serves some 2 million.
	• Environment & natural resources	4	Mitigating measures of negative impacts were taking into account. Natural gas development has been strengthened. Most of the power plants including El Arish use natural gas.
	• Sectoral Capacity	3	Sector reforms were carried out and capacity enhanced
	Executing Agency	3	Satisfactory
	• Skills upgrading	3	Bilateral financing used for skill upgrading. Training is an on going effort in the electricity sub-sector.
	• Other (Technical Assistance)	3	Bilateral sources are used for this
v)	Social Objectives and Targets	<b>3</b>	<b>Satisfactory</b>
	Poverty Alleviation	3	Indirectly targeted at appraisal. The project has created jobs
vi)	Environment Objectives	<b>3.33</b>	<b>Satisfactory</b>
	Natural Resource Management	3	Natural gas development is an going policy of the government and its proper management has helped to use natural gas for the project
	Maintenance of biodiversity	3	Marine Resources were preserved through discharge of well treated water used for cooling system
	Maintenance of soil, air and water quality	4	The project is environmentally friendly through use of natural gas, discharge of treated water back into the sea and high chimney to avoid air pollution.
vii)	Private Sector Development Objectives	<b>3</b>	<b>Satisfactory.</b> Government has encouraged private sector participation in the electricity sub-sector. The availability of electricity by the project has helped to enhance private sector activities in the areas

**EGYPT EL ARISH POWER PROJECT**  
**EVALUATION CRITERIA**  
**Detailed and Aggregate Performance Ratings**

<b>No.</b>	<b>Component Indicators</b>	<b>Score (1 to 4)</b>	<b>REMARKS</b>
<b>3.</b>	<b><u>Efficiency</u></b>	<b>3.00</b>	Highly Satisfactory The project contributed to the growth of Egyptian economy
i)	Economic Rate of Return	4	The EIRR is satisfactory particularly if all the externalities were quantified
ii)	Financial Rate of Return	2	FIRR is on the low side due primarily low tariff
<b>4.</b>	<b><u>Institutional Development Impact</u></b>	<b>3</b>	<b>Satisfactory</b>
i)	<b><u>National Capacity</u></b>	3	Satisfactory
	• Poverty Alleviation	3	Reduction of unemployment. There are several crop processing factories in the area
	• Environment & natural resources	3	Environment conservation has been successfully achieved
	• Support to private sector	3	Private investors were involved in electric power generation and distribution.
	• Sectoral Capacity	3	Sector reforms and capacity strengthening have been achieved.
ii)	<b><u>Executing Agency</u></b>	<b>4</b>	<b>Highly satisfactory</b>
	• Skills upgrading/Training	4	The utility has put in place permanent training programme for all categories of workers
	• Management Information System	4	At country level, an information management system was put in place
	• Agency Restructuring (decentralisation)	4	There are several power generation and distribution companies
<b>5.</b>	<b><u>Sustainability</u></b>	<b>2.87</b>	<b>Unsatisfactory.</b>
i)	Technical Soundness (including O&M) facilitation, availability of recurrent funding, spare parts, workshop facilities, etc.)	4	The project, at appraisal was technically sound; the scope was indicated by the feasibility study. Recurrent funds to facilitate O&M activities are secured
ii)	Continued Borrower Commitment (including legal/regulatory framework)	2	Regulatory framework has improved but pricing issues still not resolved. Loan conditions related to tariff increase and reduction in outstanding accounts receivables not met fully.
iii)	Socio-political Support (including beneficiary participation, vulnerable groups protection, political stability)	3	Egypt remains politically stable
iv)	Economic Viability	3	The project will continue to be economically viable
v)	Financial Viability	1	The project's financial viable is at stake due to low tariff and inadequate cash flows
vi)	Institutional arrangements (organisational and management)	3	This is expected to continue to be satisfactory.
vii)	Environment viability	4	Highly satisfactory and expected to continue in the same vain
viii)	Resilience to exogenous Factors	3	The viability of the project did not suffer from any exogenous factors
<b>6.</b>	<b><u>Aggregate Performance Indicator</u></b>	<b>3.00</b>	<b>Satisfactory.</b>

**EGYPT – EL ARISH POWER PROJECT**  
**BORROWER'S PERFORMANCE RATINGS**

No.	Components Indicators	Score (1 to 4)	REMARKS
<b>1.</b>	<b>Quality of preparation</b>	<b>3.00</b>	<b>Satisfactory</b>
	<ul style="list-style-type: none"> <li>Ownership, Beneficiaries participation</li> </ul>	3	El Arish Power Generation Project is own by the Government. There is no indication on participatory approach in the Appraisal report
	<ul style="list-style-type: none"> <li>Government commitment</li> </ul>	2	GOE committed itself to the success of project implementation but it has not allowed periodic tariff increases and settlement of arrears on timely basis.
	<ul style="list-style-type: none"> <li>Macroeconomic and Sector policies</li> </ul>	3	Government is taking great efforts in improving policies in these areas
	<ul style="list-style-type: none"> <li>Institutional Arrangements (counterpart funding)</li> </ul>	4	Satisfactorily availed. Borrower met the Cost overrun.
<b>2.</b>	<b>Quality of Implementation</b>	<b>3.13</b>	<b>Satisfactory</b>
	<ul style="list-style-type: none"> <li>Assignment of Key Staff</li> </ul>	4	Key Staff were appointed on time to enable PIU to operate efficiently.
	<ul style="list-style-type: none"> <li>Management Performance of Executing Agency</li> </ul>	4	The Executing Agency adequately handled the project.
	<ul style="list-style-type: none"> <li>Use of Technical Assistance</li> </ul>	4	Over the years, EEA/EEHC has gained adequate experience in building and operating steam power generation plants. TA has been used to carry out the reforms and enhance the institutional capacity and information system
	<ul style="list-style-type: none"> <li>Mid-Course Adjustments</li> </ul>	4	Positive reaction of the beneficiary to adjust project cost at bidding process stage and cover cost overrun
	<ul style="list-style-type: none"> <li>Adherence to time schedule &amp; costs</li> </ul>	2	Project implementation suffered from delays in fulfilment of loan conditions and procurement of civil works
<b>3.</b>	<b>Compliance with Covenants</b>	1	The Borrower has had difficulties in fulfilment of some of the conditions prerequisite to first disbursement and other major conditions
<b>4.</b>	<b>Adequacy of Monitoring &amp; Evaluation and Reporting</b>	2	The Borrower did not develop any performing Monitoring and Evaluation system
<b>5.</b>	<b>Satisfactory Operations (if applicable)</b>	4	El Arish Project is contributing to the economic development of the country
	<b>Overall Borrower Performance</b>	<b>3.06</b>	<b>Satisfactory</b>

**EGYPT – EL ARISH POWER PROJECT**  
**BANK PERFORMANCE RATINGS**

No.	Component Indicators	Score (1 to 4)	REMARKS
<b>1.</b>	<b><u>At Identification</u></b>	<b>3.3</b>	<b>Satisfactory</b>
1.1	Project consistency with Bank Strategy	3	The Bank supports infrastructure development in the country in general and the electricity sub-sector in particular in line with the government strategy
1.2	Project consistency with Bank strategy for country	3	The Bank is committed to assisting in basic infrastructure development
1.3	Involvement of government/beneficiaries	3	GOE was fully involved in the project but there is no evidence that beneficiaries were directly involved in the identification stage
1.4	Project innovativeness	4	The project had undergone several studies and dual fuel fired power generating system has some innovative aspects
<b>2.</b>	<b><u>At Preparation of Project</u></b>	<b>3</b>	<b>Satisfactory. There was a preparatory mission on this project</b>
2.1	Relevance of Bank support	3	The Bank involvement at the preparation stage was highly satisfactory
2.2	Timely Bank support	3	The processing of the official request was highly satisfactory
<b>3.</b>	<b><u>At Appraisal</u></b>	<b>3</b>	<b>Satisfactory</b>
3.1	Quality of technical, economic, financial, institutional, social, environment analyses	3	This was carried out satisfactorily.
3.2	Relevance of Conditions and covenants	4	Were very relevant for the financial health of the utility.
3.3	Adequacy of lending instrument	4	ADB window was adequate for the country at the time
3.4	Financial package adequacy	2	There were cost overruns on overall cost but savings on ADB loan
3.5	Quality of co-ordination with other donors/partners	3	The Bank co-financed the project with GOE.
3.6	Implementation & Supervision plans (including performance indicators, M&E requirements)	2	Implementation schedule is given but no plans were spelt out for M & E
<b>4.</b>	<b><u>At Supervision</u></b>	<b>1.3</b>	<b>Unsatisfactory</b>
4.1	Adequacy of Bank staff (skills, time & continuity)	2	The supervision was inadequate; there has been change of experts
4.2	Problem solving	1	Not very active in sector reforms achievements
4.3	Responsiveness to changing conditions	1	The Bank was absent in electricity sub sector reforms in Egypt
4.4	Realistic ratings at PCR	2	FIRR rating was on the high side, but EIRR ratings are acceptable
4.5	Attention to likely social development impact	1	Supervision missions were inadequate to monitor the social impact
4.6	Attention to sustainability issues	1	Supervision missions were inadequate to resolve sustainability issues
<b>5.</b>	<b><u>Overall Assessment of Bank Performance</u></b>	<b>2.7</b>	<b>Unsatisfactory</b>

**EGYPT – EL ARISH POWER PROJECT**  
**FACTORS AFFECTING IMPLEMENTATION PERFORMANCE AND OUTCOME**

No.	Factors	Substantial	Partial	Negligible	N/A	REMARKS
<b>1.</b>	<b>Not subject to Government control</b>					
1.1	World Market prices		-			The project cost was revised upward at the bidding stage due to the world market prices for imported goods and services.
1.2	Natural events				N/A	
1.3	Bank Performance		+			Bank overall performance though unsatisfactory had not negatively affected project implementation
1.4	Performance of contractors/consultants	-				The poor performance of the contractor of the civil works delayed the project.
1.5	Civil war				N/A	
<b>2.</b>	<b>Subject to Government control</b>					
2.1	Macro policies		-			Inflation rate and devaluation of LE had negative impact on the project
2.2	Sector policies		-			Energy policy was adequate but pricing need to be revised
2.3	Government commitment		-			Government is committed for the sector but did not remove pricing distortions both for the inputs (petroleum products) and output (electricity tariff)
2.4	Appointment of key staff	+				Key staff were timely appointed for PIU
2.5	Counterpart funding	+				Counterpart funds were timely secured
2.6	Administrative capacity	+				Project administration was adequate
<b>3.</b>	<b>Subject to Executing Agency Control</b>					
3.1	Management	+				Project management was adequate
3.2	Staffing	+				PIU staffing was adequate
3.3	Use of technical assistance		+			Financed through bilateral sources
3.4	Monitoring & Evaluation				NA	M&E plan was not provided
3.5	Beneficiary Participation				NA	End users participation was not recorded
<b>4.</b>	<b>Factors Affecting Implementation</b>					
4.1	Changes in project scope/scale/design				N.A.	Implemented as designed
4.2	Deficiency in estimating physical inputs, the base unit cost		-			Physical and unit base cost were adequate. Cost overruns were due to market conditions
4.3	Inadequacy of price & physical contingencies			-		Price and physical contingencies were not adequately estimated. But Government covered the cost overrun
4.4	Changes in exchange rates, in financial and institutional arrangements		+			The continued devaluation of the Egyptian Pound has made imports and loan repayment costly
4.5	Unrealistic implementation schedule				NA	Project implementation schedule was sound. The delay resulted due to non fulfilment of conditions prior to entry into force and delay on the part of civil contractors
4.6	Quality of management including financial management		+			Management was adequate
4.7	Delays in selecting staff, consultants, contractors and in receiving counterpart funds		+			Carried out on time.
4.8	Inefficient procurement and disbursement procedures				NA	There were no records on inefficiency of procurement and disbursement procedures.

**EL ARISH POWER PROJECT**  
**RECOMMENDATIONS AND FOLLOW UP ACTION MATRIX**

<b>MAIN FINDINGS AND CONCLUSIONS</b>	<b>RECOMMENDATION</b>	<b>FOLLOW-UP ACTIONS</b>	<b>RESPONSIBILITY</b>
<p><u>Formulation and Project Rationale</u></p> <p>1.1 Project objective was in line with sector goal and well formulated. But adequate quantifiable indicators were lacking</p> <p>1.2 The transformation of the sector in general and institutional reforms of the electricity sub-sector in particular were not perceived during appraisal</p>	<p>1.1 Project objective need to be backed with adequate performance indicators to permit monitoring and evaluation of achievement of objectives. The use of MPDE matrix in recent projects has improved quality at entry</p> <p>1.2 Bank needs to be more proactive and engaged in sector and institutional reforms in RMCs</p>	<p>1.1 Ensure that project objectives are backed with quantifiable indicators as much as practicable using MPDE matrix</p> <p>1.2 Ensure that future CSPs capture all possible reforms in the sectors and see to what extent the Bank should be proactive and extend its assistance</p>	<p>Operations Department</p> <p>Country Department</p>
<p><u>Project Implementation</u></p> <p>2.1 Bank played a rather dormant role during project implementation and sector reforms</p>	<p>2.1 There is need to have a proactive monitoring schedule for project implementation and engaged in sector reforms</p>	<p>2.1 Ensure that monitoring is carried out regularly and proactively and engaged actively in sector reforms</p>	<p>Operations Department</p> <p>Country Department</p>
<p><u>Compliance with Loan Conditions</u></p> <p>3.1 Fulfilment of conditions to loan effectiveness was delayed and other major conditions were not fulfilled</p>	<p>3.1 There is need to ensure that conditions are fulfilled on time</p>	<p>3.1 Ensure that monitoring is carried out regularly and proactively to follow-up fulfilment of major conditions</p>	<p>Operations Department</p>
<p><u>Performance Evaluation and Project Outcome</u></p> <p>4.1 The institutional transformation exercise has resulted in making the utilities more efficient and aim at cost recovery operations. The credit goes to the Government and bilateral donor agencies</p>	<p>4.1 There is need for the Bank to be proactive in institutional reform program of public utilities as this is a major factor in project outcome and financial viability of the entities</p>	<p>4.1 Ensure that Bank is proactive in sector and institutional reform needs during preparation of CSPs</p>	<p>Country Department</p> <p>Operations Department</p>