



CAIRO, EGYPT

UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

PD-ABJ-668

ACTION MEMORANDUM FOR THE ACTING DIRECTOR

DATE: July 14, 1994
FROM: Richard Steelman, (A) OD/PDS/PS *Richard Steelman*
THROUGH: Robert Jordan, AD/PDS *RJ*
SUBJECT: Approval of the Power Sector Support II Project Paper and Project Authorization
ISSUE: Your signature is required to approve the Project Paper and Project Authorization for the Power Sector Support II Project (263-0224) for \$200 million.

DISCUSSION:

The attached Project Paper (PP) has been reviewed by the Project Design Team and Executive Committee. There are no further issues pending and all necessary clearances have been obtained. In accordance with the decisions made at the Executive Committee review held on June 22, 1994, the PP was modified as indicated below.

Annex J, Economic Analysis, was revised to more fully justify the Project on economic grounds by elaborating on the economic benefits derived from accomplishing the policy and institutional reforms under the Project. Section VI.B, Summary of Economic Analysis, was also revised to clarify that separate detailed financial and economic analyses of future infrastructure activities will be undertaken as they are identified over the years of the Project.

The justification for using Direct Letters of Commitment was revised in Section III.I to indicate that they are used to increase competition by encouraging more firms to bid on the various project components.

The project paper contains a full description, with supporting analyses, of a \$200 million power sector project. In order to underscore the incremental nature of USAID funding for the project, and the linkage of the release of funds to GOE policy performance, the project will not initially be authorized at the life of project (LOP) level of \$200 million. Instead, project funds will be incrementally authorized, as well as obligated, in four annual tranches of \$50 million in FYs 94-97.

As stated in Section IV.C.3, approval of this Project Paper constitutes approval by the Mission Director for use of the two-stage bidding process for the procurement of the more complex infrastructure components to be financed under the Project.

RECOMMENDATION :

That you approve the Power Sector Support II Project Paper and the Project Authorization by signing: below; Block No. 17 of the Project Data Sheet; the Project Authorization (page iii); the FAA Section 611 (e) Certification at Annex F; and, the Gray Amendment Certification at Annex G.

APPROVAL Christopher D. Crowley

DISAPPROVAL _____

DATE 7/31/94

Clearance:

OD/DR/PT, J. Hunt [Signature]
 AD/DR, F. Guymont [Signature]
 AD/LEG, V. Moore [Signature]
 AD/FM, D. Franklin [Signature]
 OD/DIR/CS, J. Dunlap [Signature]
 (A)DDIR, D. Miller [Signature]

[Drafted by: TGehr:PDS/PS:07/03/94:DocID:TED\PPAPROV.694] [Signature]



UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

May 31, 1994

TO : (A)OD/PDS/PS, Richard Steelman
 FROM : DR/PT, Raouf Youssef *RY*
 THROUGH : OD/DR/PT, John Hunt *JH*
 SUBJECT : Power Sector Support II (263-0224)
 Project Paper

1. The attached Project Paper has been prepared by the Project Team for review to the Executive Committee.

The Project Team approved the subject document in a review meeting on May 8, 1994.

The Project Team and Officers named below have reviewed the document and agree with the format, analysis and presentation.

2. An issues paper will be prepared and circulated in advance of the Executive Committee meeting as per Mission Order 3-30.

3. <u>Project Team:</u>	<u>Clearance</u>	<u>Date</u>
Ted Gehr, PDS/PS	<i>TG</i>	<i>5/31/94</i>
Laila Latif, PDS/PS	<i>Laila Latif</i>	<i>6/6/94</i>
Vicki Moore, LEG	<i>VV</i>	<i>6/8/94</i>
Rasha Abdel-Hakim, EAP	<i>Rasha A. Hakim</i>	<i>6/7/94</i>
Michael Walsh, DIR/CS	<i>M W</i>	<i>6/6/94</i>
Diane Leach, HRDC/ET	<i>DL</i>	<i>6/6/94</i>
Mokhtar El Shaarani, FM/FA	<i>ME</i>	<i>6/7/94</i>
Mark Gellerson, EAP	<i>MG</i>	<i>6-1-94</i>
Marc Madland, PDS/ENV	<i>M</i>	<i>6/10/94</i>
Paul Thorn, AD/DR	<i>PT</i>	<i>6/7/94</i>
John Giusti, PDS/P	<i>JG</i>	<i>6/6/94</i>

3. An Executive Committee meeting will be scheduled in June 1994.

(Drafted:TGehr:PDS/PS:5/31/94:Doc:TED\PSSCLEAR.594)

PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number

DOCUMENT CODE

3

2. COUNTRY/ENTITY

EGYPT

3. PROJECT NUMBER

263-0224

4. BUREAU/OFFICE

Asia Near East

5. PROJECT TITLE (maximum 40 characters)

Power Sector Support II

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)

MM DD YY
09 30 01

7. ESTIMATED DATE OF OBLIGATION

(Under "B." below, enter 1, 2, 3, or 4)

A. Initial FY 94 B. Quarter C. Final FY 01

8. COSTS (\$000 OR EQUIVALENT \$1 = 3.4)

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	()	()	(50,000)	()	()	(200,000)
(Loan)	()	()	()	()	()	()
Other U.S.						
1.						
2.						
Host Country						32,640
Other Donor(s)						
TOTALS			50,000			232,640

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ESF	740	825				50,000		200,000	
(2)									
(3)									
(4)									
TOTALS						50,000		200,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODES

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code

B. Amount

13. PROJECT PURPOSE (maximum 480 characters)

To accelerate and enhance the transformation of EEA into an autonomous electric utility capable of operating on a commercially sound, self-sustaining basis.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
10 9 8 0 1 0 2

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 0-11 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page IP Amendment.)

USAID/Egypt controller concurs with the proposed methods of implementation and financing.

Douglas J. Franklin

Douglas Franklin; AD/FM

17. APPROVED BY

Signature

Christopher D. Crowley

Title: Christopher D. Crowley
Acting Director, USAID/Egypt

Date Signed

MM DD YY
10 7 13 1 2 4

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AD/W COMMENTS, DATE OF DISTRIBUTION

MM DD YY

4



CAIRO, EGYPT

PROJECT AUTHORIZATION

Name of Country: Arab Republic of Egypt

Name of Project: Power Sector Support II

Number of Project: 263-0224

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended (the "Act"), I hereby authorize the Power Sector Support Project II (the "Project") for the Arab Republic of Egypt ("Cooperating Country") involving planned obligations not to exceed fifty million United States Dollars (\$50,000,000) in grant funds over a four year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. Operating Year Budget/Allotment process, to help in financing the foreign-exchange and local-currency costs of goods and services required for the Project. The estimated life of the Project is seven years from date of initial obligation.

2. The Project will assist the Government of Egypt in accelerating and enhancing the evolution of EEA into a fully autonomous and efficient electric utility.

3. The Project Agreement may be negotiated and executed by the officers to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority. The Project shall be subject to the following essential condition, together with such other terms, conditions, and covenants as A.I.D. may deem appropriate.

Source and Origin of Goods and Services

Goods and services financed by A.I.D. under the Project, except for ocean shipping, shall have their source and origin in the United States, or as authorized pursuant to the requirements of AID Handbook 1B, Chapter 18, except as the USAID/Cairo Mission Director, or his/her designee, may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed on flag vessels of the United States.

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4. Based upon the justification set forth in the Project Paper, I hereby determine, in accordance with Section 612(b) of the Act, that the expenditure of United States Dollars for the procurement of goods and services in Egypt is required to fulfill the purposes of this Project; the purposes of this Project cannot be met effectively through the expenditure of U.S.-owned local currencies for such procurement; and the administrative official approving local cost vouchers may use this determination as the basis for the certification required by Section 612(b) of the Act.

Christopher D. Crowley
Christopher D. Crowley
Acting Director

2/31/94
Date

Clearances:

OD/DR/PT, JHunt
AD/DR, FGuymont
AD/LEG, VMoore
PDS/PS, TGehr
AD/PDS, RJordan
AD/FM, DFranklin
(A)DDIR, DMiller

[Handwritten signatures and initials over horizontal lines]

**PROJECT PAPER
POWER SECTOR SUPPORT II PROJECT
(PROJECT 263-0224)**

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GLOSSARY OF ACRONYMS

AfDB	African Development Bank
AFESD	Arab Fund for Economic and Social Development
AGC	Automatic Generation Control
ANE	Bureau for Asia and the Near East (USAID/Washington)
CFR	Code of Federal Regulations
CMC	Construction Management Consultants
CPA	Certified Public Accountant
CRCC	Cairo Regional Control Center
DCC	Distribution Control Center
DR/PT	Directorate for Development Resources, Office of Power and Telecommunications (USAID/Cairo)
EAP	Economic Analysis and Policy Directorate (USAID/Cairo)
E&CMC	Engineering and Construction Management Contractor
EDCO	Electric Distribution Companies
EEA	Egyptian Electricity Authority
EIB	European Investment Bank
EMD	Energy Manpower Development
ExCom	Executive Committee
FM	Directorate for Financial Management (USAID/Cairo)
FY	Fiscal Year
GOE	Government of Egypt
GWH	Gross Watt/Hour
HB	Hand Book
HCCDEP	Holding Company for Construction and Distribution of Electric Power

HRDC/ET	Directorate of Human Resources for Development Cooperation, Office of Education and Training (USAID/Cairo)
IBRD	International Bank for Reconstruction and Development (World Bank)
IDC	Institutional Development Contractor
IEE	Initial Environmental Examination
IMF	International Monetary Fund
KV	Kilovolt
LAN	Local Area Network
LE	Egyptian Pound
LOP	Life of Project
LRMC	Long Run Marginal Cost
MEE	Ministry of Electricity and Energy
MIC	Ministry of International Cooperation
MKWH	Million Kilowatt Hours
MOU	Memorandum of Understanding
MVA	Mega Volt Amperes
MVAR	Mega Volt Amperes Reactive
MW	Megawatts
Mwh	Megawatt/Hour
NECC	National Energy Control Center
NUE	Northern Upper Egypt
PID	Project Identification Document
PLC	Power Line Carriers
PP	Project Paper
PDS	Program Development and Support
PSS	Power Sector Support

PT	Piaster
RCC	Regional Control Center
RFPT	Request for Technical Proposals
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SVC	Static VAR Compensator
TA	Technical Assistance
TOD	Time-of-Day
UHF	Ultra High Frequency
UPS	Unified Power System
U.S.	United States
USAID	United States Agency for International Development

POWER SECTOR SUPPORT II PROJECT

263-0224

SUMMARY AND RECOMMENDATION

INTRODUCTION

The proposed project consists of a seven year, \$200 million activity to finance capital improvements, technical assistance and training, which will leverage specific policy and institutional reforms identified in a Memorandum of Understanding (MOU) signed by the Government of Egypt (GOE) and USAID.

In 1975, when USAID provided initial funding for the sector, the bulk power supply facilities were not sufficient to meet customer demand. Service curtailments occurred frequently and generating capacity was not sufficient to permit necessary scheduled maintenance. As a result of maintenance deferrals, generating unit failures occurred more frequently, further hindering scheduled maintenance. The bulk power supply system was managed by an obsolete computer that was not of sufficient capacity to monitor the network or perform the necessary computations which would form the basis of economic operation. The distribution facilities were deteriorated and subject to frequent failures. Organizationally, Egyptian Electricity Authority (EEA) was overstaffed and undermanaged, with all decision making centralized in the Chairman.

Since 1975, USAID and the Government of Egypt (GOE) have jointly implemented a total of eleven projects consisting of 24 subprojects in the electric power sector totalling over \$1.6 billion in project and commodity assistance. This assistance has been provided for the construction of power plants, transmission lines, distribution lines, substations, and control centers. In addition, USAID has supported urban electric distribution system modernization, transmission upgrades and training. USAID assistance has contributed to the installation of 2,990 MW of generating capacity in operation and 1,350 MW of capacity under construction, and to the rehabilitation of an additional 2,700 MW of Egypt's generating capacity.

As a result of these efforts, there have been substantial reductions in energy losses, fewer outages, more reliable service and savings in fuel costs. The system has grown from a disconnected unreliable operation to a modern, well-connected system with central control operated by a competent workforce. USAID funds have contributed to the development of this vital sector of the Egyptian economy, enabling it to close the gap between demand and supply with a margin of safety.

The primary mission of the Ministry of Electricity and Energy (MEE) and the Egyptian Electricity Authority (EEA) has been to provide a reliable source of electric energy for Egypt. Objectives such as profitability and adequate return on investment have not been priorities. Furthermore, EEA has had no authority over the cost or source of fuel used, nor over the price of electricity sold. As a result, EEA has essentially been a "production-oriented" entity, i.e., not concerned with questions of financial efficiency or self-sustainability.

With the advent of the electricity pricing reform process in 1989, EEA is beginning to focus on generating revenue from the sale of electricity to cover a larger portion of their funding requirements, particularly those allocated to expansion. Accordingly, the time is appropriate for EEA to begin operating as a profitable, efficient electric utility generating real profits and cash flow. This change will require a complete reorientation of EEA's management toward efficiency and self-sustainability. It is imperative for EEA to become a least-cost producer while providing adequate, reliable service to both residential and industrial customers.

The Egyptian electric power sector currently faces a number of constraints which if not corrected will increasingly impede the sector's overall efficiency. Broadly, these constraints involve: EEA's authority to retain revenue; its capability to self-finance a substantial portion of system expansion; its authority to implement changes in electricity tariffs; and, EEA's ability to improve its planning and efficiency capabilities.

The Power Sector Support II Project is in conformity with Egypt's strategy for economic reform and development of the private sector, increased productivity, a cleaner environment, and a reduction in donor assistance and foreign loans. The project will provide funding to finance equipment, technical assistance and services, and training to support the GOE's high priority in increasing the efficiency and sustainability of the electric power sector. The GOE has recognized that efficient and reliable systems of power generation and transmission are essential to achieving its productivity and standard of living goals.

The Power Sector Support II Project is also consistent with the USAID's sustainable development strategy. The institutional and policy reforms to be undertaken will serve to enhance the capacity of Egypt to improve its quality of life. A more efficient and customer oriented electric power sector will free up scarce GOE resources for more pressing needs, while providing for a better natural environment for future generations. By improving EEA's planning and efficiency capabilities, energy losses will be reduced, which will reduce the amount of energy resources needed to provide electric power, thus allowing these resources to be exported to obtain essential foreign exchange

earnings. This will allow for increased economic and social growth while conserving Egypt's finite natural resources. By establishing an independent utility regulatory board, an indigenous institution will be created that will involve and empower the citizens of Egypt. At the very least, allowing for greater EEA autonomy and promoting regulatory reform will provide an enabling policy environment for a more efficient electric power sector.

The Power Sector Support II Project's emphasis on increased efficiency and sustainability of the electric power sector through support of policy reforms will support the Mission's Strategic Plan Program Subgoal 1 - Increased economic growth; Strategic Objective No. 1 - Increased macro-economic stability; and, Strategic Objective No. 2 - Increased private investment and trade. Achievement of the project purpose will also support the Mission Strategic Plan Program Subgoal 2 - Enhanced human resource productivity and quality of life; Strategic Objective No. 6 - Increased access to, and efficiency and reliability of, public utilities in urban target areas; and, Strategic Objective No. 7 - Enhanced protection of Egypt's fresh water and air resources.

PROJECT DESCRIPTION

The Goal of this project is to promote the development of an efficient and commercially oriented power sector in Egypt. The Purpose of the project is to accelerate and enhance the transformation of EEA into an autonomous electric utility capable of operating on a commercially sound, self-sustaining basis.

When the Project is complete, EEA/GOE will have achieved all policy/institutional reforms set forth in the Memorandum of Understanding (MOU) negotiated and signed by the GOE and USAID prior to Project approval. The MOU specifies major policy, legal and institutional reforms aimed at streamlined management, economic pricing, fiscal autonomy, and enhanced sustainability of the utility.

The proposed project includes two broad categories of outputs, namely, policy/institutional reforms and infrastructure development (construction and equipment). The primary focus of this project, however, is directed towards policy changes and reforms in the electric power sector. Although project funds will be disbursed primarily for engineering services, equipment and construction, the infrastructure aspect is simply a means to an end. Primary project outputs will be policy changes and improvements in the way the sector is managed, while secondary outputs will result in the more efficient provision of electric power. The specific policy/institutional reforms are included in the MOU signed by the GOE and USAID. These reforms include:

improvements in EEA's financial viability; increased autonomy for EEA; regulatory reform of the Egyptian electric power sector; and, improvements in EEA's planning and efficiency.

EEA will require technical assistance to implement some of the policy reforms agreed to under the Project. The technical assistance contractor will assist EEA in developing and implementing procedures, laws, regulations, annual business plans and other institutional development tasks as required by EEA and USAID. The scope of work for this contractor will be developed closely with EEA based on the recently completed assessment of the Egyptian electric power sector and the reforms agreed to between EEA and USAID. For planning purposes, institutional development technical assistance will consist of 216 person-months of resident expatriate long-term assistance, and 50 person-months of intermittent short-term expatriate assistance. This level of effort is based on an in-country expatriate team of six individuals for three years.

The project will fund both in-country and participant training. Implementation of training will be through the institutional development technical assistance contractor who will also be responsible for developing the life-of-project training plan and a detailed budget. Specialized operations and maintenance training will be provided by equipment suppliers for the equipment financed under the project. This training will be incidental to the equipment supply and installation contract(s), and thus is not considered participant training.

Equipment and construction services will be provided to finance discrete, stand-alone infrastructure development activities. Equipment procurements will include: time-of-day metering, planning software, and a high voltage test lab. Construction activities will consist of: static VAR compensators, a transmission substation, two regional control centers, a control room SCADA for the High Dam, and the replacement of controls at Abu Sultan. The above represents the range of activities contemplated; however, it is not all encompassing, and alternative activities may be identified during project implementation which are deemed to be more suitable for financing for each fiscal year.

The project will provide U.S. engineering and consultant management services to assist in the design, procurement, project management and supervision of the work associated with the construction of the facilities and installation of the equipment to be procured under the project. Recognizing the varying types of equipment and facilities to be procured, two separate Consulting Engineering contracts will be competed and awarded. The first contract will be for engineering and construction management services for the Wadi El Natroun substation, with options to design and manage the construction of the static VAR

compensators and the Abu Sultan control replacement, as well as to procure time-of-day metering, planning software and the renovation of the high voltage lab. The second contract will be for the engineering and construction management services for the more technically complex regional control centers and the High Dam control room SCADA.

Prior to Project approval (FY 1994), EEA and USAID reviewed the results of the recently completed sector assessment mentioned above and identified a package of reforms to be achieved over the life of the project, together with a time-sequenced plan for achieving the reform objectives. The agreed-upon reforms seek to increase the efficiency and sustainability of the electric power sector by: (i) improving EEA's financial viability through tariff reforms that achieve economic pricing, putting EEA's financial operations on a commercial basis, and strengthening EEA's accounting systems and procedures to produce accurate and timely information for financial tracking and planning; (ii) modifying EEA's charter so as permit it to operate on a commercial and autonomous basis; (iii) establishing an independent utility regulatory framework for electric utilities that results in a regulatory process that is transparent, fair, and permits informed decisions regarding economic, financial, environmental, and service issues; and, (iv) improving EEA's planning and efficiency by developing a strategic business plan, strengthening system planning and operations, and developing and properly allocating human resources. The reform package and plan is incorporated in a Memorandum of Understanding (MOU) signed by MEE, EEA, MIC and USAID.

USAID's contribution of \$200 million in LOP funds will be obligated in four annual tranches, with an initial obligation of \$50 million in FY 1994, followed by three annual obligations of \$50 million in FYs 1995-97. The size of the actual obligation may be adjusted up or down by USAID to reflect the magnitude of EEA reform efforts and progress toward the agreed upon reform targets stated in the MOU. All funds will be used by EEA to finance equipment and services.

The mechanism for implementing the policy reform feature of the project consists of a reform program for the FY 1994-97 period, which includes a set of benchmark actions to be completed during each year of the program as a condition to obligating the funding tranches programmed for each year. Completion of the benchmark actions will result in meeting reform targets which, when achieved, will assist the GOE to meet its policy reform objective and goal for the electric power sector.

Joint USAID/EEA/MEE/MIC reviews of policy performance, as compared to the agreed upon benchmark actions, will be conducted semi-annually (second and fourth U.S. fiscal year quarters) beginning in the fourth quarter of 1994. On the basis of these

reviews, USAID will determine whether the GOE is making appropriate progress in completing specific benchmark actions. Obstacles to achieving the specified benchmarks will be identified and appropriate corrective actions will be discussed. The project includes provisions for a long-term technical assistance contractor to assist EEA in implementing the reform program. Specialized short-term technical assistance, financed from the project, will also be available.

If it is determined that all benchmark actions for the specific year have been or will be met, and if other project conditions and covenants are being satisfactorily observed, USAID would then obligate the relevant tranche. In case of partial achievement of the reform objectives, the size of each year's obligation may be adjusted to reflect the magnitude of EEA reform efforts and of the sector's progress toward achievement of the agreed-to reform targets for that year. Similarly, USAID may decide to advance (subject to availability of funds) or defer obligation of a planned tranche if EEA accelerates or delays its implementation of the policy reform program described in the MOU.

As in the case of the ongoing Power Sector Support Project (263-0215), the grant agreement will include a condition precedent to disbursement calling for evidence that project funds provided by USAID for the procurement of equipment and construction services (projected at 79 percent of LOP funding, not including contingencies) will be loaned to EEA from the GOE. Funds for technical assistance and training will be passed to EEA as a grant. In addition to engineering and construction management services, technical assistance funds will be used to obtain institutional development technical assistance to assist EEA in the implementation of agreed-upon policy reforms, and in the development, implementation and management of a training program, including training equipment as necessary.

Project feasibility analyses indicate that the proposed project is viable from a technical, economic, financial, social, administrative, and environmental standpoint.

COST ESTIMATES AND FINANCIAL PLAN

The project cost estimates are summarized below:

Table 1. Summary Cost Estimate and Financial Plan (000).

Use of Funds	Source of Funds	
	USAID - \$	GOE - LE
<u>POLICY REFORM/INST. DEVT.</u>		
TA and Training	16,000	--
<u>INFRASTRUCTURE DEVELOPMENT</u>		
Engineering Services	15,000	11,000
Equip. and Constr. Services	158,000	87,000
Audit and Evaluation	500	--
Contingency	10,500	--
TOTAL	200,000	111,000¹

The USAID obligation for this seven-year project will be \$200 million in life-of-project funds, with annual obligations of \$50 million over the initial four years, from Fiscal Years 1994 to 1997, as summarized below:

¹Includes LE 13 million in-kind contribution.

Table 2. Obligation of Project Funds (\$000).

Project Component/Element	Obligation Schedule				Total
	FY 94	FY 95	FY 96	FY 97	
<u>POLICY REFORM/INST. DEVT.</u>					
1. TA and Training	16,000	0	0	0	16,000
<u>INFRASTRUCTURE DEVELOPMENT</u>					
2. Static VAR Compensators	25,010	0	0	0	25,010
3. Planning Software	2,990	0	0	0	2,990
4. Wadi El Natroun Substation	0	33,780	0	0	33,780
5. Abu Sultan Controls	0	9,790	2,190	7,790	19,770
6. Time-of-Day Metering	0	0	0	3,260	3,260
7. High Dam Control Room SCADA	0	5,430	0	0	5,430
8. Canal Zone Control Center	0	0	33,780	0	33,780
9. High Voltage Test Lab	0	0	13,030	2,170	15,200
10. NUE Regional Control Center	0	0	0	33,780	33,780
11. Audit and Evaluation	100	0	0	400	500
12. Contingency	5,900	1,000	1,000	2,600	10,500
TOTAL	50,000	50,000	50,000	50,000	200,000
CUMULATIVE TOTAL	50,000	100,000	150,000	200,000	--

The USAID annual obligation will cover the expenditures for engineering services, technical assistance and training, equipment and installation services, audit and evaluation, and contingency. The USAID annual projected expenditures by project elements are shown in Table 3 below:

Table 3-3. Expenditure Projections (\$000).

Project Component/Element								TOTAL
	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	
<u>POLICY REFORM/INST. DEVT.</u>								
TA and Training	3,000	4,000	5,000	2,000	1,500	500	0	16,000
<u>INFRASTRUCTURE DEVELOPMENT</u>								
Engineering Services	2,000	4,000	5,000	2,000	1,500	300	200	15,000
Equip. and Const. Services	12,000	20,000	30,000	44,000	30,000	18,000	4,000	158,000
- Static VAR Compensator	10,000	13,000	0	0	0	0	0	23,000
- Planning Software	2,000	0	0	0	0	0	0	2,000
- Time-of-Day Metering	0	0	0	0	3,000	0	0	3,000
- Wadi El Natroun Substation	0	4,000	14,000	13,000	0	0	0	31,000
- Abu Sultan Control Replacement	0	2,000	9,000	7,000	0	0	0	18,000
- High Dam Control Room SCADA	0	1,000	3,000	1,000	0	0	0	5,000
- Canal Regional Control Center	0	0	2,000	11,000	14,000	4,000	0	31,000
- High Voltage Test Lab	0	0	2,000	10,000	2,000	0	0	14,000
- NUE Regional Control Center	0	0	0	2,000	11,000	14,000	4,000	31,000
Audit and Evaluation	0	0	0	200	0	0	300	500
Contingency	0	3,000	2,000	5,000	500	0	0	10,500
TOTAL	17,000	31,000	42,000	53,200	33,500	18,800	4,500	200,000
CUM. TOTAL	17,000	48,000	90,000	143,200	176,700	195,500	200,000	--

The projected GOE cash and in-kind contribution is presented in Table 4 below.

Table 4. Estimated GOE Contribution (LE 000).

Item	Contribution Schedule						Total
	1995	1996	1997	1998	1999	2000	
Cash - BAB 3	5,000	18,000	24,000	24,000	20,000	7,000	98,000
In-kind - Land	2,000	3,000	5,000	0	0	0	10,000
In-kind - Buildings	500	500	0	0	0	0	1,000
In-kind - BAB 1 Salaries	100	100	200	200	200	200	1,000
In-kind - BAB 2 Operating Costs	100	100	200	200	200	200	1,000
TOTAL	7,700	21,700	29,400	24,400	20,400	7,400	111,000

PROJECT NEGOTIATION STATUS

The proposed project activities, required resources, and implementation arrangements have been discussed with EEA and the GOE. The GOE and EEA agree in principle with the objectives and implementation guidelines set forth for the project. The MOU, which includes the policy reform matrix, was signed by the GOE/EEA and USAID on May 19, 1994.

RECOMMENDATION

The Project Team recommends that a grant of \$200 million be approved for the Power Sector Support II Project, to be authorized and obligated in tranches as described in the attached project paper. The grant will be for a seven year period, and will be obligated in four increments: \$50 million in FY 1994, \$50 million in FY 1995, \$50 million in FY 1996, and \$50 million in FY 1997.

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I. PROJECT BACKGROUND AND RATIONALE

A. INTRODUCTION

Economists in the United States are unanimous in their view that economic infrastructure played an important role in the historical growth of the U.S. economy. They are equally unanimous in decrying the deterioration of that infrastructure and the implications this has for future growth. With the help of the United States over the past fifteen years, Egypt has made important progress in developing the infrastructure that is critical for economic growth. This includes major investments in power, as well as telecommunications, irrigation, water and sanitation, and transportation. In this respect, it could be argued that the completion of major infrastructure works in the later half of the 1980s, at about the same time that the Egyptian economy began to suffer reverses in externally generated growth, helped absorb the full impact of these reverses and contain the slide of GDP growth from sliding lower.

Notwithstanding these additions to the nation's productive infrastructure base, problems remain. Inappropriate pricing policies and inadequate attention to operations and maintenance are causing infrastructure, constructed during the 1960s and 1970s, to deteriorate rapidly and are jeopardizing even the newest facilities.

Economic infrastructure is essential to private investment and trade. As the private sector grows it will come to depend on this infrastructure. If full benefits are to accrue to private sector development, the productive infrastructure base will have to be expanded, modernized and protected. This cannot occur if pricing policies and institutional arrangements continue to impede the efficient management, operation and maintenance of urban utilities and other infrastructure.

Most importantly, institutional and price reforms in infrastructure will assist the GOE's cost recovery and sustainability efforts, reduce its budget deficit, and provide a base for increased production and growth. In addition, pricing reforms will reduce the demand for electricity which will decrease emissions injurious to the environment.

B. BACKGROUND

The Egyptian electric power system began as a number of isolated power systems that met the energy needs of customers located in close proximity to the source of generation. These

isolated systems were eventually interconnected on a regional basis, and then nationally to form the existing power system. Facilities to supply Egypt's electric energy requirements consist of electrical generating facilities installed at strategic locations in the Nile Valley, the Delta, and along the Suez Canal that are integrated by a complex network of transmission lines. Areas outside the reach of the power system are supplied from gas turbines and diesel driven generators with a total installed capacity of less than 300 MW. These facilities are state-owned and are the responsibility of the Ministry of Electricity and Energy (MEE) and five operational and executive authorities.

Over the past twenty years, since USAID's first electric power project in Egypt, the Government of Egypt (GOE) has given a high priority to the provision of electrical power throughout Egypt. All villages with a population over a thousand now have electrical power, and more than one-half of the 13,000 villages of less than a thousand inhabitants also have service. In the time frame from 1980/81 to 1990/91, sales in millions of kilowatt hours (MKWH) rose from 9,200 to 17,150 in the industrial sector; from 776 MKWH to 1,367 MKWH in agriculture; from 423 MKWH to 1,813 MKWH for commercial users and from 3,355 MKWH to 12,060 MKWH for residential customers. Residential and commercial usage almost quadrupled, while use in all other sectors almost doubled.

Power generation to meet this need has grown from 3,800 megawatts (MW) in 1975 to nearly 12,000 MW in 1993. Per capita consumption of electric power grew about eight per cent annually during the 1980s, but has declined in the 1990s to an annual growth rate of less than five per cent. Over 95 per cent of all urban and rural areas of Egypt are now electrified.

The Egyptian Electricity Authority (EEA) is responsible for the planning of the bulk power supply that includes generation and transmission at high voltages. EEA sells energy to large industries supplied at high voltage and to eight regional distribution companies (under a Holding Company) that distribute and sell energy at medium and low voltage to residential, commercial and small industrial customers. The Rural Electrification, Nuclear, Hydro Power Plant, and Renewable Energy Authorities are responsible for the planning and construction of rural distribution lines, nuclear and hydro power generation facilities, and renewable (solar and wind) energy developments respectively. All generating facilities, regardless of their type, are operated and maintained by EEA.

In 1975, when USAID provided initial funding for the sector, the bulk power supply facilities were not sufficient to meet customer demand. Service curtailments occurred frequently and generating capacity was not sufficient to permit necessary scheduled

maintenance. As a result of maintenance deferrals, generating unit failures occurred more frequently, further hindering scheduled maintenance. The bulk power supply system was managed by an obsolete computer that was not of sufficient capacity to monitor the network or perform the necessary computations which would form the basis of economic operation. The distribution facilities were deteriorated and subject to frequent failures. Organizationally, EEA was overstaffed and undermanaged, with all decision making centralized in the Chairman.

Since 1975, USAID and the Government of Egypt (GOE) have jointly implemented a total of eleven projects consisting of 24 subprojects in the electric power sector totalling over \$1.6 billion in project and commodity assistance (see Table 1-1). This assistance has been provided for the construction of power plants, transmission lines, distribution lines, substations, and control centers. In addition, USAID has supported urban electric distribution system modernization, transmission upgrades and training. USAID assistance has contributed to the installation of 2,991 MW of generating capacity currently in operation, the installation of an additional 1,350 MW to be placed in operation over the next three years, and to the rehabilitation of an additional 2,700 MW of Egypt's generating capacity.

As a result of these efforts, there have been substantial reductions in energy losses, fewer outages, more reliable service and savings in fuel costs. The system has grown from a disconnected unreliable operation to a modern, well-connected system with central control operated by a competent workforce. USAID funds have contributed to the development of this vital sector of the Egyptian economy, enabling it to close the gap between demand and supply with a margin of safety.

In spite of these notable improvements, key policy, institutional, and management constraints remain. Energy prices, particularly electricity prices, remain artificially low as a result of government subsidies on fuel and electricity rates. As a result, consumers are falsely encouraged to overconsume electrical energy, and energy-intensive industries utilize uneconomical manufacturing processes. Consequently, the GOE was compelled to undertake major investments in new generating facilities which have produced insufficient revenues to cover the cost of production, depreciation and debt service.

By the mid-1980s, however, the GOE had recognized the high costs of its energy policy and started to evolve a pricing strategy to encourage the economic use of resources. In response to this, under the Power Sector Support Project (263-0215) annual obligations were conditioned upon electricity tariff increases

TABLE 1-1
USAID/Egypt Electric Power Sector
Financial Assistance (\$000)

Title (Project Number)	Total Authorization	Obligations 1975 Thru June 1994	Generating Capacity (MW)	
			<u>Added</u>	<u>Rehab</u>
<u>Projects Completed</u>				
Electric Power Distribution (263-0001)	30,000	29,834	--	--
Helwan-Talkha Gas Turbine (263-0008)	69,000	67,299	312	--
Abu Sultan Thermal Power Plant (263-0009)	250,000	249,576	600	--
National Energy Control Center (263-0023)	43,500	42,296	--	--
Shoubrah Thermal Power Plant (263-0030)	263,000	261,503	1260	--
Urban Electric Distribution (263-0033)	97,200	97,128	--	--
Talkha Combined Cycle (263-0196)	64,674	64,674	100	192
<u>Projects Ongoing</u>				
Energy Manpower Development (263-0140.4)	8,600	8,600	--	--
Aswan High Dam Rehabilitation and Modernization (263-0160)	140,000	140,000		2100
Alexandria Network Modernization (263-0194)	50,000	50,000		--
Power Sector Support (263-0215)	461,000	461,000	1350	446
TOTAL PROJECT OBLIGATIONS		1,471,910	3622	2738
TOTAL COMMODITY OBLIGATIONS		176,608	719	--
TOTAL TRADE FACILITY FINANCING		5,920	--	--
TOTAL		1,654,438	4341	2738

aimed at economic costs. This resulted in a thirty per cent tariff increase in 1989, a 38 per cent increase in 1990, a fifty per cent increase in 1991, a 32 per cent increase in 1992, and a ten per cent increase in 1993. Currently, the weighted average of electricity tariffs, as a percentage of the long run marginal cost, is 73 per cent. EEA, while having managed to record marginal profits in recent years, has consistently failed to generate adequate cash to service its debts. Thus, local and foreign debt service payments made by the GOE for EEA, and carried on EEA's balance sheets, have increased from about LE 183 million in 1985 to about LE 1.775 billion at the end of 1991. EEA financial performance problems arise primarily from low electricity prices, the inability to collect for energy consumed, and high losses on the transmission and distribution systems.

C. PERCEIVED PROBLEM

The GOE has traditionally used electric power as an instrument for development within the overall context of its social, economic and political objectives. This has resulted in over-subsidized (or non-economical) tariffs to both households and industries. While all governments have used subsidies, price controls and other such methods in the administration of their economies, it is important that such measures are targeted, transparent and easily quantifiable in order to maintain managerial responsibility and accountability.

The primary mission of the Ministry of Electricity and Energy (MEE) and the Egyptian Electricity Authority (EEA) has been to provide a reliable source of electric energy for Egypt. Objectives such as profitability and adequate return on investment have not been priorities. Furthermore, EEA has had no authority over the cost or source of fuel used, nor over the price of electricity sold. As a result, EEA has essentially been a "production-oriented" entity, i.e., not concerned with questions of financial efficiency or self-sustainability.

With the advent of the electricity pricing reform process in 1989, EEA is beginning to focus on generating revenue from the sale of electricity to cover a larger portion of their funding requirements, particularly those allocated to expansion. Accordingly, the time is appropriate for EEA to begin operating as a profitable, efficient electric utility generating real profits and cash flow. This change will require a complete reorientation of EEA's management toward efficiency and self-sustainability. It is imperative for EEA to become a least-cost producer while providing adequate, reliable service to both residential and industrial customers.

The Egyptian electric power sector currently faces a number of constraints which if not corrected will increasingly impede the sector's overall efficiency. Broadly, these constraints involve: EEA's authority to retain revenue; its capability to self-finance a substantial portion of system expansion; its authority to implement changes in electricity tariffs; and, EEA's ability to improve its planning and efficiency capabilities.

The Power Sector Support II Project will address these constraints by supporting policy reforms which will increase the efficiency and sustainability of the electric power sector.

D. CONFORMITY WITH THE GOE'S DEVELOPMENT STRATEGY

To achieve its goals of increased productivity and an improved standard of living for its citizens, the Government of Egypt (GOE) has embarked on a major economic reform program designed to stabilize its economy, remove distortions, and give a newfound impetus to the private sector as a central element in its growth strategy. This project will address sector policy and institutional constraints which negatively impact on sustainable economic growth in Egypt.

Along with economic reforms, the GOE has developed a new environmental action plan and is currently strengthening its environmental laws. Activities funded under the Power Sector Support II Project will contribute to a cleaner environment through improved air quality by shifting from mazout (fuel oil) to natural gas in existing power generation facilities, modernizing combustion control systems, and reducing the need to add generating capacity through peak shaving and increased efficiency in generation and transmission.

The Power Sector Support II Project is in conformity with Egypt's strategy for economic reform and development of the private sector, increased productivity, a cleaner environment, and a reduction in donor assistance and foreign loans. The project will provide funding to finance equipment, technical assistance and services, and training to support the GOE's high priority in increasing the efficiency and sustainability of the electric power sector. The GOE has recognized that efficient and reliable systems of power generation and transmission are essential to achieving its productivity and standard of living goals.

E. RELATIONSHIP TO USAID STRATEGY

The recently developed Agency-wide strategy, entitled "Strategies for Sustainable Development," (January 1994) characterizes sustainable development as:

"... economic and social growth that does not exhaust the resources of a host country; that respects and safeguards the economic, cultural, and natural environment; that creates many incomes and chains of enterprises; that is nurtured by an enabling policy environment; and that builds indigenous institutions that involve and empower the citizenry. Development is "sustainable" when it permanently enhances the capacity of a society to improve its quality of life. Sustainable development enlarges the range of freedom and opportunity, not only day to day but generation to generation."

The Power Sector Support II Project is consistent with the Agency's sustainable development strategy as characterized above. The institutional and policy reforms to be undertaken will serve to enhance the capacity of Egypt to improve its quality of life. A more efficient and customer oriented electric power sector will free up scarce GOE resources for more pressing needs, while providing for a better natural environment for future generations. By improving EEA's planning and efficiency capabilities, energy losses will be reduced, which will reduce the amount of energy resources needed to provide electric power and thus can be exported to obtain essential foreign exchange earnings. This will allow for increased economic and social growth while saving Egypt's finite natural resources. By establishing an independent utility regulatory board, an indigenous institution will be created that will involve and empower the citizens of Egypt. At the very least, allowing for greater EEA autonomy and promoting regulatory reform will provide an enabling policy environment for a more efficient electric power sector.

The Mission's Country Program Strategy for FY 1992-1996, dated May 1992, is consistent with and reinforces the overall objectives of sustainable development as well as the four major areas of focus, i.e., protecting the environment, building democracy, stabilizing world population growth and protecting human health, and encouraging broad-based economic growth. The primary goals of the Mission's strategy is the enhancement of Egypt's role as a model of stability, democracy, free markets, and prosperity in the region. A comprehensive approach to the political and economic development of Egypt is essential to achieve the program goal. The three program sub-goals are:

increased economic growth; enhanced human resource productivity and quality of life; and, strengthened democratic systems.

To accomplish these sub-goals, the Mission is placing greater emphasis on economic policy reform through fast-disbursing policy-based programs and through projects. Greater emphasis will be placed on the elimination of policy constraints in those infrastructure sectors such as power where USAID has made, and will continue to make, major investments.

The Power Sector Support II Project's emphasis on increased efficiency and sustainability of the electric power sector through support of policy reforms will support the Mission's Strategic Plan Program Subgoal 1 - Increased economic growth; Strategic Objective No. 1 - Increased macro-economic stability; and, Strategic Objective No. 2 - Increased private investment and trade. Achievement of the project purpose will also support the Mission Strategic Plan Program Subgoal 2 - Enhanced human resource productivity and quality of life; Strategic Objective No. 6 - Increased access to, and efficiency and reliability of, public utilities in urban target areas; and, Strategic Objective No. 7 - Enhanced protection of Egypt's fresh water and air resources.

In sum, USAID is providing support for a good performer in terms of both management and policy, and to assist with essential infrastructure improvements while promoting organizational and institutional development.

F. RELATIONSHIP TO OTHER DONOR SUPPORT AND STRATEGY

The formulation and implementation of a power sector reform program has been a central topic of the policy reform agendas of the International Monetary Fund (IMF) and the World Bank (IBRD). The IBRD has conditioned the allocation of significant new resources for the electric power sector on progress in achieving policy reforms. The Power Sector Support II Project will complement the IMF and IBRD reform agendas. The African Development Bank (AfDB) and the European Investment Bank (EIB) have also linked financing in the sector to policy reforms.

The IBRD has provided five loans totalling \$1.1 billion for: generating capacity additions at the Shoubrah El Kheima and El Kureimat Thermal Power Stations and the Aswan II Hydroelectric Power Station; improving the efficiency of gas turbines at Mahmoudia and Dammanhour (combined cycle add-ons); transmission system additions associated with the Damietta combined cycle plant; and, a Rural Electrification Program. With regard to the on-going power projects financed by IBRD, EEA is in default with

the financial covenants for FY 92 and FY 93, and is unlikely to be in compliance for FY 94. Related technical issues, such as the pricing of natural gas, are under discussion. Should these issues not be resolved during FY 94, the IBRD may decide to suspend disbursements for the ongoing projects.

The AfDB likewise has taken an active role in the electric power sector. The AfDB has financed twelve projects worth \$1.1 billion in the last eighteen years. Five projects involved the extension of electrical networks along the Suez Canal and in rural areas of Egypt. An additional five projects involved generating capacity additions, including the generating units at Shoubra El Kheima and El Kureimat. The AfDB has linked financing of two projects to reforms in pricing. These projects are the installation of two 300 MW generating units at Cairo West and two 30 MW generating units at El Arish.

The EIB has financed portions of the Shoubra El Kheima plant, three 220KV transmission substations in Upper Egypt, and equipment for the steam cycles for the Damietta combined-cycle plant. EIB financing in the sector is contingent on substantial electricity price increases.

The Arab Fund for Economic and Social Development (AFESD) has provided financing for: the El Kureimat Thermal Power Station, the study of the Egypt-Jordan interconnection; consultant services, equipment and construction services for the interconnection; the study for the integration of the power systems of a number of Arab countries; and, for equipment for the steam cycle addition to the gas turbines at Damietta.

Other bilateral agencies have collectively provided more than \$1 billion equivalent for generating facilities, transmission expansion, control centers and distribution system rehabilitation and expansion.

While a number of multilateral and bilateral donors are involved in the electric power sector in Egypt, USAID will continue to be the key donor in working with the GOE in bringing about appropriate reforms within the sector. Coordination among the various donors will remain effective in meeting the needs of the power sector while, at the same time, bringing about agreed upon reforms. USAID has coordinated closely with the other donors, especially the IBRD, during the formulation of the power sector reform agenda.

II. PROJECT DESCRIPTION

A. PROJECT GOAL AND PURPOSE

The Goal of this project is to promote the development of an efficient and commercially oriented power sector in Egypt.

The Purpose of the project is to accelerate and enhance the transformation of EEA into an autonomous electric utility capable of operating on a commercially sound, self-sustaining basis.

B. END OF PROJECT STATUS

This \$200 million project will support past and promote continued GOE and EEA progress in making electric power sector policy changes by providing, as an incentive, financing for capital infrastructure components. The project will provide the forum to agree upon legal, structural, managerial and financial reforms that, if implemented, will enhance the performance of the electric power sector through greater efficiency, flexibility, overall system reliability, cost savings, and increased revenue generation. The project will specifically finance equipment, engineering services, training and technical assistance to improve the efficiency and sustainability of the national electric power network.

By the completion of the Project, it is expected that EEA will have evolved into a much stronger, financially autonomous organization with increased revenue generation based on market prices. The increased revenue will provide for sufficient cost recovery to assure sustainability of capital equipment investment and enable EEA to self finance a larger part of electric power expansion and modernization without dependence on grants and soft loans from the general GOE budget or governmental agencies. As a result, EEA will be able to develop a highly efficient system for the delivery of reliable electric energy service throughout Egypt.

When the Project is complete, EEA/GOE will have achieved all policy/institutional reforms set forth in the Memorandum of Understanding (MOU) negotiated and signed by the GOE and USAID prior to Project approval. The MOU specifies major policy, legal and institutional reforms aimed at streamlined management, economic pricing, fiscal autonomy, and enhanced sustainability of the utility.

C. PROJECT OUTPUTS

The proposed project includes two broad categories of outputs, namely, policy/institutional reforms and infrastructure development (construction and equipment). The primary focus of this project, however, is directed towards policy changes and reforms in the electric power sector. Although project funds will be disbursed primarily for engineering services, equipment and construction, the infrastructure aspect is simply a means to an end. Primary project outputs will be policy changes and improvements in the way the sector is managed, while secondary outputs will result in the more efficient provision of electric power.

The specific policy/institutional reforms are included in the MOU signed by the GOE and USAID. These reforms include: improvements in EEA's financial viability; increased autonomy for EEA; regulatory reform of the Egyptian electric power sector; and, improvements in EEA's planning and efficiency. The process by which specific policy and procedural reforms will be implemented is discussed in Section 4.0 of this project paper.

1. Financial Viability

The project will achieve continued reforms in electricity tariffs to promote financial viability and to achieve economic pricing. To further promote financial viability, EEA's financial operations will function on a commercial basis, and accounting systems and procedures will be strengthened to produce accurate and timely information for financial tracking and planning.

2. EEA Autonomy

EEA's charter will be modified so as to permit it to operate on a commercial and autonomous basis. Specifically, EEA should: operate primarily as a commercial firm, with any subsidies by the GOE provided in a transparent manner; retain its own revenues; have its own employee compensation system; be able to solicit loans and issue bonds; and, be able to enter into purchase agreements with private power producers.

3. Regulatory Reform

An independent utility regulatory board for electric utilities will be established. The resulting regulatory process should be transparent, fair, and permit informed decisions regarding economic, financial, environmental, and service issues. More specifically, it should be independent from the GOE; have built-in efficiency incentives; encourage private sector

participation in the sector; and, place day-to-day operations of EEA in the hands of EEA management.

4. Improved Planning and Efficiency

A strategic business plan will be developed which: establishes EEA's overall goals; lays out annual objectives relating to EEA's operation and performance; and, specifies actions needed to make progress towards those goals and objectives. In addition, system planning and operations will be improved to support efficient EEA operation, i.e., expansion planning and load forecasting methodologies will be strengthened by improving economic inputs, the EEA generation system will operate based on economic dispatch, maintenance procedures will be improved, and energy transmission losses and emissions from EEA thermal units will be reduced. Finally, EEA's human resources will be developed and appropriately allocated to support efficient operations.

5. Infrastructure Development

The proposed project intends to supplement EEA investment funds to carry out capital improvements which will contribute to the efficiency of the electric power system. The following is representative of the range and order of activities contemplated; however, it is not all encompassing, and alternative activities may be identified during project implementation which are deemed to be more suitable for financing for each fiscal year, or the order in which the activities are financed may change.

- **Static VAR Compensators:** During periods of high electrical demand, the Egyptian power transmission network experiences low voltage conditions causing increased electrical losses. During periods of low electrical demand, the grid system experiences high voltages which over stress transformers, insulators, customer appliances and other equipment. The existing rotating synchronous condensers, which currently serve to control and stabilize the voltage level on the transmission network, are partially disabled and operating at less than thirty per cent of the originally designed output rating. Hence, EEA plans to replace the existing three synchronous condenser units with state-of-the-art non-rotating reactive compensators at the Cairo 500 substation.
- **Wadi El Natroun Transmission Substation:** Wadi El Natroun is located in the El Beheira Governorate on the Cairo-Alexandria desert highway, adjacent to newly developing communities which are rapidly growing due to land reclamation programs in the area. The existing substations

in this regional electrical network are experiencing above normal load growth. The proposed Wadi El Natroun substation will strengthen the subtransmission and distribution networks through feeder interconnection of the electrical capacity installed at existing substations, and will improve the network system reliability. The proposed substation will be interconnected with a double circuit 220KV transmission line to the existing Sixth of October 220/66KV substation.

- **Canal and Northern Upper Egypt Regional Control Centers:** These control centers will allow EEA to monitor and control the transmission (500KV and 220KV) and subtransmission (132KV and 66KV) of electricity within their respective regions. The centers will have three main functions: 1) collecting, instantaneously displaying and storing data regarding the operating condition of the system; 2) providing remote control of selected circuit breakers and switches; and, 3) transmitting data, operating instructions and verbal conversations by a communications system between the regional control center, the national control center in Cairo, substations and maintenance centers within their respective operating regions. The system will be designed so that regional operating and maintenance personnel can be made aware of the current condition of the power system and problems as they occur, allowing for the necessary action to be taken to restore service rapidly. The EEA control center staff will utilize the information to more effectively manage the operation of this complex network. Effective management will contribute to reduced losses, enhanced quality of service, and insure the utmost reliability for customers depending on continuous service.
- **High Dam Control Room SCADA:** The High Dam control room, which was constructed in 1967, has not kept pace with either the expansion of the power system or advances in system control technology. The High Dam control room is without telemetry and telecontrol facilities, and relies basically on human operation through the use of telephone conversations. As a result, the existing system does not provide the necessary information in a timely fashion or in the detail required for the system operators to base operating decisions. In recognition of this deficiency, the High Dam control room will be provided with a Supervisory Control and Data Acquisition (SCADA) System, i.e., the software and hardware used to control an electric system remotely and to acquire data on its status, which will facilitate the supervision and control of the High Dam power system.

- **High Voltage Test Laboratory:** The existing high voltage test laboratory, located at the Pyramids High Voltage Research Center, is obsolete and not equipped to carry out high voltage testing required to meet existing standards. The lab will be upgraded to carry out the testing of high voltage equipment, such as power transformers, insulators, cables and conductors, arresters, circuit breakers, and disconnecter switches. In addition, research will be performed at the lab to assist in the development of gas insulating switch gear, DC high voltage transmission, insulation materials, and contamination and washing systems. A transmission tower testing facility equipped with appropriate instrumentation will be installed so that EEA can test tower designs.
- **Planning Software:** One of the key reform targets in the MOU between the GOE and USAID is the improvement of system planning and operations. To achieve this target, some of the planning software used by EEA should be replaced. For example, the program that is currently used to estimate load profiles is very deficient; it is time consuming to run, inflexible, and requires many manual inputs. Therefore, the Project will finance the upgrading of computer software currently in use by EEA.
- **Abu Sultan Control Replacement:** The current control system at the USAID-financed Abu Sultan power station utilizes analog processing, for which spare parts are no longer available. In order to maximize unit efficiency, and therefore system efficiency, state-of-the-art combustion management controls using digital instrumentation will be installed. Automatic Generation Control (AGC) will be modernized and integrated into the station control system.
- **Time-of-Day Metering:** An Electricity Pricing Study was completed by RCG/Hagler, Bailey, Inc., in January 1992. One major recommendation of this USAID-funded study was that EEA strive to sell every kWh on a time-of-day (TOD) tariff. EEA sells power at approximately 3,000 delivery points. Thus, it should be possible to proceed in a phased manner to procure and install TOD meters at each delivery point within a three year timeframe.

D. PROJECT INPUTS

1. Policy Reform Technical Assistance and Training

EEA will require technical assistance to implement some of the policy reforms agreed to under the Project. The technical assistance contractor will assist EEA in developing and implementing procedures, laws, regulations, annual business plans and other institutional development tasks as required by EEA and USAID. The scope of work for this contractor (see attachment to Annex L) will be developed closely with EEA based on the recently completed assessment of the Egyptian electric power sector and the reforms agreed to between EEA and USAID. For planning purposes, institutional development technical assistance will consist of 216 person-months of resident expatriate long-term assistance, and 50 person-months of intermittent short-term expatriate assistance. This level of effort is based on an in-country expatriate team of six individuals for three years.

The project will fund both in-country and participant training. Implementation of training will be through the institutional development technical assistance contractor who will also be responsible for developing the life-of-project training plan and a detailed budget. Specialized operations and maintenance training will be provided by equipment suppliers for the equipment financed under the project. This training will be incidental to the equipment supply and installation contract(s), and thus is not considered participant training.

2. Equipment and Construction

Equipment and construction services will be provided to finance discrete, stand-alone infrastructure development activities such as those described in Section 2.3 above. Equipment procurements will include: time-of-day metering, planning software, and a high voltage test lab. Construction activities will consist of: static VAR compensators, a transmission substation, two regional control centers, a control room SCADA for the High Dam, and the replacement of controls at Abu Sultan.

3. Engineering and Construction Management

The project will provide U.S. engineering and consultant management services to assist in the design, procurement, project management and supervision of the work associated with the construction of the facilities and installation of the equipment to be procured under the project. Recognizing the varying types of equipment and facilities to be procured, two separate Consulting Engineering contracts will be

competed and awarded. The first contract will be for engineering and construction management services for the static VAR compensators. This contract will also include options to design and manage the construction of the Wadi El Natroun substation, the Abu Sultan control replacement, as well as to procure time-of-day metering, planning software and the renovation of the high voltage laboratory. The second contract will be for the engineering and construction management services for the more technically complex regional control centers and the High Dam control room SCADA.

III. COST ESTIMATE AND FINANCIAL PLAN

A. PROJECT COST ESTIMATE

The project cost estimates are summarized below:

Table 3-1. Summary Cost Estimate and Financial Plan (000).

Use of Funds	Source of Funds	
	USAID - \$	GOE - LE
<u>POLICY REFORM/INST. DEVT.</u>		
TA and Training	16,000	--
<u>INFRASTRUCTURE DEVELOPMENT</u>		
Engineering Services	15,000	11,000
Equip. and Constr. Services	158,000	87,000
Audit and Evaluation	500	--
Contingency	10,500	--
TOTAL	200,000	111,000²

B. USAID PLANNED OBLIGATION

The USAID obligation for this seven-year project will be \$200 million in life-of-project funds, with annual obligations of \$50 million over the initial four years, from Fiscal Years 1994 to 1997, as summarized below:

²Includes LE 13 million in-kind contribution - see Table 3-4, Section 3.6

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Table 3-2. Obligation of Project Funds (\$000).

Project Component/Element	Obligation Schedule				Total
	FY 94	FY 95	FY 96	FY 97	
<u>POLICY REFORM/INST. DEVT.</u>					
1. TA and Training	16,000	0	0	0	16,000
<u>INFRASTRUCTURE DEVELOPMENT</u>					
2. Static VAR Compensators	25,010	0	0	0	25,010
- Engineering Services	2,010				2,010
- Equip. and Const.	23,000				23,000
3. Planning Software	2,990	0	0	0	2,990
- Engineering Services	990				990
- Equip. and Const.	2,000				2,000
4. Wadi El Natroun Substation	0	33,780	0	0	33,780
- Engineering Services		2,780			2,780
- Equip. and Const.		31,000			31,000
5. Abu Sultan Controls	0	9,790	2,190	7,790	19,770
- Engineering Services		790	190	790	1,770
- Equip. and Const.		9,000	2,000	7,000	18,000
6. Time-of-Day Metering	0	0	0	3,260	3,260
- Engineering Services				260	260
- Equip. and Const.				3,000	3,000
7. High Dam Control Room SCADA	0	2,170	0	3,260	5,430
- Engineering Services		170		260	430
- Equip. and Const.		2,000		3,000	5,000
8. Canal Zone Control Center	0	0	33,780	0	33,780
- Engineering Services			2,780		2,780
- Equip. and Const.			31,000		31,000
9. High Voltage Test Lab	0	0	13,030	2,170	15,200
- Engineering Services			1,030	170	1,200
- Equip. and Const.			12,000	2,000	14,000
10. NUE Regional Control Center	0	0	0	33,780	33,780
- Engineering Services				2,780	2,780
- Equip. and Const.				31,000	31,000
11. Audit and Evaluation	100	0	0	400	500
12. Contingency	5,900	1,000	1,000	2,600	10,500
TOTAL	50,000	50,000	50,000	50,000	200,000
CUMULATIVE TOTAL	50,000	100,000	150,000	200,000	--

C. DETERMINATION PURSUANT TO SECTION 611(A) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

Project activities include foreign exchange financing for the supply and construction of two regional control centers, time-of-day metering, a transmission substation, planning software, a high voltage test lab, static VAR compensators, a control room SCADA, and control replacements; consulting engineering services; technical assistance and equipment support for institutional development; and training relevant to all components of the project. The estimated costs of the goods and services to accomplish the Project purpose are based on sound engineering practice as well as experience gained in implementing previous projects in the power sector. The plans for accomplishing the Project purpose are consistent with good utility practices. The project cost estimates were prepared by DR/PT based on information provided by the EEA Projects and Planning Departments for both the USAID dollar funds and the GOE Egyptian Pound (LE) contribution. EEA's projections are based on feasibility studies. DR/PT has reviewed the cost estimates and finds them reasonable.

As the foregoing indicates, all plans necessary to carry out this project and a reasonably firm estimate of the cost to the United States government have been completed. It is the conclusion of the Project Design Team that the requirements of Section 611(a) of the Foreign Assistance Act of 1961, as amended, have been satisfied.

D. USAID EXPENDITURES PROJECTIONS

The USAID annual obligation will cover the expenditures for engineering services, technical assistance and training, equipment and installation services, audit and evaluation, and contingency. The USAID annual projected expenditures are shown in Table 3 below:

Table 3-3. Expenditure Projections (\$000).

Project Component/Element								TOTAL
	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	
<u>POLICY REFORM/INST. DEVT.</u>								
TA and Training	3,000	4,000	5,000	2,000	1,500	500	0	16,000
<u>INFRASTRUCTURE DEVELOPMENT</u>								
Engineering Services	2,000	4,000	5,000	2,000	1,500	300	200	15,000
Equip. and Const. Services	12,000	20,000	30,000	44,000	30,000	18,000	4,000	158,000
- Static VAR Compensator	10,000	13,000	0	0	0	0	0	23,000
- Planning Software	2,000	0	0	0	0	0	0	2,000
- Time-of-Day Metering	0	0	0	0	3,000	0	0	3,000
- Wadi El Natroun Substation	0	4,000	14,000	13,000	0	0	0	31,000
- Abu Sultan Control Replacement	0	2,000	9,000	7,000	0	0	0	18,000
- High Dam Control Room SCADA	0	1,000	3,000	1,000	0	0	0	5,000
- Canal Regional Control Center	0	0	2,000	11,000	14,000	4,000	0	31,000
- High Voltage Test Lab	0	0	2,000	10,000	2,000	0	0	14,000
- NUE Regional Control Center	0	0	0	2,000	11,000	14,000	4,000	31,000
Audit and Evaluation	0	0	0	200	0	0	300	500
Contingency	0	3,000	2,000	5,000	500	0	0	10,500
TOTAL	17,000	31,000	42,000	53,200	33,500	18,800	4,500	200,000
CUM. TOTAL	17,000	48,000	90,000	143,200	176,700	195,500	200,000	--

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E. FUNDING RESPONSIBILITIES

USAID grant funds will finance the foreign exchange and local currency costs for consultant services. USAID will also finance the foreign exchange costs associated with design, supply, construction and training contracts under the Project's various infrastructure components. Payment will be made by USAID through direct letters of commitment. The GOE contribution of LE 98 million cash and LE 13 million in-kind will finance the other local currency costs associated with the project including land acquisition, building construction and civil works. For the GOE cash contribution, the GOE will issue appropriate local currency letters of credit to eligible suppliers of equipment and materials. The in-kind contributions include counterpart personnel costs, services, administrative costs, fair market value of land contributed and other similar costs.

The Project Grant Agreement will contain a Condition Precedent to Disbursement requiring that proceeds of the Grant used for equipment and construction will be lent from the cooperating country to EEA (see Section 7.1).

F. GOE CONTRIBUTION

The projected GOE cash and in-kind contribution is presented in Table 4 below.

Table 3-4. Estimated GOE Contribution (LE 000).

Item	Contribution Schedule						Total
	1995	1996	1997	1998	1999	2000	
Cash - BAB 3	5,000	18,000	24,000	24,000	20,000	7,000	98,000
In-kind - Land	2,000	3,000	5,000	0	0	0	10,000
In-kind - Buildings	500	500	0	0	0	0	1,000
In-kind - BAB 1 Salaries	100	100	200	200	200	200	1,000
In-kind - BAB 2 Operating Costs	100	100	200	200	200	200	1,000
TOTAL	7,700	21,700	29,400	24,400	20,400	7,400	111,000

Host country contribution estimates are based on consultations with the GOE as well as current host country contributions for ongoing projects in the electric power sector. The Project Grant Agreement will include a Condition Precedent to Disbursement

requiring evidence that local currency financing for the Project has been budgeted by the cooperating country and will be available for timely expenditure by EEA (see Section 7.1).

The cash contribution will be allocated in the implementing agency's annual budget BAB 3 - Capital Investment, as approved by the GOE Ministry of Planning and Ministry of Finance. The implementing agency will maintain records on both cash and in-kind contributions to the project. The implementing agency will submit annual and quarterly reports to the USAID project office, according to guidance provided in the Project Agreement and Project Implementation Letters. The implementing agency reports on planned and actual contributions will be based on its accounting system and financial regulations.

G. ASSESSMENT OF THE EGYPTIAN ELECTRICITY AUTHORITY CONTRACTING AND VOUCHER PROCESSING CAPABILITIES

Since 1977, EEA has effectively implemented eleven projects financed by USAID, involving obligations exceeding \$1.6 billion. EEA has utilized host country contracting mechanisms for more than eighty contracts for these projects, and has extensive experience in contracting for services and equipment being financed from a wide range of bilateral and multilateral financing agencies. During this period, no areas of specific or material weaknesses in EEA's contracting or voucher examination capabilities were observed.

A comprehensive general assessment of EEA's accounting, internal controls and contracting capabilities was completed in December 1991 by a local CPA firm, and EEA was certified to that effect. The assessment examined EEA's capabilities in advertising, awarding and negotiating contracts, monitoring contract implementation and invoice examination. This assessment will be updated prior to the expiration of the current certification in December 1994. Costs related to updating EEA's host-country contracting and voucher examination capability will be financed under the current Power Sector Support Project (263-0215).

H. AUDIT, ASSESSMENT, AND EVALUATION COVERAGE

Funds provided by this project will be used to finance lump sum host country contracts with U.S. companies for the provision of equipment and construction services. Since these are lump sum, competitively bid, fixed price contracts, they are not subject to audit of costs except for any cost reimbursable items. They are, however, subject to audit for compliance with other USAID regulations. The project will also utilize consultant engineering services financed through a host country cost plus fixed-fee contract, and technical assistance financed under a

USAID-direct cost plus fixed-fee contract. The project budget includes approximately \$200,000 to cover the auditing of these contracts. Approximately \$300,000 has been included for evaluations. Evaluation arrangements are discussed in Section 8.0 of this project paper.

I. METHODS OF IMPLEMENTATION AND FINANCING

The following table illustrates the methods of implementation and financing for USAID funds as planned in the Power Sector Support II Project Paper:

Table 3-5. Proposed Methods of Implementation and Financing.

Project Element	Approximate Value (\$000)	Proposed Method of		Type of Contract	Implementing Agency
		Implementation	Financing		
Engineering Services	15,000	Host Country	Direct L/Com	Cost + Fixed Fee	EEA
Equip. and Const. Services	168,500	Host Country	Direct L/Com	Lump Sum	EEA
TA/Training	16,000	USAID Direct	Direct Payment	Cost + Fixed Fee	USAID
Audit/Eval.	500	USAID Direct	Direct Payment	Cost Reimburse.	USAID

The justification for using Direct Letters of Commitment is to increase competition among bidders. The Mission believes that firms are more likely to bid on the various project components with the knowledge that payments will come directly from USAID.

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IV. IMPLEMENTATION PLAN

A. PROJECT APPROACH

The proposed project consists of a seven year, \$200 million activity to finance capital improvements, technical assistance and training, which will leverage specific policy and institutional reforms identified in a MOU signed by the GOE and USAID (see Annex N).

EEA is a parastatal organization which generates revenue sufficient to cover its operations and maintenance costs as well as part of its capital requirements. EEA has demonstrated its ability to maintain equipment similar in design and complexity to the equipment proposed for funding under this project. However, there are a number of political, legal, financial and administrative barriers to achieving full self-sufficiency with regard to EEA's ability to operate on a commercial basis and to self finance its capital investment program on a commercially acceptable scale. It is thus appropriate that the project address the need to implement sectoral reforms that will overcome these barriers.

A comprehensive assessment of the Egyptian electric power sector (completed December 15, 1993), as well as an electricity pricing strategy study (completed in January 1992), were financed under the Mission's Power Sector Support Project (263-0215). The assessment identified those structural, policy, managerial and financial reforms that are most critical to the growth and stability of the electric power sector in Egypt. The Ministry of Electricity and Energy (MEE) and EEA fully support the assessment and study, and have agreed to a series of reforms based upon the documents' recommendations. These reforms would involve a hierarchy of issues: issues within the control of the sector that can be dealt with by EEA; issues involving internal policies that must be addressed by the Minister of Electricity and Energy; and, issues involving broad policies of a national concern that can only be addressed by the most senior levels of the GOE.

Prior to Project approval (FY 1994), EEA and USAID reviewed the results of the recently completed sector assessment mentioned above (see Annex O), and identified a package of reforms to be achieved over the life of the project, together with a time-sequenced plan for achieving the reform objectives. The agreed-upon reforms seek to increase the efficiency and sustainability of the electric power sector by: (i) improving EEA's financial viability through tariff reforms that achieve economic pricing, putting EEA's financial operations on a commercial basis, and strengthening EEA's accounting systems and procedures to produce accurate and timely information for financial tracking and planning; (ii) modifying EEA's charter so as permit it to operate on a commercial and autonomous basis; (iii) establishing an

independent utility regulatory framework for electric utilities that results in a regulatory process that is transparent, fair, and permits informed decisions regarding economic, financial, environmental, and service issues; and, (iv) improving EEA's planning and efficiency by developing a strategic business plan, strengthening system planning and operations, and developing and properly allocating human resources. The reform package and plan is incorporated in a Memorandum of Understanding (MOU) signed by MEE, EEA, MIC and USAID.

USAID's contribution of \$200 million in LOP funds will be obligated in four annual tranches, with an initial obligation of \$50 million in FY 1994, followed by three annual obligations of \$50 million in FYs 1995-97. The size of the actual obligation may be adjusted up or down by USAID to reflect the magnitude of EEA reform efforts and progress toward the agreed upon reform targets stated in the MOU. All funds will be used by EEA to finance equipment and services.

The mechanism for implementing the policy reform feature of the project consists of a reform program for the FY 1994-97 period, which includes a set of benchmark actions to be completed during each year of the program as a condition to obligating the funding tranches programmed for each year. Completion of the benchmark actions will result in meeting reform targets which, when achieved, will assist the GOE to meet its policy reform objective and goal for the electric power sector.

Joint USAID/EEA/MEE/MIC reviews of policy performance, as compared to the agreed upon benchmark actions, will be conducted semi-annually (second and fourth U.S. fiscal year quarters) beginning in the fourth quarter of FY 1994. On the basis of these reviews, USAID will determine whether the GOE is making appropriate progress in completing specific benchmark actions. Obstacles to achieving the specified benchmarks will be identified and appropriate corrective actions will be discussed. The project includes provisions for a long-term technical assistance contractor to assist EEA in implementing the reform program. Specialized short-term technical assistance, financed from the project, will also be available.

If it is determined that all benchmark actions for the specific year have been or will be met, and if other project conditions and covenants are being satisfactorily observed, USAID would then obligate the relevant tranche. In case of partial achievement of the reform objectives, the size of each year's obligation may be adjusted to reflect the magnitude of EEA reform efforts and of the sector's progress toward achievement of the agreed-to reform targets for that year. Similarly, USAID may decide to advance (subject to availability of funds) or defer obligation of a planned tranche if EEA accelerates or delays its implementation of the policy reform program described in the MOU.

As in the case of the Power Sector Support Project (263-0215), the grant agreement will include a condition precedent to disbursement calling for evidence that project funds provided by USAID for the procurement of equipment and construction services (projected at 79 percent of LOP funding, not including contingencies) will be loaned to EEA from the GOE. Funds for technical assistance and training will be passed to EEA as a grant. In addition to engineering and construction management services, technical assistance funds will be used to obtain institutional development technical assistance to assist EEA in the implementation of agreed-upon policy reforms, and in the development, implementation and management of a training program, including training equipment as necessary.

B. MANAGEMENT AND ADMINISTRATIVE ARRANGEMENTS

EEA will have primary responsibility for the overall management of project implementation. EEA has many years of extensive and successful experience in undertaking similar projects, particularly USAID funded projects, and thus have adequate staff for project implementation (see Annex L). Due to the technical complexity and interface requirements of the two regional control centers and the High Dam control room SCADA, a Condition Precedent will require EEA to establish special project management teams for these components of the project. These teams will report directly to the EEA Chairman. The teams will have authority to manage these more technically complex components on a day-to-day basis. EEA will continue to use project teams reporting to the Vice Chairman of Projects for the Static VAR Compensation, Wadi El Natroun substation, and Abu Sultan control replacement, as well as to procure time-of-day metering and planning software, and renovation of the high voltage test lab. The establishment of project management teams provides for more efficient project implementation on the part of EEA.

The USAID Office of Power and Telecommunications, within the Development Resources Directorate (DR/PT), will have monitoring responsibilities for USAID. The Office is staffed with experienced electrical engineers and project managers who have been responsible for the implementation of the \$461 million Power Sector Support Project (263-0215) as well as other projects within the power and telecommunications sectors. The staff has developed an excellent working relationship with all levels of EEA. In addition, the DR/PT staff will receive implementation support from the project team, which is comprised of representatives from the various support offices within the Mission, including: the Contracts Office, the Financial Analysis Office, the Economic Analysis and Policy Directorate, the Program Development and Support Directorate, the Legal Office, and the Education and Training Office.

C. PROCUREMENT PLAN

1. Consulting Engineer

EEA will require the services of qualified U.S. Engineering and Construction Management Contractors (E&CMC) to assist in the design, procurement, project management and supervision of the work associated with the construction of the facilities and installation of the equipment to be procured under the Project. Host Country Contracting procedures for Professional and Technical Services (AID Handbook 11, Chapter One) will be used in consideration of EEA's generally successful awarding and administration of similar contracts under the Power Sector Support Project. (See Section 3.7 on EEA's contracting capabilities.)

Recognizing the varying types of equipment and facilities to be procured under the project, two separate Consulting Engineering contracts will be competed and awarded. Each of the contracts will be competed, negotiated and awarded for the packages as specified below. The E&CMC will not initiate work on a particular package unless EEA meets the pre-conditions established in the MOU and USAID obligates sufficient funding to fully finance the procurement. This obligation will enable EEA to exercise the option in the E&CMC's contract to begin the design of the relevant subproject. The E&CMC will only mobilize sufficient staff to implement the agreed upon subproject, which will preclude the need to partially terminate the contract for convenience in the event USAID does not agree to obligate funds for a particular subproject.

The first E&CMC contract will be for the installation of the static VAR compensators, with options to design and manage the Wadi El Natroun substation and the Abu Sultan Control Replacement, and timely procurement of planning software, time-of-day metering and the renovation of the high voltage test lab. Note that the various components of the high voltage test lab may be competed as a whole package for which the E&CMC will develop the specifications and assist EEA in the competition, award and supervision of a single host country contract.

The second contract will be for the E&CMC of the more technically complex subprojects involving the Canal and NUE Regional Control Centers and the High Dam Control Room SCADA. Again, USAID must obligate adequate funding under the project before EEA can exercise the option to proceed with the work on a particular subproject.

Contracting procedures will consist of an initial pre-qualification round based on submitted SF 254s ("Architect-Engineer and Related Services Questionnaire for Specific Projects"), after which the short-listed firms will be issued Requests for Technical Proposals (RFTPs). The pre-qualified

firms will prepare technical proposals which will be evaluated by EEA's evaluation committee as part of their response to the RFTP. Following the technical evaluations, a cost proposal will be requested from the top-ranked offeror. If negotiations are successful, award of the contract will be made accordingly, otherwise EEA may initiate negotiations with the second ranked firm.

Both contracts will provide for additional work under the project as necessary and appropriate. A FIDIC-type scope of work will permit the E&CMC to work closely with EEA host country contracts. The participation of disadvantaged enterprises in this procurement will be encouraged in accordance with Mission policy. The technical complexity, demonstrated experience and size of these procurements makes it inappropriate for an 8(a) set-aside.

2. Equipment

It is anticipated that EEA will follow competitive bidding procedures under AID Handbook 11, Chapter 3 (Equipment) in awarding contracts to pre-qualified U.S. Contractors for the time-of-day metering, planning software and high voltage test lab. These contracts will also entail incidental services for training and installation. As mentioned above, the E&CMC will assist EEA in the development of the specifications, solicitations, negotiations and awards. Award will be to the lowest, responsive, responsible bidder.

The high voltage test lab will include incidental upgrading of the building and office space to accommodate the new equipment, which will likely require a subcontract with a suitably qualified Egyptian construction firm. The U.S. prime contractor, however, will be held responsible for the quality and performance of all works. Utilization of disadvantaged enterprises will be encouraged.

3. Construction

The static VAR compensators and Wadi El Natroun substation construction contracts involve the procurement of equipment normally manufactured to meet utility requirements. Construction will also include foundations typically utilized in the utility industry for similar applications. Equipment specifications to be used as the basis for competitive bidding already exist for the type of equipment to be procured and installed. EEA will adhere to normal competitive bidding procedures described in AID Handbook 11, Chapter 2, Section 3.6. EEA and the E&CMC will pre-qualify bidders for each procurement, conduct pre-bid conferences and inspections of the respective sites for all pre-qualified bidders, and following the submission of bids, will evaluate the bids for responsiveness. Finally, for each procurement, EEA will award a contract to the lowest responsive, responsible bidder.

Given the relative complexity of the equipment and performance-type specifications expected to be used for the Canal and NUE Regional Control Centers, the High Dam Control Room SCADA, and possibly the Abu Sultan Control Replacement, where appropriate EEA will adhere to two-stage competitive bidding procedures as described in AID Handbook 11, Chapter 2 (Construction Services), Section 3.6.6, in awarding contracts.

Although the E&CMC will be responsible for the preliminary design of these facilities, prospective bidders will be required to submit technical proposals. With the assistance of the E&CMC, discussions will be conducted by EEA with the offeror to obtain additional information, clarification or revisions which may be required. Technical proposals will be categorized by EEA and the E&CMC as unacceptable, conditionally unacceptable or fully acceptable. A technical proposal will only be categorized as unacceptable if it cannot be made acceptable within a reasonable degree of effort given the time constraints of the procurement process.

After the discussion phase, bids will be invited only from firms with technical proposals deemed fully acceptable, based on the discussions with EEA. The specifications to be used as a basis for bidding will be those contained in the bidder's technical proposal as modified and accepted by EEA during the technical evaluation phase. The lowest responsive, responsible bidder will then be awarded the contract.

This two-stage process will enable EEA to establish and refine technical specifications through discussions with pre-qualified bidders before the submission of prices. Approval of this Project Paper constitutes approval by the Mission Director for this type of procurement as required by HB 11, Chapter 2, Section 3.6.6.1.a.

The procurement of these subprojects will be tranching, subject to obligation of sufficient funds under the overall project.

The construction of these facilities will likely require the U.S. Prime Construction Contractors to subcontract with suitably qualified Egyptian construction firms. The U.S. prime contractor, however, will be held responsible for the quality and performance of all works. Utilization of disadvantaged enterprises will be encouraged.

4. Institutional Development TA Contract

A technical assistance contractor will be required to assist EEA in developing and implementing procedures, laws, regulations, training, annual business plans and other institutional development tasks as required by EEA and USAID. The scope of work for this contractor (see attachment to Annex L) will be developed closely with EEA based on the recently

completed assessment of the Egyptian electric power sector and the reform program agreed to between EEA and USAID.

A cost-plus-award-fee, performance-based, USAID direct contract is anticipated. The success of the contract will be measured by the degree to which the established contract outcomes are achieved using validated indicators. Although measured by a mix of indicators, the focus will be on the outcome of the contract, i.e., the change that occurs as result of the activities conducted in the scope of work. Each outcome is linked to tasks to be performed by the contractor. These tasks are specific pieces of work to be carried out by the contractor which, when completed, should contribute to achievement of the outcome to which they are related. The contract outcomes will be based on the MOU.

For monitoring and evaluation purposes, indicators will be established for each outcome under the contract. All tasks and activities planned and carried out under this contract will also have established indicators. For each task listed in the statement of work, offerors will be expected to propose their recommended approaches to carrying out the task and achieving the outcome to which the task contributes. In addition, the offerors will state the indicators which will be used to measure progress and define success of that task.

The Contractor will provide an adequate number of professionals with appropriate disciplines and skills to work with EEA to plan and implement each reform action within the agreed-upon time frame. The contractor team will consist of experienced personnel in areas such as accounting, systems management, regulatory boards, legal, utility management, utility economics, manpower development, power system engineering and other areas as required. The duration of the contract is initially for 36 months with a 12 month option for extension. A draft of the statement of work will be issued to interested offerors for comments and suggestions, if time permits, to assure understanding, comprehensiveness and contractibility.

Small business concerns, small disadvantaged business concerns and women-owned small businesses will be encouraged to participate as prime or subcontractors in accordance with Federal Acquisition Regulations Part 19 and USAID/Cairo's Gray Amendment Policies.

5. Mode of Contracting and Financing Procedures

USAID grant funds will finance the foreign exchange cost of the consulting engineering contractor and the foreign exchange and foreign exchange equivalent of local currency costs for the institutional development contract. Both contracts are anticipated to be cost type with payment paid directly by USAID

for the institutional development contractor and by a USAID/Cairo Direct Letter of Commitment for the E&CMCs.

Funds provided by this project will be used to finance host-country, firm, fixed-priced contracts between EEA and U.S. suppliers of equipment and construction services. All equipment and materials to be financed by USAID funds will comply with the standard U.S. source/origin rules. These implementation methods and contracting procedures have been successfully adopted for the contracts financed by USAID under the Power Sector Support Project (263-0215). The contractors will be paid through use of USAID Direct Letters of Commitment and where EEA is responsible for payment, Egyptian Pound letters of credit.

6. Buy America Considerations

With the exception of audits and local currency expenses financed by EEA, the source of all inputs funded by USAID under this project will be USAID Geographic 000, as all inputs will be provided through U.S. contractors. Any local procurement and local currency expense will be financed by EEA. Audit services will be obtained locally, but as these will be professional services contracts estimated not to exceed \$250,000, they are exceptions in line with HB 1, Supplement B, Chapter 18, Item A1c(4).

It is anticipated that the USAID direct-funded U.S. contractors will spend approximately \$7 million on residential and office rent, utilities, temporary lodging allowance, education allowance, local per diem, salaries of local staff, office consummables and short-term vehicle rental. As these are composed of commodities and services that are available only locally, local procurement of these items is eligible in accordance with HB 1, Supplement B, Chapter 18, Item A1c(6).

D. TRAINING PLAN

The project will fund both in-country and participant training. Implementation of training will be through the technical assistance contractor who will also be responsible for developing the life-of-project training plan and budget.

EEA has for many years provided training for its technical personnel. In view of the reform program on which this project is based, it will be of prime importance to re-orient the management of EEA towards commercialization. This will require executive training geared toward the operation of a profit driven utility. Such training should also include the promotion of: a more customer-oriented attitude; a better understanding of the cost structure of EEA's operations; and, the training of accounting and financial personnel in the operation of modern accounting systems, computerization, and international financial

issues such as foreign exchange risks and international lenders' requirements.

One of the first tasks of the technical assistance and training contractor will be to review the electric power sector assessment, and, in coordination with EEA, develop a training needs assessment. Then, based on the needs assessment, the contractor will develop a comprehensive training plan and budget covering both in-country and participant training. The training plan will be developed in accordance with guidelines in Handbook 10 (Participant Training) and Mission Order 10-1 (Participant and In-country Training) and will include the needs assessment, implementation plan, monitoring, reporting and follow-up plans, and a training evaluation plan. As required by Mission Order 10-1, the plan will be approved by the Power Sector Support II project team, as well as DR/PT and HRDC/ET, prior to implementation and disbursement of funds for training.

An additional task of the technical assistance and training contractor will involve working with EEA to determine the kinds of training courses to be provided, review and refine curriculum for existing training programs offered by EEA, determine the need for additional training courses including the development of curriculum and training material, identify and procure appropriate training-related equipment, develop a cadre of skilled trainers to conduct programs, and develop EEA staff to plan, manage, and implement an ongoing, comprehensive staff development and training program for its personnel.

In addition to providing appropriate personnel for technical assistance activities, the technical assistance and training contractor will provide a combination of both long-term and short-term training expertise to develop the training plan and implement training activities over the life of project. At least one long-term, resident training specialist will be required as well as short-term consultants to assist in the development of the training plan and budget. Short-term training specialists (expatriate and Egyptian) will also be required to assist EEA with planning and implementing, monitoring, reporting on, and evaluating the in-country training and in institutionalizing EEA's in-house training capacity and training facility.

The training program will be coordinated with the training activities under the Energy Manpower Development (EMD) Project (263-0140.4). The purpose of the EMD Project is to improve the technical and managerial capacities of the petroleum and electricity sectors through capacity building, i.e., training programs, training of trainers, and improving training facilities. Thus, the training activities under the EMD Project will be used as resources for the Power Sector Support II Project training activities.

Although precise estimates of training costs cannot be made at this time, \$16 million in project funds are to be allocated for institutional development technical assistance, which will include training activities. Equipment suppliers, as part of their commodity package, will provide training related specifically to the installation, operation and maintenance of the equipment supplied. As noted in the Technical Analysis (Annex H, Section C.5) and in Section 7.2 of this Project Paper, EEA will provide an existing building to house a comprehensive training facility for the ongoing training of EEA staff.

E. IMPLEMENTATION SCHEDULE

Detailed implementation schedules for the infrastructure subprojects will be included in the design reports prepared by the engineering consultants and submitted to EEA within two months after mobilization.

Below is an illustrative list of major implementation actions and a projected schedule. This schedule will be updated by EEA and USAID annually, at a minimum.

IMPLEMENTATION SCHEDULE

ACTIVITY	U.S. FISCAL YEAR QUARTER									
	94	95	96	97	98	99	00	01	02	
A. EEA Contracting Assessment		1Q								
B. Technical Assistance										
1. CBD Notice for TA	3Q									
2. RFP for TA	3Q									
3. TA Interviews Completed		1Q								
5. Award for TA		1Q								
6. TA Mobilized		2Q								
C. Engineering Consulting Services										
1. Consultant Advertized	3Q									
2. Consultant Short List Approved	4Q									
3. RFP Issued to Consultants		1Q								
4. Award for Consultant		1Q								
5. Consultant Mobilized		2Q								
D. Planning Software Procured		3Q								
E. Static VAR Compensators										
1. Final Design and Specs. Complete		3Q								
2. Construction Contract Signed			1Q							
3. Construction Started			2Q							
4. Construction Completed					2Q					
5. Warranty Period Complete						2Q				
F. Time-of-Day Metering Procured						2Q				
G. Wadi El Natroun Substation										
1. Final Design and Specs. Complete			1Q							
2. Construction Contract Signed			4Q							
3. Construction Started				1Q						
4. Construction Completed						1Q				
5. Warranty Period Complete							1Q			

IMPLEMENTATION SCHEDULE

ACTIVITY	U.S. FISCAL YEAR QUARTER									
	94	95	96	97	98	99	00	01	02	03
H. Abu Sultan Control Replacement										
1. Final Design and Specs. Complete				1Q						
2. Installation Contract Signed				4Q						
3. Installation Started					1Q					
4. Installation Completed							1Q			
5. Warranty Period Complete									1Q	
I. High Dam Control Room SCADA										
1. Final Design and Specs. Complete			1Q							
2. Installation Contract Signed				1Q						
3. Installation Started				3Q						
4. Installation Complete							4Q			
5. Warranty Period Complete									4Q	
J. Canal Regional Control Center										
1. Final Design and Specs. Complete					1Q					
2. Construction Contract Signed						3Q				
3. Construction Started						4Q				
4. Construction Complete								4Q		
5. Warranty Period Complete										4Q
K. High Voltage Test Lab										
1. Final Design and Specs. Complete						1Q				
2. Construction Contract Signed						4Q				
3. Construction Started							1Q			
4. Construction Complete								1Q		
5. Warranty Period Complete										1Q
L. NUE Control Center										
1. Final Design and Specs. Complete					1Q					
2. Construction Contract Signed							1Q			
3. Construction Started							2Q			
4. Construction Complete										4Q
5. Warranty Period Complete										03

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V. MONITORING PLAN

A. MONITORING RESPONSIBILITIES

Both the DR and EAP Directorates in USAID/Cairo monitor policy developments in the power sector as part of their ongoing responsibilities. Information on the impacts of electricity pricing reforms on the macroeconomy are continuously gathered via special studies designed by USAID staff economists and/or via external project evaluations. Data necessary to facilitate decisions regarding obligation and release of funds under the Power Sector Support II Project will be collected primarily by the Institutional Development Contractor (IDC). This data, supplemented by additional sources available to USAID, will then be analyzed and presented to Mission management and to the Project Team by USAID/Cairo's DR and EAP Directorates.

Monitoring responsibilities related to the infrastructure components will be carried out by DR/PT. In addition to participating in reviews of contractors' progress and preparation of contractors' work plans (described below), DR/PT representatives will conduct periodic site visits to confirm progress indicated in monthly contractor reports (described below).

B. PROJECT PERFORMANCE INDICATORS, AND DATA COLLECTION METHODOLOGIES

Performance indicators for achievement of the project purpose will be those policy/institutional reforms set forth in the MOU signed by the GOE and USAID. Indicators include:

- Electricity tariffs reach 100 per cent of Long Run Marginal Cost.
- Accounts receivables reduced to 75 days or less.
- EEA achieves a debt service ratio of at least 1.5.
- An improved automated accounting and financial management system is fully operational.
- Fixed asset records are up to date, and improved accounting and cost allocation procedures are fully operational.
- Charter modifications and/or presidential decrees are implemented that permit EEA to operate on a commercial and autonomous basis.
- A fully functioning regulatory body for electric utilities is operating effectively.
- Strategic business plans are prepared and implemented.
- Load forecasting and system planning methodologies are improved and used.
- Generating units are dispatched continuously so as to achieve target reliability at the lowest system cost.

- Preventative maintenance procedures are operational in 75 per cent (by capacity) of generating plants.
- Energy losses in the transmission system reduced by at least as much as the planned target.
- Heat rate testing and boiler performance monitoring programs are successfully operating.
- Performance targets relating to the implementation of an acceptable management training plan are met.
- An acceptable ratio of employees per kwh generated is met.

The Project outputs will supplement EEA investment funds to carry out capital improvements which contribute to the efficiency of the electric power system. The performance indicators of Project output achievement include:

- Static VAR compensators installed at the Cairo 500 power plant.
- Planning software in use at EEA.
- Transmission substation constructed and operational at Wadi El Natroun.
- Controls replaced and operating at Abu Sultan.
- Time-of-day metering installed and operating.
- SCADA system installed and operational at High Dam.
- Canal Regional Control Center constructed and operational.
- High Voltage Test Lab constructed and operational.
- NUE Regional Control Center constructed and operational.

The key purpose and output level questions are: (i) whether the agreed-upon policy and institutional reforms are being implemented as planned; and, (ii) whether the procurement, construction and installation of the infrastructure subprojects are proceeding as planned. If the answer to either of these questions is "no," then what factors are constraining timely or appropriate policy reform and/or installation/construction of system infrastructure? How can these constraints be overcome?

The procedures developed by DR/PT for collecting information on output level indicators will be supplemented by those established by the Institutional Development Contractor in their monitoring and evaluation plan. The Contractor's plan will quantify progress of both the Contractor and the overall Project in achieving specified outcomes. Benchmarks will also be established in these plans to monitor interim progress at both the contractual and project levels.

The engineering services contractor will have primary responsibility for monitoring all equipment supply/installation and construction activities and approving invoices submitted by all equipment suppliers. The engineering consultant will assist

EEA in monitoring the contractors' performance and will provide general support to EEA. Likewise, the technical assistance contractor will monitor policy reform progress as well as progress under the institutional development training program. Each contractor will implement monitoring systems with the following features:

- ▶ Monthly and Quarterly Reports
- ▶ Annual Work Plans
- ▶ Joint Annual Reviews of Progress

1. Monthly Progress Reports

The E&CMC will prepare monthly progress reports to communicate implementation progress and problems to the implementing agency and to USAID project management. These reports will discuss planned versus actual procurement and construction/installation, accomplishments of tasks and subtasks, and costs; will identify existing or expected problems/constraints which have or could result in delays or slippage; will propose and rank solutions to these problems; and, if appropriate, will present revised timetables for accomplishment of tasks.

These reports will be brief, concise and action oriented. The reports will include a prioritized list of issues which require action by either EEA or USAID project management. Issues will be presented in tabular format with entries for the following: assigned priority; brief description of issue; date identified; assistance needed; by when; and, current status. Issues will be repeated in the table until they are resolved.

Monthly progress review meetings will be held at each site. The monthly meetings will be attended by USAID, EEA, and the appropriate engineering consultant and contractor(s). Problems will be identified as they occur and will be resolved either on-site or submitted for discussion and resolution at the monthly site meetings. The consultants' monthly progress report will be the basis for the monthly progress review.

2. Quarterly Progress Reports

The IDC will prepare quarterly progress reports for EEA and USAID project management that will describe implementation progress and problems encountered. These reports will communicate information on resources (person-months and financial) expended and remaining, accomplishment of tasks and subtasks, problems experienced or anticipated and recommended or implemented solutions, as well as an updated timetable for accomplishment of tasks relative to the annual work plan.

The focus of the contract will be on the accomplishment of the specified tasks and subtasks rather than the generation of periodic reports; therefore, these reports will be brief, concise and action-oriented. The information will concentrate on issues and progress related to the tasks and subtasks in the contract as well as other information required under the contract for monitoring of EEA's progress in accomplishing the targets established in the MOU.

These reports will be supplemented by progress meetings with the IDC Team Leader on a weekly basis for the first three months while the contractor is mobilizing and biweekly once the work is well underway. The Project Officer must closely monitor the progress of the IDC to enable USAID to fairly assess their performance in determining an appropriate award fee on a semi-annual basis.

3. Annual Work Plans and Reviews

The annual work plan for each component of the Project will be developed together with the consultants, USAID Project management, and EEA counterparts, using conceptual guidance contained in the Project Paper along with changes suggested by review of implementation experience to date. The annual work plan is intended to answer the questions, "What exactly will we achieve this year?" and, "How will we achieve it?" The annual work plan will detail:

- ▶ The coming year's impact on the End of Project Status, output milestones, and a plan for data collection; and,
- ▶ A strategy for attaining these milestones (e.g., tasks, sequencing, responsible parties, target dates, deliverables), possible impediments/constraints to success, ways of alleviating these impediments/constraints, and alternative courses of action to pursue if they do materialize.

Joint annual reviews will be conducted to assess the past year's progress under each contract and to develop a strategy for attaining next year's milestones. This strategy will be embodied in the annual work plan for each contract. The contractors, EEA counterparts, the USAID Project Officer and selected USAID Project Team members will participate in the joint annual review. Participants will assess progress on selected indicators to determine whether implementation is progressing satisfactorily and assess the impact of the project outputs on beneficiaries. Implementation problems will be identified at the annual review along with proposed corrections or solutions.

4. **Semiannual Portfolio Reviews**

As an additional monitoring/oversight tool, the Mission undertakes semiannual portfolio reviews. The portfolio review scheduled in the Fall examines issues at the strategic objective level throughout the Mission's portfolio. The Spring portfolio review looks at implementation issues at the project output level. Both of these reviews will be useful in monitoring project progress at both the strategic and implementation levels.

VI. SUMMARIES OF ANALYSES

A. SUMMARY OF TECHNICAL ANALYSIS

The infrastructure components to be financed under the Project will enhance service to customers throughout Egypt. The capital improvements will enhance operations and communications within and among the control centers, power plants, substations and maintenance centers throughout the national power system.

The Canal and Northern Upper Egypt control centers will allow EEA to monitor and control the transmission and distribution system down through the circuit breakers to the medium tension circuits at the substation buses. The Wadi El Natroun substation will provide additional electrical network capacity to the existing distribution network service area. The static VAR compensators will provide the required voltage stability and reactive compensation to maintain system voltage levels, reduce electrical losses, and mitigate voltage swings during system disturbances caused by electrical short circuits on the transmission lines, switching surges and generation load rejections. The High Dam SCADA will be used to control the power plant remotely and to acquire data on its status, which will facilitate the supervision and control of the unit. The High Voltage Test Laboratory will be used by EEA to carry out the testing of high voltage equipment, such as power transformers, insulators, cables and conductors, arresters, circuit breakers, and disconnecter switches. Planning software will be procured to improve system planning and operations. The replacement of the obsolete controls at the Abu Sultan power plant will maximize the unit's efficiency. The transition to time-of-day metering will rationalize tariff rates and thereby increase revenues.

The technology to be introduced is proven technology which has been widely and successfully utilized in the electric utility industry for many years. Technically, the infrastructure components to be financed are feasible and necessary for the development of an efficient electric power system to serve the people of Egypt. The equipment to be installed for the control centers will include relatively sophisticated communication systems and computer software programs for storing and analyzing data related to system operations. This equipment and software, however, are not new to EEA personnel. Nevertheless, a detailed statement of system requirements and operating parameters, including staffing requirements, must be prepared by a consultant with extensive experience in planning, specifying, and installing similar systems and in developing organizations for their operation and maintenance. In addition, training of EEA's personnel by the equipment suppliers will be required. (See Annex H for further discussion.)

B. SUMMARY OF FINANCIAL ANALYSIS

Based on the cost and benefit assumptions outlined in the full analyses in Annex I, as well as the analyses conducted under the Power Sector Support Project, the capital investments proposed for this Project are financially viable. For the first two proposed infrastructure development activities, a financial internal rate of return is estimated at 28 per cent for the Wadi El Natroun substation component, and 10 per cent for the static VAR compensators. Benefit-cost analyses performed under the Power Sector Support Project for the types of infrastructure improvements that this Project will finance, including a regional control center and a transmission substation, have shown them to be financially viable.

C. SUMMARY OF ECONOMIC ANALYSIS

This Project is designed to make resources available to EEA in exchange for the adoption of policy reforms focusing on institutional and financial strengthening. Project resources will be used to finance technical assistance in support of the policy reforms as well as to upgrade part of EEA's electric power system. Thus, the project will lead to two types of economic benefits: those resulting from improved infrastructure and those resulting from institutional/financial strengthening.

Based on the assumptions regarding the benefit and cost streams described in Annex J, the Wadi El Natroun substation is expected to yield an economic internal rate of return of 28 per cent, and the static VAR compensators are expected to yield an internal rate of return of 10 per cent. Separate detailed financial and economic analyses of future activities will be undertaken as they are identified and prepared for funding over the years of the project.

Under the Power Sector Support Project, a regional control center yielded an economic internal rate of return of thirty per cent, and a transmission substation yielded an internal rate of return of 62 per cent. These infrastructure improvements are indicative of the types of capital components which this Project will fund. Thus, this Project is economically justifiable.

D. SUMMARY OF SOCIAL SOUNDNESS ANALYSIS

A functioning, competitive modern society, with sectors ranging from agriculture and tourism to industry and commerce, requires a reliable electric power supply. These sectors in turn provide jobs for society. Not only is electric power essential for adequate production capacity, but also for security, health services and education.

This Project will increase the efficiency and sustainability of the electric power sector, thereby having a positive social impact. The Project will also provide substantive environmental benefits by reducing the need to add generating capacity through increased efficiency in generation and transmission. (See Annex K for further discussion.)

E. SUMMARY OF ADMINISTRATIVE ANALYSIS

The Egyptian Electricity Authority (EEA) is the Government of Egypt's authority responsible for the planning, generation, transmission, operation and maintenance of the Egyptian electric power system. EEA has many years of extensive and successful experience in undertaking similar projects, particularly USAID funded projects. This project will build on this experience.

The project components will be managed by EEA teams headed by senior EEA officials and reporting directly to either the Chairman or the Deputy Chairman for Projects. USAID/DR/PT staff will provide technical and managerial oversight of the Project and will work closely with EEA in all aspects of the Project. (See Annex L for further discussion.)

VII. CONDITIONS PRECEDENT AND COVENANTS

A. CONDITIONS PRECEDENT TO DISBURSEMENT

The Project Agreement will include the following Conditions Precedent.

(1) First Disbursement:

Prior to any disbursement or to the issuance of any commitment document under the Grant, the Cooperating Country shall, except as the parties may otherwise agree in writing, furnish to USAID, in a satisfactory form and substance:

- (a) A statement of the names and titles with specimen signatures of the persons authorized to represent the Cooperating Country for Project purposes.
- (b) Evidence that the proceeds of the Grant, with the exception of funds to be used to finance consultant services and technical assistance, training, studies and audits, will be lent by the Cooperating Country to the Egyptian Electricity Authority (EEA) on terms and conditions acceptable to the Cooperating Country and EEA, and for the purpose of financing eligible costs under the Project;
- (c) Evidence that the local currency financing for the Project has been budgeted by the Cooperating Country and will be available for timely expenditure by EEA, pursuant to EEA's cost estimate; and,
- (d) Evidence that accounting records for local currency and in-kind contributions to the Project will be maintained by EEA.

(2) Future Obligations:

Prior to subsequent obligations of Grant funds under this project, EEA shall provide USAID with evidence, in satisfactory form and substance, that EEA has achieved the policy reform objectives set forth in the MOU for completion during each year of the program.

Evidence that additional local currency financing for the Project has been budgeted by the Cooperating Country and will be available for timely expenditure by EEA, pursuant to EEA's cost estimates.

(3) Disbursement to Finance Infrastructure:

Prior to disbursement or to the issuance by USAID of any commitment or earmarking documents to finance the Wadi El Natroun substation, and/or the Canal and Northern Upper Egypt Regional Control Centers, the Cooperating Country shall, except as USAID may otherwise agree in writing, furnish to USAID, in form and substance satisfactory to USAID, evidence that EEA owns the sites for the substation and control centers and that EEA has firm commitments for making available the necessary places to house the equipment being financed by USAID.

(5) Disbursement for Regional Control Centers and SCADA System:

Prior to disbursement or to the issuance by USAID of any commitment or earmarking documents to finance the Canal and NUE Regional Control Centers and the High Dam Control Room SCADA, the Cooperating Country shall, except as USAID may otherwise agree in writing, furnish to USAID, in form and substance satisfactory to USAID, evidence that:

(i) EEA has established special project management teams for these components of the project. These teams, which will include a project manager, and computer hardware and software specialists, as well as legal and financial specialists, will report directly to the EEA Chairman. The teams will have the authority to manage these components on a day-to-day basis.

(ii) the necessary radio frequencies, as specified by the consultant, have been allocated for the communications systems to be associated with the control centers and SCADA systems.

(iii) EEA agrees to finance all foreign exchange costs, in addition to that contributed by USAID, on a timely basis that will not effect the implementation schedule.

B. COVENANTS

The Cooperating Country shall covenant as follows:

- (1) **Training of Personnel:** The Cooperating Country, through EEA, shall allocate an existing building to house a comprehensive training facility and to promote and make available appropriate numbers and types of personnel for project-related training as identified throughout the implementation of the project.

- (2) **Periodic Discussions:** The Cooperating Country and USAID will periodically review, at least twice a year, the status of the Project and associated policy and institutional reforms.
- (3) **Local Currency and In-Kind Contributions:** The Cooperating Country, through EEA, will provide USAID, on both a quarterly and annual basis, with reports on its accounting records on local currency and in-kind contributions provided for the Project.
- (4) **Social Insurance and Taxes on Expatriates:** The Cooperating Country shall covenant that any social insurance assessment and any taxes on expatriates (non-Egyptians) arising under Grant-financed work will be paid by the Cooperating Country from its own resources.

VIII. EVALUATION ARRANGEMENTS

A final evaluation will be undertaken to measure both the extent that appropriate policy reforms were accomplished and to determine the project's impact on beneficiaries. Given that there will be obligations under this project for reforms carried out by EEA, and that these reforms will be monitored on a continuous basis, a mid-term evaluation may be unnecessary. However, the project does include funding provisions for a mid-term evaluation, should USAID and EEA determine that such an evaluation would be beneficial.

Evaluation issues concerning policy reforms will include the quality of EEA management, both in terms of financial management and bureaucratic structure. The evaluation will determine the extent of EEA's increased independence in decision-making along with greater levels of accountability. Concurrently, the evaluation will analyze EEA's progress in earning and retaining its revenues. In addition, the evaluation will examine the extent of EEA's investment in the proper training and development of its work force as it relates to improved operations and maintenance.

Questions on impact to be addressed will include:

- ▶ What classes of consumers have benefitted? How have the poor been affected? What are the measurable, positive changes in people's lives associated with this project?
- ▶ What effects have the institutional/policy reforms and infrastructure improvements financed by the Project had on electricity demand and customer service?
- ▶ What is the cost of the provision and maintenance of electric power services delivered? Do fees charged for the services cover their costs?
- ▶ How is the electric power provided used? Are these uses economically efficient?
- ▶ As a result of the institutional/policy reforms and infrastructure improvements, what economic or social activities have benefitted and which have suffered?

ANNEX A
PID APPROVAL MEMORANDUM



CAIRO, EGYPT

ACTION MEMORANDUM FOR THE ACTING DIRECTOR

DATE : February 16, 1994

FROM : Maureen Dugan, ^{Nixon} OD/PDS/PS

THROUGH : Robert Jordan, AD/PDS *[Signature]*

SUBJECT : Approval of the Power Sector Support II Project Identification Document (PID)

ISSUE : Your signature is required to approve the Power Sector Support II PID (263-0224) for \$200 million.

DISCUSSION : The subject PID has been reviewed by the Project Team and Executive Committee. There are no further issues pending and all necessary clearances have been obtained.

In accordance with the decision made at the Executive Committee review held on February 1, 1994, the PID was modified to show an anticipated obligation for FY 94 of \$50 million.

RECOMMENDATION : That you approve the subject PID by signing below and in block No. 18 of the Project Identification Document facesheet.

APPROVAL *[Signature]* _____

DISAPPROVAL _____

DATE 3/2/94 _____

Clearance:

OD/DR/PT, J. Hunt *[Signature]* _____

AD/DR, P. Thorn *[Signature]* _____

AD/LEG, V. Moore *[Signature]* _____

AD/FM, D. Franklin *[Signature]* _____

OD/DIR/CS, J. Dunlap *[Signature]* _____

(A)DDIR, D. Clark _____

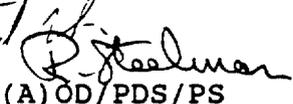
ANNEX B

**EXECUTIVE COMMITTEE DECISION
MEMORANDUM**

memorandum

DATE: June 23, 1994

FROM: Ted Gehr, PDS/PS 

THROUGH: Richard Steelman, (A)OD/PDS/PS 

SUBJECT: Power Sector Support II (263-0224)
Project Paper (PP)

TO: See Distribution

The Executive Committee (ExCom) reviewed and approved the subject PP on June 22, 1994. The following decisions were made:

1. **Benchmark Actions for FY 94 Obligation:** As agreed to by the GOE and USAID in the Memorandum of Understanding (MOU) signed on May 19, 1994, the GOE is required to accomplish a number of benchmark actions prior to obligation of funds for each fiscal year. One benchmark action for this fiscal year requires the GOE to set average electricity tariffs at ninety per cent of long run marginal cost (LRMC). USAID currently estimates that tariff rates are at 75 per cent of LRMC. Given the need for a relatively large increase in electricity rates in order to reach the ninety per cent target, it is conceivable that the GOE will fail to meet this benchmark by the end of FY 94.

To address this issue, the ExCom instructed the project team to draft an action memorandum to the Mission Director which will recommend the amount to be obligated for this fiscal year, based on the GOE's progress in meeting the benchmark actions described in the MOU. In order to allow time to hold discussions with the GOE, while leaving sufficient time for the obligation process to be completed, the project team will submit the action memorandum to the Mission Director by August 31, 1994.

2. **Economic Analysis:** The economic internal rate of return for the static VAR compensators, which are to be financed under this year's obligation, was ten per cent, and thus only marginally justifiable in economic terms. The ExCom directed that care be taken in the selection of infrastructure activities to ensure economic feasibility. In order to more fully justify the Project on economic grounds, the ExCom instructed the project design team to elaborate on the economic benefits of the Project as a whole, i.e., assess, in a qualitative fashion, the economic

benefits derived from accomplishing the policy and institutional reforms under the Project.

3. **Justification for Direct Letters of Commitment (L/Com):**
The project paper stated that the justification for using Direct Letters of Commitment was due to the host country's lack of sufficient foreign exchange to make payment and then seek reimbursement from USAID. The ExCom pointed out that the actual rationale for using Direct L/Coms was to encourage increased competition among bidders, i.e., firms will be more likely to bid on the project components knowing that the financing will come directly from USAID. The project design team will revise the project paper accordingly.

Clearance:

(A)AD/PDS, RRhoda	<u>REL</u>
AD/EAP, PDeuster	<u>(draft)</u>
(A)AD/DR, FGuymont	<u>FG</u>

Distribution:

Executive Committee

(A)DIR, Christopher Crowley	(A)DDIR, Duncan Miller
(A)AD/PDS, Richard Rhoda	(A)AD/DR, Frederick Guymont
(A)AD/HRDC, Joy Riggs-Perla	AD/MGT, Joe Liebner
AD/TI, Priscilla del Bosque	AD/LEG, Vicki Moore
AD/AGR, Clemence Weber	AD/EAP, Paul Deuster
(A)AD/FM, Amanda Levenson	OD/DIR/CS, James Dunlap
(A)OD/PDS/P, Jean DuRette	

cc: 1. Project Team Members

OD/DR/PT, J. Hunt	DR/PT, R. Youssef
PDS/PS, L. Latif	PDS/ENV, M. Madland
EAP, R. Abdel-Hakim	LEG, V. Moore
FM/FA, M. Mounir	EAP, M. Gellerson
DIR/CS, M. Walsh	FM/FA, M. El Shaarani
HRDC/ET, D. Leach	

2. (A)OD/PDS/PS, R. Steelman

(Drafted:TGehr:PDS/PS:06/23/94:DocID:TED\PPXDE1.694)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: FY 1994 to FY 2000
Total U.S. Funding: \$200 million
Date Prepared: May 29, 1994

Project Title and Number: Power Sector Support II Project (263-0224)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS								
<p><i>Program or Sector Goal: The broader objective to which this project contributes:</i></p> <p>Increased access to, and efficiency and reliability of, public utilities in target areas.</p>	<p><i>Measures of Goal Achievement:</i></p> <p>Electricity losses reduced to 9 per cent of electricity generated.</p> <p>Reduction in fuel consumption by 10 per cent.</p>	<p>EEA Statistics.</p>	<p><i>Assumptions for achieving goal targets:</i></p> <p>Increased efficiency of public utilities remains a high priority of the GOE.</p>								
<p><i>Project Purpose:</i></p> <p>To accelerate and enhance the transformation of EEA into an autonomous electric utility capable of operating on a commercially sound, self-sustaining basis.</p>	<p><i>Conditions that will indicate purpose has been achieved: End of project status.</i></p> <p>EEA/GOE has achieved all policy/institutional reforms set forth in the MOU signed by EEA/MEE/GOE and USAID in FY 94.</p>	<p>EEA records; Contractor reports</p>	<p><i>Assumptions for achieving purpose:</i></p> <p>The overall reform climate in the GOE will remain favorable toward achievement of the needed political and policy adjustments which must accompany the desired policy reforms.</p>								
<p><i>Outputs:</i></p> <ol style="list-style-type: none"> 1. Static VAR compensators installed and operating. 2. EEA effectively utilizing upgraded software for planning. 3. Construction of a 220/66KV transmission substation. 4. Replacement of controls at Abu Sultan power station. 5. Installation and operation of time-of-day metering. 6. Installation of SCADA system at High Dam power station. 7. Regional control centers constructed and operational. 8. Construction of high voltage test lab. 	<p><i>Magnitude of outputs:</i></p> <ol style="list-style-type: none"> 1. Three Static VAR compensators installed at the Cairo 500 substation 2. Upgraded planning software in use at EEA. 3. Substation constructed and operational at Wadi El Natroun. 4. Controls replaced and operating at Abu Sultan power station. 5. Time-of-day metering installed and operating. 6. SCADA system installed and operational at High Dam power station. 7. Two regional control centers constructed and operating in the Canal Zone and Northern Upper Egypt Zone. 8. High voltage test lab constructed and in use. 	<p>EEA records; Contractor reports; site visits.</p>	<p><i>Assumptions for achieving outputs:</i></p> <ol style="list-style-type: none"> 1. EEA and MEE management support modernization of EEA's operating procedures and management policies and are willing to undertake agreed-upon reforms. 2. The GOE macroeconomic and political environment allows the implementation of agreed-upon electricity tariff reforms. 3. Sufficient qualified staff available for EEA to implement subprojects in timely manner. Microwave frequencies are available and approved by GOE. 4. EEA will provide sufficient local currency to cover installation costs and foreign exchange to cover any short fall in financing. 								
<p><i>Inputs:</i></p> <ol style="list-style-type: none"> 1. Technical Assistance and Training 2. Equipment/Installation 3. Construction Management 	<p><i>Implementation Target (Type and Quantity)</i></p> <table> <tr> <td>1. TA and Training:</td> <td>\$ 16 million</td> </tr> <tr> <td>2. Equipment/Installation:</td> <td>\$166 million</td> </tr> <tr> <td>3. Consultant Engineering:</td> <td>\$ 18 million</td> </tr> <tr> <td>TOTAL:</td> <td>\$200 million</td> </tr> </table>	1. TA and Training:	\$ 16 million	2. Equipment/Installation:	\$166 million	3. Consultant Engineering:	\$ 18 million	TOTAL:	\$200 million	<p>Executed contract documents; Contractor reports; Contractor/supplier invoices approved and paid; Site visits by USAID personnel.</p>	<p><i>Assumptions for providing inputs:</i></p> <ol style="list-style-type: none"> 1. EEA will satisfy requirements precedent to disbursement. 2. EEA maintains its certification to undertake host-country contracting. 3. EEA nominates and makes available qualified staff for training, and retains the qualified staff.
1. TA and Training:	\$ 16 million										
2. Equipment/Installation:	\$166 million										
3. Consultant Engineering:	\$ 18 million										
TOTAL:	\$200 million										

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ANNEX D
STATUTORY CHECKLIST

A.I.D. PROJECT STATUTORY CHECKLIST

Introduction

The statutory checklist is divided into two parts:
5C(1) - Country Checklist; and 5C(2) - Assistance Checklist.

5C(1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable to the eligibility of countries to receive the following categories of assistance: (A) both Development Assistance and Economic Support Funds; (B) Development Assistance funds only; or (C) Economic Support Funds only.

A. COUNTRY ELIGIBILITY CRITERIA APPLICABLE TO BOTH DEVELOPMENT ASSISTANCE AND ECONOMIC SUPPORT FUND ASSISTANCE

1. Narcotics Certification

(FAA Sec. 490): (This provision applies to assistance provided by grant, sale, loan, lease, credit, guaranty, or insurance, except assistance relating to international narcotics control, disaster and refugee relief assistance, narcotics related assistance, or the provision of food (including the monetization of food) or medicine, and the provision of non-agricultural commodities under P.L. 480. This provision also does not apply to assistance for child survival and AIDS programs which can, under section 522 of the FY 1994 Appropriations Act, be made available notwithstanding any provision of law that restricts assistance to foreign countries.) If the recipient is a "major illicit drug producing country" (defined as a country producing during a fiscal year at least five metric tons of opium or 500 metric tons of coca or marijuana) or a "major drug-transit country" (defined as a country that is a significant direct source of illicit drugs significantly affecting the United States, through which such drugs are transported, or through which significant sums of drug-related

N/A.

profits are laundered with the knowledge or complicity of the government):

(1) has the President in the April 1 International Narcotics Control Strategy Report (INCSR) determined and certified to the Congress (without Congressional enactment, within 45 calendar days, of a resolution disapproving such a certification), that (a) during the previous year the country has cooperated fully with the United States or taken adequate steps on its own to satisfy the goals and objectives established by the U.N. Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, or that (b) the vital national interests of the United States require the provision of such assistance?

(2) with regard to a major illicit drug producing or drug-transit country for which the President has not certified on April 1, has the President determined and certified to Congress on any other date (with enactment by Congress of a resolution approving such certification) that the vital national interests of the United States require the provision of assistance, and has also certified that (a) the country has undergone a fundamental change in government, or (b) there has been a fundamental change in the conditions that were the reason why the President had not made a "fully cooperating" certification.

2. Indebtedness to U.S. citizens
(FAA Sec. 620(c): If assistance is to a government, is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies, (b) the debt is not denied or contested by such government, or (c) the indebtedness arises under an unconditional guaranty of payment given by such government or controlled entity?

No.

3. **Seizure of U.S. Property** (FAA Sec. 620(e)(1)): If assistance is to a government, has it (including any government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.

4. **Communist countries** (FAA Secs. 620(a), 620(f), 620D; FY 1994 Appropriations Act Secs. 507, 523): Is recipient country a Communist country? If so, has the President: (a) determined that assistance to the country is vital to the security of the United States, that the recipient country is not controlled by the international Communist conspiracy, and that such assistance will further promote the independence of the recipient country from international communism, or (b) removed a country from applicable restrictions on assistance to communist countries upon a determination and report to Congress that such action is important to the national interest of the United States? Will assistance be provided either directly or indirectly to Angola, Cambodia, Cuba, Iraq, Libya, Vietnam, Iran or Syria? Will assistance be provided to Afghanistan without a certification, or will assistance be provided inside Afghanistan through the Soviet-controlled government of Afghanistan? No.

5. **Mob Action** (FAA Sec. 620(j)): Has the country permitted, or failed to take adequate measures to prevent, damage or destruction by mob action of U.S. property? No.

6. **OPIC Investment Guaranty** (FAA Sec. 620(l)): Has the country failed to enter into an investment guaranty agreement with OPIC? No.

7. **Seizure of U.S. Fishing Vessels** (FAA Sec. 620(o); Fishermen's Protective Act of 1967 (as amended) Sec. 5): (a) Has No.

the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel because of fishing activities in international waters? (b) If so, has any deduction required by the Fishermen's Protective Act been made?

8. **Loan Default** (FAA Sec. 620(q); FY 1994 Appropriations Act Sec. 512 (Brooke Amendment)): (a) Has the government of the recipient country been in default for more than six months on interest or principal of any loan to the country under the FAA? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the FY 1994 Appropriations Act appropriates funds?

(a) Not at present
6/13/94.

(b) No.

9. **Military Equipment** (FAA Sec. 620(s)): If contemplated assistance is development loan or to come from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget and amount of the country's foreign exchange or other resources spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

Yes, taken into account by the Administrator at time of approval of Agency OYB.

10. **Diplomatic Relations with U.S.** (FAA Sec. 620(t)): Has the country severed diplomatic relations with the United States? If so, have relations been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

No.

11. **U.N. Obligations** (FAA Sec. 620(u)): What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget?

Current, no arrears.

(Reference may be made to the "Taking into Consideration" memo.)

12. International Terrorism

a. **Sanctuary and support** (FY 1994 Appropriations Act Sec. 529; FAA Sec. 620A): Has the country been determined by the President to: (a) grant sanctuary from prosecution to any individual or group which has committed an act of international terrorism, or (b) otherwise support international terrorism, unless the President has waived this restriction on grounds of national security or for humanitarian reasons? No.

b. **Airport Security** (ISDCA of 1985 Sec. 552(b)): Has the Secretary of State determined that the country is a high terrorist threat country after the Secretary of Transportation has determined, pursuant to section 1115(e)(2) of the Federal Aviation Act of 1958, that an airport in the country does not maintain and administer effective security measures? No.

13. Countries that Export Lethal Military Equipment (FY 1994 Appropriations Act Sec. 573): Is assistance being made available to a government which provides lethal military equipment to a country the government of which the Secretary of State has determined is a terrorist government for purposes of section 40(d) of the Arms Export Control Act? No.

14. Discrimination (FAA Sec. 666(b)): Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA? No.

15. Nuclear Technology (FAA Secs. 669, 670): Has the country, after August 3, 1977, delivered to any other country or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements No.

or safeguards, and without special certification by the President? Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? If the country is a non-nuclear weapon state, has it, on or after August 8, 1985, exported (or attempted to export) illegally from the United States any material, equipment, or technology which would contribute significantly to the ability of a country to manufacture a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.)

16. **Algiers Meeting** (ISDCA of 1981, Sec. 720): Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. on Sept. 25 and 28, 1981, and did it fail to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the "Taking into Consideration" memo.) No.

17. **Military Coup** (FY 1994 Appropriations Act Sec. 508): Has the duly elected Head of Government of the country been deposed by military coup or decree? If assistance has been terminated, has the President notified Congress that a democratically elected government has taken office prior to the resumption of assistance? No.

18. **Exploitation of Children** (FAA Sec. 116(b)): Does the recipient government fail to take appropriate and adequate measures, within its means, to protect children from exploitation, abuse or forced conscription into military or paramilitary services? No.

19. **Parking Fines** (FY 1994 Appropriations Act Sec. 574): Has the overall assistance allocation of funds for a country taken into account the requirements of this section to reduce assistance by 110 percent of the amount of Yes.

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unpaid parking fines owed to the District of Columbia as of September 30, 1993?

B. COUNTRY ELIGIBILITY CRITERIA APPLICABLE ONLY TO DEVELOPMENT ASSISTANCE ("DA") N/A.

C. COUNTRY ELIGIBILITY CRITERIA APPLICABLE ONLY TO ECONOMIC SUPPORT FUNDS ("ESF")

Human Rights Violations (FAA Sec. 502B): Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the President found that the country made such significant improvement in its human rights record that furnishing such assistance is in the U.S. national interest? No.

5C(2) - ASSISTANCE CHECKLIST

Listed below are statutory criteria applicable to the assistance resources themselves, rather than to the eligibility of a country to receive assistance. This section is divided into three parts. Part A includes criteria applicable to both Development Assistance and Economic Support Fund resources. Part B includes criteria applicable only to Development Assistance resources. Part C includes criteria applicable only to Economic Support Funds.

CROSS REFERENCE: IS COUNTRY CHECKLIST UP TO DATE?

A. CRITERIA APPLICABLE TO BOTH DEVELOPMENT ASSISTANCE AND ECONOMIC SUPPORT FUNDS

1. Host Country Development Efforts (FAA Sec. 601(a)): Information and conclusions on whether assistance will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan

This Project supports the transformation of the GOE's Electricity Authority (EEA) into an autonomous electric utility capable of operating on a commercially sound, self-sustaining basis,

associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.

in order to promote the development of an efficient and commercially oriented power sector in Egypt. It is expected that the Project (a) will increase the flow of international trade; (b) will foster private initiative and competition; (c) will not directly encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) will not directly discourage monopolistic practices; (e) will improve technical efficiency, agriculture, and commerce and (f) will not directly strengthen free labor unions.

2. U.S. Private Trade and Investment (FAA Sec. 601(b)): Information and conclusions on how assistance will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

U.S. private enterprises will be the source of procurement of goods and services required for this Project.

3. Congressional Notification

a. General requirement (FY 1994 Appropriations Act Sec. 515; FAA Sec. 634A): If money is to be obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified (unless the Appropriations Act

Standard Congressional Notification procedures have been satisfied prior to obligation of funds.

notification requirement has been waived because of substantial risk to human health or welfare)?

b. Special notification requirement (FY 1994 Appropriations Act Sec. 520): Are all activities proposed for obligation subject to prior congressional notification?

Yes.

c. Notice of account transfer (FY 1994 Appropriations Act Sec. 509): If funds are being obligated under an appropriation account to which they were not appropriated, has the President consulted with and provided a written justification to the House and Senate Appropriations Committees and has such obligation been subject to regular notification procedures?

N/A.

d. Cash transfers and nonproject sector assistance (FY 1994 Appropriations Act Sec. 537(b)(3)): If funds are to be made available in the form of cash transfer or nonproject sector assistance, has the Congressional notice included a detailed description of how the funds will be used, with a discussion of U.S. interests to be served and a description of any economic policy reforms to be promoted?

N/A.

4. Engineering and Financial Plans (FAA Sec. 611(a)): Prior to an obligation in excess of \$500,000, will there be: (a) engineering, financial or other plans necessary to carry out the assistance; and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes.

5. Legislative Action (FAA Sec. 611(a)(2)): If legislative action is required within recipient country with respect to an obligation in excess of \$500,000, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance?

The People's Assembly should ratify the Grant Agreement in a timely manner. In the past, the Assembly has ratified all grant agreement in time to permit orderly accomplishments of projects.

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6. **Water Resources** (FAA Sec. 611(b)): If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.) N/A.

7. **Cash Transfer/Nonproject Sector Assistance Requirements** (FY 1994 Appropriations Act Sec. 537). If assistance is in the form of a cash transfer or nonproject sector assistance: N/A.

a. **Separate account:** Are all such cash payments to be maintained by the country in a separate account and not commingled with any other funds (unless such requirements are waived by Congressional notice for nonproject sector assistance)?

b. **Local currencies:** If assistance is furnished to a foreign government under arrangements which result in the generation of local currencies:

(1) Has A.I.D. (a) required that local currencies be deposited in a separate account established by the recipient government, (b) entered into an agreement with that government providing the amount of local currencies to be generated and the terms and conditions under which the currencies so deposited may be utilized, and (c) established by agreement the responsibilities of A.I.D. and that government to monitor and account for deposits into and disbursements from the separate account?

(2) Will such local currencies, or an equivalent amount of local currencies, be used only to carry out the purposes of the DA or ESF chapters of the FAA (depending on which chapter is the source of the assistance) or for the administrative requirements of the United

States Government?

(3) Has A.I.D. taken all appropriate steps to ensure that the equivalent of local currencies disbursed from the separate account are used for the agreed purposes?

(4) If assistance is terminated to a country, will any unencumbered balances of funds remaining in a separate account be disposed of for purposes agreed to by the recipient government and the United States Government?

8. **Capital Assistance** (FAA Sec. 611(e)): If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively?

The Mission Director has so certified. See Annex F.

9. **Local Currencies**

a. **Recipient Contributions** (FAA Secs. 612(b), 636(h)): Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

The GOE contribution is LE 111 million: LE 98 million in cash and LE 13 million in-kind, and will cover part of the procurement and construction costs.

b. **U.S.-Owned Currency** (FAA Sec. 612(d)): Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

No.

10. **Trade Restrictions**

a. **Surplus Commodities** (FY 1994 Appropriations Act Sec. 513(a)): If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive

No.

capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

b. Textiles (Lautenberg Amendment) (FY 1994 Appropriations Act Sec. 513(c)): Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel? No.

11. Tropical Forests (FY 1991 Appropriations Act Sec. 533(c)(3) (as referenced in section 532(d) of the FY 1993 Appropriations Act): Will funds be used for any program, project or activity which would (a) result in any significant loss of tropical forests, or (b) involve industrial timber extraction in primary tropical forest areas? No.

12. PVO Assistance

a. Auditing and registration (FY 1994 Appropriations Act Sec. 568): If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.? N/A.

b. Funding sources (FY 1994 Appropriations Act, Title II, under heading "Private and Voluntary Organizations"): If assistance is to be made to a United States PVO (other than a N/A.

cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government?

13. Project Agreement Documentation (State Authorization Sec. 139 (as interpreted by conference report)): Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision).

Case-Zablocki Act reporting procedures will be followed with respect to this Project.

14. Metric System (Omnibus Trade and Competitiveness Act of 1988 Sec. 5164, as interpreted by conference report, amending Metric Conversion Act of 1975 Sec. 2, and as implemented through A.I.D. policy): Does the assistance activity use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate? Will A.I.D. specifications use metric units of measure from the earliest programmatic stages, and from the earliest documentation of the assistance processes (for example, project papers) involving quantifiable measurements (length, area, volume, capacity, mass and weight), through the implementation stage?

The metric system of measurement has been utilized, and will continue to be utilized, to the extent practical from the earliest programmatic stages of the Project through the implementation stage.

15. **Abortions** (FAA Sec. 104(f); FY 1994 Appropriations Act, Title II, under heading "Population, DA," and Sec. 518):

a. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions? No.

b. Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations? No.

c. Are any of the funds to be made available to any organization or program which, as determined by the President, supports or participates in the management of a program of coercive abortion or involuntary sterilization? No.

d. Will funds be made available only to voluntary family planning projects which offer, either directly or through referral to, or information about access to, a broad range of family planning methods and services? (As a legal matter, DA only.) N/A.

e. In awarding grants for natural family planning, will any applicant be discriminated against because of such applicant's religious or conscientious commitment to offer only natural family planning? (As a legal matter, DA only.) N/A.

f. Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? No.

g. Are any of the funds to be made available to any organization if the President certifies that the use of these funds by such organization would violate any of the above provisions related to No.

abortions and involuntary sterilization?

16. **Cooperatives** (FAA Sec. 111): No.
Will assistance help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life?

17. **Procurement**

a. **Small business** (FAA Sec. 602(a)): Yes.
Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?

b. **U.S. procurement** (FAA Sec. 604(a)): Yes,
Will all procurement be from the U.S., the recipient country, or developing countries except as otherwise determined in accordance with the criteria of this section?

c. **Marine insurance** (FAA Sec. 604(d)): Egypt does not so discriminate.
If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company?

d. **Non-U.S. agricultural procurement** (FAA Sec. 604(e)): N/A.
If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)

e. **Construction or engineering services** (FAA Sec. 604(g)): No.
Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those countries which receive direct economic assistance under the FAA and permit United States firms to compete for

construction or engineering services financed from assistance programs of these countries.)

f. Cargo preference shipping No.
(FAA Sec. 603): Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?

g. Technical assistance Yes.
(FAA Sec. 621(a)): If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

h. U.S. air carriers Yes.
(International Air Transportation Fair Competitive Practices Act, 1974): If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available?

i. Consulting services Yes.
(FY 1994 Appropriations Act Sec. 567): If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)?

j. Competitive Selection Yes.
Procedures (FAA Sec. 601(e)): Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules

allow otherwise?

k. **Chemical Weapons** (FY 1994 Appropriations Act Sec. 569): Will the assistance be used to finance the procurement of chemicals that may be used for chemical weapons production? No.

18. **Construction**

a. **Capital project** (FAA Sec. 601(d)): If capital (e.g., construction) project, will U.S. engineering and professional services be used? Yes.

b. **Construction contract** (FAA Sec. 611(c)): If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? Yes.

c. **Large projects, Congressional approval** (FAA Sec. 620(k)): If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the Congressional Presentation), or does assistance have the express approval of Congress? Yes.

19. **U.S. Audit Rights** (FAA Sec. 301(d)): If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A.

20. **Communist Assistance** (FAA Sec. 620(h)). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? Yes.

21. **Narcotics**

a. **Cash reimbursements** (FAA Sec. 483): Will arrangements preclude use of financing to make reimbursements, in Yes.

the form of cash payments, to persons whose illicit drug crops are eradicated?

b. Assistance to narcotics traffickers (FAA Sec. 487): Will arrangements take "all reasonable steps" to preclude use of financing to or through individuals or entities which we know or have reason to believe have either: (1) been convicted of a violation of any law or regulation of the United States or a foreign country relating to narcotics (or other controlled substances); or (2) been an illicit trafficker in, or otherwise involved in the illicit trafficking of, any such controlled substance? Yes.

22. Expropriation and Land Reform (FAA Sec. 620(g)): Will assistance preclude use of financing to compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President? Yes.

23. Police and Prisons (FAA Sec. 660): Will assistance preclude use of financing to provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? Yes.

24. CIA Activities (FAA Sec. 662): Will assistance preclude use of financing for CIA activities? Yes.

25. Motor Vehicles (FAA Sec. 636(i)): Will assistance preclude use of financing for purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? Yes.

26. Export of Nuclear Resources (FY 1994 Appropriations Act Sec. 506): Will assistance preclude use of financing to finance--except for purposes of nuclear safety--the export of nuclear equipment, fuel, or technology? Yes.

27. Publicity or Propaganda (FY 1994 Appropriations Act Sec. 557): Will No.

assistance be used for publicity or propaganda purposes designed to support or defeat legislation pending before Congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by Congress?

28. **Marine Insurance** (FY 1994 Appropriations Act Sec. 531): Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate? Yes.

29. **Exchange for Prohibited Act** (FY 1994 Appropriations Act Sec. 533): Will any assistance be provided to any foreign government (including any instrumentality or agency thereof), foreign person, or United States person in exchange for that foreign government or person undertaking any action which is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law? No.

30. **Commitment of Funds** (FAA Sec. 635(h)): Does a contract or agreement entail a commitment for the expenditure of funds during a period in excess of 5 years from the date of the contract or agreement? No.

31. **Impact on U.S. Jobs** (FY 1994 Appropriations Act, Sec. 547):

a. Will any financial incentive be provided to a business located in the U.S. for the purpose of inducing that business to relocate outside the U.S. in a manner that would likely reduce the number of U.S. employees of that business? No.

b. Will assistance be provided for the purpose of establishing or developing an export processing zone or designated area in which the country's No.

tax, tariff, labor, environment, and safety laws do not apply? If so, has the President determined and certified that such assistance is not likely to cause a loss of jobs within the U.S.?

c. Will assistance be provided for a project or activity that contributes to the violation of internationally recognized workers rights, as defined in section 502(a)(4) of the Trade Act of 1974, of workers in the recipient country, or will assistance be for the informal sector, micro or small-scale enterprise, or smallholder agriculture? No.

B. CRITERIA APPLICABLE TO DEVELOPMENT ASSISTANCE ONLY N/A.

N.B. PART B OF THE ASSISTANCE CHECKLIST, WHICH IS APPLICABLE TO DEVELOPMENT ASSISTANCE ONLY HAS BEEN OMITTED BECAUSE IT IS INAPPLICABLE TO THIS ESF-FUNDED PROJECT.

C. CRITERIA APPLICABLE TO ECONOMIC SUPPORT FUNDS ONLY

1. **Economic and Political Stability** Yes.
(FAA Sec. 531(a)): Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA?

2. **Military Purposes** (FAA Sec. 531(e)): Will this assistance be used for military or paramilitary purposes? No.

3. **Commodity Grants/Separate Accounts** (FAA Sec. 609): If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? (For FY 1994, this provision is superseded by the separate account requirements of FY 1994 Appropriations Act Sec. 537(a), see Sec. 537(a)(5).) N/A.

4. **Generation and Use of Local Currencies** (FAA Sec. 531(d)): Will ESF funds made available for commodity import N/A.

programs or other program assistance be used to generate local currencies? If so, will at least 50 percent of such local currencies be available to support activities consistent with the objectives of FAA sections 103 through 106? (For FY 1994, this provision is superseded by the separate account requirements of FY 1994 Appropriations Act Sec. 537(a), see Sec. 537(a)(5).)

5. **Capital Projects** (Jobs Through Exports Act of 1992, Sec. 306, FY 1993 Appropriations Act, Sec. 595): If assistance is being provided for a capital project, will the project be developmentally-sound and sustainable, i.e., one that is (a) environmentally sustainable, (b) within the financial capacity of the government or recipient to maintain from its own resources, and (c) responsive to a significant development priority initiated by the country to which assistance is being provided. (Please note the definition of "capital project" contained in section 595 of the FY 1993 Appropriations Act. Note, as well, that although a comparable provision does not appear in the FY 94 Appropriations Act, the FY 93 provision applies to, among other things, 2-year ESF funds which could be obligated in FY 94.)

Yes.

ANNEX E
GRANTEE REQUEST FOR ASSISTANCE

POWER SECTOR SUPPORT II PROJECT
263-0224

**Certification Pursuant to Section 611(e)
of the Foreign Assistance Act of 1961, as Amended**

I, Christopher D. Crowley, Acting Director, the Principal Officer of the U.S. Agency for International Development in Egypt, having taken into account, among other things, the maintenance and utilization of projects in Egypt previously financed by the United States, do hereby certify that in my judgement Egypt has both the financial capability and the human resources to effectively install, maintain, and utilize the capital assistance to be provided for the Power Sector Support II Project.

This judgement is based upon general considerations discussed in the Project Paper to which this certification is attached.

Christopher D. Crowley

Christopher D. Crowley
Acting Director

7/31/94

Date

POWER SECTOR SUPPORT II PROJECT
263-0224

**Determination Pursuant to the Gray Amendment to the
Foreign Operations, Export Financing, and Related
Programs Appropriations Act of 1993**

As Acting Director and Principal Officer of the U.S. Agency for International Development in Egypt, I, Christopher D. Crowley, hereby certify that full consideration has been given to the potential involvement of small and/or economically and socially disadvantaged enterprises, historically black colleges and universities and minority-controlled private and voluntary organizations covered by the Gray Amendment.

The project paper to which this certification is attached discusses the efforts that will be undertaken in connection with each element of the procurement plan to maximize the participation of minority-owned and small and disadvantaged organizations. At the time of each procurement action, every effort will be made to encourage the participation of these organizations and draw upon their knowledge and expertise.

Christopher D. Crowley

Christopher D. Crowley
Acting Director

7/31/94

Date

POWER SECTOR SUPPORT II PROJECT
263-0224**Technical Analysis****I. STATIC VAR COMPENSATORS****A. GENERAL**

The technical justification for the proposed Static Reactive Compensator component is based on the need to install new, state of the art reactive power compensator control equipment to replace the existing rotating type synchronous condensers which are partially disabled and operating at less than thirty per cent of the originally designed output rating. Three synchronous condensers manufactured and supplied by the Soviet Union were installed at the Cairo terminal of the 500KV transmission lines from the High Dam in 1968 to control and stabilize the voltage level on the transmission network. During periods of high electrical demand, the network experiences low voltage conditions and high electrical losses. During periods of low electrical demand, the grid system experiences high system voltages which over stress equipment such as transformers, insulators and customer appliances.

The three rotating synchronous condensers are each rated at 80MVAR capacitive reactance (used to compensate for low voltage conditions) and 45MVAR inductive reactance (used to compensate for high voltage conditions). Each of the three units are connected to the network through the 11KV winding of the associated 500MVA 500/220/11KV transformers. Through the years, the specialty type rotating equipment spare parts for these units are no longer available to provide the needed replacement parts. The units, which are cooled with hydrogen, were leaking hydrogen gas, which contributed to the permanent shutdown of two units and the partial output derating of the remaining operational unit. Since 1968, when these units were placed into service, installed generating capacity has increased from 3,100MVA to more than 12,000MVA, and the 220KV transmission network has nearly quadrupled in length and capacity. Today, the existing reactive compensation equipment is no longer sized to meet system requirements.

The Egyptian Electricity Authority plans to replace the existing three synchronous condenser units with state-of-the-art non-rotating type reactive compensators at the Cairo 500 substation. Three reactive compensator systems will be installed, each with an operating range of reactive power adjustment rating of 100MVAR capacitive reactance to 50MVAR inductive reactance. The reactance compensators will provide the required voltage stability and

reactive compensation to maintain system voltage levels, reduce electrical losses, and will have the added capability to mitigate voltage swings during system disturbances caused by electrical short circuits on the transmission lines, switching surges and generation load rejections.

B. STATIC REACTIVE COMPENSATOR SITE

The reactive compensators will be installed and connected at the existing Cairo 500 bulk transmission substation. This substation is located in the Giza Governorate, fifteen kilometers northwest of Cairo and six kilometers east of the Cairo/Alexandria desert highway. This substation is one of eight 500KV substations which interconnect the backbone grid of the 500KV transmission line system.

C. TECHNICAL ANALYSIS

The Egyptian Electricity Authority (EEA) has performed system voltage stability and network load studies through the year 2000. These studies indicate that without the planned reactive compensator equipment, the system voltage will fluctuate widely during daily load cycles and during abnormal system conditions. These voltage fluctuations are disruptive to a reliable power supply and contribute to equipment failures.

The reactive compensation equipment, through its high speed solid-state switching circuits, minimizes system voltage fluctuations during short circuits and generation load mismatches which occur when a generator trips off the line.

The reactive compensation equipment will be installed and connected to the 11KV tertiary windings of the three 500MVA 500/220/11KV main power transformers at the Cairo 500 substation.

The reactive compensator equipment will consist of electrically separate inductive reactance components and capacitive reactance components as follows:

Inductive Components

Solid-state thyristors

Voltage sensing devices

Inductive reactors

-

SVC control circuits

Capacitive Components

Solid-state thyristors

Voltage sensing devices

Capacitors

Damping reactors

SVC control circuits

Voltage sensing devices will instantaneously and continuously monitor the 500KV system voltage level and will send proper commands to correct voltage variations. During high peak demand periods, as the 500KV system voltage begins to drop, the capacitive reactance component control circuit thyristors receiving voltage sensing signals will automatically switch into service stages of capacitors to bring the system voltage to the desired level. As customer demand continues to increase, more capacitors will be switched on. Conversely, during low demand periods, as the system voltage begins to raise above the desired level, the inductive reactance component control circuit thyristors receiving voltage sensing signals will automatically adjust the inductive reactors to correct the voltage variation.

Throughout the entire range of load increases or decreases, the reactive compensation voltage controlled thyristors will also dampen out momentary voltage transients and harmonics associated with short circuits, switching and load rejections.

The planned solid state reactive compensation equipment requires minor maintenance and has lower internal power losses, as compared to hydrogen cooled rotating type synchronous condensers. This will be reflected in lower operations and maintenance costs, and a significantly more reliable VAR compensation system.

D. CONCLUSION

The reactive power compensation technology is a proven technology which has been widely and successfully used in the electric utility industry for many years. The development of high power semiconductor technology has greatly expanded the versatility, reliability and range of application of reactive power compensation technology.

II. WADI EL NATROUN SUBSTATION

A. GENERAL

The technical justification for the proposed Wadi El Natroun Substation component is based on the need to install additional electrical capacity to meet the rapid growth of land reclamation programs and new communities in the Wadi El Natroun area. The existing substations in this regional electrical network are experiencing above normal load growth. The proposed Wadi El Natroun substation will strengthen the subtransmission and distribution networks through feeder interconnection of the electrical capacity installed at existing substations, thereby improving network system reliability. The Wadi El Natroun Substation will be interconnected with a double circuit 220KV transmission line to the existing 6th of October 220KV/66KV substation.

B. WADI EL NATROUN SUBSTATION SITE

The Wadi El Natroun substation site is located in the El Beheira Governorate, on the Cairo-Alexandria desert highway, one hundred kilometers (sixty seven miles) north of Cairo. The Wadi El Natroun substation site is located in the distribution service area presently served by the East Sahraway and Wadi El Farigh substations, and is approximately thirty kilometers north-west of the existing 6th of October bulk power and transmission substation.

The size of the substation site is estimated to be 100 X 200 meters (394 X 787 feet).

C. TECHNICAL ANALYSIS

The proposed Wadi El Natroun substation will provide transmission and distribution facilities that will interconnect to existing transmission and subtransmission lines and distribution feeders. The substation will initially consist of the following components:

- . 220KV overhead transmission line terminals;
- . 220KV switchyard bus with associated switchgear equipment;
- . 220KV circuit breakers and associated switches;
- . 220/66KV 125MVA power transformers;
- . 66KV switchyard with associated switchgear equipment;
- . 66KV circuit breakers and associated switches;
- . 66/11KV 25MVA distribution transformers;

- . 11KV distribution feeders and associated circuit breakers;
- . substation control building; and,
- . a material storage area.

Transmission Line Terminals: The Wadi El Natroun substation will be located thirty kilometers north-west of the existing 6th of October 220KV bulk power and transmission substation, and will be interconnected with a 220KV double circuit transmission line. These lines will provide the loop-in and loop-out 220KV transmission line terminals at the substation 220KV bus.

220KV Switchyard: The 220KV switchyard consists of interconnecting circuit breakers and switches for connection to the incoming transmission lines and to the 220/66KV power transformers. The switchyard will include circuit breakers, switches, potential and current measuring devices, lightning arresters, wave traps and carrier coupling devices. The dual bus arrangement provides operational flexibility during normal operation and during maintenance periods. The 220KV buses will be designed for the future addition of two 220KV line terminals.

Power Transformers: Two 125MVA 220/66KV power transformers will provide the bulk power transformation from the incoming 220KV power sources to the 66KV subtransmission voltage level.

Subtransmission Buses: The 66KV subtransmission buses receive power from the bulk power transformers at 66KV, with circuit breakers and switches on both the high and low voltage side of the transformer. The 66KV buses provide interconnection and backup power feeders to other adjacent 66KV substations and the 66/11KV distribution power transformers.

Distribution Transformers: Two 25MVA 66/11KV distribution transformers will provide power from the 66KV bus to the 11KV bus.

11KV Distribution Bus: The 11KV distribution buses will provide the power to the 11KV overhead and underground feeders which will serve commercial, residential and rural distribution customers.

Substation Control Building: Equipment to be contained in this building includes 11KV switchgear, all control, metering and relay panels for the 220KV, 66KV and 11KV circuit breakers, and the power and distribution transformers. Additional equipment facilities include the supervisory control and data acquisition (SCADA) systems, control batteries, station service electrical power panels, heating, ventilating, air conditioning, communications terminals and office space.

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Material Storage Area: This facility consists of both indoor and outdoor storage areas used to store equipment and material needed in the routine operation and maintenance of the substation. Items stored would include spare parts for all major pieces of electrical equipment, test equipment and electrical material and hardware.

D. CONCLUSION

The substation equipment to be installed is similar to other substations in operation on the EEA system. EEA has successfully operated substations of equal or greater complexity and capacity for many years.

III. CANAL AND NUE REGIONAL CONTROL CENTERS

A. BACKGROUND

The Egyptian Electricity Authority (EEA), within the Ministry of Electricity and Energy, is responsible for planning and providing thermal cycle generating facilities, the planning and construction of transmission facilities and for the operation of all generation and transmission facilities to supply electric energy to consumers in Egypt. Hydraulic and renewable energy generation are planned by different Authorities under the Ministry of Electricity and Energy. While EEA is responsible for central planning, the operation of its generation and transmissions systems are managed by seven regional administrative zones. The operation of the Egyptian power system is managed from the National Energy Control Center (NECC). EEA is introducing Regional Control Centers (RCC) which will be responsible for the management of the regional power systems. The relationship between the NECC and RCC is shown in Figure 1.

EEA sells electric energy directly to a limited number of large industries served at very high transmission voltages, and sells at bulk rates energy to eight regional Distribution Companies at medium voltages, including the Canal Zone and the Northern Upper Egypt (NUE) Zone. Within both regions, the demand for electric energy continues to expand as the number of consumers increases. In order to meet the growth in electric demand, the EEA has progressively promoted the construction of new thermal power stations, substations and transmission lines. These regions have experienced substantial growth in recent years that has resulted in the excessive loading of transmission and substation facilities.

The management of the power systems in the Canal and NUE zones has not kept pace with either the expansion of the systems or advances in system control technology. Both zones are currently managed by antiquated dispatch centers. These centers are without telemetry and telecontrol facilities, and rely basically on human operation through the use of telephone conversations. As a result, the existing systems do not provide the necessary information in a timely fashion, or in the detail required for the system operators to base operating decisions. In recognition of this deficiency, EEA has decided to provide the facilities to better supervise and control the power systems serving the Canal and NUE regions. The RCCs will utilize two systems: 1) a Supervisory Control and Data Acquisition (SCADA) System; and, 2) a communication system for data and voice signal transmission.

B. ORGANIZATION OF EGYPT'S CONTROL CENTERS

EEA currently operates their bulk power system from the NECC, and the Upper Egypt Zone system from a computer based regional control center in Nag Hammadi. Distribution Companies are utilizing, to various degrees, control centers to manage the medium and low voltage distribution networks. Some of these centers are automated with SCADA systems for monitoring and controlling their respective network responsibilities. A computer based control center is being installed in Alexandria to provide supervision and control of the power system serving the Alexandria region, and another control center is being installed in the Cairo Region as well. Both of these control centers are being financed by USAID.

The relationship of the control centers is shown in Figure 1. Overall coordination of the power system operation is accomplished at the NECC, where decisions are made to achieve optimum loading of the power generating units, the transfer of bulk power at extra high voltage, and to manage the transmission network to achieve optimum economy, stability and security. Currently, the 500KV and 220KV transmission systems, and all generating plants are being monitored by microwave and power line carriers to the NECC, which has the responsibility to control the bulk power system of Egypt, including those facilities in the Canal and NUE zones.

The Regional Control Centers are the second layer of control, and manage the operation of the transmission and subtransmission systems at the 220KV, 132KV and 66KV levels. However, recent conceptual changes to be undertaken by EEA will increase the functions and responsibilities of RCCs, requiring them to be in charge of the data collection for all stations above 11KV, although the NECC will continue to have direct control over bulk

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power. As such, the RCCs will combine the transmission, subtransmission, and first tier distribution network monitoring and control into one SCADA sub-system.

C. DESCRIPTION OF THE ZONES

C.1 Existing Network

The RCCs are responsible for the operation of all substations served from the 220KV and 66KV transmission or subtransmission networks within their respective regions. EEA has adopted a system control philosophy in which the RCCs will be responsible for the collection of data from all facilities above 11KV level including 500KV and power generating facilities.

The RCCs have the following load dispatching responsibilities:

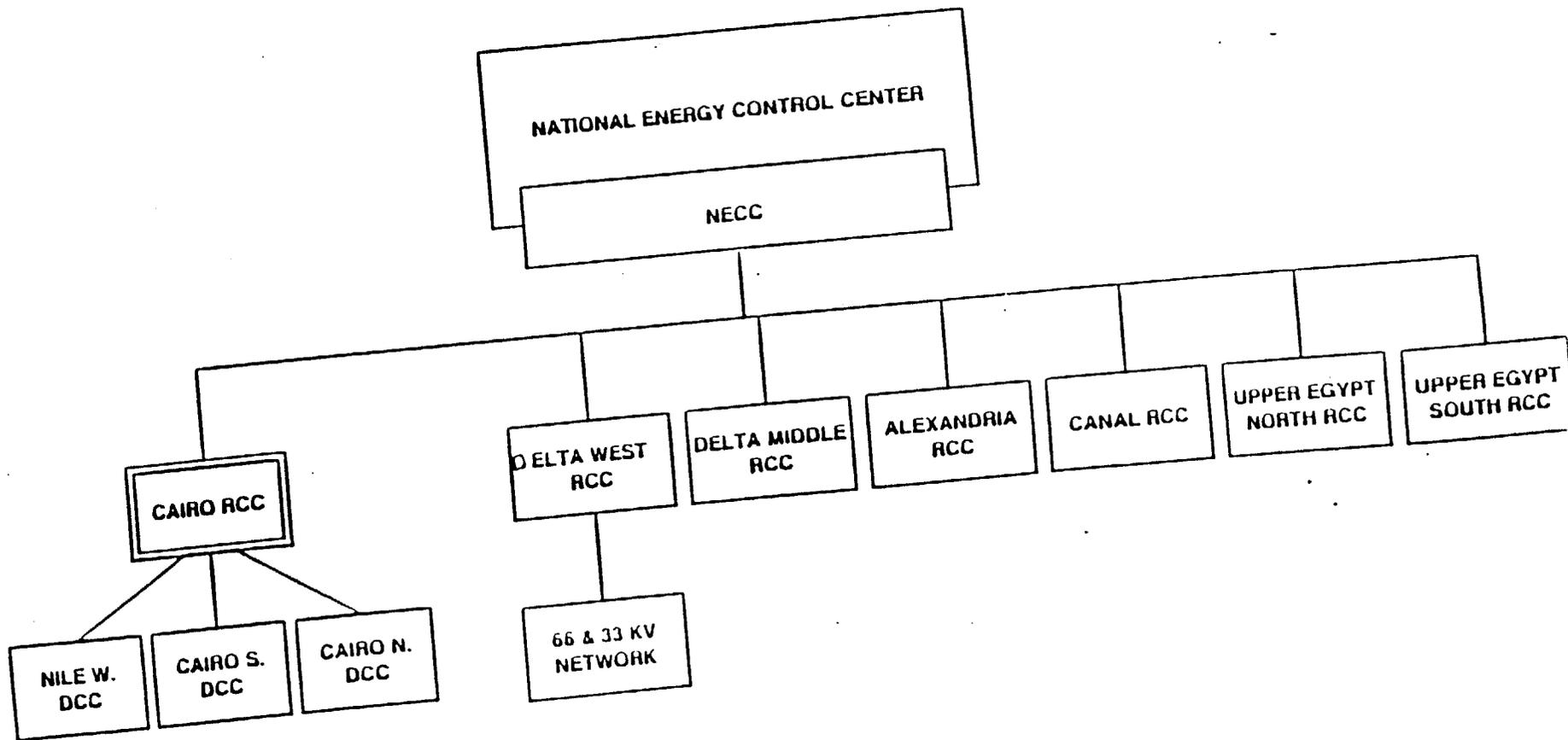
- planning of scheduled shutdowns of power facilities and substations;
- taking out of service and putting back into service of transmission lines and transformers;
- connecting, disconnecting and rerouting transmission;
- supervision of recovery from power system outage;
- manual recording of load data;
- recording of power system behavior under abnormal conditions;
- reporting to the NECC.

The present RCCs do not have the current requisites for a modern control center, i.e., facilities that collect, present and provide for control of facilities. Due to the immense quantity of data continuously supplied to the centers for analysis, the only practical means of performing the necessary data analysis and presentation must depend on digital data transmission and computer analysis.

C.2 Existing Communications

The existing communications system between substations and to the existing RCCs relies on limited speech channels using Power Line Carriers (PLC) and party-line type UHF radio, both of which have very limited capability for transmitting high speed and high quality data signals. These communication systems are not adequate to effectively monitor and control a system of the complexity presently serving the Canal and NUE regions.

Schematic Organization of Control Centers



RCC Regional Control Center
DCC Distribution Control Center

D. OUTLINE OF THE RCC COMPONENTS

The RCCs will enhance service to the customers in the Canal and NUE zones through the provision of reliable energy at all times. The control system will provide the needed information upon which the EEA operating staff can make appropriate decisions for the reliable and efficient operation of the power system serving these zones. The communications system, which ties the control center with the power stations, substations and the maintenance center, will have the capability and capacity to transmit digital data throughout the region.

The control centers will allow EEA to monitor and control the subtransmission and the distribution system down through the circuit breakers of the medium voltage circuits leaving the substation buses. The centers will have three main functions: 1) collecting, instantaneously displaying and storing data regarding the operating condition of the system; 2) remote control of selected circuit breakers and switches; and, 3) a communication system for transmitting data, operating instructions and verbal conversations between the center and maintenance personnel. The system will be designed so that district operating and maintenance personnel can be made aware of the current condition of the power system and problems as they occur. This will permit the necessary action to be taken in order to restore service rapidly.

All substations are staffed with full-time operators, who operate and maintain the substations. EEA reports that they have difficulties obtaining qualified operations personnel to man these substations. Even with staff in the stations, however, the ability to make assessments and control the system from a central location will greatly reduce the total outage time for virtually all system disturbances.

D.1 SCADA System

The control system will consist of distributed components which communicate with each other via a Local Area Network (LAN). The functions of the control center will be undertaken by a distributed computer system where the subsystems are connected via the LAN. To obtain a high degree of efficiency, software architecture based on a unified realtime data base will be used, which will ensure efficient and reliable task communication within each and among the different subsystems within the control center.

An important aspect of system performance is the amount of time required for the SCADA system to respond to the display request from the master control station, and the important status changes to be displayed at the master station. In an advanced large scale SCADA system, for example, the master station normally interrogates each subtransmission remote terminal unit (RTU) at least every two seconds and each distribution RTU at least every ten seconds to determine if a status change or an alarm occurrence has been detected. The protocol of the RTUs is in accordance with IEC 870-5, which defines a general world standard of communication in the field of substations.

In this analysis, the following are set as the target values for the time-related system performance.

- For any display request from an operations console, the SCADA system should output the new display, complete with all dynamic data, within two seconds.
- An alarm or event message should be displayed at the master station within four seconds of the occurrence of the status change or alarm at the remote site.

D.2 Remote Terminal Units (RTUs)

Each of the substations should be equipped with programmable RTU(s). The RTU has the function of interfacing with the measurements and status points at a substation and converting the information into digital form for transmission to the control center over the communication channel. The RTU also has the function of accepting commands coming over the communication channel from the control center and carrying out such commands through its interface with the substation equipment.

D.3 Communication System

The control and monitoring points in any electrical network are scattered over a comparatively large area. A good communications system is a vital link that brings SCADA functions together at a central point so that the overall state of the network can be perceived and a central operator can take control of actions anywhere in the network.

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It is important that the communications subsystem be properly designed to perform the functions required of it. The system must be modern, efficient, and cost effective. It must be flexible enough to be able to easily accommodate future changes or additions. Lastly, it must be able to survive and function effectively in the existing environment at each site. For all of this to occur, the communications subsystem will require the following:

- **Voice Communications Requirements.** The traditional way of tying a network together so it can be operable is by way of people talking to people, i.e., voice communications. This requirement still exists even with the installation of a SCADA system.
- **Data Transmission Requirements.** The transmission of digital data over distances of more than approximately one hundred meters is normally done using tone-modulated signals passing over one or more voice-grade telephone channels. The standard data signaling rate for present day SCADA systems is 1200 baud, i.e., 1200 clock pulses per second. One such signal can be carried at a time over a single voice-grade telephone channel. RTUs do not continuously emit data signals. Rather, they emit data in short bursts, or "messages," after being polled from the master station. Because of this intermittent nature of data transmission, it is possible for RTUs to share a communication channel, just as telephone subscribers sometimes share a "party line." However, to avoid conflicts and ensure the availability of the communication channel when it is required, the number of RTUs sharing a party line must be limited, especially those communication channels providing services for higher voltage substations. This is also recommended considering that the Master Station should poll each sub-transmission RTU as quickly as possible.
- **Reliability and Availability.** The communication subsystem is vital to the functioning of the SCADA system and to the electric network itself. It should have the highest degree of reliability which can reasonably be attained. In order to satisfy this requirement, the redundancy designs of system/equipment are applied in various ways, including:
 - a) **Backbone Links (Point-to-Point Radio Links).** Full equipment redundancy to protect against equipment failures, space diversity and propagation anomalies should be applied. Also, a closed loop configuration should be applied to increase reliability, especially for the data signal.

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b) **Distribution Links (Point-to-Multipoint Radio Links).**
The distribution system is basically designed with no redundancy. However, the base station and repeater station equipment should be provided with redundancy so that a failure of one component does not cause a loss of services to other substations.

- **Geographical Location.** The use of a point-to-multipoint digital radio system with a high transmission capacity (i.e., 60 time slots) is considered to be the most suitable for application to the distribution links. This is because a one point radio frequency can be shared by many terminal stations and the transmission capacity is sufficient to handle a high degree of dedicated channel operations for the data signals.

E. IMPLEMENTATION PLAN

Generally, the implementation of the RCCs will involve the following project implementation phases:

- preliminary engineering, survey and specifications;
- procurement and work statement preparation;
- system implementation;
- engineering; and,
- installation and commissioning.

Specific implementation considerations will be defined by the consultant to effectively coordinate the engineering and procurement. By making the Contractor responsible for all erecting and installation, tighter control of the implementation plan can be accomplished.

F. TECHNICAL EVALUATION AND JUSTIFICATION OF THE RCC COMPONENTS

F.1 Technical Justification of the Enhanced Control System

Network operations in the Canal and NUE regions are becoming more complex and will continue to increase in complexity as the power system expands to keep up with the growth in demand. When the RCCs enhancement project is accomplished as planned, and the control system is completed, the automation of the monitoring and control of the power system will be fulfilled. At that time, the RCCs will permit the Canal and NUE zone management, engineering and operations to acquire more information to better maintain and control the system.

The benefits associated with the completion of the RCCs enhancement include:

- Increased network reliability through early detection and correction of overload or insecure operating situations.
- Increased equipment safety and reduced outage time through the ability to detect and disconnect overloaded or malfunctioning elements of the network.
- Reduced operation costs, permitting less labor at stations and centralized monitoring and control.
- Improved monitoring and record keeping of both normal and abnormal conditions as an aid in management and long term operations and network expansion.
- Reduced (or deferment of) capital investments in transmission capacity through the better utilization of network capacity and improved allocation of operating margins.
- Increased revenues through reduction in outages and faster restoration of service in the event of outages.
- Reduced energy losses in power transmission facilities through improved energy management.
- Increased reliability of electrical power to the customer base in the Cairo zone.

F.2 Technical Justification of the Enhanced Communication System

The current communication system in the Canal and NUE zones utilize a simple UHF voice radio with PLC distribution links. This highly unsophisticated system, together with the serious lack in the number of required channels, seriously hinders the proper operation of dispatching functions. This situation will increasingly worsen as the power network continues to grow. It is worth mentioning here that present communication is only for telephony; no data communication is in service.

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The projected communication system will provide the following benefits:

- The communication system, consisting mainly of the digital microwave radio links, will increase system reliability in harmony with the new control system.
- By installing a point-to-multipoint digital microwave radio, better frequency efficiency and more flexible service of the new communication link can be expected.
- High speed and high quality data communication service between all stations will be provided, in addition to voice communication.

With the above benefits, the total service level and quality to the consumers will be improved to a level which is indispensable for the industrial and commercial development of Egypt.

G. CONCLUSION

The installation of such control centers is technically feasible, and will be similar to control centers installed and operated by other utilities around the world as a cost effective way of controlling the power system, improving operating efficiency and storing data.

Technically, the proposed installation of a SCADA system in the control centers is feasible and necessary for the development of an efficient electric distribution system to serve the people of the Canal and NUE regions.

It is not expected that new technology will be introduced in the design of the regional control centers. The equipment to be installed will include a relatively sophisticated communication system and a computer (with appropriate software programs) for storing and analyzing data related to system operations. This equipment and software are not new to EEA personnel. However, a detailed statement of system requirements and operating parameters, including staffing requirements, must be prepared by a consultant with extensive experience in planning, specifying, and installing similar systems and in developing organizations for their operation and maintenance. Training of EEA's personnel by the equipment suppliers will be required.

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POWER SECTOR SUPPORT II PROJECT
263-0224**Financial Analysis**

Assuming adequate policy performance on the part of the GOE and EEA, the PSS II Project will make annual obligations of funds to be used to finance specific power system investments. Benefit-cost analyses have already been performed under the Power Sector Support Project (263-0215) for the types of infrastructure improvements that this Project will finance. For example, a regional control center for the Cairo area yielded an economic rate of return of thirty per cent. A financial internal rate of return of between six and seven per cent was calculated for the same component. The gap between the two rates is due to the high economic value of output and efficiency realized through a reduction in outages, which is not accounted for in the financial analysis. Also under the Power Sector Support Project, rates of return were calculated for a transmission substation, resulting in a financial rate of return of sixty per cent. Hence, these types of capital investments have shown positive rates of return in the past.

Following are the financial benefit-cost analyses for the Static VAR Compensators and the Wadi El Natroun transmission substation, which are the infrastructure components to be financed during the first two years of the Project. Both of these components are determined to be financially viable.

STATIC VAR COMPENSATORS

(1) **Benefits:**

Based on an EEA study conducted in 1993, the installation and operation of the Static VAR Compensators (SVC) will result in the reduction of power losses, and therefore savings in the cost of fuel used in the generation of such power. The total cost of fuel saved as a result of SVC installation is estimated at \$3.69 million annually. This savings consists of the following:

- (A) **Fuel Cost Savings at Peak Loading Hours:** Benefits will be realized due to the reduction in the generated active and reactive power at peak loading hours, which is estimated at \$1.34 million. This estimate is based on an annual assumed power reduction at peak load hours of 83.5 MVAR, 1095 hours of SVC operation/year, and an estimated fuel consumption cost of \$14.71 per MWh.
- (B) **Fuel Cost Savings at Minimum Loading Hours:** Additional savings at minimum loading hours are estimated at \$2.35 million based on an estimated power reduction of 87.4 MVAR, 1,825 hours of SVC operation per year, and an estimated fuel consumption cost of \$14.71 per MWh.

(2) **Costs:**

Total capital costs of this component are estimated at \$27.24 million. Capital costs consist of \$26.26 million from USAID, and the equivalent of \$0.98 million (LE 3.33 million) from the GOE, including the value of land which will be purchased by EEA for the equivalent of \$0.07 million.

The useful life of the investment is estimated to be twenty years from the time the SVC become fully operational. The component will be completed and become fully operational within two years.

Operation and Maintenance (O & M) costs are estimated at 1.5 per cent of total investment costs.

(3) **Financial Internal Rate of Return (FIRR):**

Based on benefit and cost projections of the component (see Table 1), the FIRR on this investment is 9.8 per cent.

**POWER SECTOR SUPPORT II (COMPUTATION OF FIRR)
 STATIC VAR COMPANSATORS (US.\$ Million)**

Year	Capital Costs	O&M	Total Costs	Fuel Cost Savings	Net Benefits
1	\$11.81	\$0.00	\$11.81	\$0.00	(\$11.81)
2	\$15.33	\$0.00	\$15.33	\$0.00	(\$15.33)
3	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
4	\$0.10	\$0.41	\$0.51	\$3.69	\$3.18
5	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
6	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
7	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
8	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
9	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
10	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
11	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
12	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
13	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
14	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
15	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
16	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
17	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
18	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
19	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
20	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
21	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28
22	\$0.00	\$0.41	\$0.41	\$3.69	\$3.28

FIRR	0.0976599834
NPV	(0)

WADI EL NATROUN SUBSTATION

(1) Benefits:

The expected increase in the supply of energy due to the proposed substation, according to a study prepared by EEA in 1993, is estimated at 707.4 million KWh. This estimate is based on an assumed load of 161.5 MW, multiplied by 8,760 operation hours per year, times a load factor of 0.5.

Sales revenues are estimated at \$28.58 million annually, based on a projected long run marginal cost of \$0.0404/KWh for the 1994/95 base year of the project.

The analysis of the proposed substation has identified a second benefit resulting from reduction in line losses. This loss reduction results in additional energy sales amounting to 15 million KWh per year, valued at \$0.61 million.

(2) Costs:

Capital Costs: Capital costs are estimated at \$40.75 million, consisting of \$35.43 million from USAID and LE 18.07 million (equivalent to \$5.32 million) from the GOE. The land on which the substation will be constructed is owned by the GOE and has been excluded from the financial cost projections. An estimate by EEA for interest during construction has also been excluded from our cost projections.

The project will become fully operational in three years and will have a useful life of thirty years.

Operation and Maintenance Costs: Annual operation and maintenance (O & M) costs are estimated at 1.5 per cent of investment costs, valued at \$0.61 million.

Generation Costs: Annual generation costs are estimated at \$14.87 million, approximately 51 per cent of sales projections.

(3) Financial Internal Rate of Return (FIRR):

The FIRR of the proposed investment, based on benefit and cost assumptions as stated (see Table 2), above is 27.9 per cent. From this analysis, we can conclude that the proposed investment is financially sound and profitable.

POWER SECTOR SUPPORT II (COMPUTATION OF FIRR)
WADI EL NATRUN SUBSTATION (U.S. \$ MILLION)

Year	Capital Costs	O&M	Generation Costs	Total Costs	Sales Revenues	Net Benefits
1	\$4.92	\$0.00	\$0.00	\$4.92	\$0.00	(\$4.92)
2	\$18.66	\$0.00	\$0.00	\$18.66	\$0.00	(\$18.66)
3	\$17.17	\$0.00	\$0.00	\$17.17	\$0.00	(\$17.17)
4	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
5	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
6	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
7	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
8	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
9	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
10	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
11	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
12	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
13	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
14	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
15	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
16	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
17	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
18	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
19	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
20	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
21	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
22	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
23	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
24	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
25	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
26	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
27	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
28	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
29	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
30	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
31	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
32	\$0.00	\$0.61	\$14.87	\$15.48	\$29.19	\$13.71
33	\$0.00	\$0.61	\$14.97	\$15.48	\$29.19	\$13.71

FIRR	0.279119801
NPV	(0)

POWER SECTOR SUPPORT II PROJECT
263-0224**Economic Analysis****I. Overview**

It is an established fact that a well designed and operated electric power system is virtually essential if a country is to achieve sustained economic growth. This is due to the importance of electricity as an input for many other productive processes and the magnitude of resources invested in the power grid itself. This suggests that power system investments, which are properly designed, implemented and carried out in an appropriate policy framework, should yield good economic returns.

The situation described above certainly pertains to Egypt today. The national grid is well developed and reaches most of the country. A significant amount of national investment goes to the power sector. At the same time, however, the power sector is faced with a number of problems. These can be summarized in terms of EEA's lack of autonomy, its poor financial performance, and its inefficiency. The Power Sector Support II (PSS II) Project will help the GOE focus on these problems so as to ensure that the resources devoted to this sector yield the highest possible economic return.

An example of this type of assistance is an electricity pricing study, which will be undertaken as one of the benchmarks aimed at reforming electricity tariffs to promote financial viability and achieve economic pricing (see attachment to this Annex). This study will determine the future level and structure of electric power tariffs consistent with both EEA's economic cost of supply (based on appropriate economic pricing of all inputs) and its financial viability.

This Project is designed to make resources available to EEA in exchange for the adoption of policy reforms focusing on institutional and financial strengthening. Project resources will be used to finance technical assistance in support of the policy reforms as well as to upgrade part of EEA's electric power system. Thus the project should lead to two types of economic benefits: those resulting from improved infrastructure and those resulting from institutional/financial strengthening.

Reform of the pricing system for electricity is expected to remove the severe market distortions resulting from the underpricing of electric power. It is estimated that the implicit electricity subsidy reached LE 4.2 billion and LE 4.4 billion in 1991/92 and 1992/93 respectively.¹ Moreover, the industries that depend heavily on the cheap supply of electricity

¹ Memo by Rasha Abdel-Hakim on "Explicit & Implicit Gov. Subsidies in Egypt" dated June 1991.

(e.g., the Aluminum Complex at Nagah Hammadi) are considered to be an additional drain on the national economy, as their very "raison d'etre" rests on the uneconomic pricing of electric power. Therefore, by establishing a price system based on the economic cost of supply, misallocation of resources will be corrected and the economic losses associated with it will be greatly reduced.

The policy components related to regulatory framework, institutional development, and financial strengthening, and for which technical assistance will be provided to EEA, is expected to lessen the technical, financial, and X-inefficiencies (i.e., non-technical inefficiencies) that constrain EEA's activities and hence transform EEA into a market oriented entity capable of achieving the highest levels of efficiency and profitability. It is expected that fulfilling the policy measures will help EEA improve its maintenance procedures, operate on the basis of economic dispatch, and strengthen its expansion planning and load forecasting methodologies, thereby reducing energy losses and saving scarce resources.

A simple benefit-cost analysis of the economic viability of providing technical assistance to EEA shows that annual cost savings to EEA of only LE 9 million (\$2.65 million) per year for ten years would yield a ten per cent economic rate of return on the TA investment of \$16 million. Taking into account the size of EEA's operating revenues and expenditures (LE 2.5 billion and LE 1.65 billion respectively in 1992), it is very reasonable to argue that the potential impact of the proposed TA on EEA's performance will more than justify the cost. This conclusion is endorsed by the USAID-financed Egyptian Power Sector Assessment (December 93), which estimates that if EEA manages to reduce its accounts receivables from 6.4 months to sixty days, savings will reach LE 140 million per year, i.e., more than fifteen times the savings required to yield a ten per cent rate of return. This is just one quantitative example of the benefits gained from strengthening the planning and managerial capabilities within EEA.

Finally, the environmental benefits should be noted as they relate to the electricity pricing reforms under the Project. The increase in electricity tariffs will result in less electricity consumption and thus less requirement to operate thermal power plants, which are a major source of air pollution. While the positive environmental impacts of increased electricity prices are difficult to measure accurately, a preliminary calculation of impacts suggests that they are very large. Assuming that overall price elasticity of electricity is 0.3, the ten per cent real increase in electricity rates in FY 1993 would result in a three per cent decrease in consumption compared to what it would have been without the price increase. This decrease is roughly equivalent to averting the emissions associated with a 350 megawatt capacity power plant.

II. Approach

Assuming adequate policy performance on the part of the GOE and EEA, the PSS II Project will make annual obligations of funds to be used to finance specific power system investments. Benefit-cost analyses have already been performed under the Power Sector Support Project (263-0215) for the types of infrastructure improvements that this Project will finance. For example, a regional control center for the Cairo area yielded an economic rate of return of thirty per cent. Also under the Power Sector Support Project, rates of return were calculated for a transmission substation, resulting in an economic rate of return of 62 per cent. Hence, these types of capital investments have shown positive rates of return in the past.

Below are economic benefit-cost analyses for the major capital investments to be financed during the first two years of the Project. These components, together with the regional control centers, are indicative of the types of capital improvements which this Project will fund. Separate detailed financial and economic analyses of future activities will be undertaken as they are identified and prepared for funding over the years of the project.

III. Results

WADI EL-NATROUN SUBSTATION

According to EEA studies, land reclamation projects require the installation of new substations. The proposed substation at Wadi El-Natroun is expected to supply the first phase of land reclamation with a load of 190 MVA, equivalent to 161.5 MW. Total energy supplied by the proposed substation is therefore:

$$161.5 \text{ MW} \times 8760 \text{ hrs/year} \times 0.5 \text{ (load factor)} = 707.4 \text{ GWh}$$

A) Evaluation of the Benefits:

The Wadi El-Natroun substation is expected to generate two main benefits:

1. **Increased energy sales:**

The first benefit from the substation is the increase in the volume of energy sold, calculated at 707.4 Gwh, based on a load factor of 0.5. Since the substation will serve land reclamation, the increase in sales was valued at the LRMC of energy supplied by EEA to high voltage industrial and agricultural projects. The LRMC was estimated at PT 11.34/kwh in 1992. Since the project's implementation will start in 1994/95, we have assumed an inflation rate of 10 per cent per year to obtain the LRMC in the base year of the

project. The resulting LRM C is PT 13.72/kwh or US \$0.0403/kwh.

2. Reduction in line losses:

The establishment of the Wadi El-Natroun substation is expected to result in a decline in line losses by 5MW per year, i.e., 15 million kwh/year (5MW x 3000 hrs per year/1000). The reduction in losses was valued at the LRM C of US \$0.0403/kwh.

B) Costs:

1. Investment Cost:

Total investment cost was estimated by EEA at \$30 million and LE 20 million, excluding land which will be provided for free. DR/PT revised the foreign exchange estimate, raising it to \$35.43 million. Two adjustments were made to convert this financial cost to an economic cost. First, an imputed value of LE 5,000 per feddan of land (land is estimated at 6 feddans) was added to the local cost. Second, the cost of "interest during construction" which relates to the interest cost on the project's loans has been excluded, as it is a mere transfer of funds from one entity to another and hence, is not considered an economic cost. With these adjustments, total cost of the substation (local & foreign) was estimated at \$40.76 million.

2. Running Costs:

Operation and maintenance costs are estimated at 1.5 per cent of the total investment cost of the substation.

C) Internal Rate of Return:

Based on the previous assumptions regarding benefit and cost streams, the project is expected to yield an economic rate of return of 28 per cent, which strongly supports the economic justification for the project (see attached table).

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WADI EL NATROUN SUBSTATION

Economic Analysis

	BENEFITS					COSTS (US \$ Million)				NET BENEFITS
	1. Increased Sales (mil. kwh) (mil US \$)	2. Reduced Line Losses (mil. kwh) (mil US \$)	TOTAL BENEFIT		1. Investment Cost	2. Running Cost	3. Incremental Generation Cost	TOTAL COSTS		
1995						4.93			4.93	-4.93
1996						18.66			18.66	-18.66
1997						17.17			17.17	-17.17
1998	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
1999	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2000	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2001	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2002	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2003	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2004	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2005	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2006	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2007	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2008	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2009	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2010	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2011	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2012	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2013	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2014	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2015	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2016	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2017	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2018	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2019	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2020	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2021	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2022	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2023	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2024	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2025	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2026	707.4	28.55	15.00	0.61	29.15		0.61	14.85	15.47	13.69
2027	707.4	28.55	15.00	0.61	29.34		0.61	14.85	15.47	13.87

Internal Rate of Return (%): 27.9%

Net Present Value (10%): 62.9

(US \$ Million)

N.B. Total benefits in the last year include the salvage value of land (\$190,000)

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STATIC VAR COMPENSATORS

EEA conducted a siting and sizing analysis which concluded that a static VAR compensator (SVC) is needed at the Cairo 500 substation by 1997 to reduce the generated active power of this substation and hence, reduce the cost of power generation.

A) Evaluation of Benefits:

The proposed SVC is expected to reduce the generated active power at peak loading hours by 0.2 MW and 83.3 MVAR. It is also expected to reduce the generated active power at minimum loading hours by 0.4 MW and 87.0 MVAR. Total reduction in generated power is therefore:

- For peak loading hours = $(0.2 + 83.3) \times 1095 \text{ hrs} = 91.43 \text{ MWh}$
- For minimum loading hours = $(0.4 + 87) \times 1825 \text{ hrs} = 159.5 \text{ MWh}$

Where:

- 1095 hrs = no. of peak loading hours based on 3 hours per day.
- 1825 hrs = no. of minimum loading hours based on 5 hours per day.

The main benefit resulting from this reduction in generated power is the reduction in fuel consumption, and hence fuel cost.

- Fuel savings = savings in Mwh x fuel consumption (kg / Mwh)

$$\text{i.e.:} = (91.43 + 159.5) \times 250 \text{ kg} = 62,733 \text{ kg or } 62.73 \text{ tons}$$

- Annual fuel savings in US\$ = $62.73 \text{ tons} \times \text{US } \$ 59.35/\text{ton} = \text{US\$}3.72 \text{ million}$

B) Costs:

1. Investment Cost:

Total investment cost was estimated by EEA at \$30 million, including the cost of land. The cost of equipment and machinery is expected to reach \$25 million. DR/PT revised the total estimate, reducing it to \$27.24 million. EEA officials informed us that the project is to be implemented in one year only. We think, however, that to be on the safe side, the analysis should be based on two years, with 40 per cent of the cost being incurred in the first year and the remaining 60 per cent in the second year.

2. Running costs:

Operation and maintenance costs are estimated at 1.5 per cent of investment cost.

C) Internal Rate of Return:

Based on the previous assumptions regarding the benefits and costs streams (see Table 2), the project is expected to yield an internal rate of return of 10 per cent. This rate makes the component marginally justifiable on economic grounds.

VAAR COMPENSATOR PROJECT

Economic Analysis

	BENEFITS		COSTS (US \$ Million)		TOTAL COSTS	NET BENEFITS
	Reduced Fuel Cost		1. Investment	2. Running		
	(000's tons)	(mil US \$)	Cost	Cost		
1995			11.81		11.81	-11.81
1996			15.33		15.33	-15.33
1997	62.73	3.69		0.41	0.41	3.28
1998	62.73	3.69	0.10	0.41	0.51	3.18
1999	62.73	3.69		0.41	0.41	3.28
2000	62.73	3.69		0.41	0.41	3.28
2001	62.73	3.69		0.41	0.41	3.28
2002	62.73	3.69		0.41	0.41	3.28
2003	62.73	3.69		0.41	0.41	3.28
2004	62.73	3.69		0.41	0.41	3.28
2005	62.73	3.69		0.41	0.41	3.28
2006	62.73	3.69		0.41	0.41	3.28
2007	62.73	3.69		0.41	0.41	3.28
2008	62.73	3.69		0.41	0.41	3.28
2009	62.73	3.69		0.41	0.41	3.28
2010	62.73	3.69		0.41	0.41	3.28
2011	62.73	3.69		0.41	0.41	3.28
2012	62.73	3.69		0.41	0.41	3.28
2013	62.73	3.69		0.41	0.41	3.28
2014	62.73	3.69		0.41	0.41	3.28
2015	62.73	3.69		0.41	0.41	3.28
2016	62.73	3.69		0.41	0.41	3.28

Internal Rate of Return (%): 9.8%
 Net Present Value (10%): -0.4
 (US \$ Million)

N.B. Total benefits in the last year include the salvage value of land (\$570,000)

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SCOPE OF WORK

ELECTRICITY PRICING STUDY

I. Objective

The objectives of this study are threefold. First, the study shall determine the most appropriate methodology for estimating the economic cost of supplying electricity to consumers through Egypt's national grid. This is the so-called long run marginal cost of supply (LRMC). The study will clearly justify the recommended methodology--contrasting it with alternative methodologies as necessary. Second, the study shall determine the most appropriate values of key parameters to use in this methodology and then apply this methodology to estimate the economic cost of supplying electricity to various categories of consumers within the grid for the period through July 1998. Third, the study shall model EEA's financial performance, and then use this model--together with LRMC estimates--to identify a two year tariff reform plan which ensures that tariffs broadly consistent with the structure and level of LRMC, and sufficient to meet EEA's financial requirements, will be in place by the start of FY 1997/98.

II. Background

Egypt is in the midst of implementing a wide ranging economic reform program. This aims to improve the economy's macroeconomic stability and promote sectoral reforms which increase market orientation and permit resources to be allocated more efficiently.

One of the key sectoral distortions to be addressed relates to the pricing of electricity. For at least the last decade, the price of electricity supplied by the Egyptian Electricity Authority (EEA) and the regional distribution companies has been, on average, highly subsidized. While the magnitude of the subsidy has been reduced significantly in recent years, considerable overall subsidies still remain. Cross subsidies between categories of consumers also persist.

More specifically, the reform of electricity tariffs has been addressed in the World Bank's Structural Adjustment Loan (SAL) and in project conditionality contained in USAID/Egypt power projects. Specifically, under both the Government of Egypt committed itself to annual tariff increases, starting in mid-1991, sufficient to make average tariffs equal to LRMC by mid-1995. Specific LRMC estimates for the period in question were derived from an electricity pricing study carried out by Hagler-Bailly Inc. in 1991 and subsequently modified by EEA in 1992 (with tacit World Bank and USAID agreement) to reflect changing economic circumstances.

There is a need at present, however, to reassess estimates of LRMC within the national power grid. Work by Hertzmark in late 1993 suggested that the general approach taken by Hagler-Bailly to estimate the capital cost component of LRMC, the so-called "peaker" method, resulted in a serious underestimation of that cost parameter. There has also been a considerable debate concerning the appropriate method of valuing or costing the natural gas produced in Egypt and increasingly used to fire EEA's thermal power plants. One measure of this cost is the energy equivalent border price of fuel oil since they are close substitutes and (at least at present and in the near future) an increase in the use of natural gas in EEA plants means that more domestically produced and refined fuel oil is available to Egypt for export. An alternative measure is the LRMC of extracting natural gas in Egypt and transporting it to the power plant sites. These two measures likely yield different estimates of the economic cost of natural gas which, in turn, result in significantly different estimates of the energy cost component of LRMC.

Taking a broader perspective, EEA's financial performance--at least as measured by its ability to self-finance a reasonable percentage of its capital expansion plan--is projected to remain weak even when average tariffs reach 100 percent of currently defined LRMC in mid-1995. This is perhaps the most important indication of the need for continued tariff reform beyond 1995. Such reform needs to be based upon a firm understanding of both the level and structure of EEA's supply costs and EEA's financial requirements. In addition, the GOE has recently expressed an interest in incorporating private power suppliers within the national grid. This can only be accomplished if power purchase agreements based on realistic measures of the benefits to the GOE of private power production (i.e. the avoided cost of EEA supply) are available.

III. The Technical Assistance Activity

During the course of this study, the consultant shall:

1. Review relevant prior studies and data relating to: the organization of the power sector; the economic cost of supplying power within the national grid; the market for natural gas and the economic cost of natural gas supplied to EEA power plants; EEA's expansion plans and financial performance.
2. Meet with relevant officials in the Ministry of Electricity and Energy, EEA, the regional Electric Distribution Companies, the Egyptian General Petroleum Corporation, and other organizations on an as needed basis to collect information on the operations of, and costs associated with, the national power grid.
3. Review alternative methodologies for estimating the LRMC of power within a grid and identify a recommended approach for use in this study.

4. Determine, in cooperation with EEA and other relevant entities, the values of key parameters to be used in the methodology identified in (3) above.
5. Estimate strict LRMC for FY 1995/96, FY 1996/97 and FY 1997/98 by consumer category using the methodology and data identified in (3) and (4) above, and determine a tariff structure consistent with this estimate.
6. Develop a model power purchase agreement that is consistent with the LRMC estimates derived in (5).
7. Develop a simple model for assessing EEA's financial performance (in terms of its self financing ratio) and then apply this model to estimate EEA's financial performance for FY 1996/97 and FY 1997/98 assuming the tariff structure identified in (5) was implemented.
8. Based on the results of (6), revise the proposed tariff structure (if and as necessary) so that it produces adequate financial performance (defined as a self financing ratio of 35 percent for FY 1997/98) on the part of EEA, while at the same time remaining broadly consistent with the structure and level of LRMC.
9. Propose a time phased plan of tariff reform for FYs 1996/97 and 1997/98 which will achieve the proposed tariff structure by the beginning of FY 1997/98.
10. Make the methodologies and models described in (3) to (6) above available to EEA and train relevant staff to fully operate these models/methodologies.

IV. Deliverables and Reports

The consultant shall prepare and submit to USAID and EEA for approval a work plan and final report outline within two weeks of beginning work in country. The consultant shall submit three copies each to USAID and EEA of interim reports by the end of the first, second, and third months in country. These reports shall describe progress to date, present initial results, and identify any key issues to be resolved. Ten copies of a draft final report, together with a formal debriefing, shall be presented to USAID and EEA by the end of the eighth week in country. Twenty copies of the consultant's final report shall be submitted within three weeks of receiving USAID and EEA comments. This final report shall:

1. Review the pros and cons of alternative methodologies for estimating LRMC and clearly justify the use of a particular methodology here in Egypt.
2. Summarize and--to the extent necessary--justify the values of key parameters used in the recommended methodology.
3. Present in detail the application of the proposed methodology

for estimating LRMC, summarize resulting estimates of strict LRMC by customer category for FY 1996/97 and 1997/98, and present a tariff structure consistent with strict LRMC.

4. Present a model power purchase agreement consistent with strict LRMC estimates.

5. Present a simple model for assessing EEA's financial performance.

6. Assess EEA's financial performance using the model described in (5) and the strict LRMC-based tariff, and recommend adjustments to the tariff structure as necessary so as to ensure adequate EEA financial performance for FY 1997/98 while at the same time retaining overall consistency with the structure and level of LRMC.

7. Propose a time phased tariff reform plan for FYs 1996/97 and 1997/98 which will achieve the proposed tariff structure by the beginning of FY 1997/98.

V. Relationships and Responsibilities

The consultant shall work under the direction of USAID and EEA. Required reports shall be submitted at the same time to both organizations.

VI. Level of Effort and Staffing

The study shall require approximately 16 man months of expatriate expertise and 12 man months of local expertise to complete. The duration of the study will be approximately 4 months. The expatriate team will consist of:

Expatriates

Chief of Party: This person should be a Ph.D. energy economist with at least 10 years experience carrying out electricity pricing and related studies. He/she should have significant experience leading technical assistance teams in developing countries. Prior Egypt experience would be useful.

Power System Economist: This person should be a Ph. D. economist with at least 7 years experience working on electricity pricing, investment, and demand forecasting issues. Prior developing country and Egypt specific experience would be useful.

Financial Analyst: This person should have at least 10 years experience carrying out financial analysis. He/she should have significant demonstrated experience in the financial modeling and analysis of electric utilities. Prior developing country and Egypt specific experience would be useful.

Power System Analyst/Engineer: This person should have at least 10 years experience in the analysis of power systems. He/she should be familiar with modern analytical techniques for expansion planning and economic dispatch. Prior developing country and Egypt specific experience would be useful.

Egyptians

Energy Economist: The person should be a Ph.D. economist with considerable experience working on electricity-related issues. Prior experience working with EEA would be useful.

Financial Analyst: This person should have considerable experience in the financial analysis of utilities. Prior experience working with EEA would be useful.

Power System Analyst/Engineer: This person should have considerable experience in the analysis of power systems. Prior experience working with EEA would be useful.

POWER SECTOR SUPPORT II PROJECT
263-0224

Social Soundness Analysis

A functioning, competitive modern society, with sectors ranging from agriculture and tourism to industry and commerce, requires a reliable electric power supply. These sectors in turn expand and provide jobs for society. Not only is electric power essential for adequate production capacity, but also for increased quality of life, security, health services and education.

A rich body of anecdotal evidence indicates that electricity has numerous socioeconomic benefits. Although very little rigorous research has been done to verify such benefits and measure them, it does appear that in many instances electricity services have been associated with benefits ranging from improved literacy to improved general quality of life to improved economic productivity to reduced incentives for rural-to-urban migration. Especially compelling is evidence that even very poor people are willing to make sacrifices, when electricity is available, to purchase and operate appliances such as electric lights, televisions, and fans. People in developing countries perceive benefits to electricity use. This does not necessarily mean that the benefits are large enough for a nation to continue to subsidize electricity prices or the expansion of rural electrification or to bear the environmental costs of unlimited power production, and it does not establish how much the benefits are reduced when electricity supplies are unreliable or the power is of poor quality. But people, rich and poor, do seem to want electricity and the services it enables.

As a part of the more general development process, electrification alone is unlikely to have a great deal of benefit, any more than highways alone spur development; people need jobs, income, and complementary improvements in socioeconomic conditions. On the other hand, an integrated development agenda that makes electricity available and, at the same time, improves the access of households and small firms to capital and makes public investments in agriculture, education, health services, water supplies, sanitation, and housing can greatly improve economic productivity and quality of life. It is not possible from available evidence to isolate the contribution that electricity makes to such an integrated development program other than to say that electricity becomes an integral part of the program once investments have been made in electrical end-use equipment for irrigation, public lighting, or healthcare. The following examples, however, illustrate some of the ways in which electricity is often associated with socioeconomic benefits.

Vaccination: Vaccines for many human and livestock diseases require refrigeration. The total annual worldwide losses from diseases that could have been prevented by vaccination if refrigeration were more widespread are probably in the billions of dollars. Although refrigeration can be provided through non-electric technologies, expansion of electric refrigeration would simplify the effort.

Education: Electricity is associated with information transfer, classroom conditions, and study habits. For instance, studies have found that children who can read by electric lights spend more time reading at home than those who lack electric lights.

Income and employment: Although there is a lack of reliable information on this subject, electricity use can increase productivity, income, and employment. For example, rural households could increase their income by undertaking cottage industrial activity using electric lights in the evening and electricity for shaftpower.

Quality of life: Electrification can increase the quality of life for all socioeconomic groups. Electricity is particularly closely associated with such benefits as air conditioning, refrigeration, communication, and household conveniences.

Migration: Cities and larger towns and villages are more likely to have electricity than small villages and rural areas, and it has been suggested that rural electrification, by reducing this disparity and improving the quality of rural life, might reduce the rate of rural-to-urban migration.

Political Stability: Development, rather than electrification, is the key to building support for a government or political system. It is clear from anecdotal evidence, however, that a failure to maintain reliable electricity services can result in general public dissatisfaction.

The Power Sector Support II Project, which will increase the efficiency and sustainability of the electric power sector, has an extensive positive social impact because it will increase the access to, and efficiency and reliability of, public utilities throughout Egypt. The project will also provide substantive environmental benefits, contributing to improved air quality by encouraging the shift from Mazout (fuel oil) to natural gas in existing power generation facilities, and by reducing the need to add generating capacity through increased efficiency in generation and transmission. For example, through a number of project interventions to date, as well as price reform

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conditionality, USAID has helped to avert the emission of air pollutants associated with burning 791,000 tons of fuel annually.

The Project also addresses sector policy and institutional constraints which negatively impact on economic growth. Subsidized pricing promotes the inefficient use of power among all consumers, causing a drain on budgetary resources. Therefore, reducing subsidies will benefit Egyptian society as a whole. Quality of life will also improve for the general population as a result of a more efficient and reliable transmission and distribution network which affects all dimensions of life. It should be noted that tariff increases should not have a negative impact on poor Egyptians, the reason being that there are low lifeline electricity rates for small consumption levels of electricity.

The Project should have significant benefits for women. About 25 per cent of the engineers employed by EEA are women. This figure is high relative to female representation in electric utilities in the United States. The positions created at the regional control centers and substation to be financed will provide additional opportunities for training and promotion of women.

The construction of the transmission substation, regional control centers, and static VAR compensators, in addition to the upgrading of existing infrastructure components, will offer both short-term and long-term employment opportunities in terms of construction, operations, and support for the facilities, all of which will directly enhance the economy of the areas surrounding the component sites.

Most of the residential customers and the industrial and commercial establishments where the capital improvements will take place will directly benefit through improved reliability of electric power service. In addition, since the various zone distribution systems are supplied with energy from the Egyptian Unified Power System (UPS), improving the efficiency and operation of the regional systems will benefit all users of electric energy supplied from the UPS.

POWER SECTOR SUPPORT II PROJECT
263-0224**Administrative Analysis****A. Organization**

The Ministry of Electricity and Energy (MEE) is responsible for managing the electric power sector. The Egyptian Electricity Authority (EEA), a government-owned enterprise, is responsible for almost all the power generated and transmitted in Egypt. EEA sells energy to large industries supplied at high voltage and to eight Distribution Companies (under a Holding Company) that distribute and sell energy at medium and low voltage to residential, commercial and small industrial customers. The Rural Electrification, Nuclear, Hydro Power Plant, and Renewable Energy Authorities are responsible for the planning and construction of rural distribution lines, nuclear and hydro power generation facilities and renewable (solar and wind) energy developments respectively. All generating facilities, regardless of their type, are operated and maintained by EEA.

The new components contained in this Project will be implemented by the Egyptian Electricity Authority. All decisions involving commitment of project funding must be approved by the EEA's High Purchase Committee, Board of Directors and Chairman, with the concurrence of the Minister of Electricity and Energy.

B. Institutional Development Technical Assistance

A major component of this Project will be the provision of technical assistance to EEA (see attachment of draft scope of work). The technical assistance will provide services in connection with the strengthening of institutional capacities for the operation and maintenance of EEA. Services to be provided will include: clarifying the legal mandates regarding provision of electricity; establishing a data base and accompanying analysis capability to assess revenues and costs; develop financial management and administrative support systems; developing personnel training and career development programs; establishing a performance monitoring system; and, establishing a public education and public relations program.

C. EEA Project Management

Day-to-day implementation of the capital improvement components will be the responsibility of the of the EEA Deputy Chairman for Projects. A Requirement Precedent to Disbursement will be included in the Project Agreement requiring EEA to establish project management teams for the control centers and

the SCADA systems reporting directly to the President of EEA and the project management teams for all other components reporting directly to the EEA Deputy Chairman for Projects. The teams will have the authority to make day-to-day decisions and approvals. Each team will be composed of a project manager, a project engineer, a financial specialist, and a legal expert. The establishment of project management teams provides for more efficient project implementation on the part of EEA.

D. Operations and Maintenance

The EEA will be responsible for providing operations, maintenance and administrative staff for the infrastructure components after they are completed. The personnel assigned to the various components will receive refresher training in disciplines appropriate to their operations.

In addition, the turnkey equipment contractors will be required to maintain the new equipment for a one-year warranty period starting from provisional acceptance and ending at the final acceptance by EEA of the systems.

E. The USAID Power and Telecommunications Office

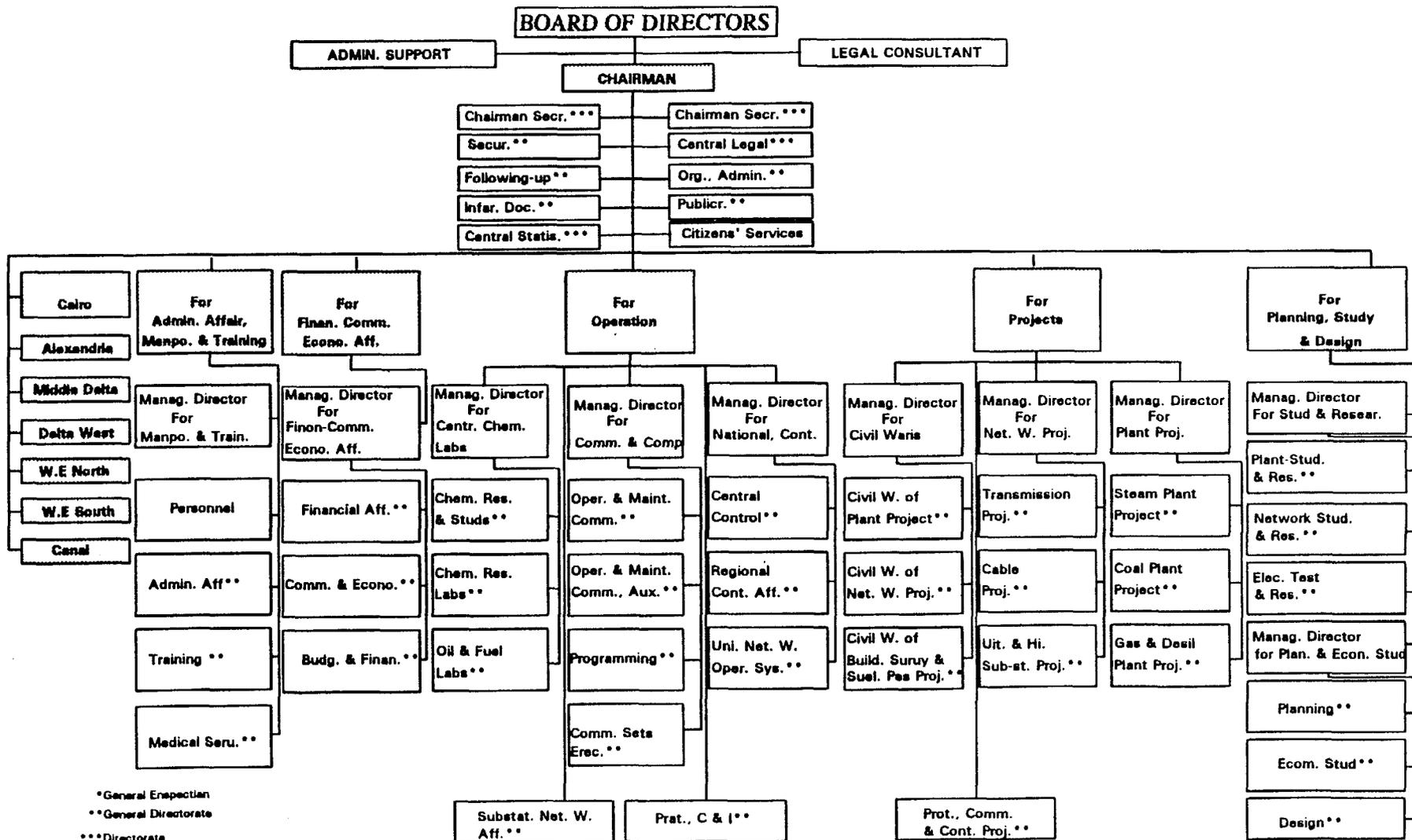
DR/PT will have monitoring responsibilities for USAID. The Office has been responsible for implementation of the \$461 million Power Sector Support Project, as well as many other projects within the power sector, and has developed an excellent working relationship with all levels of EEA personnel. The assigned personnel are experienced in the design, construction, operation and maintenance of power systems, and should provide sufficient USAID monitoring support for this project.

Conclusion

EEA has many years of extensive and successful experience in the construction, operation and maintenance of electric power systems. The proposed project is designed to build on this experience. EEA over the years, has demonstrated a capability to effectively manage the implementation of much larger and more complex power projects. At the same time, the available DR/PT staff should be sufficient to provide the necessary USAID monitoring support. Accordingly, the project is administratively feasible.

EGYPTIAN ELECTRICITY AUTHORITY

Revised Figure 5-1 (11/8/93)



*General Expectation
 **General Directorate
 ***Directorate

12/29



CAIRO EGYPT

UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

ANNEX L
Attachment 1

Office of Contract Services
USAID/Cairo
Unit 64902
APO AE 09839-4902

May 5, 1994

Subject: RFP No. 263-94-P-007
Institutional Development of
Egyptian Electricity Authority (EEA)
Draft Statement of Work

Dear Sir/Madam:

As stated in the Commerce Business Daily (CBD) Notice published on April 8, 1994 regarding the subject solicitation, USAID/Cairo is distributing a draft of the proposed statement of work for comments and suggestions.

Please review the draft document to identify areas or specific points that may be expanded upon, refined or clarified. The intent is to develop a statement of work in which the goals, objectives and specific tasks are understandable and achievable in the context of a performance-based, cost-plus-award-fee type contract over a three to four year period. Please also provide feedback on those points which, if changed, could reduce costs or otherwise improve the acquisition.

To facilitate issuance of the RFP, please provide your specific comments, if any, no later than May 26, 1994. You may telefax them to 011-20-2-356-2932. All comments will be given full consideration. The RFP will be issued soon after appropriate revisions are made to the statement of work.

Note that this document is not a Request for Proposal (RFP). It does not obligate the U.S. Government to award a contract, nor does it commit the U.S. Government to pay any cost incurred by you in preparing and submitting your comments or, ultimately, a proposal. Thank you for your assistance.

Sincerely,

Michael F. Walsh
Contracting Officer

Encl: Draft Statement of Work (21 pages)

LTR/DIR/CS/94/0271

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TERMS OF REFERENCE

INSTITUTIONAL DEVELOPMENT CONTRACT

EGYPTIAN ELECTRICITY AUTHORITY

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I. BACKGROUND

The Egyptian electric power system serves over 12 million customers concentrated in Cairo, Alexandria, the Delta, along the Suez Canal and along the River Nile. Per capita consumption of electric energy has nearly doubled in the past ten years encouraged by heavily subsidized electricity tariffs. The government of Egypt has invested nearly \$5 billion in foreign exchange, obtained from multi-lateral and bi-lateral financing agencies and LE 2 billion in local currency to develop the necessary facilities to reliably meet customer demands.

While the resulting generating facilities and transmission and distribution networks are currently adequate to meet today's customer demands, and as the Government of Egypt (GOE) proceeds with a program of major economic reforms designed to stabilize its economy, remove distortions and give impetus to the private sector as a central element in its growth strategy, substantial additional investments in facilities and networks will be required to meet the anticipated growth in demand. These investments will finance: committed generating facilities and associated transmission networks; expand and rehabilitate distribution networks; and upgrade and expand facilities to more effectively manage the operating power system.

The Egyptian electric power system has evolved from a number of isolated power systems that met the energy needs of customers located in close proximity to the source of generation. These isolated systems were eventually joined together (interconnected) on a regional basis and then nationally to form the existing power system. Facilities to supply Egypt's electric energy requirements consist of electrical generating facilities installed at strategic locations in the Nile Valley, the Delta and along the Suez Canal that are integrated by a complex network of transmission lines. Areas outside the reach of the power system are supplied from gas turbines and diesel driven generators with a total installed capacity of less than 300 MW. These facilities are state owned and are the responsibility of the Ministry of Electricity and Energy (MEE) and five operational and executive authorities. At present, legislation restricts the sale of energy to customers to that energy produced or supplied from the national utility system and therefore prohibits private generation.

The Egyptian Electricity Authority (EEA) is responsible for the planning of the bulk power supply that includes generation and transmission at high voltages. EEA sells energy to large industries supplied at high voltage and to eight Distribution Companies (under a Holding Company) that distribute and sell energy at medium and low voltage to residential, commercial and small industrial customers. The Rural Electrification, Nuclear, Hydro Power Plant and Renewable Energy Authorities are responsible for the planning and construction of rural distribution lines, nuclear and hydro power generation facilities and renewable (solar and wind) energy developments respectively. All generating facilities regardless of their type are operated and maintained by EEA.

In 1977, when AID provided initial funding for the sector, the bulk power supply facilities were not sufficient to meet customer demands. Service curtailments occurred frequently and generating capacity was not sufficient to permit necessary scheduled maintenance. As a result of maintenance deferrals, generating unit failures occurred more frequently, further hindering scheduled maintenance. The bulk power supply system was managed by an obsolete computer that was not of sufficient capacity to monitor the network or perform the necessary computations which would form the basis of economic operation. The distribution facilities were deteriorated and subject to frequent failures. Organizationally, EEA was overstaffed and under managed with all decision making centralized in the Chairman.

Seventeen years later, as a result of over \$5 billion equivalent in financial assistance by AID, the World Bank, and numerous multi-lateral and bi-lateral financing agencies and over LE 2 billion provided by the Government of Egypt, the electricity sector has, for the time being, closed the gap between customer demand and available generating capacity, provided a reliable bulk power transmission network and initiated a long term program to rehabilitate the distribution system.

The moment to moment scheduling of generation to meet customer demands most efficiently and reliably is centrally controlled from the National Energy Control Center located in Cairo. The same center also monitors the bulk power transmission network to assure maximum reliability. The growth in the bulk power system has exceeded the center's capacity to manage the collected data and the center's capacity is being expanded. EEA has only limited information on the regional networks supplied from the bulk power system and is not able to effectively manage these networks. EEA is embarking on a program to construct and staff these regional centers that will collect, process and display system performance data essential for efficient and reliable operation. One center is in operation in Upper Egypt and USAID is financing a center in Alexandria.

Egypt's 156 generating units have a combined nameplate capacity of exceeding 12,000 MW. The mix of capacity is: 55 percent steam turbine generation; 23 percent gas turbine generation; and 22 percent hydro generation. EEA is rehabilitating 350 MW of steam turbine capacity, originally financed by AID in the 1960's, through USAID financing, and plans to utilize financing from the World Bank and possibly USAID to rehabilitate 700 MW of gas turbine capacity and add 350 MW in steam cycle additions to produce combined-cycle plants. EEA is constructing 3300 MW of capacity to be in service between 1994 and 1998 and is planning an addition 2900 MW that could be in service prior to mid 2000. EEA plans to retire some 600 MW of aged generating capacity prior to 2000. This additional capacity should be sufficient to meet customer demands at least to 2001.

The total energy generated to meet customer requirements in EEA's fiscal year ending in June 19932 was 45.3 billion KWHr. Sales to customers totalled nearly 42.0 billion KWHr. Energy losses during transmission was nearly 3.3 billion KWHr or nearly 8 percent of the energy sales. On a well designed, operated and maintained transmission system, losses should not exceed 4 percent. The high level of losses are due to the uncorrected effects of induction loads on the network, and the improperly sized conductors and transformers, deteriorated components and improper metering on the distribution system.

The growth in both peak demand and energy production of less than 4 percent are attributed to the government's program of economic reforms in electricity pricing and a general downturn in the Egyptian economy resulting from the 1991 IMF and World Bank initiated economic reform program. A completed Energy Pricing Strategy Study, financed by USAID, has provided the government with the pricing strategies to reach full economic pricing of electricity.

Since 1977, USAID and the Government of Egypt have jointly implemented a total of ten projects consisting of 22 subprojects in the electric power sector totalling nearly \$1.4 billion, of which ten subprojects were successfully completed and the other 12 subprojects are proceeding on schedule. These projects provided financing for: (1) consultant services and technical assistance covering specific aspects of power system planning, construction, operation and maintenance, and utility arrangement; (2) expansion and rehabilitation involving 4800 MW of generating facilities; (3) rehabilitation of transmission facilities; (4) rehabilitation and expansion of distribution systems; and (5) establishment of computer centers to monitor, supervise and direct the operation of the bulk power supply network and the network serving Alexandria.

USAID has also provided nearly \$190 million in Commodity funding for the electric power sector for equipment and spare parts for gas turbines, boilers, cables and work equipment. The total project and commodity funding for the sector is nearly \$1.6 billion.

The World Bank has provided four loans totaling \$841.6 million for technical assistance, regional electrification and major equipment or services packages for the construction of the Shoubrah El Kheima Thermal Power Station and the Aswan II Hydroelectric Power Station. The World Bank has approved a fifth loan of \$125 million for the El Kureimat Thermal Power Station and associated facilities.

The African Development Bank and the African Development Fund have provided nearly \$1.1 billion for 12 projects in the Power sector for rehabilitation and expansion of distribution systems and construction of power stations at Shoubrah El Kheima, Damietta, Cairo West and El Arish.

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Other bilateral agencies have collectively provided more than \$1 billion equivalent for generating facilities, transmission expansion, control centers and distribution system rehabilitation and expansion.

II. THE PROBLEM

The GOE has traditionally used electric power as an instrument for development within the overall context of its social, economic and political objectives. This has resulted in over-subsidized (or non-economical) tariffs to both households and industries. While all governments have used subsidies, price controls and other such methods in the administration of their economies, it is important that such measures be made transparent and easily quantifiable in order to maintain managerial responsibility and accountability.

The primary mission of the Ministry of Electricity and Energy (MEE) and the Egyptian Electricity Authority (EEA) has been to provide a reliable source of electricity for Egypt while operating within GOE laws and regulations. Objectives such as profitability and adequate return on investment have not been priorities. Furthermore, EEA has had no authority over the cost or source of fuel used, nor over the price of electricity sold. As a result, EEA has essentially been a "production-oriented" entity, i.e., not concerned with questions of financial efficiency or self-sustainability.

With the advent of the reform process in 1991, under which the GOE began to adopt a series of economic measures to move the country closer to a market economy, EEA needs to focus on generating revenue from the sale of electricity to cover a larger portion of their funding requirements, particularly those allocated to expansion. Accordingly, EEA is now compelled to operate as a profitable, efficient electric utility generating real profits and cash flow. This change will require a complete reorientation of EEA's management toward efficiency and self-sustainability. It is imperative for EEA to become a least-cost producer while providing adequate, reliable service to both residential and industrial customers.

III. ELECTRICITY SECTOR CONSTRAINTS

The Egyptian electric power sector currently faces a number of constraints which if uncorrected will increasingly impede the sector's overall efficiency. Broadly, these constraints involve: policies related to economic pricing of electric energy; institutional issues relating to the training of middle management staff; transmission and distribution networks; and technical issues involving imbalanced allocation of financing to generation, energy losses, capacity derating, and lack of facilities to manage the regional systems. In many instances, technical constraints are exacerbated directly or indirectly by the policy and institutional constraints.

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POLICY CONSTRAINTS

- **SUBSIDIES:**

Government subsidies to the sector have kept electric energy prices far below economic prices and as a result customers had no incentive to control their consumption and industries utilized obsolete and inefficient processes. In recent years, the government has implemented a program of annual increases in the tariffs and reduction in the sector subsidy with the target of economic pricing by mid 1995. While economic pricing of electric energy is the initial objective, of equal concern is the economic pricing of energy for each class of consumer so no one class of consumer benefits at the expense of another class of consumer.

- **RETIREMENT OF INEFFICIENT PLANTS:**

EEA is presently maintaining the operation of several generating facilities for the sole purpose of keeping the employees of these power plants gainfully employed. Under the present government labor laws a reduction in the workforce is not permitted.

- **PAYMENT BY GOVERNMENT AGENCIES:**

Over 40% of EEA's accounts receivables are due to non-payments by other GOE agencies for electricity. EEA is unable to enforce the payment by conventional means such as cut-off services. This hinders EEA's ability to balance its books and properly develop its financial/accounting system.

- **REGULATION:**

In the absence of a utility regulatory system, it is difficult for the sector to ensure a sufficient rate of return on the investments in the sector on one hand and to protect customers by ensuring that fair non-monopolistic prices are charged for electricity.

INSTITUTIONAL CONSTRAINTS

- **ORGANIZATION:**

EEA is currently subject to various GOE regulations inappropriate to the commercial operation of a utility. There is no clear delegation of authority within EEA. Senior Management are overloaded with all aspects of running the authority. This contributes to significant delays in the decision making process. In addition, coordination among various departments appear to be weak.

- **MANAGEMENT DEVELOPMENT:**

The middle management ranks of the various authorities under the Ministry of Electricity and Energy are the source of future management within the sector. These middle level managers have had little or no exposure to effective management techniques or management functions in managing the utilities operations. An initial series of training programs was presented in the late 1970's to the then middle management, today's senior management. Subsequent training was not rigorously pursued until 1991 when USAID was requested to finance an Executive Management Training program for the present senior management. An introductory program in management will meet the immediate needs but a more extensive assessment of the Ministries training goals, objectives and course content, considering the cultural environment to management change, must be performed. As a result, today's managers remain ill equipped to manage this major utility effectively.

- **MANAGEMENT INFORMATION SYSTEMS:**

EEA, with the assistance of UNDP, has developed a project to computerize its operation. However, the Financial and Accounting Department does not use the installed system as intended. The Department should re-evaluate and revise its policy concerning integration of its manually-recorded and computer generated records, and the organization structure which it supports. This upgrade in the MIS should also extend to procurement and inventory of parts and personnel data.

- **FINANCE AND ACCOUNTING:**

EEA lacks an adequate plan for upgrading and automating its accounting records. A plan should be developed and implemented in phases, with automated systems operating in parallel with the manual system before each phase is finalized.

IV. PROPOSED INTERVENTION

To achieve its goals of increased productivity and an improved standard of living for its citizens, the GOE has embarked on a major economic reform program designed to stabilize its economy, remove distortions, and give a newfound impetus to the private sector as a central element in its growth strategy. The availability of reliable sources of electric power is crucial to Egypt's development.

By removing the most serious constraints to growth, Egypt hopes to make the policy climate correct, one in which the playing field is levelled and where both the public and private sectors can fashion appropriate roles in furthering the development of the country. Together with making the policy environment favorable, the GOE has engaged its judicial machinery in a serious effort to dismantle a legal framework that

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has given concrete expression to and reinforced old policies.

To meet the electric power needs of both the public and private sectors that will depend on a reliable supply of electric energy, the Egyptian Electricity Authority has developed an investment plan, for the period 1993 - 1997, based on the priorities and objectives of the Ministry of Electricity and Energy. These priorities in turn reflect and support the development objectives of the Government of Egypt. The investment plan provides for adding generating capacity, developing renewable resources, rehabilitating and refurbishing capacity, reducing losses on the transmission network, expanding transmission networks to serve population growth and strengthen the networks, constructing regional control centers and developing the management staff within the Ministry. The Ministry has requested USAID assistance for a number of these projects for 1994 and beyond and will seek additional assistance in subsequent years.

USAID has advised the Ministry that specific projects would be identified well in advance of each years funding authorization and would be linked to the government's progress in meeting previously agreed upon reforms. The reform agenda will be based on the results and recommendations from the recently completed Electricity Pricing Strategy Study, a Policy Reform and Institutional Development Assessment and subsequent studies directed to loss reduction on the networks and efficiency improvements compatible with the operating system. Reform targets, linked to future funding, will be agreed upon by USAID and the MEE. Compliance with the targets, in the context of reform and schedule, will allow for the authorization of tranching funding.

One of the studies funded by USAID was the Policy Reform and Institutional Development Assessment, a comprehensive examination and assessment of EEA to determine the political, legal and financial impediments that, if corrected, would enhance the performance of EEA through greater efficiency, flexibility, overall system reliability, cost savings, and increased revenue generation. The assessment has recommended a structured, time-phased plan for, but not limited to, improvements in overall financial performance; changes in accounting systems; changes in policies/regulations; tariff structures, tariff collection; organization structures; operating procedures; and profitability of various services.

This contract will be funded under the new Power Sector Support II Project. Project funding will be in tranches that will be authorized annually following the GOE's compliance with previously agreed upon reforms.

V. **EXPECTED OUTCOME OF THIS EFFORT**

The Contractor will contribute to the achievement of USAID policy concerning institutional development, which requires that institutional development be addressed on all project activities to insure that benefits can be sustained after external assistance is completed. The purpose of the contract is to strengthen the institutional capacities in support of the Egyptian Electricity Authority (EEA) to operate and maintain the physical electric generation facilities installed on a commercial basis.

The objectives which are expected to be achieved under the Technical Assistance contract may be summarized as follows: EEA;

- attainment of financial viability;
- achievement of organizational effectiveness (autonomy);
- improvement in service delivery capability; and
- availability of competent manpower.

By the completion of the project, EEA will have evolved into a much stronger, financially autonomous organization with increased revenue generation based on market prices. The increased revenue will provide for sufficient cost recovery to assure sustainability of capital equipment investment and enable EEA to self finance a larger part of electric power expansion and modernization without dependence on grants and soft loans from the general GOE budget or governmental agencies. As a result, EEA will develop the most efficient delivery of reliable electric power service throughout Egypt.

To promote independence and financial profitability, it is of prime importance to re-orient the management of EEA towards commercialization. This will require management training geared toward the operation of a profit driven utility. Such training will include fostering a more customer-oriented attitude and a better understanding of the cost structure of EEA's operations.

The ability of EEA to maintain the power network will also be strengthened through training of the EEA staff to improve existing skills and gain new expertise in planning, operating, and maintaining Egypt's national electric power system.

Performance indicators for achievement of the desired results will be those policy/institutional reforms set forth in the MOU to be signed by MEE and USAID. The indicators will likely include: a) electricity pricing reaching 100 per cent of Long Run Marginal Cost; b) establishment of a regulatory board; c) increased operational efficiency leading to decreased electrical energy losses and reductions in fuel consumption of more than 10 per cent; d) increased financial autonomy of EEA; and, e) adoption of commercial practices concerning managerial and skilled labor.

VI. GENERAL DESCRIPTION OF SERVICES TO BE PROVIDED

The contractor shall provide services in connection with the strengthening of institutional capacities for operation and maintenance of the EEA. The contractor shall develop an inventory of previous and ongoing institutional development studies relevant to EEA. This shall be used as a basis of coordination with other power sector programs in Egypt; clarify the legal mandates regarding provision of electricity; establish a data base and accompanying analysis capability to assess revenues and costs; develop financial management and administrative support systems, including procedures and equipment; develop personnel training and career development programs; establish a performance monitoring system; and establish a public education/public relations program.

VII. DUTIES OF THE INSTITUTIONAL DEVELOPMENT CONTRACTOR (IDC):

A broad range of skills will be required under this contract. The contractor, must designate a Project Manager/Team Leader to be the primary representative for the project activities in Egypt. The designated Project Manager should have full authority to make decisions and commitments on behalf of the IDC team in Egypt. The IDC team will be expected to meet the objectives stated in this statement of work included in this document over the period of time specified. The IDC Team Leader will be expected to prepare draft agendas for the semi-annual review of the reform plan and to be present to discuss any issues or respond to requests for additional information.

This project is intended to be action oriented. Many studies have been made and reports written. This effort must be directed toward implementation, with minimal amount of review and re-evaluation of the issues. The implementation strategy for achieving the reforms is the responsibility of EEA and the GOE . The IDC is expected to assist EEA and the GOE in the implementation of the reforms. The IDC performance will be judged based on the programs implemented.

The personnel selected for assignment to this project will be critical to the successful implementation of reforms.

VIII. SCOPE OF WORK

A comprehensive assessment of the Egyptian power sector and an electricity pricing strategy study were financed under the Mission's Power Sector Support Project (263-0215). These studies identify those structural, policy, managerial and financial reforms that are most critical to the growth and stability of the electric power sector in Egypt. The most effective vehicle for providing further capital assistance to the

electric power sector while simultaneously encouraging needed policy reforms is to condition the project resources on a specific program of policy and institutional reform.

From the results of the sector assessment and pricing study, MEE and USAID will agree during FY94 on an action plan of reforms that can be achieved during the life of the project. The agreed-upon action plan will specify major policy, legal and institutional reforms aimed at commercial oriented management practices, rationalizing tariffs, fiscal autonomy, and enhanced sustainability of the utility, e.g.: a) reduced levels of accounts receivables; b) operation on full economic dispatch; c) retirement of inefficient plants; d) implementation of modern preventative maintenance; e) planning realistic forecasts for energy sales and peak demand; f) develop least cost expansion plans; g) develop a comprehensive business plan that covers all of EEA's activities and spells out the results expected to be achieved during the following fiscal year; h) achieve a debt/equity ratio that enables EEA to borrow both in the local and international markets without a GOE guarantee; i) EEA management properly trained and adapting to commercial operations; j) establish an independent regulatory agency that regulates prices and services; k) revise EEA's Charter, allowing it to operate as a commercial and profitable utility's and l) electricity tariffs to Long Run Marginal Cost.

The agreed-to action plan will be incorporated into a Memorandum of Understanding (MOU) between the parties. The MOU will describe the goals for the FY 94-97 period, and will include a set of milestones that define specific policy actions or quantified indicators of progress toward the goals that are planned to be completed during each year of the program as a condition of EEA receiving the funding tranches programmed for each year.

USAID's contribution of \$200 million in LOP funds would be obligated in four annual tranches, with an initial obligation of \$50 million during FY 94, and \$50 million each in FYs 95, 96 and 97. All funds would be "projectized," i.e., used by EEA to finance equipment and services.

Joint USAID/EEA/MEE reviews of policy performance as compared to the agreed milestones will be conducted on a semi-annual basis, in the first and third quarters of each fiscal year. On the basis of these reviews, USAID will determine whether EEA is making appropriate progress in fulfilling the specific milestones. If a positive determination that all milestones specified for that specific year are achieved, and if other project conditions and covenants are being satisfactorily observed, USAID would then obligate the relevant tranche. The size of the obligation may be adjusted to reflect the magnitude of EEA reform efforts and progress toward the agreed goals, i.e., USAID may decide to advance obligations pending availability of funds.

As indicated above, much of the analysis regarding EEA needs and types of reforms have been previously produced with USAID funding. The intent of the IDC is to assist EEA implement, establish and maintain the reforms. It is expected that the IDC will work diligently and diplomatically to achieve EEA cooperation.

Each major task described below must include the following features:

- A. Preparation of an action plan to accomplish the intended objective, with appropriate time schedule for achievement of "milestones".
- B. Review of existing data and incorporation of work done by others as appropriate.
- C. Following completion of each major task, a task completion report shall be prepared and submitted.

TASKS

1. **Tariff Structure, Formulation and Approval Process:**
 - 1.1 Establish and maintain with EEA a data base using methodologies developed by earlier and on-going studies to facilitate cost estimating (LRMC) and economic analysis capability in each of the respective power generating facilities, including operating expenditure categories such as manpower salaries and benefits, replacement parts, equipment, machinery tools, meters, fuel, materials; capital expenditures for repair and rehabilitation, replacement improvements and extensions; and recovery of the total costs of producing electricity. Project recurrent annual operation and maintenance expenses and capital costs and evaluate the effectiveness and practicality of alternative methods of generating sufficient revenues to achieve self sufficiency of the electricity sector.
 - 1.2 Develop or adapt an existing and appropriate computer software system, capable of analyzing financial data and of balancing 100% of all O&M and capital cost factors with potential revenue streams from electricity sales, including certain predetermined equity considerations. The system should be sufficiently comprehensive, yet simple to operate and maintain so as to permit frequent updates.
 - 1.3 Establish a Tariff Review and Ratification process involving representatives of interested groups. Prepare appropriate data for presentation at public hearing(s) and for periodic publication in local newspapers. (see 4 below).

2. **Financial Management:**

- 2.1 Review the financial management practices of EEA and assess the degree of integration and the efficiency in carrying out financial functions such as cost factor analysis, long-range capital programming, annual budgeting, revenue collection and cash management, accounting and recordkeeping, evaluation and auditing, setting of standards, and reporting on financial performance.
- 2.2 Assist in establishing an integrated system of accounts, including the introduction of new and revision of existing data formats, data gathering and processing methods and procedures, the procurement and use of appropriate computer hardware and software systems, record maintenance and reporting.
- 2.3 Establish a consolidated billing, revenue collection, and accounting process for electricity, including an administrative enforcement process to settle all accounts receivables and payables within a given time frame. Establish a system of fines, including a technical assistance program to facilitate consumers to meet their financial obligations in a timely manner.
- 2.4 Provide hands on training in identified managerial areas for existing personnel or assist in hiring additional personnel from within or outside of the government agencies.

3. **Legal Status and Mandate:**

- 3.1 Prepare the necessary documentation of the precise legal requirements and authorities for EEA to become an independent organization. This includes (1) exploration and analyses of the various statutory, regulatory, decrees or other legal means by which EEA can attain the requisite autonomy and (2) after considering the various approaches, drafting of appropriate legal documents including (a) laws, regulations, orders, decrees, etc. required for Government approval and submittal for approval to the People's Assembly and/or other appropriate Governmental bodies and (b) an initial enabling Presidential Decree regarding the planning for EEA autonomy.
- 3.2 Determine the Governmental Body which has the authority to plan, draft and present the necessary legal documents for an autonomous EEA.

- 3.3 Analyze the means of enforcing the laws and decrees to assure the appropriate effective autonomous operation of EEA and the continuation of EEA as an autonomous entity once it is established.

4. **Utility Regulatory Commission:**

- 4.1 Evaluate public utility commissions in other countries, especially electric power industry regulatory commissions. Identify the regulatory system most suitable for Egypt.
- 4.2 Prepare a conceptual framework for electric utility regulation, transmission and distribution in Egypt.
- 4.3 Examine the feasibility of establishing a regulatory commission for electric utility.
- 4.5 Prepare a detailed plan to implement the proposed regulatory commission in Egypt.

5. **EEA Management Capability:**

- 5.1 Review the existing organizational structure of EEA and make recommendations to the Chairman for improvements through reorganization.
- 5.2 Provide assistance to the Chairman in his evaluation of a more effective organizational structure for EEA. This will include providing staff support to the Chairman in discussions with the Minister of Electricity and Energy and other offices and agencies of the Government of Egypt.
- 5.3 Review existing policies and procedures and develop a list of critical management policies for review and approval by EEA Chairman. Once approved, draft management policy statements for the Chairman's review and approval.
- 5.4 Develop, in draft form, specific procedures for implementation of the approved policies.
- 5.5 Develop, in draft form, means and methods of effective internal communication of policies and procedures within EEA.
- 5.6 Provide and deliver an intensive management training program for EEA senior managers. Seminars and workshops to be delivered on at

least three topics including: financial management of utilities, personnel management and procurement procedures and practices.

- 5.7 Utilize graduate engineers and other individuals identified by the EEA Chairman as a pool, select junior-level individuals for a training program in public administration. Selection criteria will be developed and will include tools such as personality/aptitude instruments, interviews and supervisor recommendations.
- 5.8 Develop opportunities for professional advancement for EEA managers through a program of participation and observation at professional conference and trade shows in the USA, Egypt and elsewhere. This would include participation at trade and specialty conferences sponsored by similar utilities.

6. **EEA Business Plan:**

- 6.1 Define incremental improvements in the organization, maintenance and efficiency of the system, while continually striving to lower maintenance costs and improve services.
- 6.2 Define agreed upon overall objectives leading to self sufficiency and competitiveness.
- 6.3 Establish timing methods and financing for programs to reduce overemployment.
- 6.4 Develop alternative models of commercialization and privatization of EEA.
- 6.5 Develop First Year Business Plan for EEA as outlined in attachment (A).
- 6.6 Update Annual basic plan for future years.

Training

Develop an organization-specific operations and maintenance training system for EEA that emphasizes the autonomy and commercially oriented organization. The training system should be based on the training curricula developed and should be coordinated with the training activities under the Energy Manpower Development Project. The contractor shall make recommendations regarding the need for, and location of, additional training centers taking into account existing facilities available. The contractor will ensure that a comprehensive, coordinated training program is in

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place and shall be responsible for training activities associated with this institutional development effort. The training system shall include the following activities.

- a. Identify and select staff members to be trained as trainers; and provide instruction in operation and maintenance training methodologies and skills.
- b. Conduct personnel skill testing and evaluation to determine training needs for EEA, develop a comprehensive training development plan and schedule.
- c. Develop appropriate supervisory, operations, maintenance, and safety training curricula for the Electric Power Sector including pre-service and in-service training modules; train instructors in the development of course modules, supporting manuals and handbooks, standard procedures, maintenance checklists, training aids, and audiovisual aids. Training materials will be developed in Arabic and supported with sufficient graphic illustrations to reflect the literacy skills of the trainees.
- d. Develop performance evaluation systems based on performance indicators to test the skills of the newly trained personnel and the performance of facilities and equipment operated and maintained by trained personnel. Design and implement course modifications and refresher training as required.

IX. PROJECT STAFFING

The successful candidate firms for the IDC must have demonstrated capability and experience in successful project implementation and must show that a sufficient number of qualified personnel are available for assignment in all position classifications. It will also be important that sufficient home office support capability exists to provide the technical and administrative backup required. The positions specified below are considered to be essential to the work effort described in the Statement Of Work.

The selection of qualified project personnel is one of the most critical issue leading to the achievement of project objectives. While this statement applies with most work efforts, it is especially important in developing country contracts. It is very important that the designated project personnel be very well qualified and that those designated will actually be available for assignment. Any substitutions of personnel will be evaluated in comparison to the qualifications of the originally designated personnel and substitutes must equal the qualifications of the previously designated personnel.

While each position designated below is considered to be a specialist in one or more areas of activity, it will be important that all staff have roles in training, consultation

and skills transfer. Key personnel proposed must have good communications skills, training experience and cross cultural sensitivity.

Candidate firms must submit two CV's (one designated as the primary candidate and the second as the alternate) in the technical proposal, with evidence that they will actually be available for assignment.

A. **Long Term Expatriate Personnel (one year or more)**

It is estimated that the IDC will provide the full time resident staff listed below and with the terms shown below. However, alternative staffing and schedules may be proposed and will be considered as long as the Statement of Work can be accomplished. Resident key staff requirements are estimated to be the following :

<u>Position</u>	<u>Number</u>	<u>Person Months</u>
Utility Program Manager (Project Mgr)	1	36
Financial Manager	1	36
Computer Manager	1	36
Training Specialist	1	36
Organization Specialist	1	36
Personnel Specialist	1	36

1. The Utility Program Manager (Project Manager), should be a seasoned electric power utility manager, with a graduate degree in engineering or in Public Administration, and with recent experience with developing country projects. This person must be a strong manager but sensitive to Host Country required diplomacies. The candidate should have at least 20 years of professional experience with five years experience in developing countries. The person in this position will be expected to represent the prime contractor in Egypt, to manage and supervise all staff, to provide project planning, scheduling and strategies, and to work directly with the USAID Project Officer to ensure all project deliverables.
2. The Financial Manager should be a graduate accountant and CPA with strong qualifications and experience in utility financial management analysis and systems development at the Chief Financial Officer level, with recent experience in developing country electric power utilities. Arabic language capability would be a useful additional qualification for this position. The candidate should have at least 15 years of professional experience. The person in this position will be expected to develop and implement payroll, auditing, billing, purchasing, cost accounting, inventory control, and computerization programs for EEA.

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3. The Computer Manager should be a masters level graduate of a computer sciences program with strong qualifications and experience in electric utility computer program management, and with special qualifications in the computerization of financial programs. Experience in developing countries would also be most useful, but is not a requirement of the position. The candidate must have at least 15 years of experience in computer operations with at least five years at the management level. The person in this position will be responsible for development of a computerization plan for EEA and for implementation of a program of phased computerization of personnel, financial, maintenance and inventory programs.
4. The Training Specialist should be a graduate of an engineering or vocational education curriculum with a teaching credential and extensive experience in training programs, especially related to energy operations or maintenance programs (mechanical or electrical), and with recent experience in developing countries. The candidate should have at least 15 years professional experience and at least five years experience in a formal training program. The person in this position will be expected to develop training programs, coordinate training by others, train and assist in the development of the EEA Training Department. Fluency in Arabic would be a strong advantage.
5. The Organization Specialist should be a masters level graduate of a Business Administration curriculum, with qualifications and experience in utility organizational analysis and in the development of policies and procedures, with experience in developing countries. The organization specialist will be responsible for the candidate should have at least 15 years of professional experience with a utility type organization and five years specifically in organizational analysis and modification. The organization specialist will be responsible for the overall EEA organizational analysis with recommendations for improvement, development of an office management plan, drafting of policies and procedures, and will assist in the development of position descriptions for EEA. Previous experience with GOE agencies would be a strong advantage.
6. The personnel Specialist should be a masters level graduate of a Public Administration curriculum with an emphasis in personnel management, qualifications and experience in innovative personnel programs, and experience in developing countries. The candidate should have at least 10 years of professional experience in personnel programs with at least five years at the management level and with at least two years experience with utility programs. The person in this position will be responsible for a detailed

analysis of the existing EEA personnel program, development of programs to retain competent employees, implementation of an operator certification program and an awards based incentive program and development of an action plan with accomplishments.

B. **Intermittent Personnel Requirements (less than one year)**

Intermittent expatriate and local short and long term staff will also be provided by the IDC. These personnel are subject to the approval of USAID and EEA and must have specific, individual statements of work approved prior to assignment. Short term assignments for expatriate personnel must be approved by USAID and will generally be from one to three months, but may be longer where appropriate. The full range of technical management and administrative specialists may be required, as scheduled in annual work plans or as otherwise requested. The number of intermittent expatriate personnel required and the person-months allocated is flexible and will depend on the progress of the work. The following is an illustrative list of specialists that may be required:

- Electric Utility Specialist
- Personnel Specialist
- Financial Specialists
- Computer Programmer
- Rate Specialist
- Budget/Financial Planner
- Management Trainer
- Procurement Specialist
- Energy Economist

C. **Local Associate Staffing**

It is expected that local engineers and specialist personnel and administrative support staff will be assigned to the project to achieve the Statement of Work. As with the all project staff, these personnel are subject to the approval of USAID and EEA and must have specific individual written statements of work approved in writing prior to assignment to the project. The full range of technical management and administrative specialists may be required, as scheduled in annual work plans or as otherwise requested. Salary levels and billing rates for associate staff must be approved by USAID and EEA by category in advance and must be based on incremental increases and salary history. The number of local associate personnel required, their specialties and the person-months allocated is flexible and will be decided by the IDC, within the person-months allocated in the level of effort specified. The IDC will be expected to show planned local associate personnel classifications and

personmonth allocations in the technical proposal, but this listing will be considered to be for planning purposes only.

D. **Home Office Staff**

Home office staff, full and part time, will be provided in the contractor's home offices to coordinate all contract activities for the project in the U.S. and to support the in country contract staff. A Home Office Coordinator and secretary and specialist staff will be assigned on an as needed basis. The home offices will be expected to play a major role in the procurement required for this project and will also provide coordination of arrangements with other aspects as needed.

E. **Level of Effort**

The ISC will provide services in accordance with the Statement of Work and must achieve all project deliverables with a sufficient number of well qualified staff as outlined above. The IDC will be expected to use judgement in the assignment of personnel to the project only if and when they are needed. The technical proposals must be specific in terms of the personnel needed for each element of the project. The following level of effort personmonth allocations are provided as upper limits for planning purposes:

Long term expatriate personnel	216	Person-months
Intermittent expatriate personnel	50	Person-months
Local associate staff	144	Person-months
Home Office Support	72	Person-months

X. **Progress Reporting**

1. Develop annual work plan with benchmarks and targets for the institutional development activities, and establish reporting systems to document progress in relation to the benchmarks and targets. Benchmarks against which the success of effecting the desired institutional changes which will be measured will include, but will not necessarily be limited to, the following:
 - a. Improved financial management and cost recovery.
 - b. Strengthening of legal framework.
 - c. Improved management information systems.
 - d. Improved resource management.

- e. Improvements in system operation and maintenance.
 - f. Establishment and sustainability of training units.
 - g. Adequacy of training as evidenced by EEA performance during implementation of the project.
2. Prepare and maintain project records, conduct quarterly implementation workshops to report progress, and resolve problem areas.

XI. Submittals

1. The contractor shall submit quarterly progress reports to USAID/Cairo. The reports shall, at a minimum, include the following:
 - a. A brief discussion of current activities for each major element of the project.
 - b. Major problem areas, current or foreseen, and recommendations for resolving these problems.
 - c. Anticipated activities for the coming quarter.
 - d. A status report on the contractor staff, including arrival and departure dates of U.S. personnel, employment and termination dates of Egyptian personnel, a summary of man-months to date and projected for each major task for U.S., and Egyptian personnel, and exhibits showing expenditure versus work done and work scheduled versus work done.
 - e. Presentation of actual progress to date versus scheduled progress in graphic form, and where appropriate, discuss reasons for slippage from schedule and actions being taken toward recovery.
 - f. Such supporting information as required to provide a concise and comprehensive report.

Quarterly status reports shall be due on the tenth working day of the following month at the end of each quarter. Fifteen copies of each report shall be delivered to the USAID/Cairo Project Officer. Three quarterly reports shall be submitted for the first three quarters of each year.

2. An annual progress report, similar in format to the quarterly reports shall be submitted in the same numbers to the same parties as the quarterly reports, within 20 working days of the close of each 12 month period following project initiation. The annual report shall summarize the activities of each major element of the project, with emphasis on progress against benchmark, cost, schedule, and problems.

3. A project completion report shall be submitted and shall summarize:
 - Expatriate personnel (by name and job title); arrival and departure dates; man weeks of service in the performance of the work.
 - Egyptian personnel (by name and job title) with inclusive dates of work on the project.
 - Sub-contracts; purpose; starting and completion dates; brief evaluation of work (competence of personnel) adequacy of equipment and management.
 - Actual submission and approval dates; comments.
 - Problem areas in contract administration and suggestions for improvements.
 - All sources of data, information interviews, etc, and a bibliography of reference works used in carrying out the project.
 - A draft report shall be submitted to USAID for review and comment prior to submittal of the final report.
 - Ten copies of the CONTRACTOR's final report shall be submitted to USAID.

ANNEX M

ENVIRONMENTAL THRESHOLD DECISION

THRESHOLD DECISION
BASED ON INITIAL ENVIRONMENTAL EXAMINATION

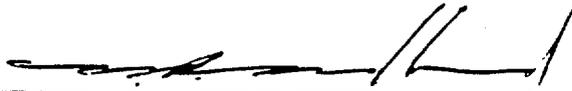
Project Location: Egypt

Project Title/ID: Power Sector Support II, (263-0224)

Funding (Fiscal Year and Amount): FY 1994 - FY 2002, \$200 million

Prepared By:

Date:



Marc P. Madland
Mission Environmental Officer

10/31/93

Environmental Action Recommended: Negative Determination as per 22
CFR 216.3 (a) (2) (iii)

Associate Mission Director's Concurrence:

Date:



Paul Thorn
Associate Director, DR

11/A/93

Decision of Environmental Coordinator,
Bureau for the Near East:

Approved: Herbert S. Japko

INITIAL ENVIRONMENT EXAMINATION

1. Project Location: Egypt
2. Project Title/ID: Power Sector Support II
No. 263-0224
3. Funding (Fiscal Year and Amount): FY 1994 - FY 1999
LOP: \$200 million
4. IEE Prepared By: _____ Date: _____



Marc P. Madland
Mission Environmental Officer

10/21/93

5. Action Recommended: Negative Determination as per 22 CFR
216.3 (a) (2) (iii).
6. Discussion of Major Environmental Relationships of Project
Relevant to Attached Impact Identification and Evaluation Form:

Background

The proposed project would be the eleventh USAID-financed project in the Egyptian power sector since 1977. As the case for its predecessor project, the physical inputs of the new project would consist of modernization and expansion of existing power plants, relay stations, grid connections and electricity delivery systems in Egypt and rehabilitation and conversion of fuel-oil fired power generating plants to natural gas or combined cycle operations. In addition, the proposed project would supplement the earlier project's activities consisting of a network of National and Regional Electricity Control Centers and Electricity Distribution Systems which will centralize and expand the Egyptian Electricity Authority's (EEA) capability to produce, distribute and control energy usage in a more efficient manner. Expected performance indicators are electricity pricing to reach 100% of Long Run Marginal Cost by 1995, increased operational efficiency leading to decreased electricity energy losses of more than nine percent and reductions in annual fuel consumption of more than ten percent. Also expected, as a result of the proposed project, is increased financial autonomy for the power sector and an improved retention of managerial and skilled labor for the sector.

Environmental impacts of the project will be of limited scope and duration mainly associated with the construction phase. Once

installed, the environmental impacts of operating the control centers and power plant facilities will be very limited as natural gas will be the prime fuel source used in the generation of energy. Pollution by combined cycle plants will be minimum as state-of-the-art furnaces and boilers, filters and combustion control systems will be used in those plants using limited fuel-oil to produce electricity. Three or four physical activities with a potential for environmental impact under the project will be the construction of control centers, temporary disruption of generation plant sites in order to retrofit/convert the plants for natural gas consumption; and, the rehabilitation of two or three power generation plants. All construction work will take place in areas that are heavily built-up and have high baseline levels of ambient air and noise pollution or in areas that are located in uninhabited desert locations. Any construction will be on sites which are significantly disturbed, and/or along existing utility right-of-ways or areas that are isolated and unused or uninhabited/covered by humans, animals or vegetation. Therefore, the potential for impacts on cultural antiquities, vegetative, human or animal habitats are very low.

Civil and electro-mechanical distribution works will be financed by the proposed project and performed by U.S. contractors and Egyptian subcontractors with oversight from project-funded U.S. construction management consultants (CMC), which was the case in the predecessor Power Sector Support I Project. This ensures that environmental impacts (dust, noise, construction debris, vehicle and equipment exhaust, etc.) and hazards (unmarked open trenches, overhead power lines, etc.) are minimized to the fullest extent possible, and that adequate occupational safety and health practices are followed by the local construction crews. The CMC will also review all designs and drawings for new or retrofitted buildings and will ensure that the completed facilities adhere to internationally acceptable codes for water supply, electricity, lighting, ventilation, sanitation, electrical grid connections, boiler/furnace emissions and worker safety and health.

Discussion

On the basis of an analysis similar to the foregoing, in 1989 the NE Bureau Environmental Coordinator approved a negative determination of significant environmental effect for the Power Sector Support I Project. Subsequent IEEs for the Power Sector Support I Project were approved on the same basis in 1989, 1992 and 1993 respectively.

Pursuant to 22 CFR 216.3(a) (2), the originator of the proposed project has reviewed the potential environmental impacts of the action as summarized in the foregoing IEE, and has determined that the proposed project, if implemented as designed, will not have a significant effect on the environment. The environmental status of the project will be reviewed periodically during implementation by means of routine site visits by USAID/Egypt technical staff. Any required corrections in implementation will be made on the basis of these findings.

Pursuant to 22CFR 216.3 (a) (2) (iii), the originator of the proposed project recommends a negative determination of significant environmental effect for the Power Sector Support II Project, and requests NE Bureau approval of a negative threshold decision for this activity.

ENVIRONMENTAL IMPACT IDENTIFICATION AND EVALUATION FORM

ENVIRONMENTAL IMPACT INDICATOR AREAS/ENVIRONMENT CONSIDERATIONS*

A. LAND USE

- 1. Changing the character of the land through:
 - a. Land clearing L
 - b. Construction (roads, buildings, piping) L
 - c. Extraction of minerals/natural resources N
 - d. Creation of deposits of unwanted materials (waste spoils) L
- 2. Alteration of natural barriers (dunes, marshes) N
- 3. Foreclosing important future uses N
- 4. Potential for endangering populated areas N
- 5. Other factors:
None

B. SURFACE AND GROUND WATER

- 1. Effects on Quality
 - a. Introduction of industrial pollutants N
 - b. Introduction of agricultural pollutants N
 - c. Introduction of urban/sewage wastes N
 - d. Introduction of biomedical wastes N
 - e. Potential for transnational impacts N
- 2. Effects on Quantity
 - a. Changes in water flow rates N
 - b. Increasing probability of floods N
 - c. Potential for changing demand/supply relation N
 - d. Potential for transnational impacts N
 - e. Potential for evaporation losses N

C. AIR

- 1. Potential for increased NO_x, SO_x, HC, CO₂/CO emissions L
- 2. Potential for increased particulate emissions N
- 3. Potential increase of noxious odors, vapors, pathogens N
- 4. Noise pollution L
- 5. Other factors:
None

D. ENERGY

- 1. Potential for increased energy demand N
- 2. Use of renewable energy sources N
- 3. Plans for energy efficiency/conservation N
- 4. Other factors:
Increased energy efficiency

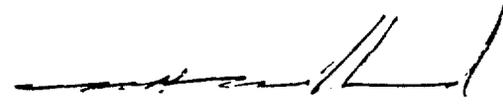
- E. COASTAL AND MARINE RESOURCES
 - 1. Introduction of biological/chemical pollution N
 - 2. Introduction of agricultural runoff N
 - 3. Mineral extractions N
 - 4. Impacts on fish/shellfish harvest N
 - 5. Potential for algal blooms N
 - 6. Potential for erosion (wind, sand, water) N
 - 7. Other factors:
 - None

- F. BIOTA
 - 1. Introduction of exotic/pathogenic organisms N
 - 2. Destruction/alteration of critical habitat N
 - 3. Potential for impact to endangered species N

- G. ANTIQUITIES PROTECTION
 - 1. Potential for harm to historic sites N
 - 2. Increased access/use of historic sites N

- H. PESTICIDE USE (Required by 22 CFR 216)
 - 1. Will pesticides be used? N
 - a. Are they USEPA registered? NA
 - b. Are they "Restricted-Use," Canceled, or under "Special Review?" NA
 - c. Are complete plans in place to train and fully protect applicators? NA
 - 2. Impacts on wildlife and aquatic organisms NA

- I. OTHER POSSIBLE IMPACTS (not listed previously)
 - 1. Air quality impacts during construction L
 - 2. _____
 - 3. _____

Prepared by :  Date: 10/31/93

Project Location: Egypt
Project Title/ID: Power Sector Support II, 263-0215

* N - No perceived environmental impact
L - Little environmental impact
M - Moderate environmental impact (substantiate)
H - High environmental impact (substantiate)
U - Unknown environmental impact

ANNEX N

MEMORANDUM OF UNDERSTANDING

**POWER SECTOR SUPPORT II
USAID GRANT 263-0224**

MEMORANDUM OF UNDERSTANDING

The Egyptian electric power sector currently faces a number of constraints which, if not corrected, will increasingly impede the sector's overall efficiency. Broadly, these constraints involve: the Egyptian Electricity Authority's (EEA's) inability to retain revenue due to limited autonomy, constraints imposed by various GOE regulations which are inappropriate for operating EEA on a commercial basis; policies related to electricity tariffs; and EEA's need for reforms (institutional, management and operational).

The goal of the Power Sector Support II Project is to promote the development of an efficient and commercially oriented power sector in Egypt. The project will address the sector's constraints by supporting policy reforms which will increase the efficiency and sustainability of the electric power sector.

This Memorandum of Understanding (MOU) records the agreements between the Ministry of Electricity and Energy (MEE), the Ministry of International Cooperation (MIC), the Egyptian Electricity Authority (EEA), and the United States Agency for International Development (USAID) regarding the conditions and procedures for implementing the Power Sector Support II Grant. The responsibility of the parties to perform in accordance with the terms of this MOU is subject to the execution by the GOE and USAID of the Grant Agreement for Power Sector Support II.

I. THE POWER SECTOR POLICY REFORM PROGRAM AGREEMENT

The Project includes two broad categories of outputs, policy/institutional reforms and infrastructure development. Project outputs may include, but not be limited to, modernization of EEA's operating procedures and management policies; setting an appropriate level of electricity tariffs; increased EEA autonomy; establishment of an independent utility regulatory framework; and installation of regional electricity control centers, substations, modernization of facilities and other technical and institutional support.

This MOU describes a reform program for the FY 1994-97 period, which includes a set of benchmark actions to be completed during each year of the program as a condition of obligating the funding tranches programmed for each year. All funds will be projectized, i.e., used by the EEA to finance equipment and services. Completion of the benchmark actions results in meeting reform targets which, when achieved, will assist the GOE to meet its policy reform objective and goal for the electric power sector.

II. OBLIGATION MECHANISM

Joint USAID/EEA/MEE/MIC reviews of policy performance, as compared to the agreed upon benchmark actions, will be conducted in July and at other times during the year, as warranted. In preparation for each review, EEA will provide USAID 15 days in advance of the date of the review, with documents required by USAID to show progress made to date in completing the specific benchmark actions and in achieving the reform targets, objective and goal of the reform program. On the basis of these reviews, USAID will determine progress made by the GOE in completing the specific benchmark actions within the context of the reform program's targets, goal and objective. If USAID makes a positive determination that all benchmark actions specified for that specific year are achieved, and that progress is being made towards achieving the reform targets, objective and goal, and if other project conditions and covenants are being satisfactorily observed, USAID would then obligate the relevant tranche. If adequate progress is not being made, USAID reserves the right to defer obligation of all or part of the related funding until such time when the benchmark actions are achieved.

It is expected that during the first year of this \$200 million project (subject to availability of funds), up to \$50 million may be obligated, followed by annual obligations of up to \$50 million in each of the next three years. The size and frequency of the actual obligations may be adjusted up or down by USAID, to reflect the pace and magnitude of EEA's reform efforts and progress toward the agreed reform targets stated in this MOU. USAID may decide to advance (pending availability of funds), or defer obligation of a planned tranche, if EEA accelerates or delays completion of the benchmark actions described in the attached Policy Reform Matrix. The result of any such deferral or delay in planned obligations, due to lack of adequate progress towards completion of agreed-to benchmark actions by the GOE, may result in a determination by USAID that such obligations cannot occur at a later date, if adequate time will not remain from the date of such deferred obligation until the end of the project to utilize the funds to finance equipment and services in accordance with USAID requirements.

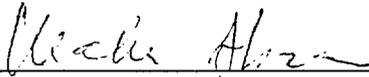
III. POLICY REFORM MEASURES

The attached Policy Reform Matrix, which is an integral part of this MOU, sets forth the agreed upon reform benchmark actions for each year of the program. As stated above, a joint review of the current year's benchmark actions will occur in July and at other times during the year, as warranted, and obligations, based on progress towards completion of these benchmark actions, will occur. If, however, based on the outcome of the joint review, USAID determines that certain benchmark actions have not been met within the time frame indicated, USAID will, after consultation

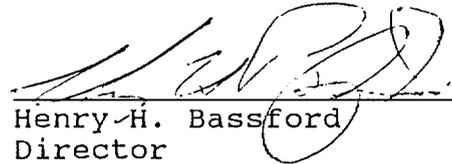
with EEA/MEE/MIC, determine whether or not the timeframe for meeting such unmet benchmark actions should be extended. Such extensions in the timeframe for meeting unmet benchmark actions will be communicated by USAID through an MOU Implementation Letter to be countersigned by EEA, or through an amendment to the MOU.

During the joint reviews, future year benchmarks will also be discussed and if the GOE, represented by EEA/MEE/MIC, and USAID determine that different reform targets and/or benchmark actions would provide greater support for GOE policy and institutional reforms, the reform targets and/or benchmark actions will be revised and incorporated into the MOU and its attached Policy Reform Matrix, by amending the MOU.

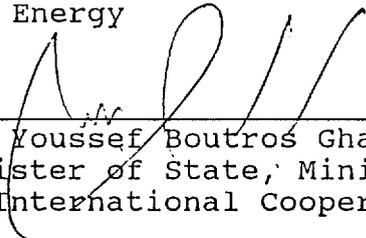
In determining whether adequate reforms have been undertaken by the GOE to warrant obligation of funds, and/or in determining whether there is a need to revise the Policy Reform Matrix, USAID will consider not only the specific actions taken, but whether or not such actions and related actions by the GOE, not specified in the Policy Reform Matrix, have had a positive impact on the reform targets, objective and goal stated in the Policy Reform Matrix attached hereto.



Eng. M. Maher Abaza
Minister of Electricity
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Henry H. Bassford
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Dr. Hassan Selim
Administrator for Department
For Economic Cooperation with U.S.
Ministry of International
Cooperation

Date: May 19, 1994

POLICY MATRIX

Goal: To promote the development of an efficient and commercially oriented power sector in Egypt.

Objective: To encourage EEA's transformation into an autonomous, commercially self-sufficient, and efficient utility.

REFORM TARGET:	BENCHMARK ACTIONS BY END OF JUNE 94:	BENCHMARK ACTIONS BY END OF JUNE 95:	BENCHMARK ACTIONS BY END OF JUNE 96:	BENCHMARK ACTIONS BY END OF JUNE 97:
<p><u>I. Financial Viability:</u></p> <p>A. Tariffs are reformed to promote financial viability and to achieve economic pricing.</p> <p>B. EEA's financial operations are placed on a commercial basis and financial viability is achieved.</p>	<p>A.1. Average tariffs for FY 95 are set equal to 90% of long run marginal cost (LRMC), as estimated by a methodology mutually acceptable to USAID and the GOE.</p> <p>A.2. The Scope of Work (SOW) for an electricity pricing study is agreed to by the GOE. This study will determine the future level and structure of power tariffs consistent with both EEA's economic cost of supply (based on appropriate economic pricing of all inputs) and its financial viability.</p>	<p>A.1. Average tariffs for FY 96 are set equal to 100% of LRMC, as estimated by a methodology mutually acceptable to USAID and the GOE.</p> <p>A.2. An acceptable tariff reform plan, based on the results of the pricing study is agreed to by the GOE.</p> <p>B.1. Accounts receivable/payable are reduced to 120 days or less.</p> <p>B.2. EEA agrees to an acceptable plan to achieve a self financing ratio (SFR) of 35% by FY 1998 at the latest. 1]</p> <p>B.3. EEA achieves a debt service ratio (DSR) of at least 1.5 for FY 1995. 2]</p>	<p>A.2. Electricity tariffs are adjusted for FY 1997 so as to reduce by at least one-half in real terms the difference between average FY 1996 tariffs and the final target agreed to in the reform plan.</p> <p>B.1. Accounts receivable/payable are reduced to 90 days or less.</p> <p>B.2. EEA achieves a SFR of at least the plan target for FY 1996.</p> <p>B.3. EEA achieve a DSR of at least 1.5 for FY 1996.</p>	<p>A.2. Electricity tariffs are adjusted for FY 1998 so as to achieve at least the final target agreed to in the reform plan.</p> <p>B.1. Accounts receivable/payable are reduced to 75 days or less.</p> <p>B.2. EEA achieves a SFR of at least the plan target for FY 1997 and everything necessary for achieving FY 1998 target is in place.</p> <p>B.3. EEA achieves a DSR of 1.5 for FY 1997.</p>

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REFORM TARGET:	BENCHMARK ACTIONS BY END OF JUNE 94:	BENCHMARK ACTIONS BY END OF JUNE 95:	BENCHMARK ACTIONS BY END OF JUNE 96:	BENCHMARK ACTIONS BY END OF JUNE 97:
<p>C. Accounting systems and procedures are strengthened to produce accurate and timely information for financial tracking and planning.</p> <p><u>II. EEA Autonomy:</u></p> <p>EEA's charter is modified so as to permit it to operate on a commercial and autonomous basis. Specifically, EEA should:</p> <ol style="list-style-type: none"> 1) operate primarily as a commercial firm, with any subsidies provided in a transparent manner by the Government; 2) retain its own revenues; 3) have its own employee compensation system; 4) be able to solicit loans and issue bonds; 5) be able to enter into purchase agreements with private power producers. 	<p>A committee is appointed to draft the EEA charter modifications and/or Presidential decrees as needed to permit EEA to achieve the listed objectives.</p>	<p>C.1. EEA agrees to an acceptable time phased plan to implement an improved automated accounting and financial management system.</p> <p>C.2. EEA agrees to an acceptable time phased plan to improve fixed asset records, strengthen zone energy accounting procedures, and allocate costs between zones based on actual operation.</p> <p>Any necessary charter modifications and/or Presidential decrees are adopted by passage of a new law in the Peoples Assembly and/or issued.</p>	<p>C.1. Work on implementing an improved automated accounting and financial management system is underway - including data collection, procurement, and staff training.</p> <p>C.2. Improved accounting and cost allocation procedures are developed, and updating data collection regarding fixed assets is underway.</p> <p>The GOE implements any necessary charter modifications and/or presidential decrees that permit EEA to achieve the listed objectives.</p>	<p>C.1. An improved automated accounting and financial management system is fully operational.</p> <p>C.2. Fixed asset records are up to date. Improved accounting and cost allocation procedures are fully operational.</p> <p>EEA operates on a commercial autonomous basis.</p>

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REFORM TARGET:	BENCHMARK ACTIONS BY END OF JUNE 94:	BENCHMARK ACTIONS BY END OF JUNE 95:	BENCHMARK ACTIONS BY END OF JUNE 96:	BENCHMARK ACTIONS BY OF JUNE 97:
<p><u>III. Regulatory Reform:</u></p> <p>An independent utility regulatory framework for electric utilities is established. The resulting regulatory process should be transparent, fair, and should permit informed decisions regarding economic, financial, environmental, and service issues. More specifically, it should have independent decision making authority; build in efficiency incentives; encourage private sector participation in the sector; and ensure that day-to-day operations of EEA remain in the hands of EEA management;</p>	<p>A committee is established by the GOE to draft legislation for the establishment of an independent regulatory board for electric utilities.</p>	<p>A regulatory body for electric utilities is established by passing the required legislation and/or issuing the needed decrees, and the necessary steps are taken to make the body operational, i.e. developing working procedures and hiring staff.</p>	<p>A fully functioning regulatory body for electric utilities is in place.</p>	<p>The regulatory body operates effectively.</p>

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REFORM TARGET:	BENCHMARK ACTIONS BY END OF JUNE 94:	BENCHMARK ACTIONS BY END OF JUNE 95:	BENCHMARK ACTIONS BY END OF JUNE 96:	BENCHMARK ACTIONS BY END OF JUNE 97:
<p><u>IV. Improved Planning and Efficiency:</u></p> <p>A. A business plan is developed which: establishes EEA's overall goals; lays out annual objectives relating to EEA's operation and performance; and specifies actions needed to make progress towards those goals and objectives.</p> <p>B. System planning and operations are improved to support efficient EEA operation:</p> <p>B.1. Expansion planning and load forecasting methodologies are strengthened by improving economic inputs.</p> <p>B.2. The EEA generation system is operated based on economic dispatch.</p> <p>B.3. Maintenance procedures are improved.</p>	<p>A. The EEA appoints a task force to develop a comprehensive business plan that integrates system planning, financial planning and human resource planning to achieve a defined level of service as efficiently as possible.</p> <p>B.2. EEA agrees to the economic dispatch of its generation capacity so that target reliability is achieved at the lowest system cost.</p>	<p>A. An acceptable business plan for FY 96 is adopted.</p> <p>B.1. Load forecasting and system planning methodologies are improved. Revised load forecasts (energy sales and peak demand) and least economic cost expansion plans for a twenty year planning horizon are completed.</p> <p>B.2. EEA presents evidence that their generating units are being dispatched continuously so as to achieve target reliability at the lowest system cost.</p> <p>B.3. EEA submits an acceptable plan to implement preventative maintenance procedures.</p>	<p>A. The FY 96 business plan is satisfactorily implemented, and an acceptable business plan for FY 97 is adopted.</p> <p>B.1. EEA uses methodologies and refines them as needed.</p> <p>B.2. EEA presents evidence that their generating units are being dispatched continuously so as to achieve target reliability at the lowest system cost.</p> <p>B.3. Preventative maintenance procedures are operational in 50% (by capacity) of generating plants.</p>	<p>A. The FY 97 business plan is satisfactorily implemented, and acceptable business plan for FY is prepared.</p> <p>B.1. EEA uses methodologies and refines them as needed.</p> <p>B.2. EEA presents evidence that their generating units are being dispatched continuously so as to achieve target reliability at the lowest system cost.</p> <p>B.3. Preventative maintenance procedures are operational in 75 (by capacity) of generating plant</p>

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REFORM TARGET:	BENCHMARK ACTIONS BY END OF JUNE 94:	BENCHMARK ACTIONS BY END OF JUNE 95:	BENCHMARK ACTIONS BY END OF JUNE 96:	BENCHMARK ACTIONS BY END OF JUNE 97:
B.4. Energy transmission losses are reduced.	B.4. EEA agrees to utilize a consultant engineer to perform comprehensive system studies to identify and quantify energy losses in the transmission system.	B.4. EEA agrees to a plan to reduce energy transmission losses including targets for the next 2 years.	B.4. Energy losses in the transmission system reduced by at least as much as the plan target.	B.4. Energy losses in the transmission system reduced at least as much as the plan target.
B.5. Emissions from EEA thermal units are reduced.	B.5. EEA submits an acceptable plan to: 1) implement periodic heat rate testing of all generating units and identify causes of increased heat rates; 2) monitor boiler performance and upgrade combustion controls as necessary to maintain most efficient operation.	B.5. Testing and monitoring programs are fully operational.	B.5. Testing and monitoring programs are successfully operated.	B.5. Testing and monitoring programs are successfully operated.
C. Human resources are developed and allocated to support efficient operations.		C.1. EEA develops an acceptable management training plan complete with performance targets. C.2. The GOE and EEA agree to an acceptable plan to achieve a recognized industry level ratio of employees per KWH generated.	C.1. Performance targets relating to the implementation of the training plan for FY 96 are met. C.2. A plan to achieve an acceptable ratio of employees per kwh generated is in place and under implementation.	C.1. FY 97 performance targets are met. C.2. The FY 97 employee/kwh target is met.

ACTION PLAN NOTES

- 1) The self-financing ratio for a given year equals the ratio of net funds generated from internal sources divided by average capital expenditures by the utility in the previous current, and next year. In simple terms, net internal funds equal revenues from all sources minus all expenses related to operations, adequate maintenance, taxes, and debt service. N.B. depreciation is not included as an expense.
- 2) The debt service ratio in a given year equals the ratio of revenues from internal sources minus operating expenses and taxes (except for depreciation and interest) divided by debt service.

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ANNEX O

SUMMARY OF POWER SECTOR ASSESSMENT

PART I: EXECUTIVE SUMMARY

USAID/Office of Energy and Infrastructure and the USAID/Cairo awarded K&M Engineering and Consulting Corporation a technical assistance contract to perform a Policy Reform and Institutional Development Assessment of the Egyptian Power Sector under the direction of the Private Sector Energy Development (PSED) program. This part of the report, Volume I, focuses on the Egyptian Electricity Authority (EEA) while Volume II concentrates on the distribution of electricity.

USAID has provided funding for various projects in the Electric Power Sector of Egypt for the past 17 years. This sector falls under the jurisdiction of the Ministry of Electricity and Energy. USAID funds have contributed to the development of this vital sector of the Egyptian economy and enabled it to close the gap between demand and supply with a margin of safety. Over 95% of the Egyptian population now have access to electricity. A recently completed Energy Pricing Strategy Study, also financed by USAID, is being implemented in stages and is providing EEA with increased revenues. These revenues will help finance new investments and enable EEA to achieve a greater degree of financial independence better planning, and higher productivity.

USAID, with the approval and cooperation of the Ministry of Electricity and Energy, wishes now to proceed with an analysis and assessment of the organizational and operational efficiencies of the EEA and the distribution companies, as well as their respective expansion plans. Such a study will help the Egyptian Electric Power Sector, USAID and the other bilateral and multilateral financing institutions to develop a set of priorities for the allocation of available financial resources.

The objectives of this study are to assess the current status of the Egyptian power sector and to produce tangible recommendations for achieving a transition to its operation on a commercial basis through:

- Increased operational and financial independence
- Increased operational efficiency
- Improved profitability and return on investments
- Recognition of the customer and the competitive market place as the ultimate commercial concerns.

The Executive Summary represents a compilation and summary of the recommendations made in the various chapters of the report. These recommendations are categorized below according to the level of government authority required for their implementation. The classification is as follows:

- EEA OPERATIONAL ISSUES
- POWER SECTOR POLICY ISSUES
- GOE ISSUES

EEA Operational Issues

The recommendations in this category involve changes that EEA's management can implement without external permission or supervision. These recommendations concern the overall management, organization and functioning of the Egyptian power sector. They include:

Organization

- Commercial operation at EEA will require that all current procedures be reviewed and significantly modified to establish a clear pattern of delegation and accountability. In areas such as procurement and recruiting of personnel, Deputy Chairmen, Zone Presidents, and Plant Managers should be given specific authorities with guidelines and ceilings. Such authorities should be consistent with policies formulated and amounts budgeted in the Business Plan with accountability for costs.
- While a large number of technical oriented staff is not unusual in electric utilities, there is still the need for skilled administrators, accountants, economists, etc. as in every business enterprise. It is therefore recommended that in the future a more varied mix of professional backgrounds be represented among EEA's top management personnel.

Human Resource Management

- Gradually reduce personnel as outlined in the recommendation under POWER SECTOR POLICY ISSUES.
- In view of the new policy of independence and financial profitability it will be of prime importance to reorient the management of EEA toward commercialization. This will

require executive training geared toward the operation of a profit-driven utility. Training should also include the fostering of:

- A more customer-oriented attitude (see Chapter 8);
 - A better understanding of the cost structure of EEA's operations; and
 - A particular attention to the training of accounting and financial personnel should be given. It should include the operation of modern accounting systems, computerization, and international financial issues such as foreign exchange risks, foreign and international lenders' requirements, etc.
- EEA should utilize to the maximum extent possible existing management, development programs offered by U.S. universities, the American Management Association, the Edison Electric Institute and industry consultants that deal with personnel compensation. Compensation of employees needs to be restructured at EEA. Incentives and profit sharing should be increased at all levels in order to motivate personnel. These incentives, however, should be made commensurate with results and not distributed across the board.

Management Information Systems

- Increase divisional dependence on computer-based operation by designing a phased transition plan to automate operations. This plan should be given a high priority and treated as a project with a responsible project manager to supervise its design and implementation. This plan should include extensive training especially to the department managers and supervisors.
- Re-evaluate and revise divisional operational policies on the integration of manual and automated systems. Support and direction for this change should come from Deputy Chairmen through clear and unequivocal mandates to all departments within their respective divisions.
- The data-entry and data-verification process should be incorporated into each department. Each department will then increase its staff by one or two or use one or two of its existing staff for data entry and verification. The departments should then be made accountable for the availability of accurate data on a timely basis.
- Departmental Staff should receive specialized training on the benefits of an MIS systems and how one is created. This training should be carried out by the Data Bank staff.
- Linkage between Al-Ahram historical statistical consumption information and the Data Bank should be established to facilitate data flow between EEA and the distribution sector.

- The proposed linkage of the Zones to the Data Bank is highly recommended to allow data flow from its source. It will allow EEA divisions to conduct their operations efficiently without delays caused by manual transfer of data or data discrepancy. Furthermore, it is also vital to allow cross-pollination of new data in the system to ensure consistency and accuracy.
- The Financial Affairs and Accounting division should re-evaluate and revise its policy concerning integration of its manually-recorded and computer-generated records, and the organizational structure which it supports.

Thermal and Hydroelectric Generation

- Consistent monitoring of fuel consumption and periodic testing of heat rate of all units at all plants.
- Adoption of a uniform preventive maintenance program for all plants. The system presently introduced at the Ataka plant is the primary candidate as a model for other plants.
- Training of personnel should be expanded to emphasize preventive maintenance programs.
- Continue enforcement of environmental protection regulations and upgrade older plants to bring them in line with those regulations. Should the cost of improving some of the older plants prove to be uneconomical then further consideration should be given to accelerating the phasing out of such plants.
- A work group including people from each Zone and Headquarters should be formed to:
 - Exchange experiences concerning solutions to maintenance and procurement problems;
 - Establish criteria and medium term plans to standardize station components wherever possible;
 - Identify individuals that can contribute positively to the determination of inventory levels;
 - Establish a program to computerize maintenance and spare parts control for plants that will not be retired shortly; and
 - Establish mechanisms that will enable plants to consult each others' (computerized) inventory records in order to reduce stocking levels and duplication.

- A budgeting and procurement system should be established to anticipate the need for spare parts and speed-up the procurement of parts that have been included in the budget.
- The methods used to purchase mazout for power generation should be refined to more accurately reflect the characteristics and price of the fuel.
- It is recommended that EEA investigate a large number of past mazout sample analyses in order to determine the uniformity of heat content.
- An immediate investigation should be initiated to determine expected variations in the heat content of the natural gas purchased by EEA, so that negotiations to adjust the price of this gas according to its heat content can be pursued.
- A study should be carried out to determine if the methods used to measure gas are adequate, and to ascertain what improvements are required.
- EEA should survey its present natural gas heat content testing capabilities in order to determine what changes are required to allow comprehensive control of natural gas purchasing. This survey would also ascertain whether or not permanent testing facilities should be installed at the larger power plants.
- To maximize unit efficiency and therefore system efficiency, Automatic Generation Control should be installed and operated on all units.

Transmission System

- EEA should reconsider its decision to build 500 kV lines and substations between Cairo and Alexandria as part of the planned expansion of Sidi Krir power plant by the addition of two 300 MW units (Numbers 3 and 4). Based on network studies it appears that the existing 220 kV facilities will deliver this additional power with only a small short time limitation on the maximum generation possible at Sidi Krir under a double line outage condition. This decision would postpone a very large capital expenditure for several years.
- EEA should study the use of less expensive substation designs, such as ring bus configurations for its 500 kV substations, and continue investigating alternate methods for cleaning insulators while the equipment is energized.
- EEA should change its policy and reduce the number of transformers installed in each substation until such time (probably many years) as the 66 kV transmission system is not able to carry the load from adjoining substations.

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- EEA should change its policy and initially install only one 25 MVA transformer in each substation until such time (probably many years) as the 11 kV distribution system is not able to carry the load from adjoining substations. The same logic applies when considering the addition of third and fourth transformers to these substations.
- EEA should consider developing a program to identify under-loaded transformer capacity on its system with the objective of moving such excess transformer capacity to areas of higher loads.
- EEA should encourage the development among Zones of common specifications for equipment, tools, and construction materials across zones.
- EEA should implement a patrolling system to identify obstructions to the right-of-way and remove them before they become very difficult to overcome.

Customer Service Operations

- EEA should consider replacing most of the existing electromechanical meters with multifunction electronic meters, which are much more precise.
- EEA should appraise the adequacy of the existing meter installation testing program and initiate procedures to inspect and recondition all of them as needed.
- EEA should survey the location of the instrument transformers in the customer metering installations to insure that they measure the energy delivered at the highest tension point of the power transformers.
- It is important for EEA to become more customer-oriented. Therefore, we believe that it is essential to create a customer service department designed to meet the needs of the 42 EHV and HV customers. This department's duties would include:
 - Maintaining close, frequent contact with the customers, and identifying their problems;
 - Assisting customers with their forecasts, thereby providing better inputs to EEA's planning; and
 - Developing new approaches to tariff structures and service that will benefit both EEA and its customers.
 - All expansion planning should include economic and financial assessments of expansion alternatives.

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Expansion Planning and Forecasting

- EEA's planning and forecasting personnel are very capable but need specialized training in economics, forecasting, and statistical analysis. All expansion planning should include economic and financial assessments of expansion alternatives.
- Data inputs need to be improved. This can be partially achieved by:
 - active EDCO participation in the forecasting process;
 - closer cooperation with the large EHV and HV industrial consumers to obtain the impact of their production planning on their product demand
- The computer models currently in use require upgrading
- The forecast scenarios should take into consideration the following factors:
 - The elasticity of price and demand
 - The EEA demand side management programs
 - Privatization of industry which should result in greater attention to production costs and profitability
 - Energy conservation programs in both the Public & Private Sectors financed by USAID
- The expansion plan for generation to the year 2000 should be revised to take into consider all options, including:
 - New plants;
 - The refurbishment & upgrading of existing plants;
 - The retirement of old and high cost units.

System Dispatch

- The National Energy Control Center should run simulations to identify fuel savings that could be achieved by running the EEA system under true least cost dispatching.
- EEA should consider the possibility of converting aging plants into different facilities, training their present employees to perform different duties, and retiring obsolete equipment.

- Instrumentation should be acquired, and personnel trained to run periodic efficiency tests on all the generating units.
- EEA should consider installing full remote control breakers in the Control Center, and transformer operations in all substations.

Finance and Accounting

- EEA should adopt a specific plan for the automation of its accounting records. The plan should be implemented in phases, with automated systems operating in parallel with the manual system before each phase is finalized. The automated system should be designed with substantial input from management and other prospective users throughout EEA.
- EEA should prepare annual construction and operation budgets after guidelines and goals are provided by upper management, beginning at the lowest departmental level. Departmental budgets should be prepared to a level of detail which is controllable by the department head, who should receive periodic reports comparing budget to actual performance, and be held accountable for the department's performance relative to established goals. Five-year projections should also be prepared each year to plan cash flow, revenue requirements, and financing requirements.
- EEA should maintain fixed asset records in greater detail to provide cost information by major component within generating stations, substations, etc. Detailed information should be collected first with respect to new construction, but should eventually include (through allocations, if necessary) existing fixed assets. This would allow the cost of retired assets to be removed from the accounting records accurately, and would facilitate the depreciation study recommended below.
- First, the cost or value of energy transferred between zones should be recorded in the accounts of the zones. Second, the costs of the Operations Department and the Headquarters Office should be allocated to the zones in order to accurately evaluate zone performance. EEA should make allocations of these two significant cost areas between zones to make the accounting results of operations for such zones more representative of their actual performance.
- EEA should conduct a depreciation study to establish depreciation rates more reflective of the economic consumption of the fixed asset costs.
- EEA should seek approval to discontinue the procedure of continuing charging depreciation at the level of 50% of the normal rate after fixed assets are fully depreciated, since this method does not achieve the stated goal.

Sector Policy Issues

These are recommendations involving policies which generally require approval at the Ministerial or Cabinet level, or at least co-ordination with other government bodies. Accordingly, EEA may not be free to implement the recommendations in this category of its own accord. The recommended sector policy actions are:

- The retirement of inefficient plants
- The management and utilization of personnel
- The gradual reduction of excess personnel by several measures such as:
 - Freezing hiring for a set period of time, and thereby reducing total employment through attrition. New plants can be manned by transferring employees from existing facilities;
 - Offering early retirement with full benefits;
 - Making a special effort to train personnel in skills which are in demand in Arab countries. Training should include English, which is sought by most foreign firms operating in those countries; and
 - Encouraging or participating in Egyptian private companies that will bid for Operations and Maintenance contracts in the Gulf. Most of the government plants in Arab countries are operated by private firms for periods of 3 to 5 years. Egyptian companies with a qualified and well-trained personnel should have an advantage over foreign companies employing largely Asian labor.
- The improvement of the current structure of remuneration including profit sharing, and the present charter.
- The appointment of non-government directors with business and financial expertise.

G.O.E. Policy Issues

This last category is composed of recommendations concerning issues which affect EEA directly but are not within its authority. These include:

- Changes to EEA's charter to allow more operational and financial independence
- The establishment of an independent regulatory agency with authority over both public and private electric entities. This agency would play a leading role in setting transfer prices between EEA and the EDCOs, and in determining tariffs to end-users and in monitoring quality of service.
- The removal of hidden and cross subsidies
- The enforcement of payment for energy consumed by government agencies; that is, the reduction of EEA's accounts receivable to within financially acceptable limits
- An increase in EEA's capital base in order to bring its debt-equity ratio further into line with levels acceptable to financial institutions.

PART II: PROPOSED IMPLEMENTATION PLAN

In this section we have attempted to integrate and prioritize the many recommendations made in this report. The order of priority is based primarily upon the extent of the financial impact an implemented recommendation is expected to have on EEA, wherever this criterion is applicable. Otherwise, the priority is based mainly on the expected contribution to commercial operation and accountability.

To reinforce the implementation plan, and to provide a means to measure its progress by defining milestones, we have selected what we consider to be the twelve recommendations (Action Items) that will either have the greatest immediate impact on EEA's balance sheet, or will make the most immediate contribution to the achievement of significant commercialization, improved service to the public, and increased accountability. These twelve recommendations can, we believe, be achieved within one to five years. The other recommendations contained in this report are tabulated separately in Part II above, and can later be grouped together for implementation simultaneously with the high priority "Action Items", or independently, but still within the five year time frame.

The following action items for the implementation plan can be summarized under two major objectives:

A. Action Plan to Reduce Present Costs of EEA

Action Items

[1] Reduction of EEA's Accounts Receivable

The Financial viability of EEA can only be achieved if the bills for supply of electric energy are collected. Accounts Receivable can only be reduced if the various GOE entities (Administrations and Public Sector companies) are forced to meet their obligations regarding outstanding bills to EEA. EEA has 42 direct customers of which the public sector accounts for the following:

	<u>Total</u>
EHV	16.4%
HV	5.6%
MV (Industry and Agriculture)	0.58%
EDCOs	77.33% ¹

¹Source: Annual Report of Electric Statistics 1991/1992, EEA, p.45. HV figure excludes Dekhela Port.

The Distribution Companies, in turn, have large outstanding receivables with the EEA. This situation must be remedied and the various public sector entities forced to pay their debts for electric energy. Otherwise, EEA and the EDCOs will continue to face serious cash-flow problems. Furthermore, EEA must pay interest on its own debts, while unable to impose penalties or interest on delinquent accounts. It is estimated that if EEA could bring its receivables from the present level of about 6.4 months to the equivalent of 60 days of annual energy sales, it could save as much as L.E. 140 million a year (using 1991/92 figures and 16% interest rate) in interest payments.

Suggested Actions:

Notice should be given to all public and private customers that receivables must be paid within a certain time limit. Failure to do so should result in one or both of the following actions:

- Interruption of service;
- Consolidation of debts and debt-swap performed by the Ministry of Finance. Amounts due from some of the larger public sector industries such as the Aluminum Company and Kima could be consolidated and deducted from the amounts due to the Ministry of Finance from EEA.

In any event, it is imperative both to EEA's balance sheet, and to meet the covenants of outstanding loans and grants from international institutions, that receivables be brought down to no more than 90 days.

[2] Economic Dispatch

As EEA is now in a more comfortable position regarding its generation capacity as compared to its peak demand, it is becoming imperative to dispatch the generating plants based on purely economic considerations. With the present mix of old plants (commissioned as early as 1951), modern plants (commissioned between 1985-1992), comprising gas turbine simple cycle, combined cycle, as well as steam plants, efficiencies vary widely from plant to plant. For example, some of the older plants such as El-Max (gas), El-Suif (gas), and Suez (gas) have fuel consumptions in the range of 407-430 equivalent grams of Mazout/kWh, while newer plants such as Shoubra (steam), Ataka (steam), and Abu Quir (steam) have consumptions in the range of 221-229 grams of Mazout/kWh. In Chapter 6, we demonstrated that if Cairo North had been put on cold reserve during 1991/1992, and its loading picked up instead by the Shoubra station located nearby, the savings would have been substantial (approximately 51,000 MT of mazout equivalent). If this type of rationalization can be generalized and more inefficient plants retired or kept on cold reserve, substantial annual savings can be achieved. For this reason economic dispatch is high on the list of priorities. Furthermore, by placing plants on cold reserve, employment issues do not arise immediately and can be dealt with over time.

[3] Phasing out of Inefficient Plants

As new plants come into operation, or as new expansions are being considered, the closing of inefficient plants must always be considered among the available options. However, employment issues demand special consideration in this regard. The prime candidates for retirement are the plants mention in number 2 of this section.

[4] Implementation of Modern Preventive Maintenance

With the large capital investments being made in new plants and machinery, it is important that EEA maintain each plant in the best possible operating condition and able to deliver energy when and as required. This would reduce the expenses associated with outages and reduce investment in redundant capacity. Preventive maintenance, therefore, is of utmost importance. There is wide variation in the quality of maintenance programs employed by EEA at its different plants. A new Swedish-designed system is currently being introduced at Ataka. It is therefore natural to select a modern system to be applied uniformly throughout the Egyptian UPS. Such a standardized system holds great benefits for EEA, and its implementation should therefore be given high priority.

[5] Increase EEA's Capital Base

EEA's financial independence and ability to secure financing on the strength of its own balance sheet without GOE guarantees requires that its capital base be increased in line with the requirements of international lending institutions. This could be partially achieved through a debt-equity swap by GOE.

[6] Reduce Over-employment

Gradually reduce the overemployment at EEA through a variety of measures such as:

- a freeze on new hiring
- early retirement
- financial incentives
- participating in encouraging the establishment of companies to undertake O&M of plants in the countries of the Gulf.

B. Action Strategies to Improve Future Planning of EEA

[7] Development of Realistic Forecasts for Energy Sales and Peak Demand

It is essential to both expansion plans and the development of a business plan that new forecasting procedures be implemented to produce a reliable forecast for the next five to ten years. This forecast should be based on better data-input than in the past, and should try to integrate the plans and forecasts of the 42 EEA customers. It should also take into account anticipated energy price elasticities and the demand-side management program to be implemented by EEA.

[8] Determine Least-Cost Expansion Plans

With the establishment of new load and energy forecasts a new study to determine the least-cost expansion required to meet anticipated energy demand is needed. New investments in generation and transmission should be weighed on an equal footing against refurbishment and upgrading existing plants. Furthermore, when considering new generation capacity, new grassroots plants should be carefully weighed against expansion of existing plants.

[7] Business Plan

The major recommendations made in this report need to be assembled and integrated into a cohesive business plan. This report has attempted to outline the general framework for such a plan and the steps required to develop it. EEA will require assistance developing the first such plan.

[9] Management Training

EEA has for many years provided training programs for its technical personnel. In view of the new emphasis on commercial viability, profitability and cash-flow, it is essential that top management receive the appropriate training. Special training and re-orientation of top managerial staff will facilitate the implementation of EEA's new policies.

[11] Changes to the EEA Charter

The transformation of EEA into a commercially viable utility incorporating appropriate accountability for its financial results requires that it be better able to manage its resources, human and otherwise. The present charter does not provide the flexibility and independence necessary for EEA's operation under the new commercial objectives. Therefore, a new charter should be drawn, as discussed in Chapter 4, which might follow the example of the Suez Canal Authority or apply the provisions of Law 203 of 1991, which would be more expeditious.

[10] Establishment of an Independent Regulatory Framework

This issue has been discussed in Chapter 4. As the EDCOs are separated from the MOEE, transfer pricing must be independently and equitably decided. Furthermore, electric energy prices will require periodic revision in order to take into account the changing cost structure of the energy sector and the overall economic conditions. Hence the importance of establishing a mechanism for price revisions.

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