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AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

EGYPT

POWER SECTOR SUPPORT

263-0215

PROJECT PAPER AMENDMENT NO 5

DATED SIGNED 09/07/93

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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

AGENCY FOR INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

PROJECT PAPER

PROJECT NO 263-0215

JULY 1993

EGYPT POWER SECTOR SUPPORT - AMENDMENT NO 5

UNCLASSIFIED

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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1 TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____ 5 _____	DOCUMENT LODF 3
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2 COUNTRY/ENTITY Egypt	3 PROJECT NUMBER <input type="checkbox"/> 263-0215 <input type="checkbox"/>
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4 BUREAU/OFFICE Near East <input type="checkbox"/> 03 <input type="checkbox"/>	5 PROJECT TITLE (maximum 40 characters) <input type="checkbox"/> Power Sector Support <input type="checkbox"/>
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6 PROJECT ASSISTANCE COMPLETION DATE (PALD) MM DD YY 0 2 28 9 9	7 ESTIMATED DATE OF OBLIGATION (Under B below enter 1, 2, 3 or 4) A. Initial FY <input type="checkbox"/> 8 <input type="checkbox"/> 9 B. Quarter <input type="checkbox"/> 4 C. Final FY <input type="checkbox"/> 9 <input type="checkbox"/> 13
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8 COSTS (\$000 OR EQUIVALENT \$1 =)

A. FUNDING SOURCE	FIRST FY <u>89</u>			LIFE OF PROJECT		
	B FX	C L/C	D Total	E FX	F L/C	G Total
AID Appropriated Total	136,000		136,000	461,000		461,000
(Grant)	(136,000)	()	(136,000)	(461,000)	()	(461,000)
(Loan)	()	()	()	()	()	()
Other	1					
US	2					
Host Country		19,194	19,194		192,948	192,948
Other Donor(s)				637,000		637,000
TOTALS	136,000	19,194	155,194	1,098,000	192,948	1,290,948

9 SCHEDULE OF AID FUNDING (\$000)

A. APPRO- PRIATION	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	740B	825		431,000		30,000		461,000	
(2)									
(3)									
(4)									
TOTALS				431,000		30,000		461,000	

10 SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)	11 SECONDARY PURPOSE CODES
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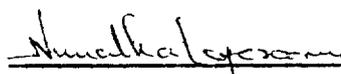
12 SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each) A. Code _____ B. Amount _____
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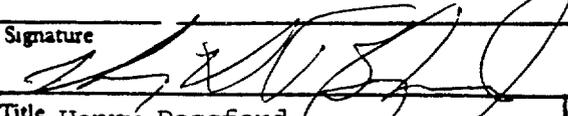
13 PROJECT PURPOSE (maximum 480 characters)

To support past and promote continued GOE progress in reducing electricity subsidies and in making other energy sector policy changes by providing capital infrastructure incentives to the GOE	(Donor Summary (000,000)) ADB 350 Arab Fund 125 Saudi Fund 50 World Bank 112 <hr/> \$ 637
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14 SCHEDULED EVALUATIONS Interim MM YY MM YY Final MM YY 1 0 9 0 1 0 9 1 0 6 9 8	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
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16 AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)
 USAID/Egypt controller concurs with the proposed methods of implementation and financing


 Nimalka Wijesooriya, A/AD/EM

17 APPROVED BY	Signature  Title Henry Bassford Mission Director	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION Date Signed MM DD YY 09 07 93
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EGYPT - POWER SECTOR SUPPORT

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PROJECT DATA SHEET

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GLOSSARY OF ABBREVIATIONS

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G	ECONOMIC ANALYSIS
H	ENVIRONMENTAL ANALYSIS

GLOSSARY OF ABBREVIATIONS

AfDB	African Development Bank
AID	Agency for International Development
AFESD	Arab Fund for Economic and Social Development
CMC	Construction Management Consultant
CPFF	Cost Plus Fixed Fee
CRCC	Cairo Regional Control Center
D L/Comm	Direct Letter of Commitment
DR/PT	Development Resources Directorate Office of Power and Telecommunications (USAID/Cairo)
EAS	Economic Analysis and Strategy Directorate (USAID/Cairo)
EDA	Egyptian Distribution Authority
EEA	Egyptian Electricity Authority
EIB	European Investment Bank
FIRR	Financial Interest Rate of Return
FM	Financial Management Directorate (USAID/Cairo)
FFP	Firm Fixed Price (Contract)
GOE	Government of Egypt
HC	Host Country
IBRD	International Bank for Reconstruction and Development (World Bank)
Km	Kilometer
KV	Kilovolt
KFAED	Kuwait Fund for Arab Economic Development
Kwhr	Kilowatt-hour
LAN	Local Area Network
L/C	Letter of Credit

LE	Egyptian Pound
LOP	Life of Project
MEE	Ministry of Electricity and Energy
MIC	Ministry of International Cooperation
MKWH	Million kilowatt hour
MVA	Mega volt amperes
MW	Megawatt
Mwhr	Megawatt-hour
NECC	National Energy Control Center
O&M	Operations and Maintenance
PACD	Project Assistance Completion Date
PLC	Power Line Carrier
Project	Power Sector Support Project
PDS/P	Program Development and Support Directorate, Program Office (USAID/Cairo)
PDS/PS	Program Development and Support Directorate, Project Support Office (USAID/Cairo)
PT	Plasters
RCC	Regional Control Center
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition System
TDD	Terminal Disbursement Date
UPS	Unified Power System
USAID	United States Agency for International Development - Cairo Mission

REFERENCES:

Project Paper - Power Sector Support, Project No 263-0215, dated September 18, 1989

Project Paper Amendment No 1 - Power Sector Support, Project No 263-0215, dated June 13, 1990

Project Paper Amendment No 4 - Power Sector Support, Project No 263-0215, dated August 5, 1992

Project Paper - Alexandria Electrical Network Modernization, Project No 263-0914, dated August 24, 1989

Electric Power Sector Strategy for FY 1992 - 1996, USAID/Egypt, May 1992

Feasibility Study Report on Cairo Regional Control Center Project, EEA, February 1991

Prefeasibility Study for Abu Rawash 2 X 125 M V A 220/66/11 KV Substation, EEA, June 1993

Preliminary Findings Report on "Policy Reform and Institutional Development Assessment for Competitive Market Adaptation of the Egyptian Power Sector," prepared for the Ministry of Electricity and Energy by K&M Engineering and Consulting Corporation, dated June 7, 1993



CAIRO EGYPT

FIFTH AMENDMENT TO PROJECT AUTHORIZATION

Name of Country Arab Republic of Egypt Name of Project Power Sector Support

Number of Project 263-0215

1 Pursuant to Section 532 of the Foreign Assistance Act of 1961, as amended, the Power Sector Support Project was originally authorized on September 18, 1989, and amended on June 13, 1990, June 27, 1991, January 26, 1992 and August 5, 1992. The authorization is hereby further amended as follows:

Paragraph 1 is amended by deleting "\$431 million" and substituting "\$461 million" therefor

2 The authorization cited above remains in force except as hereby amended.


Henry H Bassford
Mission Director,
USAID/Egypt

9/1/93
Date

Clearances:

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- AD/DR, PThorn
- AD/PDS, RJordan
- A/AD/FM, NWijesooriya
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DRAFTED: LEG·VMoore  JDoyl;mf· (9/1/93) 5PATH215

EGYPT POWER SECTOR SUPPORT - AMENDMENT NO 5
EXECUTIVE SUMMARY

I Introduction

Over the past twenty years, 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 almost one-half of the villages of less than a thousand inhabitants also have service. In the ten year time frame 1980/81 to 1990/91, sales in million 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. Over 95 per cent of all urban and rural areas of Egypt are now electrified.

Under the management of the Egyptian Electricity Authority (EEA), power generation capacity to meet this need has grown from 3,800 megawatts (MW) in 1976 to 11,280 megawatts in 1991. Per capita consumption of electric power grew about eight per cent annually during the 1980s and in 1991 and 1992 grew at approximately five per cent per year.

Over approximately the last seventeen years, USAID has provided funding to the electric power sector in Egypt for various projects on an ongoing basis. Assistance has been provided for the construction of power plants, transmission lines, distribution lines, 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 2,576 MW of baseload thermal generating capacity. This is nearly 25 per cent of the total system capacity and thirty per cent of the thermal 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 improvements, energy prices, particularly electricity prices, remain artificially low as a result of government subsidies on fuel and electricity prices. As a result, consumers are falsely encouraged to overconsume electrical energy, and energy-intensive industries utilize uneconomical manufacturing processes. Consequently, the GOE has been compelled to undertake major investments in new generating

facilities which have produced insufficient revenues to cover the cost of production, depreciation and debt service

The GOE is currently undertaking various economic reforms to strengthen the economy. Among these reforms are increases in electric energy pricing to close the gap between the economic and subsidized selling prices. Rational energy pricing is the first step in stimulating more efficient uses of energy, and to enable the GOE to self-finance the generation, transmission and distribution of electric energy. Reforming the structure of electricity pricing provides customers with more appropriate relative price information on electricity vis-a-vis other productive inputs. Higher electricity prices have two other economic effects: a) they reduce the growth of energy consumption, thereby conserving petroleum for export, and, b) GOE fiscal revenues are increased as the EEA is obligated to pay the GOE successively higher prices for fuel oil and natural gas used in the generation of electricity.

The Power Sector Support Project is an important part of USAID's strategy to assist the GOE in reforms that result in self-sustaining growth. USAID views this Project as an opportunity to support significant tariff increases and to continue a long-term policy dialogue with the GOE to encourage additional reforms.

This Project amendment will authorize the final obligation for the Power Sector Support Project. For FY 1994, USAID plans to initiate the design of a follow-on project: Power Sector Support II. This new project will be based on additional policy and institutional reforms that will follow from the ongoing joint USAID/EEA assessment of EEA's present organization and operations. From this assessment, EEA will develop a time-phased long-range action plan for a program of reforms involving structural, policy, managerial and financial areas that are most critical to the growth and stability of the electric power sector in Egypt. It is anticipated that the reforms could include, but not necessarily be limited to: a) EEA's authority to retain revenue that would be used to meet operation and maintenance requirements and debt service obligations, b) EEA's capability to self-finance a substantial portion of system expansion, c) EEA's authority to implement changes in the electricity tariffs based on all classes of services being self-supporting, i.e., not dependent on cross subsidies, and, d) EEA's authority to set and implement its own personnel policies and to be free from GOE employment quotas and salary schedules.

II Project Description

The purpose of the Project is to support past and promote continued GOE progress in reducing electricity sector subsidies and in making other energy sector policy changes by providing capital infrastructure incentives to the GOE. Project funding is

approved in tranches contingent on satisfactory policy reform in the electric energy sector

The initial tranche of \$136 million was authorized on September 18, 1989, after a thirty per cent average tariff increase in March 1989. This tranche provided for the construction of a 150 MW combined-cycle generating unit at the existing Cairo South Power Station, rehabilitation of an existing 350 MW Thermal Power Station, relocation of gas turbine-generators to a site at Hurghada to meet rapidly expanding demand, and financed commodities and technical assistance for the sector. These activities are described in the Project Paper (PP). Funding for the second tranche of \$115 million was authorized on June 13, 1990, after a 38 per cent average tariff increase in May 1990. This second tranche provided for the financing of consultant technical services for the engineering and procurement requirements of a 1200 MW Thermal Power Station located at El Kureimat, including one or more equipment packages for Unit 1. The second tranche also provided for the upgrading of the existing National Energy Control Center (NECC). These activities are described in the June 1990 PP amendment. Funding for the third tranche of \$100 million was authorized on June 27, 1991, after a fifty per cent average increase in May 1991. The third tranche financed the balance of consulting services for the El Kureimat Thermal Power Station, including companion equipment packages for Unit 2 and contingency/audit funds. The fourth tranche of funding, authorized on January 26, 1992, represented a \$40 million advance on the planned FY 92 \$80 million tranche to finance a shortfall in funding for the Cairo South subproject. Upon implementation of an electricity price increase of 32 per cent, which produced an average system tariff equal to 69 per cent of the economic price of electricity, the fifth tranche was authorized on August 10, 1992. The fifth tranche, representing the remaining \$40 million of the FY 92 funding, financed additional equipment for the upgrading of the NECC, initial technical assistance for a control center to manage the network serving the Cairo region, additional rehabilitation of the Cairo West Power Station, and additional commodities and studies.

The focus of this Project, and in particular this amendment, is the continued support of the program undertaken by the GOE to enhance the reliability and efficiency of the existing power system by upgrading the network monitoring and control system and reducing energy transmission losses. This Project Amendment will fund additional technical assistance, engineering services and equipment. This assistance is in direct response to the anticipated increase in electricity prices to eighty per cent of the economic cost (long run marginal cost) of electricity in July 1993. Adding additional components to the Project was anticipated in the 1989 Project Paper to complement GOE policy changes and improvements in the way the sector was managed. The Ministry of Electricity and Energy (MEE) and the EEA are seeking

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reforms in the sector, particularly a more rational energy pricing structure. This amendment proposes assistance which will support these organizations in achieving their sector policy goals.

The sixth tranche of funding proposed in this Project Paper Amendment will finance foreign exchange costs of a) equipment and installation services for the Cairo Regional Control Center, and, b) consultant services, equipment, construction and installation services for a 220KV transmission substation at Abu Rawash.

The control center will allow EEA to monitor and control the subtransmission and distribution system down through the circuit breakers to the medium tension circuits at the substation buses. The center 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.

The Abu Rawash substation will strengthen the distribution network system through feeder interconnection of the additional transformer capacity, which will enhance the network system reliability. Abu Rawash will be located near, and interconnected to, existing bulk power transmission lines to provide for a reliable source of power to the substation bus and installed transformer capacity.

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

III Cost Estimates and Financial Plan

AID grant funds will finance the equipment and installation services for the Cairo Regional Control Center, the consultant's foreign exchange costs (design, procurement and construction management services) and related local currency costs, and the cost of equipment and installation services for the Abu Rawash substation. Payment will be made by USAID through Direct Letters of Commitment (D L/Comm).

12-

The GOE will finance all other local currency costs associated with the Project, including land acquisition, storage areas, and, electric transmission system modifications to their network to connect the Control Center and the substation to the Unified Power System (UPS) For the GOE cash contributions, EEA will issue appropriate local currency letters of credit to eligible suppliers of equipment and materials

A Project cost estimate has been prepared for the two new components of the Project, and is summarized below

TABLE III-1
SUMMARY OF COST ESTIMATES
 (US\$ and LE in millions)

ELEMENTS	CRCC		Abu Rawash		TOTAL	
	AID (\$)	EEA (LE)	AID (\$)	EEA (LE)	AID (\$)	EEA (LE)
Consultant Services	0 ¹	1 30	1 70	0 60	1 70	1 90
Equipment/Construction	34 90	8 70	28 20	20 40	63 10	29 10
Audit/Evaluation	0 10		0 10		0 20	
TOTAL	35	10	30	21	65	31

Disbursement of AID funds over the Project implementation period is outlined in Table III-2 below The disbursement schedule is based on the Project Amendment being authorized in FY 93, all construction and equipment installation will be completed by the end of FY 97, and the consultants will have closed out all contracts in FY 98 and FY 99 The cash and in-kind GOE contributions for the two new components are shown in Table III-3 below

¹Consultant services for the CRCC (\$5 million) are financed from the fourth amendment to the Power Sector Support Project Consultant selection is in progress

TABLE III-2
EXPENDITURE SCHEDULE - AID FUNDING BY FISCAL YEAR
(US\$ in millions)

ELEMENTS	CRCC					ABU RAWASH					TOTAL				
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Consultant Services	--	--	--		²	0 6	0 6	0 5		1 7	0 6	0 6	0 5		1 7
Equipment/Construction	16 7	11 0	7 2		34 9	5 4	11 3	11 5		28 2	22 1	22 3	18 7		63 1
Audit/Evaluation	0 1	--			0 1			0 1		0 1	0 1	0 1	-		0 2
TOTAL	16 8	11 0	7 2		35 0	6 0	12 0	12 0		30 0	22 8	23 0	19 2		65 0

TABLE III-3
ESTIMATED HOST COUNTRY CONTRIBUTIONS
(LE in millions)

ELEMENTS	CRCC					ABU RAWASH					TOTAL				
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Cash (BAB III)	--	1 0	1 7	1 0	3 7	--	5 4	6 2	4 4	16 0		6 4	7 9	5 4	19 7
AB I (Salaries)	--	0 1	0 2	0 3	0 6	-	0 3	0 5	0 6	1 4		0 4	0 7	0 9	2 0
AB II Operating Costs)	--	0 2	0 4	0 7	1 3	--	0 5	0 9	1 2	2 6		0 7	1 3	1 9	3 9
Land	-	4 4	--		4 4	--	1 0		-	1 0		5 4	-		5 4
TOTAL		5 7	2 3	2 0	10 0		7 2	7 6	6 2	21 0		12 9	9 9	8 2	31 0

² Consultant services for CRCC (\$5 million) are financed from the fourth amendment to the Power Sector Support Project. Consultant selection is in process.

IV Project Negotiation Status

The two new activities described above require total funding of \$65 million. Of this amount, AID will provide \$30 million in funding through an increase in the Project Authorization to finance the Abu Rawash substation. The decision to obligate \$30 million rather than the \$65 million indicated in this Amendment was based on the fact that the GOE only partially met the electricity tariff benchmark which was a Condition Precedent to Obligation. At the same time, it may be possible to finance the CRCC with funds reprogrammed from the El-Kureimat component of the Power Sector Support Project. Hence, the rationale, description and analyses of the CRCC activity contained in this Amendment remain valid.

The Mission Director met with the Minister of Electricity and Energy and informed him of the decision to reduce the funding amount from \$65 million to \$30 million due to the GOE's failure to fully meet the electricity tariff benchmark. All project activities and implementation arrangements have been discussed with EEA. EEA is aware of the requirements and covenants discussed in the Project Paper Amendment. The formal request for assistance is included in Annex C of this amendment.

V Recommendations

The Project Team recommends that the Mission Director authorize a Grant of \$30 million for the Power Sector Support Project Amendment No. 5 by signing the Project Amendment Data Sheet, the Gray Amendment and 611(e) certifications, and the Fifth Amendment to the Project Authorization.

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VI List of Contributors

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NOTE: The following text of the Project Paper Amendment contains references to the authorization and obligation of \$65 million for the funding of two new activities, the Abu Rawash substation and the Cairo Regional Control Center (CRCC). Due to the GOE's failure to fully comply with the electricity tariff benchmark, the amount to be obligated has been reduced to \$30 million to fund the Abu Rawash substation. However, it may be possible to finance the CRCC activity with funds reprogrammed from the El-Kureimat component of the Power Sector Support Project. Hence, the rationale, description and analyses within the following text remain valid. At the same time, all references to an authorization and/or obligation amount of \$65 million should be ignored

I PROJECT BACKGROUND AND RATIONALE

A BACKGROUND

1 01 Energy prices, particularly electricity prices, are artificially low as a result of the Government of Egypt's (GOE) subsidy on fuel and electricity prices. As a result, consumers are falsely encouraged to overconsume electrical energy, and energy-intensive industries utilize uneconomical manufacturing processes. Consequently, the GOE has been compelled to undertake major investments in new generating facilities which have produced insufficient revenues to cover the cost of production, depreciation and debt service.

1 02 On September 18, 1989, the Agency for International Development (AID) authorized the \$336 million Power Sector Support Project (Project). The Project was subsequently amended on June 13, 1990, June 27, 1991, January 26, 1992, and August 5, 1992. The Project currently consists of seven subprojects and has been funded in five tranches to date.

1 03 The purpose of the Project is to support past and promote continued GOE progress in reducing electricity sector subsidies and in making other energy sector policy changes by providing capital infrastructure incentives to the GOE. Project funding is approved in tranches contingent on satisfactory policy reform in the electricity energy sector.

1 04 The initial tranche of \$136 million was authorized on September 18, 1989, after a thirty per cent average tariff increase in March 1989. This tranche provided for the construction of a 150 MW combined-cycle generating unit at the existing Cairo South Power Station, rehabilitation of an existing 350 MW Thermal Power Station, relocation of gas turbine-generators to a site at Hurghada to meet rapidly expanding demand, and financed commodities and technical assistance for the sector. These activities are described in the Project Paper (PP). Funding for the second tranche of \$115 million was authorized on June 13, 1990, after a 38 per cent average tariff increase in May 1990. This second tranche provided for the financing of consultant technical services for the engineering and procurement requirements of a 1200 MW Thermal Power Station located at El Kureimat, including one or more equipment packages for Unit 1. The second tranche also provided for the upgrading of the existing National Energy Control Center (NECC). These activities are described in the June 1990 PP amendment. Funding for the third tranche of \$100 million was authorized on June 27, 1991, after a fifty per cent average increase in May 1991. The third tranche financed the balance of consulting services for the El Kureimat Thermal Power Station, including companion equipment packages for Unit 2 and contingency/audit funds. The fourth

tranche of funding, authorized on January 26, 1992, represented the first installment of \$40 million of the planned FY 92 \$80 million tranche to partially finance a shortfall in funding for the Cairo South subproject. Upon implementation of an electricity price increase of 32 per cent, which produced an average system tariff equal to 69 per cent of the economic price of electricity, the fifth tranche was authorized on August 10, 1992. The fifth tranche, representing the remaining \$40 million of the FY 92 funding, financed additional equipment for the upgrading of the NECC, initial technical assistance for a control center to manage the network serving the Cairo region, additional rehabilitation of the Cairo West Power Station, and additional commodities and studies.

1 05 As agreed to with USAID, the GOE will implement an increase in electricity tariffs for the GOE's FY 1993-94 that cover, on average, eighty per cent of the economic cost of supplying electricity within the EEA network. In anticipation of the 1993 price increase, the Minister of Electricity and Energy, in a letter to the Mission Director dated March 2, 1993, requested that the FY 93 \$65 million tranche finance the procurement of a control center to manage the Cairo zone network and for the design and construction of a substation at Abu Rawash.

1 06 This amendment will authorize the final obligation for this project. For FY 1994, USAID plans to initiate the design of a follow-on project, Power Sector Support II. This new project will be based on additional policy and institutional reforms that will follow from the ongoing joint USAID/EEA assessment of EEA's present organization and operations. From this assessment, EEA will develop a time-phased long-range action plan for a program of reforms involving structural, policy, managerial and financial areas that are most critical to the growth and stability of the electric power sector in Egypt. It is anticipated that the reforms could include, but not necessarily be limited to: a) EEA's authority to retain revenue that would be used to meet operation and maintenance requirements and debt service obligations, b) EEA's capability to self-finance a substantial portion of system expansion, c) EEA's authority to implement changes in the electricity tariffs based on all classes of services being self-supporting, i.e., not dependent on cross subsidies, and, d) EEA's authority to set and implement its own personnel policies and to be free from GOE employment quotas and salary schedules.

B CAIRO REGIONAL CONTROL CENTER

1 07 Electrical network operations in the Cairo zone are increasing in complexity as the power network expands. The electrical energy demand in the Cairo zone was 34 per cent of national demand in 1990. Within the Cairo zone, there are presently 76 power stations and substations in operation. The

present Cairo Dispatch Center cannot adequately respond to basic load operation requirements

1 08 EEA investigated the feasibility of a Cairo Regional Control Center (CRCC) to introduce advanced technology to the monitoring and control system in the Cairo zone. The fourth Project amendment, authorized on August 5, 1992, allocated \$5 million in FY92 to finance the U S dollar cost of consultant services to review and augment EEA's feasibility study for the CRCC and to prepare engineering design and necessary draft procurement documents for the control center

C ABU RAWASH SUBSTATION

1 09 The erection of the Egyptian power network began in 1928, with a maximum voltage of 33KV. Since then, electric loads have developed over the years so that ultra-high voltage 500KV transmission lines are not used to connect Aswan to Cairo, and high-voltage 220KV transmission lines are used in Cairo and Lower Egypt while 132KV transmission lines are used in Upper Egypt. These networks are constructed in order to interconnect power stations and facilitate power flow to the load centers

1 10 EEA is planning considerable additions to the 220KV transmission in the next five to ten years. These lines are primarily to deliver new generation capacity to the load centers, as well as to provide for increasing loads, especially in the Cairo, Delta and Canal zones

D PROJECT RATIONALE

1 11 The Project supports the GOE's program to reform the structure of electricity prices and reduce the amount of the subsidy. Reforming the structure of electricity pricing provides customers with more appropriate relative price information on electricity vis-a-vis other productive inputs. Higher electricity prices have two other economic effects: a) they reduce the growth of consumption of this product, thereby conserving petroleum, so that export earnings from that product are enhanced, and, b) GOE fiscal revenues are also increased by higher electricity prices as the EEA is obligated to pay the GOE successively higher prices for fuel oil and natural gas used in the generation of electricity

1 12 This amendment will provide \$35 million to finance the U S dollar costs of procuring and installing a control center for the Cairo zone. The CRCC, when completed, will enhance network reliability, reduce outage times, improve monitoring services and increase management efficiency. This project amendment will also provide \$30 million to EEA for the U S dollar costs of technical services, equipment and construction of a 220KV transmission substation at Abu Rawash, which is located in the Giza

Governorate The substation, when completed, will strengthen the distribution network system through feeder interconnection of increased transformer capacity, which will enhance the network system reliability

1 13 Even though the Egyptian economy has had low growth in recent years, the economic stabilization and structural reform programs being undertaken by the GOE give hope that Egypt's economic growth will resume With increased economic growth, the need for an efficient and reliable electricity network system is essential Moreover, even with the elimination of uneconomic uses, the increased demand for electricity and anticipated retirements of aging generating units will require improved performance of existing electric generation and distribution facilities

E CONFORMITY WITH RECIPIENT STRATEGY AND PROGRAMS

1 14 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

1 15 To meet the electric power needs of both the public and private sectors that will depend on a reliable supply of energy, EEA has developed an investment plan for the period 1993 to 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 GOE The investment plan provides for adding generating capacity, developing renewable resources, rehabilitating and refurbishing capacity, reducing losses on both the transmission and distribution networks, expanding transmission and distribution networks to serve population growth and strengthen the networks, constructing regional control centers and developing the management staff within the Ministry

F RELATIONSHIP TO MISSION STRATEGY

1 16 USAID's strategy is to assist the GOE in reforms that result in self-sustaining growth Rational energy pricing is the first step in stimulating more efficient uses of energy, and to enable the GOE to self-finance the generation, transmission and distribution of electric energy The GOE is undertaking various economic reforms to strengthen the economy Among the reforms are increases in electric energy pricing to close the gap between the economic and subsidized selling prices, which would encourage energy conservation. USAID views this as an opportunity to

support significant tariff increases and to continue a long-term policy dialogue to encourage additional reforms

1 17 This Project supports the Mission's Strategic Plan. The goal of USAID's overall program is "enhancement of Egypt's role as a model of stability, democracy, free markets and prosperity in the region." The Mission's Program Subgoal I is "increased economic growth." USAID's power sector program is organized under Strategic Objective No. 6 of Subgoal I, "increased access to, and efficiency and reliability of public utilities in urban target areas", and Strategic Objective No. 1 of Subgoal I, "increased macroeconomic stability and market pricing." Program Outcome No. 6.2 is "improved performance of existing electric generation and distribution facilities."

1 18 Both components of this amendment are in accordance with USAID's sector strategy, which is to give primary emphasis to activities that enhance the reliability and efficiency of the existing power system. Under this amendment, USAID will finance the construction of the CRCC, which will collect and display operating data for the Cairo zone. Control center staff will utilize this information to more effectively manage the operation of this complex network. Effective management will contribute to reduced losses, enhanced quality of service and insure utmost reliability for customers who are depending on continuous service. The CRCC will be a major step forward in managing the utility system serving Cairo.

1 19 This amendment will also finance a transmission substation in the Abu Rawash district of Cairo. This substation is essential to relieve overburdened facilities in the surrounding area that will be overloaded by the mid-1990s. Overloaded facilities contribute to losses and jeopardize reliability of service to customers.

G OTHER DONORS

1 20 The formulation and implementation of a sector reform program to reduce the electricity subsidy has been a central topic of the policy reform agenda of the International Monetary Fund (IMF), the World Bank (IBRD) and USAID. Both the IBRD and USAID have conditioned the allocation of significant new resources for the electric power sector on progress in reducing the subsidy. This Project was designed to provide significant additional resources linked to real electricity price increases. The Project complements the IMF and IBRD reform agendas.

1 21 The IBRD has provided five loans totaling \$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

1 22 The African Development Bank (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.

1 23 The European Investment Bank (EIB) has taken an active role in the electric power sector. The EIB has financed portions of the Shoubra El Kheima plant, three 220KV transmission substations in Upper Egypt, and is expected to finance equipment for the steam cycle additions at Damietta. EIB financing in the sector is contingent on substantial electricity price increases.

1 24 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.

1 25 Other bilateral agencies have collectively provided more than \$1 billion equivalent for generating facilities, transmission expansion, control centers and distribution system rehabilitation and expansion.

1 26 Coordination among the various donors has been effective in meeting the needs of the power sector while, at the same time, bringing about agreed upon reforms.

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II PROJECT DESCRIPTION

A GOAL AND PURPOSE

2 01 The goal of the Project, as stated in the original Project Paper, is to promote rational investments and consumption decisions throughout the economy and to reduce the national budget deficit

2 02 The purpose of the Project is to support past and promote continued GOE progress in reducing electricity sector subsidies and in making other energy sector policy changes by providing capital infrastructure incentives to the GOE

B PROJECT FOCUS

2 03 The focus of this Project, and in particular this amendment, is the continued support of the program undertaken by the GOE to enhance the reliability and efficiency of the existing power system by upgrading the network monitoring and control system and reducing energy transmission losses. This Project Amendment will fund additional technical assistance, engineering services and equipment. This assistance is in direct response to the anticipated increase in electricity prices to eighty per cent of the economic cost (long run marginal cost) of electricity in July 1993. Adding additional components to the Project was anticipated in the 1989 Project Paper to complement GOE policy changes and improvements in the way the sector was managed. The Ministry of Electricity and Energy (MEE) and the EEA are seeking reforms in the sector, particularly a more rational energy pricing structure. This amendment proposes assistance which will support these organizations in achieving their sector policy goals

C PROJECT COMPONENTS

2 04 The total LOP funding (\$496 million) is authorized in tranches contingent on satisfactory policy reforms in the electric energy sector. Consistent with the original Project design objectives, the Power Sector Support Project is structured so that incremental funding can be provided to support specific elements in the energy sector. The four previous amendments were authorized to fund a number of discrete stand-alone elements which would not be dependent on subsequent financing. The components of the Project to be financed by this tranche also constitute two discrete subprojects, which can be carried out independent of any other Project component

23

2 05 This is the final amendment to this Project, with the initiation of the design of a new project, Power Sector Support II, planned for next year. Electricity rate increases have occurred on schedule, with full economic pricing to be reached by the end of GOE FY 1995. This sixth tranche of funding, as a response to the substantial price increase to be implemented in July 1993, represents reaffirmation of AID's commitment to support sectoral policy reforms and substantial electricity price adjustments. The follow-on project will be based on additional elements of policy and institutional reform that will result from the joint USAID/EEA assessment of the Egyptian Power Sector's organization and operations.

2 06 The sixth tranche of funding proposed in this Project Paper Amendment will finance foreign exchange costs of

- a equipment and installation services for the Cairo Regional Control Center, and,
- b consultant services, equipment, construction and installation services for a 220KV transmission substation at Abu Rawash

2 07 The control center will allow EEA to monitor and control the subtransmission and the distribution system down through the circuit breakers to the medium tension circuits at the substation buses. The center 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.

2 08 The Abu Rawash substation will strengthen the distribution network system through feeder interconnection of the additional transformer capacity, which will enhance the network system reliability. Abu Rawash will be located near, and interconnected to, existing bulk power transmission lines to provide for a reliable source of power to the substation bus and installed transformer capacity.

2 09 Consistent with the original project design

- a The AID Grant will finance services, equipment and materials with their source and origin in the United States (Code 000)
- b The GOE will finance all local currency costs for the two components of the amended project and the foreign exchange costs above what AID will provide
- c The GOE in-kind contributions will include staff, office space and equipment, buildings and land
- d The EEA will be the implementing agency for the two new components of the amended project

D PROJECT OUTPUTS

2 10 The central output of the Project, including this amendment, is significant annual increases in the selling price of electric energy sufficient to reach the economic cost of electricity by the end of GOE FY 1995

2 11 The additional outputs proposed in this Project amendment are

- a Installation of a control center for the Cairo region
- b Construction of a 220KV transmission substation at Abu Rawash

III COST ESTIMATES AND FINANCIAL PLAN

A PROJECT COST ESTIMATE

3 01 A Project cost estimate has been prepared for the two new components of the Project, and is summarized in Table III-1

TABLE III-1
SUMMARY OF COST ESTIMATES
(US\$ and LE in millions)

OBLIGATION/ ELEMENTS	<u>CRCC</u>		<u>Abu Rawash</u>		<u>TOTAL</u>	
	AID (\$)	EEA (LE)	AID (\$)	EEA (LE)	AID (\$)	EEA (LE)
Consultant Services	0 ³	1 30	1 70	0 60	1 70	1 90
Equipment/ Construction	34 90	8 70	28 20	20 40	63 10	29 10
Audit/ Evaluation	0 10		0 10		0 20	
TOTAL	35	10	30	21	65	31

B SECTION 611(a) REQUIREMENTS

3 02 The estimated costs of the goods and services to accomplish the Project purpose have been based on a sound engineering approach to achieving project outputs. The plans for accomplishing the Project purpose are consistent with good utility practices. The cost estimates for the Cairo Regional Control Center are based on an assessment prepared by the feasibility study consultant in February 1991 and recently updated by EEA. The cost estimates for the Abu Rawash 220KV transmission substation were developed by EEA based on recent cost data from several similar projects. The cost estimates have been reviewed by the Office of Power and Telecommunications of the Development Resources Directorate (DR/PT) and are judged to be reasonable.

³ Consultant services for the CRCC (\$5 million) are financed from the fourth amendment to the Power Sector Support Project. Consultant selection is in progress.

3.03 In a letter from the Mission Director to the Minister of Electricity and Energy, dated January 31, 1993, it was stated that since this would be the final obligation for this Project, any foreign exchange cost overrun exceeding available project funds would have to be funded by EEA

3.04 Based on the foregoing, it is the conclusion of the Project Committee that the requirements of Section 611(a) of the Foreign Assistance Act of 1961, as amended, have been satisfied.

C. FUNDING RESPONSIBILITIES.

3.05 This amendment will authorize the final obligation for this project, there will be no further incremental obligations.

3.06 AID grant funds will finance the equipment and installation services for the Cairo Regional Control Center, the consultant's foreign exchange costs (design, procurement and construction management services), and the cost of equipment and installation services for the Abu Rawash substation. Payment will be made by USAID through Direct Letters of Commitment (D L/Comm).

3.07 The Grant Agreement Amendment will contain a Requirement Precedent to Disbursement requiring that the Cooperating Country provide evidence that the proceeds of the Grant's funding for consultant services have been passed to the EEA as a grant and the balance of the Grant for equipment, materials and installation service will be passed to the EEA as a loan

3.08 The Grant Agreement Amendment will contain a Requirement Precedent to Disbursement requiring that the Cooperating Country provide any additional foreign exchange necessary for the Project above what AID will provide

3.09 The GOE will finance the local currency costs associated with the Project, including in-kind contributions, such as: land acquisition, storage areas, electric transmission system modifications to their network to connect the Control Center and the substation to the Unified Power System (UPS); and, other related costs For the GOE cash contributions, EEA will issue appropriate local currency letters of credit to eligible suppliers of equipment and materials.

3.10 The Grant Agreement Amendment will contain a Requirement Precedent to Initial Disbursement requiring that the Cooperating Country provide evidence that the cash local currency financing for the Project components included in this Project Amendment has been budgeted by the Cooperating Country and will be available for timely expenditure by the EEA.

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3.11 A Requirement Precedent to Disbursement of funds provided by the Grant Agreement Amendment will require evidence that the EEA owns or otherwise has legal jurisdiction of the Abu Rawash substation site and the site for the CRCC.

D. AID EXPENDITURE PROJECTIONS:

3.12 Disbursement of the additional \$ million in AID funds over the Project implementation period is outlined in Table III-2 below. The disbursement schedule is based on the Project Amendment being authorized in FY 93, all construction and equipment installation will be completed by the end of FY 97, and the consultants will have closed out all contracts in FY 98 and FY 99.

E. GOE CONTRIBUTIONS.

3.13 The FY 89 Project Agreement, as well as the subsequent Project Agreement Amendments, contain a Requirement Precedent to Initial Disbursement requiring that the EEA establish and maintain accounting records of local currency cash and in-kind contributions for each component of the Project and maintain these records on a quarterly basis. The EEA will be required to establish and maintain accounting records of local currency cash and in-kind contributions for the new CRCC and Abu Rawash components.

3.14 The FY 89 Project Agreement and subsequent Project Agreement Amendments also contain a covenant that the EEA will provide to USAID, in a timely fashion, quarterly and annual reports of the accounting information on local currency and in-kind contributions for each component of the Project. The EEA will be required to provide to USAID similar quarterly and annual reports for the new CRCC and Abu Rawash components.

3.15 The cash and in-kind GOE contributions for the two new components are shown in Table III-3 below:

TABLE III-2
EXPENDITURE SCHEDULE - AID FUNDING BY FISCAL YEAR
(US\$ in millions)

ELEMENTS	CRCC					ABU RAWASH					TOTAL				
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Consultant Services			-		4		0 6	0 6	0 5	1 7		0 6	0 6	0 5	1 7
Equipment/Construction		16 7	11 0	7 2	34 9		5 4	11 3	11 5	28 2		22 1	22 3	18 7	63 1
Audit/Evaluation	-	0 1			0 1			0 1		0 1		0 1	0 1	-	0 2
TOTAL		16 8	11 0	7 2	35 0		6 0	17 0	12 0	30 0		22 8	23 0	19 2	65 0

TABLE III-3
ESTIMATED HOST COUNTRY CONTRIBUTIONS
(LE in millions)

ELEMENTS	CRCC					ABU RAWASH					TOTAL				
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Cash (BAB III)		1 0	1 7	1 0	3 7	-	5 4	6 2	4 4	16 0		6 4	7 9	5 4	19 7
AB I (Salaries)		0 1	0 2	0 3	0 6	-	0 3	0 5	0 6	1 4		0 4	0 7	0 9	2 0
AB II (Operating Costs)		0 2	0 4	0 7	1 3		0 5	0 9	1 2	2 6		0 7	1 3	1 9	3 9
Land		4 4		-	4 4	-	1 0			1 0		5 4		-	5 4
TOTAL		5 7	2 3	2 0	10 0		7 2	7 6	6 2	21 0		12 9	9 9	8 2	31 0

⁴Consultant services for CRCC (\$5 million) are financed from the fourth amendment to the Power Sector Support Project. Consultant selection is in process.

F ASSESSMENT OF EEA CONTRACTING AND VOUCHER EXAMINATION CAPABILITIES

3 16 Since 1977, EEA has effectively implemented ten projects financed by AID, involving obligations exceeding US\$1.5 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.

3 17 An assessment of EEA's capability to undertake Host Country contracting, including accounting and internal controls, was completed in 1991 by a local CPA firm, and the Host Country implementing agency was certified to this effect. An update assessment and certification of EEA capability is planned for December 1994.

G METHODS OF IMPLEMENTATION AND FINANCING

3 18 Table III-4 illustrates the methods of implementation and financing of AID funds as planned for the two new components. The justification for using Direct Letters of Commitment is that the Host Country does not have the foreign currency to make payment and seek reimbursement from AID.

TABLE III-4
METHODS OF IMPLEMENTATION AND FINANCING - AID

ACTIVITY	METHOD OF IMPLEMENTATION	TYPE OF CONTRACT	METHOD OF FINANCING	COST ESTIMATE (\$000)	IMPLEMENTING AGENCY
<u>CRCC</u>					
Equipment/ Construction	Host Country Contract	Fixed Price	Direct L/Comm	34,900	EEA
Audit/ Evaluation	AID Direct	Cost Type	Direct Payment	100	AID
<u>ABU RAWASH</u>					
Consultant Services	Host Country Contract	Cost Type	Direct L/Comm	1,700	EEA
Equipment/ Construction	Host Country Contract	Fixed Price	Direct L/Comm	28,200	EEA
Audit/ Evaluation	AID Direct	Cost Type	Direct Payment	100	AID

H AUDIT COVERAGE

3 19 Funds provided for the two new components will be used to finance two firm, fixed-price (FFP) host country (HC) contracts for equipment/construction costs. The Project will also utilize consultant engineering services financed through a cost plus fixed-fee (CPFF) host country contract, which is subject to audit of costs. All contracts will be subject to audit for compliance with other AID regulations, and funds are allocated for this purpose. The Project budget includes \$60,000 to cover the estimated auditing costs of these contracts. Audit funds budgeted by activity are summarized in Table III-5.

3 20 In addition, funds are allocated under the CRCC component for the update of EEA's host country contracting and voucher examination capability, estimated at \$20,000, which also covers the Abu Rawash component.

TABLE III-5
UTILIZATION OF AUDIT FUNDS

ACTIVITY	NUMBER OF CONTRACTS	TYPE OF CONTRACT	ESTIMATED CONTRACT AMOUNT (\$000)	AUDIT FUNDS BUDGETED (\$000)
<u>CRCC</u>				
Equipment/ Construction	1	HC-FFP	34,900	20
<u>ABU RAWASH</u>				
Consultant Services	1	HC-CPFF	1,700	20
Equipment/ Construction	1	HC-FFP	28,200	20

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IV PROJECT IMPLEMENTATION PLAN

A IMPLEMENTING AGENCY

4 01 The EEA will have primary responsibility for the overall management of the components being funded under the Project amendment and for providing direction to the consulting engineer and contractors funded by this amendment. The Project Agreement Amendment will contain a Requirement Precedent to Initial Disbursement requiring a statement of the names and titles of the persons authorized to represent the Cooperating Country for each component of the amended Project together with a specimen signature of each person.

B PROJECT PROCUREMENT PLAN - GENERAL

4 02 The procedures and guidelines contained in AID Handbook 11, Country Contracting, shall apply to the procurement of Technical Services, Construction Services and Commodities, as appropriate, for the components being funded by the Project Amendment with source/origin of goods and services limited to AID Geographic Code 000 (U S)

4 03 Utilization of minority and/or small businesses owned by socially and economically disadvantaged individuals will be encouraged. A set-aside for Section 8(a) small business enterprises is not considered appropriate given minimal staffing expected by the U S consultant, the demonstrated experience required of the consultant and the technical complexity of the new components. However, all notices and advertisements placed in the U S soliciting expressions of interest or announcing opportunities to submit bids by U S firms or organizations on this project will state that the prime contractor will make every reasonable use of Gray Amendment entities.

4 04 USAID will approve all Scopes of Work and Services and Terms of Reference for the new CRCC and Abu Rawash components prior to their issuance and will prepare the appropriate solicitation announcements for publication in the Commerce Business Daily and other appropriate media. USAID will review, modify as necessary and concur in evaluation procedures to be utilized by the EEA, will review the EEA's evaluations for conformance with agreed upon procedures, and provide concurrence to the results of the evaluation and proposed contract awards, will review all contracts to assure compliance with AID regulations, and, will verify the reasonableness of the cost of each contract. All USAID approvals will be communicated to the EEA by way of Implementation Letters.

4 05 No procurement waivers are contemplated at this time

4 06 AID's sixth tranche of funding will be utilized to finance

- a Supply and installation of equipment, training of EEA staff and placing in operation (including the establishment of a spare part inventory management system) of the Cairo Regional Control Center
- b Technical services, supply and installation of equipment, and construction of a 220KV transmission substation at Abu Rawash

C PROJECT PROCUREMENT PLAN - TECHNICAL SERVICES

4 07 The previous amendment to this project authorized the financing of consulting services to review and augment (as necessary) EEA's feasibility study of the CRCC, prepare the design studies, including draft procurement documents, and provide technical services during the installation of equipment. The EEA is currently in the process of competitively selecting a consulting engineering firm to provide the necessary technical services under a host country contract for the control center.

4 08 The EEA will competitively select, in accordance with Handbook 11, Chapter 1 (Technical Services) procedures and guidelines, a consulting engineering firm to provide the necessary technical services for the Abu Rawash 220KV transmission substation. Services will include, but not be limited to preparing a detailed plan for an adequate substation, preparing cost estimates, preparing procurement documents, evaluating proposals, assisting EEA in awarding a turnkey contract, monitoring progress, reporting, approving invoices, inspection and testing of equipment, and other appropriate activities necessary for the timely completion of an adequately staffed substation.

4 09 The USAID's DR/PT Office will oversee the implementation of the components included in this Project Amendment.

D PROJECT PROCUREMENT PLAN - CONSTRUCTION SERVICES AND COMMODITIES

4 10 A host country turnkey contract for the detailed design, supply and installation of equipment, training of EEA staff and placing the system in operation (including the establishment of a spare part inventory management system) is planned for the CRCC. Because of rapid changes in technology and the difficulties experienced in achieving a timely award for the AID-financed National Energy Control Center (NECC), a modified two-stage bidding process (See Handbook 11, Chapter 3, Clause 3.7) will be used in developing the implementation schedule. Experience with previous procurements has indicated that the difficult part of the process is getting all bids on the same technical base in

light of the widely divergent technical capabilities of "standard" pieces of equipment an individual supplier might propose to keep the proposal within budget. Although the use of the two-stage procedure should reduce these types of procurement problems, the control center equipment to be procured may not require the high degree of sophistication currently anticipated, and a specification may be able to be written that fully defines the procurement. Lessons learned from the NECC and the Alexandria Regional Control Center subprojects concerning the procurement of sophisticated systems for similar application of this type will be reviewed by the consultant before reaching a decision on the type of procurement document to be used. Should the result of the review indicate that a detailed specification could be written with reasonable expectation of achieving an award, the normal procurement process will be followed and the implementation schedule shortened.

4 11 A host country turnkey contract for the detailed design, supply and installation of equipment, construction, and training of EEA staff is also planned for the Abu Rawash substation. The Abu Rawash substation will include the following components: overhead transmission line terminals, buses with associated switchgear equipment, circuit breakers and associated switches, power transformers, and, distribution transformers.

E IMPLEMENTATION SCHEDULE

4 12 A detailed implementation schedule for the CRCC will be included in the Design Report to be prepared by the consultant engineer and submitted to EEA within two months after the start of work (see Annex E, Section E)

4 13 A detailed implementation schedule for the Abu Rawash substation will be included in the Design Report to be prepared by the consultant engineer and submitted to EEA within two months after the start of work.

4 14 Principal or milestone dates of this schedule are summarized in Table IV-1 below.

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TABLE IV-1
PROJECT MILESTONE SUMMARY

Project Amendment Authorized	July 1993
Project Agreement Amendment Signed	August 1993
Requirements Precedent to Initial Disbursement Satisfied	November 1993

	<u>CRCC</u>	<u>ABU RAWASH</u>
Consultant Contract Signed	November 1993 ⁵	August 1994
Final Design and Specifications Complete	September 1994	March 1995
Construction Contract Signed	September 1995	January 1996
Construction Started	February 1996	February 1996
Construction Completed	September 1997	February 1997
Warranty Period Completed	September 1998	February 1998
Project Completed	February 1999	

F TRAINING

4 15 A covenant will be included in the Grant Agreement Amendment which will provide that the EEA select operations and maintenance staff as required for the CRCC and will commence training sufficiently in advance of the actual start-up of the CRCC so that the personnel responsible for operating and maintaining the equipment will be on-site, trained and fully qualified to operate and maintain the control center when it is placed in service

4 16 All training under this amendment will be provided by the equipment supplier and related specifically to the installation, operation and maintenance of the equipment supplied For the Abu Rawash substation component, approximately fifty participants will undertake on-the-job training The CRCC component will include approximately twenty trainees

⁵Consultant services are financed under the fourth amendment to the Project Consultant selection is in progress

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G AID FINANCING PROCEDURES

4 17 All Host Country procurements of services and equipment financed by this Grant will be financed by Direct Letters of Commitment (D L/Comm) Upon receipt of an executed contract acceptable to AID and a request from the EEA to issue a Letter of Commitment, AID will issue a Direct L/Comm to the contractor

H TERMINAL DATES

Requirements Precedent

4 18 The terminal date for meeting the Requirements Precedent for Initial Disbursement will be ninety days from the signing of the Grant Agreement Amendment

Project Assistance Completion Date

4 19 The Project Assistance Completion Date (PACD) will be February 28, 1999, seventeen months following the projected date of operation of the CRCC and the Abu Rawash substation

Terminal Disbursement Date

4 20 The Terminal Disbursement Date (TDD) will be November 30, 1999, nine months following the PACD, to allow for final payments

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V MONITORING AND EVALUATION PLAN

A GENERAL

5 01 The information collected and analyzed in this monitoring and evaluation plan will be used by the EEA, the Project consultants, and USAID Project and Mission management

B INSTITUTIONAL FOCUS

5 02 The Economic Analysis and Strategy (EAS) Directorate in USAID monitors policy developments in the electricity and energy sectors as part of its 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 Project are collected, analyzed, and presented to Mission management and to the Project Committee by USAID's EAS Directorate

C PROJECT OUTPUTS, INDICATORS, QUESTIONS AND DATA COLLECTION METHODOLOGIES

Project Outputs:

5 03 Project outputs necessary to achieve objectives include installation of a control center for the Cairo Region and construction of a 220KV transmission substation at Abu Rawash

Indicators:

5 04 The Project indicators for the Project outputs achieved are

- a One control center in service by September 1998
- b One 220KV transmission substation in service by February 1998

Output Level Questions:

5 05 The key output level questions are 1) whether the installation of the CRCC is proceeding as planned, and, 2) whether the construction of the 220KV Abu Rawash transmission substation is proceeding as planned. If the answer to either of these questions is NO, then what factors are constraining timely or appropriate installation/construction? How can these constraints be overcome?

Data Collection Methodology:

5 06 Procedures will be developed by the Project consultants and DR/PT for collecting information on output level indicators

D FEEDBACK/MONITORING

5 07 Project consultants selected to implement the CRCC component and the Abu Rawash substation component of the project will have primary responsibility for monitoring all activities and approving invoices submitted by all contractors for their respective projects. Each consultant will assist the EEA in monitoring the contractors' performance and providing general support to the EEA for the respective projects. Each consultant will implement monitoring systems with the following features

- a Monthly and Quarterly Reports
- b Annual Work Plans
- c Joint Annual Reviews of Progress

5 08 USAID has had considerable experience implementing projects similar to the proposed Project components. The primary responsibility for USAID monitoring of the individual components of the Project will be carried out by the DR/PT Office. The Project Officers within DR/PT are experienced and will adequately carry out this responsibility

5 09 In addition to participating in monthly and annual reviews of progress and annual work plans, USAID will conduct periodic site visits to confirm progress indicated in monthly and/or quarterly reports

E MONTHLY PROGRESS REPORTS

5 10 The purpose of the reports will be 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, identify existing or expected problems/constraints which have or could result in delays or slippage, propose and rank solutions to these problems, and, if appropriate, present revised timetables for accomplishment of tasks

5 11 These reports will be brief, concise and action oriented. They should avoid unnecessary detail. They should be written to be read by a busy project manager

5 12 These reports will include a prioritized list of issues which require action by either the EEA or USAID project management. Issues will be presented in table 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.

5 13 Monthly progress review meetings will be held at each site. The monthly meetings will be attended by USAID, the 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.

F JOINT ANNUAL REVIEW OF PROGRESS

5 14 The purpose of the joint annual reviews will be to assess the past year's progress and to develop a strategy for attaining next year's benchmarks. This strategy will be embodied in the annual workplan, discussed below. The contractors, the 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.

G ANNUAL WORKPLAN

5 15 The annual workplan for each component of the Project will be developed together with the consultants, USAID Project management, and the EEA counterparts, using conceptual guidance contained in the Project Paper along with changes suggested by review of implementation experience to date. The annual workplan is intended to answer the questions, "What exactly will we achieve this year?" and, "How will we achieve it?" The annual workplan will detail

- a the coming year's impact on the End of Project Status, output benchmarks, and a plan for data collection, and,
- b a strategy for attaining these benchmarks (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.

H EXTERNAL EVALUATIONS

5 16 USAID, in collaboration with the EEA, will conduct formal reviews of these Project components in early 1995, following the consultants' completion of the final design and specifications of major equipment, and again in early 1996, once construction/installation at the sites has begun. These formal reviews will determine the status of compliance with covenants, implementation progress and planned future actions.

5 17 A final Project evaluation will be scheduled for mid 1998, after the CRCC and substation begin commercial operations. The purpose of this evaluation will be to assess progress in achieving Project outputs and the impact of these outputs on the GOE's long-term energy sector goals. The evaluation will be designed to determine how effective the provision of funding for critical initiatives has been in promoting progress on electricity pricing issues, and determine the impact of electricity pricing reforms on economy-wide investment and consumption decisions.

I BUDGET

5 18 Roughly US\$200,000 or 0.3 per cent of the US\$65 million designated for this Project Amendment has been set aside for special studies, external evaluations and other data collection, monitoring and evaluation activities.

11

VI SUMMARY OF ANALYSES

A TECHNICAL ANALYSIS

6 01 The CRCC component will enhance service to the customers in the Cairo zone through the provision of reliable energy at all times. The control system will operate the power network in the Cairo zone and the communication system, which ties the control center with the power plants, substations and the maintenance center.

6 02 The control center will allow EEA to monitor and control the subtransmission and the distribution system down through the circuit breakers to the medium tension circuits at the substation buses. The center 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.

6 03 The equipment and software, while new to EEA Cairo zone personnel, will be similar to the equipment presently installed and operating at the National Energy Control Center and at the Upper Egypt Regional Control Center, and to be installed in the Regional Control Center in Alexandria.

6 04 All substations are staffed with full-time operators of the Cairo Energy Distribution Company (CEDC), who operate and maintain the substations for EEA. It is expected that over time the number of personnel in selected substations will be reduced. However, even with full staffing in the stations, 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.

6 05 The substation will provide additional electrical capacity to the existing distribution substation network service area. At the present time, the existing substations are experiencing normal load growth, as well as low voltage conditions during peak electrical load periods and during distribution feeder outage conditions. The Abu Rawash substation will strengthen the distribution network system through feeder interconnection of the additional transformer capacity, which enhances the network system reliability. The Abu Rawash substation will be located near, and interconnected to, existing bulk power transmission lines to provide for a reliable source of power to the substation bus and installed transformer capacity. The EEA operations and maintenance personnel will be trained on-site in the unique features of this substation.

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6 06 The Abu Rawash substation will incorporate proven technologies. The equipment to be installed will consist of various components similar to those in service in many other substations in Egypt.

B FINANCIAL ANALYSIS

6 07 Based on the benefit and cost projections described in Annexes F and G, the financial internal rate of return on the CRCC is between six and seven per cent. This rate is far below the economic rate of return (see below and Annex G) of thirty per cent. This gap 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.

6 08 The financial rate of return on the proposed Abu Rawash substation, based on benefit and cost assumptions detailed in Annexes F and G, is sixty per cent. The financial rate of return is slightly less than the economic rate of return of 62 per cent (see below and Annex G) because any additional economic benefits are minimal when compared to revenue derived from sales.

C ECONOMIC ANALYSIS

6 09 The main task of the CRCC is to supervise and control the subtransmission and distribution substations within the Cairo region, resulting in two major benefits: 1) reduced energy losses in power transmission facilities, and hence increased energy sales, and, 2) a reduced number of outages on feeders from the substations, as well as faster restoration of service in the event of outages.

6 10 Based on the assumptions for the benefit and cost streams described in Annex G, the CRCC component of the Project amendment is expected to yield an economic rate of return of 30 per cent, which reflects the high economic viability of the component. A sensitivity analysis that assumed a reduced cost in outages yielded a rate of return of close to nineteen per cent.

6 11 The Abu Rawash substation is expected to provide three main benefits: 1) increased energy sales, 2) reduced outage costs, and, 3) a reduction in line losses.

6 12 Based on the assumptions regarding the benefit and cost streams described in Annex G, the Abu Rawash substation is expected to yield an economic rate of return of 62 per cent, which strongly supports the economic justification for the project. Sensitivity analyses were done assuming an increase in the net incremental generation cost and an increase in the investment cost. Both of these sensitivity analyses resulted in an internal rate of return of fifty per cent.

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D SOCIAL SOUNDNESS ANALYSIS

6 13 The September 1989 Project Paper contained a detailed Social Soundness Analysis, the validity of which is not diminished by the addition of these components to the Project

a Socio-Cultural Feasibility

6 14 The socio-cultural impacts of this Project, as amended, continue to be positive due to the continuing economic reforms in the electricity pricing structure. These reforms are encouraging proper economic decisions by all customers which will bring about more effective use of Egypt's energy resources. These reforms will also encourage the formulation of electricity rate structures based on the economic cost to serve users, thereby minimizing preferential rates for special interest groups. Finally, these reforms will result in the addition of efficient generating capacity based on least cost alternatives to assure customers of a reliable power supply.

6 15 The July 1993 rate increase will continue the pattern established with the March 1989 rate increase, and subsequent increases every year since, of correcting the price inequity by further implementing rate structures based on actual cost to serve the various types of customers while giving special attention to the low income Egyptian energy consumers.

b Spread Effects:

6 16 The substation to be financed by this Project amendment will build on technology previously introduced in Egypt which has been operating successfully for a number of years. Host Country personnel will be trained as part of the project to operate and maintain the new equipment.

c Gender Considerations:

6 17 EEA employs a number of women engineers, and the positions created at the control center and the substation will provide additional opportunities for training and promotion of women. When providing training in the installation, operation and maintenance of the equipment supplied, the suppliers will consider any cultural limitations on travel or other activities which may limit women's training opportunities, and make the necessary arrangements to maximize women's participation.

d Benefit Incidence:

6 18 The construction of the substation at Abu Rawash and the installation of the CRCC will offer both short-term and long-term employment opportunities, in terms of construction, operations and support for the facilities, which will directly enhance the economy of the areas surrounding the component sites

6 19 Most of the residential customers and the industrial and commercial establishments in the Cairo Region will directly benefit from the control center and the substation through improved reliability of electric service. In addition, since the Cairo zone distribution system is supplied with energy from the Egyptian Unified Power System (UPS), improving the efficiency and operation of the system will benefit all users of electric energy supplied from the UPS

E MANAGERIAL/ADMINISTRATIVE ANALYSIS

6 20 The September 1989 Project Paper contained a detailed Managerial/Administrative analysis of the Ministry of Electricity and Energy and the implementation agency, the Egyptian Electricity Authority. The validity of the analysis has not diminished by the addition of these components to the Project

a Organization:

6 21 The new components contained in this Project amendment 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 EEA Project Management:

6 22 Day-to-day implementation of the CRCC component will be the responsibility of the President of the EEA Cairo zone. Day-to-day implementation of the Abu Rawash substation will be the responsibility of the Deputy Chairman for Projects. A Requirement Precedent to Disbursement will be included in the Project Agreement Amendment requiring EEA to establish a project management team for the CRCC reporting directly to the President of the EEA Cairo zone and a project management team for the Abu Rawash substation reporting directly to the EEA Deputy Chairman of 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. Upon completion of the projects, the team members will either be integrated into the control center and substation staff, or continue to provide EEA with enhanced project management expertise



c Operation, Maintenance and Training:

6 23 The EEA will be responsible for providing operations, maintenance and administrative staff to the control center and the substation after they are completed. The control center and substation will be operated within the Cairo zone. The personnel assigned to the control center and the substation will receive refresher training in disciplines appropriate to their operations. This training will be through existing EEA courses and funded by the GOE, not AID.

F ENVIRONMENTAL ANALYSIS

6 24 The Near East Bureau Environmental Coordinator has approved a negative threshold decision, confirming a negative determination of significant impact on the environment (Annex H)

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VII REQUIREMENTS PRECEDENT, COVENANTS

A REQUIREMENTS PRECEDENT TO DISBURSEMENT

7 01 The Requirements Precedent contained in the Grant Agreement and the previous Grant Agreement Amendments have been satisfied

7 02 Amendment No 6 to the Grant Agreement shall contain the following Project-specific Requirements Precedent

- 1) Prior to any disbursement or to the issuance of any disbursement authorization or commitment of funds provided under the Sixth Amendment to the Grant, the Grantee shall, except as the Parties may otherwise agree in writing, furnish to AID, in form and substance satisfactory to AID
 - a) A statement of the names and titles with specimen signatures of the persons authorized to represent the Cooperating Country for Project purposes for the CRCC and Abu Rawash substation components of the Project (4 01)
 - b) Evidence that the proceeds provided by the Sixth Amendment to the Grant, except for funds used to finance consultant services and technical assistance, will be lent to the EEA (3 07)
 - c) Evidence that the local currency financing for the CRCC and Abu Rawash substation components of the Project have been budgeted by the Grantee and will be available for timely expenditure by the EEA (3 10)
 - d) Evidence indicating that the Grantee has made a commitment that any foreign exchange financing, in addition to that contributed by AID, be available for timely expenditure by the EEA (3 08)
 - e) Evidence that the EEA will maintain accounting records for local currency and in-kind contributions to the CRCC and the Abu Rawash substation components of the Project (3 13)
 - f) Evidence that the EEA has acquired the land necessary for the construction and installation of the CRCC and Abu Rawash substation components of the Project (3 11)

- 2) Prior to any disbursement or to the issuance of any disbursement authorization or commitment of funds provided under the Sixth Amendment to the Grant Agreement for purposes of procuring installation services or related services for the CRCC, the Grantee shall furnish to AID, except as AID may otherwise agree in writing, in form and substance satisfactory to AID
- a) Evidence that the EEA has established and staffed a management team fully authorized to make all decisions necessary to implement the control center (6 21)
 - b) Evidence that the necessary radio frequencies, as specified by the consultant, have been allocated for the communications system to be associated with the control center

7 03 The terminal date for satisfying the Requirements Precedent to Initial Disbursement of funds provided by the Sixth Amendment to the Grant Agreement (part A 1 above) will be ninety days from the signing of the Sixth Amendment to the Grant Agreement

B COVENANTS

7 04 The Project Agreement also sets forth Covenants to be met throughout the life of the Project The EEA is complying with these Covenants

7 05 Amendment No 6 to the Project Agreement shall contain the following additional Covenant

Control Center Operations and Maintenance Training

The Grantee will ensure that EEA will select operational and maintenance staff to receive training, and will commence training sufficiently in advance of the actual start-up of the CRCC so that operations and maintenance personnel will be on-site, trained and fully qualified to operate and maintain the control center when it is placed in service (4 15)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project FY 1989 to FY 1999
Total U S Funding \$496 million
Date Prepared July 15 1993

Project Title and Number Power Sector Support Project 263 0215

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal The broader objective to which the project contributes</p> <p>promote rational investment and consumption decisions throughout the economy and to reduce the national budget deficit</p>	<p>Measures of Goal Achievement</p> <p>Decreased rate of growth in electricity consumption overall and for selected consumer categories</p> <p>Increased electric energy conservation in all classes of users except large industrial</p> <p>Reduced contribution to the national budget deficit by electric power sector's implicit subsidy</p>	<p>EEA Data</p> <p>EAS Directorate calculations</p>	<p>Assumptions for achieving goal target</p> <p>Electricity price increases are sufficient to decrease inefficient and wasteful uses</p> <p>Fuel price increases passed on to consumers</p>
<p>Objective Purpose</p> <p>support past and promote continued GOE progress reducing electricity sector subsidies and in making other energy sector policy changes by providing capital infrastructure incentives to the GOE</p>	<p>Conditions that will indicate purpose has been achieved End of project status</p> <p>Electricity price increases are implemented</p> <p>Electricity price increases are sufficient to obtain balance of foreign exchange financing from other bilateral/multilateral financing agencies</p> <p>future electricity price structures are based on economic cost to serve various customer classes</p>	<p>EEA data</p> <p>EAS Directorate calculations</p>	<p>Assumptions for achieving purpose</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>Outputs</p> <p>Significant annual increase in the selling price of electric energy sufficient to eliminate the electricity sector subsidy by the mid 1990s</p> <p>Construction of 1 150MW Combined cycle unit</p> <p>Rehabilitation of 4 steam turbine generating units</p> <p>Rehabilitation of 3 gas turbines and install at new site</p> <p>Extension of microwave communications system</p> <p>Provision of spare and replacement parts work equipment technical assistance and studies</p> <p>Construction of 2 600MW steam turbine generating units at the El Kureimat site</p> <p>Expansion of the data processing capability of the National Energy Control Center to handle planned and contemplated network expansion</p> <p>Installation of a control center for the Cairo region</p> <p>Construction of a 220KV transmission substation</p>	<p>Measures of output</p> <p>1 1992 69% of full economic pricing</p> <p>1993 80% of full economic pricing</p> <p>1994 90% of full economic pricing</p> <p>1995 100% of full economic pricing</p> <p>2 Combined cycle unit in service by 11/94</p> <p>3 4 boilers and steam turbine generators are rehabilitated and put into operation by 8/93</p> <p>Auxiliary systems put into operation by 11/95</p> <p>4 3 24MW gas turbine generating capacity in service by 1/92</p> <p>5 Six additional stations being monitored by the National Energy Control Center of the expanded microwave system by 2/95</p> <p>6 Amounts of commodities procured Technical assistance provided and studies completed are determined in accordance with EEA priorities and available funds</p> <p>7 2 600MW generating units in operation by 5/97</p> <p>8 Expansion of the data processing capability of the NECC from 60 stations to 200 stations by 12/97</p> <p>9 1 control center in service by September 1998</p> <p>10 1 220KV transmission substation in service by February 1998</p>	<p>EEA Monthly Operating Reports</p> <p>EEA Annual Report of Electric Statistics</p> <p>Inspection and examination of the work</p>	<p>Assumptions for achieving output</p> <p>Sufficient foreign exchange is provided from other financiers to cover equipment and construction start-up costs for El Kureimat</p> <p>El Kureimat plant will be designed and constructed to comply with appropriate U S EPA environmental standards</p> <p>EEA will provide foreign exchange to cover any shortfall not covered by other financiers</p> <p>EEA will provide sufficient local currency to cover installation costs</p> <p>Equipment at Cairo West can be rehabilitated</p> <p>Sufficient gas supply is available to fuel the combined cycle unit 4 steam turbine generating unit boilers and 3 gas turbines</p> <p>Microwave frequencies are available and approved by GOE</p> <p>Sufficient qualified staff available for EEA to implement subprojects in timely manner</p>
<p>Inputs</p> <p>Consultant services</p> <p>Equipment/Installation</p> <p>Studies/Audit/Contingency</p>	<p>Input Allocation Table (Type and Quantity)</p> <p>1 Consultant services \$72.7 million</p> <p>2 Equipment/Installation \$389.05 million</p> <p>3 Studies/Audit/Contingency \$34.25 million</p> <p>TOTAL \$496 million</p>	<p>Executed contract documents Contractor reports Contractor/supplier invoices approved and paid Site visits by USAID personnel</p>	<p>Assumptions for providing input</p> <p>EEA will award contracts to U S firms for those services and equipment financed by AID</p> <p>EEA will award contracts to other firms for services and equipment financed by other donors</p> <p>EEA will satisfy Requirements Precedent to Disbursement</p>

A I D PROJECT STATUTORY CHECKLIST FOR FY 1993

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? Yes

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

This project supports past and promotes continued Government of Egypt progress in reducing electricity sector subsidies and in making other energy sector policy changes. It is expected that the project will (a) increase the flow of international trade, will (b) foster private initiative and competition, will not directly (c) encourage development and use of cooperatives, credit unions, and savings and loan associations, will not directly (d) discourage monopolistic practices, will (e) improve technical efficiency of industry, agriculture, and commerce, and will not directly (f) 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 1993 Appropriations Act Sec 522 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 notification

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

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

b Notice of new account obligation (FY 1993 Appropriations Act Sec 514) If funds are being obligated under an appropriation account to which the are 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

c Cash transfers and nonproject sector assistance (FY 1993 Appropriations Act Sec 571(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

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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 agreements in time to permit orderly accomplishment of the project

6 Water Resources (FAA Sec 611(b), FY 1993 Appropriations Act Sec 501) If project is for water or water related land resource construction, have benefits and costs been computed to the extent practicable

N/A

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)

7 Cash Transfer and Sector Assistance (FY 1993 Appropriations Act Sec 571(b)) Will cash transfer or nonproject sector assistance be maintained in a separate account and not commingled with other funds unless such requirements are waived by Congressional notice for nonproject sector assistance)?

N/A

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 D

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 owed by the U S are utilized in lieu of dollars

The GOE contribution is LE 31 million LE 19.7 million in cash and LE 11.3 million in-kind and will cover part of the technical assistance procurement and construction

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

c Separate Account (FY 1993 Appropriations Act Sec 571) If assistance is furnished to a foreign government under arrangements which result in the generation of local currencies

N/A

(1) Has A I D (a) required that local currencies be deposited in a separate account

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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?

10 Trade Restrictions

a Surplus Commodities (FY 1993 Appropriations Act Sec 520(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 capacity becomes operative and is such assistance likely to cause substantial injury to U S producers of the same, similar or competing commodity?

No

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b Textiles (Lautenberg Amendment) (FY 1993 Appropriations Act

No

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Sec 520(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 directl. 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 allets or coin purses worn on the person) ork gloves or leather earing apparel?

11 Tropical Forests (Fi 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 1993 Appropriations Act Sec 536) 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 1993 Appropriations Act Title II under heading "Private and Voluntary Organizations') If assistance is to be made to a United States PVO (other than 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?

N/A

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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 Women in Development (FY 1993 Appropriations Act Title II under heading "Women in Development") Will assistance be designed so that the percentage of women participants will be demonstrably increased?

The project is gender neutral it will benefit all Egyptians

15 Regional and Multilateral Assistance (FAA Sec 209) Is assistance more efficiently and effectively provided through regional or multilateral organizations? If so why is assistance not so provided? Information and conclusions on whether assistance will encourage developing countries to cooperate in regional development programs

No

16 Abortions (FY 1993 Appropriations Act Title II under heading "Population, DA," and Sec 524)

a Will assistance 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

b Will any funds be used to lobby for abortion?

No

17 Cooperatives (FAA Sec 111) Will assistance help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better

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N/A

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procured in U S)

e Construction or engineering services (FAA Sec 604(g))
Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 241 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)

No

f Cargo preference shipping (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?

No

g Technical assistance (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?

Yes

h U S air carriers (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?

Yes

i Termination for

Yes

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convenience of U S Government (FY 1993 Appropriations Act Sec 504) If the U S Government is a party to a contract for procurement does the contract contain a provision authorizing termination of such contract for the convenience of the United States?

j Consulting services (FY 1993 Appropriations Act Sec 523) 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)?

yes

k Metric conversion (Omnibus Trade and Competitiveness Act of 1988 as interpreted by conference report amending Metric Conversion Act of 1975 Sec 2 and as implemented through A I D policy) Does the assistance program 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

l Competitive Selection Procedures (FAA Sec 601(e)) Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes

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20 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

21 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

22 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

23 Narcotics

a Cash reimbursements (FAA Sec 483) Will arrangements preclude use of financing to make reimbursements in the form of cash payments, to persons whose illicit drug crops are eradicated? Yes

b Assistance to narcotics traffickers (FAA Sec 487) Will arrangements take "all reasonable Yes

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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 other use or role in the illicit trafficking of any such controlled substance?

24 **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

25 **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

26 **CIA Activities** (FAA Sec 662) Will assistance preclude use of financing for CIA activities? Yes

27 **Motor Vehicles** (FAA Sec 636(1)) 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

28 **Military Personnel** (FY 1993 Appropriations Act Sec 503) Will assistance preclude use of financing to pay pensions, annuities retirement pay or adjusted service compensation for prior or current military personnel? Yes

29 **Payment of U N Assessments** (FY 1993 Appropriations Act Sec 505) Will assistance preclude use of financing to pay U N assessments, arrearages or dues? Yes

30 **Multilateral Organization Lending** (FY 1993 Appropriations Act Sec 506) Will assistance preclude use of financing to carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)?

Yes

31 **Export of Nuclear Resources** (FY 1993 Appropriations Act Sec 510) Will assistance preclude use of financing to finance the export of nuclear equipment fuel or technology?

Yes

32 **Repression of Population** (FY 1993 Appropriations Act Sec 511) Will assistance preclude use of financing for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?

Yes

33 **Publicity or Propaganda** (FY 1993 Appropriations Act Sec 516) Will 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?

No

34 **Marine Insurance** (FY 1993 Appropriations Act Sec 560) 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

35 **Exchange for Prohibited Act** (FY 1993 Appropriations Act Sec 565) 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

No

is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law?

36 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

37 Impact on U S Jobs (FY 1993 Appropriations Act Sec 599)

(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 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 ? No

(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? 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

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C CRITERIA APPLICABLE TO ECONOMIC SUPPORT FUNDS ONLY

1 Economic and Political Stability (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 FA?

Yes

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 509) 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 1993 this provision is superseded by the separate account requirements of FY 1993 Appropriations Act Sec 571(a) see Sec 571(a)(5))

N/A

4 Generation and Use of Local Currencies (FAA Sec 531(d)) Will ESF funds made available for commodity import 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 1993 this provision is superseded by the separate account requirements of FY 1993 Appropriations Act Sec 571(a) see Sec 571(a)(5))

N/A

5 Cash Transfer Requirements (FY 1993 Appropriations Act Title II under heading 'Economic Support Fund and Sec 571(b)) If assistance is in the form of a cash transfer

a Separate account Are all such cash payments to be maintained by the country in a separate account and not to be commingled with any other funds?

N/A

b Local currencies Will all local currencies that may be generated with funds provided as a cash transfer to such a country also be deposited in a special account and has A I D entered into an agreement with that government setting forth the amount of the local currencies to be generated the terms and conditions under which they are to be used and the responsibilities of A I D and that government to monitor and account for deposits and disbursements?

N/A

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c U S Government use of local currencies Will all such local currencies also be made available to the U S government as the U S determines necessary for the requirements of the U S Government or to carry out development assistance (including DFA) or ESF purposes?

N/A

d Congressional notice Has Congress received prior notification providing in detail how the funds will be used including the U S interests that will be served by the assistance and as appropriate the economic policy reforms that will be promoted by the cash transfer assistance?

N/A

6 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)

Yes



MINISTRY OF ELECTRICITY & ENERGY
OFFICE OF THE MINISTER

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Cairo,

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Mr Henry Bassford
Director
USAID
Cairo, Egypt

ACTION TO	DR	SIR
ACTION TAKEN	WAM	DUE DATE 3/1
DATE		INITIALS JH

Dear Mr Bassford

Thank you for your letter dated January 31, 1993 concerning the proposed financing of power sector for 1993 which were discussed between us on last December 1992

I would like to point out that due to the limitation in the USAID financing, we agree in principal on the proposed sectorial support projects for 1993 to be as follows:-

Cairo Regional Control Center	\$ 35 M
Abu Rawash Substation	\$ 30 M
Grand Total	\$ 65 M

Mr Thorn and his staff are quite welcome to work with our staff to discuss the details. It is understood that the government is taking the necessary steps to fulfill the planned 1993 tariff increase

In the mean-time I am sure that the joint USAID/EEA assessment study will conclude in more future cooperation in financing the new expansion projects.

Thank you for your cooperation and continuous support to the Electricity Sector.

Please accept my best wishes.

5

CERTIFICATION PURSUANT TO
SECTION 611 (e) OF THE
FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

As Director and Principal Officer of the Agency for International Development in Egypt, having taken into account, among other things, the maintenance and utilization of projects in Egypt previously financed or assisted by the United States, I do hereby certify that in my judgement Egypt has both the financial capability and human resources capability to effectively maintain and utilize the capital assistance to be provided for the installation of an energy control center for the Cairo Region and a 250MW transmission substation at Abu Rawash

This judgment is based upon general considerations summarized in Section VI - E (Managerial/Administrative Analysis) of the Project Paper Amendment to which this certification is attached



Henry H Bassford
Mission Director,
USAID/Egypt

9/3/53

Date

CERTIFICATION PURSUANT TO
GRAY AMENDMENT

As Director and Principal Officer of the Agency for International Development in Egypt, I 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 attached Project Paper Amendment discusses the efforts that will be undertaken in connection with 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


Henry H Bassford
Mission Director,
USAID/Egypt

5/7/93
Date

TECHNICAL ANALYSIS

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 centrally plans, 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's) which will be responsible for the management of the regional power systems. The relationship between the NECC and RCC's 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. Consumers of electric energy in the Cairo Governorate are served from transmission facilities managed by EEA's Cairo Zone through distribution systems owned by the Cairo Electric Distribution Company (CEDC).

As the capital of the Arab Republic of Egypt (ARE) and the nation's commercial and industrial center, the Cairo Zone is Egypt's most important region. 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. The western portion of the Cairo zone has experienced substantial growth in recent years that has resulted in the excessive loading of transmission and substation facilities.

The management of the power system in the Cairo zone has not kept pace with either the expansion of the system or advances in system control technology. The Cairo zone is currently managed by an antiquated dispatch center located in Cairo. This center 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 Cairo Regional Control Center (CRCC) project was conceived to provide the facilities to supervise and control the power system serving Cairo. The CRCC

will utilize two systems 1) a Supervisory Control and Data Acquisition (SCADA) System, and, 2) a communication system for data and voice signal transmission

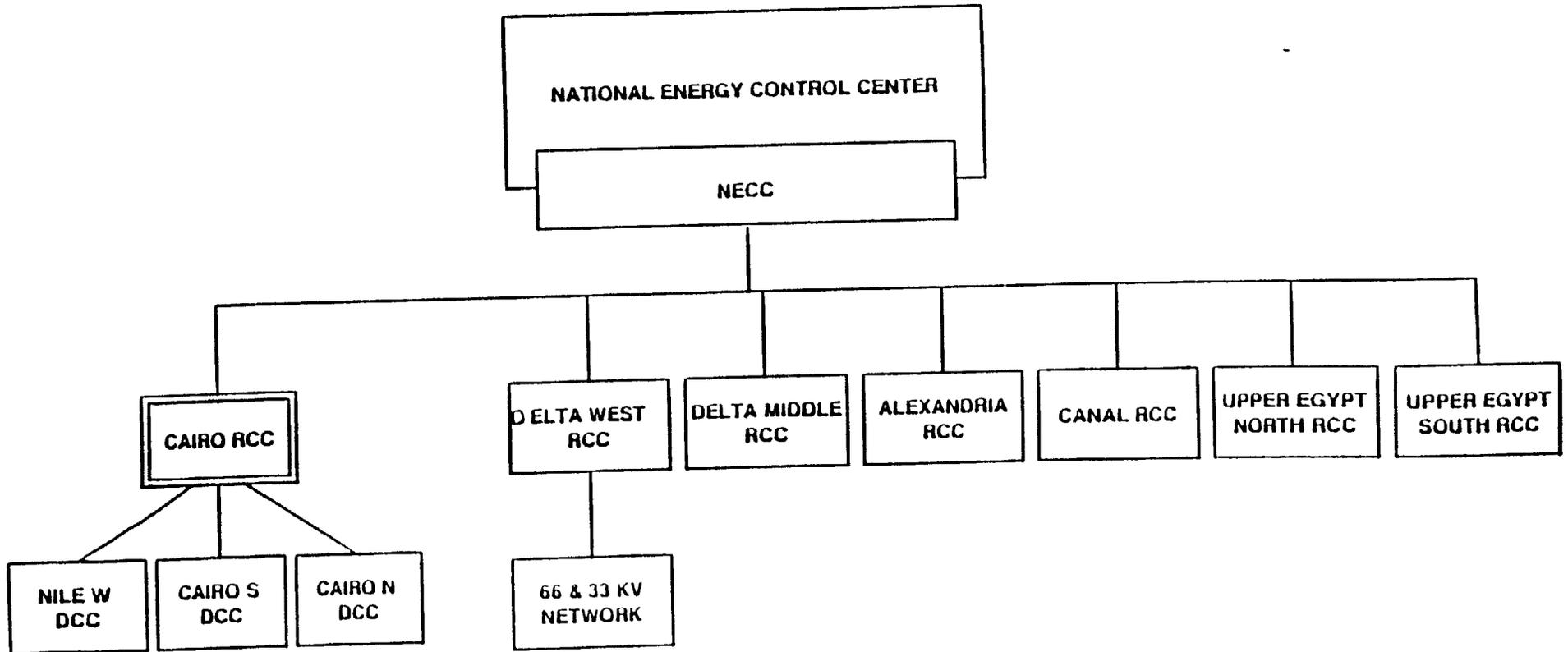
B ORGANIZATION OF EGYPT'S CONTROL CENTERS

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. A computer based control center is being installed in Alexandria to provide supervision and control of the power system serving the Alexandria region. Distribution Companies are utilizing, to various degrees, control centers to manage the medium and low voltage distribution networks. The Cairo Zone, due to its size and complexity, requires subdividing distribution control into more than one center. Some of these centers are automated with SCADA systems for monitoring and controlling their respective network responsibilities.

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 carrier to the NECC, which has the responsibility to control the bulk power system of Egypt, including those facilities in the Cairo zone.

The Regional Control Centers (RCC) are the second layer of control and manage the operation of the transmission and subtransmission systems at the 220KV, 132KV and 66KV levels. However, the recent conceptual changes to be undertaken 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 power. As such, the Cairo Regional Control Center will combine the transmission and subtransmission and first tier distribution network monitoring and control into one SCADA sub-system.

Schematic Organization of Control Centers



RCC Regional Control Center
DCC Distribution Control Center

C. DESCRIPTION OF THE CAIRO ZONE

C.1 Existing Network

Figure 2 provides the geographical locations of the existing and planned (until 1995) transmission and subtransmission lines and substations for the power system serving the Cairo zone. The antiquated control center for the Cairo zone is located in EEA's dispatch headquarters adjacent to the Cairo West thermal power generating station. The NECC occupies an adjacent wing of the same building.

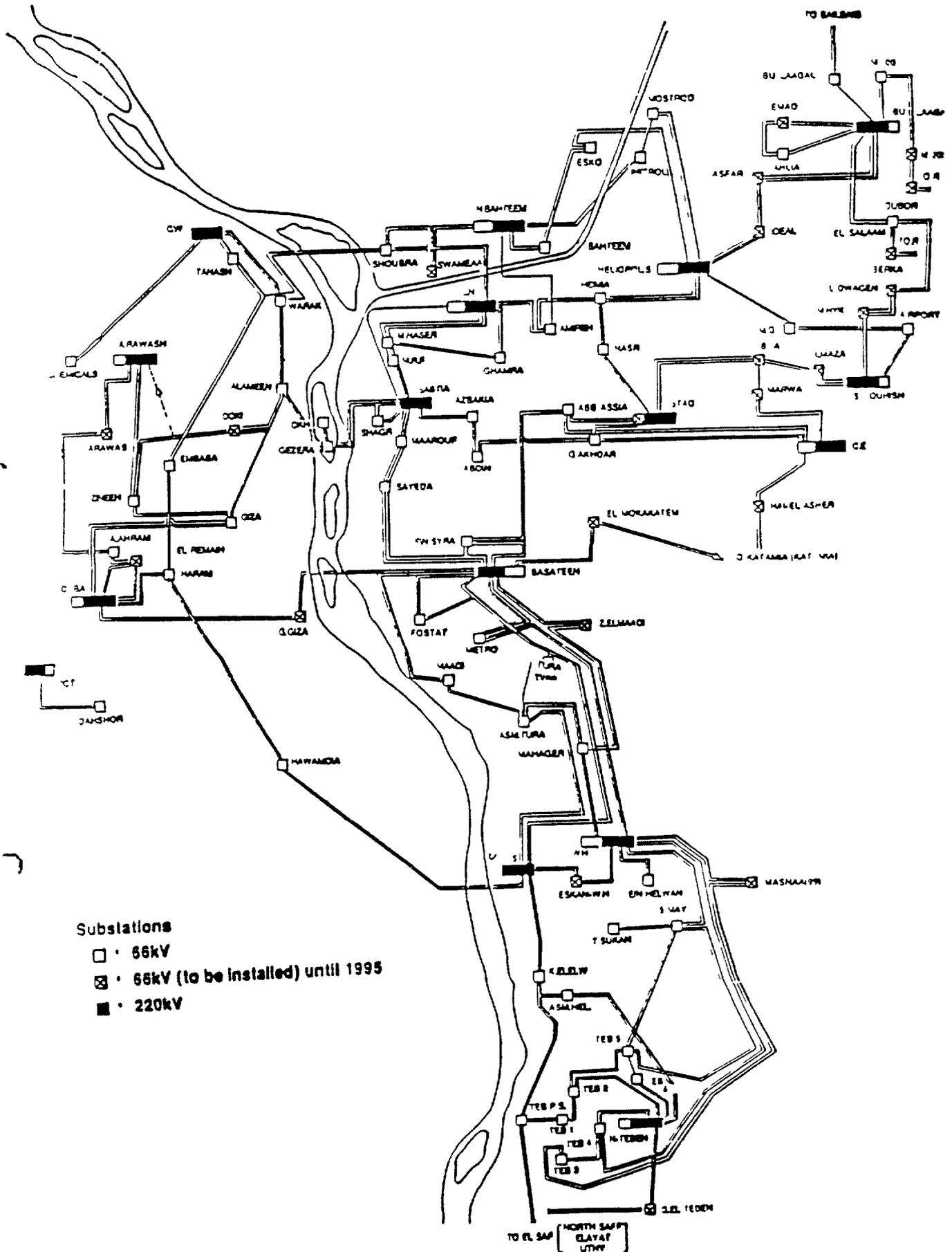
The Cairo RCC is responsible for the operation of all substations served from the 220KV and 66KV transmission or subtransmission networks. EEA has adopted a system control philosophy in which the Cairo RCC, and all other RCCs, will be responsible for the collection of data from all facilities above 11KV level including 500KV and power generating facilities. Within the Cairo zone, there are presently 76 stations in operation with an additional 23 stations planned to be installed by 1995.

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 Cairo Dispatch Center does 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 center for analysis, the only practical means of performing the necessary data analysis and presentation must depend on digital data transmission and computer analysis.

FIGURE (2)



Geographical Locations of the 220/66kV Substations until 1995

Handwritten signature or initials.

C.2 Existing Communications

The existing communication system between substations and to the existing RCC 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 Cairo.

The following describes the status of individual communication equipment currently in use, and preliminary diagnoses for their applicability (re-usability) to the upgraded system.

- **1.5 Ghz Microwave radios with 300 channel capacity supplied by GE.** The equipment has been in service for more than thirteen years (Not recommended to be re-used as backbone for upgrading system due to their age)
- **1.5 Ghz Microwave radios with 120 channel capacity supplied by ABB.** The equipment was placed in service in 1990 (To be re-used)
- **400 Mhz UHF radios of the party line system which have been in service since 1990.** Each of the existing links is designed to transmit one duplex telephone channel by using two frequencies per one party line network. There are two technical complications to applying the existing UHF facility to the upgraded system. The first is a shortage of frequency allocations. EEA is authorized to use a total of seven radio frequencies only. This is not a sufficient number to cover existing substations after increasing the capacity to two duplex speech channels and one duplex data channel (for data polling and data sending) per substation. The second complication is the technical limitations in transmitting high speed data signals over a party line system.
- **PLC (Power Line Carrier) system with a maximum capacity of two speech channels.** The equipment has been in service for approximately thirteen years, and is of the tube type. In the current system, the control and status indication signals are carried by the system they are intended to monitor. If a power line fails, the communication system carried by it also fails. This can make a power line carrier system unavailable at the time when it is needed most.

The existing microwave links can be re-used for communications with the planned RCC. However, the microwave radio equipment supplied by GE will have limited usage due to its age. The GE

links will basically be used for supportive (constructive loop) circuits only

Some other existing equipment may also be re-used, such as towers for approximately twelve stations. The existing Dispatch Center power supply equipment is not considered to be re-usable, however, some of it may be re-used after more detailed investigation.

D OUTLINE OF THE CRCC PROJECT

The CRCC component will enhance service to the customers in the Cairo zone 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 the Cairo zone. The communication 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 Cairo zone.

The control center 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 center 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. The utility reports that they have difficulties obtaining qualified operations personnel to man these substations. It is expected that over time the number of personnel in selected substations will be reduced. However, even with staff in the stations, 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

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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.

It is important that the communications subsystem be properly designed to perform the functions required of it. The system

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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 100 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.
 - 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** As shown in Figure 2 , the stations associated with the Cairo area power distribution network are scattered over a comparatively large area, and partly concentrated in some specific areas Therefore, a simple usage of either a point-to-point or point-to-multipoint radio system is not suitable for providing the required efficiency A combination of these systems is recommended from the stand point of cost and the effective use of radio frequencies 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 CRCC 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 CRCC PROJECT

F.1 Technical Justification of the Enhanced Control System

Network operations in the Cairo zone are becoming more complex and will continue to increase in complexity as the power system expands to keep up with the growth in demand The energy demand in the Cairo zone as a percentage of the energy demand for the entire country is 33.8 per cent, which emphasizes the importance of the Cairo zone In addition, the power demand in the Cairo zone is projected to grow at an annual rate of approximately seven per cent

When the CRCC 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 CRCC will permit Cairo zone management, engineering and operations to acquire more information to better maintain and control the system

The benefits associated with the completion of the CRCC enhancement project include the following

- 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 outage
- 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 Cairo zone utilizes 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.

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 a center 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 proposed EEA dispatch control center is feasible and necessary for the development of an efficient electric distribution system to serve the people of Cairo

It is not expected that new technology will be introduced in the design of the regional control center. 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.

TECHNICAL ANALYSIS FOR ABU RAWASH SUBSTATION**A GENERAL**

The technical justification for the proposed Abu Rawash project component is based on the need to install additional electrical capacity supplying the existing 66KV subtransmission network service area in the area adjacent to Abu Rawash. At the present time, the existing substations are experiencing normal load growth, as well as low voltage conditions during peak electrical load periods and during distribution feeder outage conditions. Abu Rawash will strengthen the subtransmission and distribution networks through feeder interconnection of the additional transformer capacity, which will enhance the network system reliability. Abu Rawash will be located near, and interconnected to, existing bulk power transmission lines to provide for a reliable source of power to the substation bus and installed transformer capacity.

B ABU RAWASH**Site**

The Abu Rawash substation site is located in the Giza Governorate, six kilometers (four miles) west of Cairo, and is adjacent to the Embaba, El Mashtal and Zenein distribution substations serving high density residential areas on the western bank of the Nile river. The site is southeast of the Cairo West substation and northeast of the Hadaba substation, and is approximately five kilometers (3.3 miles) southeast of the existing Cairo West/Hadaba double circuited 220KV overhead transmission line.

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

TECHNICAL ANALYSIS

Abu Rawash is a transmission and distribution substation that will interconnect to existing transmission and subtransmission lines and distribution feeders. The substation will consist of the following components:

- four 220KV overhead transmission line terminals,
- two 220KV switchyard buses with associated switchgear equipment,
- eight 220KV circuit breakers and associated switches,
- two 220KV/66KV/11KV 125MVA power transformers,
- two 66KV subtransmission operating buses with associated switchgear equipment;
- eight 66KV circuit breakers and associated switches,

- two 66KV/11KV 25MVA distribution transformers,
- two 11KV distribution feeder buses with associated switchgear equipment and capacitors,
- ten 11KV feeders and associated circuit breakers,
- one substation control building, and,
- a material storage area

Transmission Line Terminals

The Abu Rawash substation is located five kilometers (3.3 miles) southeast of the existing Cairo West/Hadaba double circuit overhead transmission line. These lines will be intersected to provide the loop-in and loop-out 220KV transmission line terminals at the substation 220KV buses.

220KV Switchyard

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

Power Transformers

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

Subtransmission Buses

The 66KV subtransmission buses receive power from the bulk power transformers at the 66KV voltage level, with circuit breakers and switches on both the high and low voltage side of the transformer. The 66KV buses provide backup power feeders to other 66KV substations, power feeders to industrial customers such as the Abu Rawash sewage plant and the Zenein commercial/residential substations, which are served at the 66KV voltage level, and to the 66KV/11KV distribution power transformers.

Distribution Transformers

Two 25 MVA 66/11KV distribution transformers will provide the power transformation from the 66KV bus power source voltage level to the 11KV power source voltage level.

11KV Distribution Bus

The 11KV distribution buses provides the power to the 11KV overhead and underground feeders which serve industrial, commercial, residential and rural step-down 11KV/380 Volt transformers, providing electrical energy to the area customers

Substation Control Building

Equipment contained in this building includes the 66KV busses and circuit breakers, the 66/11KV transformers and 11KV switchgear, 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) system, control batteries/racks/chargers, station service electrical power panels, heating, ventilating, air conditioning, communications terminals and office space

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

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FINANCIAL ANALYSIS

See Economic Analysis (Annex G) for a detailed explanation of assumptions used for the costs and benefits of the two new components

Cairo Regional Control Center

(A) COSTS

As provided in the economic analysis (Annex G), capital costs consist of \$40 million from USAID and the equivalent of \$2 91 million from the GOE. The useful life of the investment is estimated to be twelve years from the time the CRCC becomes fully operational. It is anticipated that an additional investment of \$7 5 million will be required for renovations in year 9 of the project, bringing the total capital investment to \$50 41 million. Operating costs are estimated at \$300,000 per year and will increase to \$360,000 per year as a result of the anticipated renovation/expansion work in year 9 of the project.

(B) BENEFITS

The economic analysis (Annex G) outlines two types of benefits resulting from the proposed CRCC: 1) increased energy sales as a result of energy loss reductions, and, 2) a reduction in outages, providing benefits in terms of output and efficiency. For the purpose of this financial analysis, we have not accounted for the benefits resulting from a reduction in outages, since they are economic in nature.

Table I shows the revenue projections for the CRCC, reflecting both USAID and EEA estimates of annual energy consumed, lost, saved and sold.

(C) FINANCIAL INTERNAL RATE OF RETURN (FIRR)

Based on benefit and cost projections in Table II, the Financial Internal Rate of Return on this investment is between 6 0 and 7 0 percent. This rate is far below the economic rate of return of 30 4 percent. This gap is due to the high economic value (benefits) of output and efficiency realized through reduction in outages. Therefore, in spite of the low discount rate resulting from the financial benefit/cost projections, the project seems strongly justified in economic terms.

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POWER SECTOR SUPPORT REG.CONTROL CENTER

TABLE 1

REVENUE PROJECTIONS	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
ENERGY CONSUMED(MIL KWHR)	18 958 0	19 811 1	20 702 6	21 634 2	22 607 8	23 625 1	24 688 2	25 799 2	26 960 2	28 173 4	29 441 2
ENERGY LOST (MIL KWHR) 3%	568 7	594 3	621 1	649 0	678 2	708 8	740 6	774 0	808 8	845 2	883 2
ENERGY SAVLD (MIL KWHR) 20	113 7	118 9	124 2	129 8	135 6	141 8	148 1	154 8	161 8	169 0	176 6
INCREASE IN SALES 90%	102 4	107 0	111 8	116 8	122 1	127 6	133 3	139 3	145 6	152 1	159 0
SALES PRICE (\$0 0543/KWHR) (IN MIL US DOLS)	5 6	5 8	6 1	6 3	6 6	6 9	7 2	7 6	7 9	8 3	8 6

Prepared By I M/ I A

BEST AVAILABLE

of
5/1

POWER SECTOR SUPPORT Computation of FIRR REG.CONTROL CENTER

TABLE II

YEAR	CAPITAL	O&M	TOTAL	DI @7%	PW	REVENUE	DI @7%	PW
1	\$2,200 0	\$0 0	\$2,200 0	0 935	\$2 057 0	\$0 0	0 935	\$0 0
2	\$19,760 0	\$0 0	\$19,760 0	0 873	\$17,250 5	\$0 0	0 873	\$0 0
3	\$12,470 0	\$0 0	\$12,470 0	0 816	\$10,175 5	\$0 0	0 816	\$0 0
4	\$8,470 0	\$0 0	\$8,470 0	0 763	\$6,462 6	\$0 0	0 763	\$0 0
5	\$0 0	\$300 0	\$300 0	0 713	\$213 9	\$5 600 0	0 713	\$3 992 8
6	\$0 0	\$300 0	\$300 0	0 666	\$199 8	\$5 800 0	0 666	\$3 862 8
7	\$0 0	\$300 0	\$300 0	0 623	\$186 9	\$6 100 0	0 623	\$3 800 3
8	\$0 0	\$300 0	\$300 0	0 582	\$174 6	\$6 300 0	0 582	\$3 666 6
9	\$7,500 0	\$300 0	\$7,800 0	0 544	\$4,243 2	\$6,600 0	0 544	\$3,590 4
10	\$0 0	\$360 0	\$360 0	0 508	\$182 9	\$6 900 0	0 508	\$3 505 2
11	\$0 0	\$360 0	\$360 0	0 475	\$171 0	\$7,200 0	0 475	\$3 420 0
12	\$0 0	\$360 0	\$360 0	0 444	\$159 8	\$7 600 0	0 444	\$3 374 4
13	\$0 0	\$360 0	\$360 0	0 415	\$149 4	\$7,900 0	0 415	\$3 278 5
14	\$0 0	\$360 0	\$360 0	0 388	\$139 7	\$8,300 0	0 388	\$3 220 4
15	\$0 0	\$360 0	\$360 0	0 362	\$130 3	\$8,600 0	0 362	\$3 113 2
16	\$0 0	\$360 0	\$360 0	0 339	\$122 0	\$9,000 0	0 339	\$3,051 0

\$50,400 0

\$42,019 2

\$41,875 6

Prepared By FM/IA

AD

Abu Rawash Substation

(A) COSTS

Capital costs are estimated at \$30 million and LE 20 million, excluding land. The land on which the substation will be constructed is owned by EEA (LE 1 million) and has been excluded from the financial cost projections.

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

Operational costs are estimated at approximately 1.5 per cent of investment costs. Incremental generation costs are approximately 39 per cent of sales, based on information obtained from EEA.

(B) BENEFITS

The benefits derived from the Abu Rawash substation have been identified as follows:

- (1) increased sales,
- (2) reduced outages, and,
- (3) reduced line losses.

All revenue assumptions are detailed in the economic analysis (Annex G) based on information obtained from EEA. For the purpose of this financial analysis, we have only accounted for revenues from increased energy sales.

(C) FINANCIAL INTERNAL RATE OF RETURN

The FIRR of the proposed investment, based on benefit and cost assumptions detailed in the economic analysis (Annex G) is sixty per cent (Table III). The financial rate is slightly less than the economic rate of return of 62.4 per cent. This is because the additional economic benefits are minimal when compared to revenue derived from sales.

From this analysis, we can conclude that the proposed investment is exceptionally sound and profitable in both financial and economic terms.

POWER SECTOR SUPPORT

(Computation of FIRR)

TABLE III

ABOU RAWASH SUB-STATION

YEAR	CAPITAL COSTS	RUNNING COSTS	GENERATION COSTS	TOTAL COSTS	SALES REVENUES	NET BENEFITS
1	\$6,950 0	\$0 0	\$0 0	\$6,950 0	\$0 0	(\$6,950 0)
2	\$14,510 0	\$0 0	\$0 0	\$14,510 0	\$0 0	(\$14,510 0)
3	\$14,510 0	\$0 0	\$0 0	\$14,510 0	\$0 0	(\$14,510 0)
4	\$0 0	\$540 0	\$20,410 0	\$20,950 0	\$51,980 0	\$31,030 0
5	\$0 0	\$540 0	\$21,470 0	\$22,010 0	\$54,680 0	\$32,670 0
6	\$0 0	\$540 0	\$22,540 0	\$23,080 0	\$57,380 0	\$34,300 0
7	\$0 0	\$540 0	\$23,600 0	\$24,140 0	\$60,080 0	\$35,940 0
8	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
9	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
10	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
11	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
12	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
13	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
14	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
15	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
16	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
17	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
18	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
19	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
20	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
21	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
22	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
23	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
24	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
25	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
26	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
27	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
28	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
29	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
30	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
31	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
32	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
33	\$0 0	\$540 0	\$23,990 0	\$24,530 0	\$61,090 0	\$36,560 0
FIRR	0.59844725	<i>Prepared By FM/FA USAID/CAIRO</i>				
NPV	0.000					

ECONOMIC ANALYSIS

CRCC COMPONENT

a) Evaluation of the Benefits

Total energy consumption in the Cairo zone was 14,983 kwh in 1992, and is expected to grow at four to five per cent per year thereafter. According to EEA, generation losses average three to four per cent in the Cairo zone (the AID-financed Preliminary Findings Report on "Policy Reform & Institutional Development in the Egyptian Power Sector" prepared by K&M Engineering and Consulting Corporation for the MEE on June 7, 1993, confirms the four per cent figure). To be conservative, we used the 3 per cent rate for energy losses. The CRCC project is expected to reduce these losses by twenty per cent.

The main task of the CRCC is to supervise and control the sub-transmission and distribution substations within the Cairo region. It will result in two major benefits: 1) reduced energy losses in power transmission facilities, and hence increased energy sales, and, 2) reduced number of outages on feeders from the substations, as well as faster restoration of service in the event of outages.

Sales have been evaluated using the EEA tariff rate in 1996 (PT 18.18/kwh or \$0.0543/kwh), which is expected to equal the LRMC in that year. The cost of outages saved for the economy (in the form of lost output and reduced efficiency) was calculated using the World Bank estimate of \$1.0/kwh in 1984, after adjusting it for the exchange rate changes and the inflation rates. Therefore, in 1994, which is the base year for the project¹, the cost of outages is estimated to reach \$1.1/kwh, based on the following formula:

$$\$1.0 \times 0.84 \text{ (exchange rate in 1984)} / 3.35 \text{ (exchange rate in 1994)} \times \text{inflation rates (1985-1994)}$$

Inflation rates in 1985-94 are 13%, 22%, 20%, 17%, 22%, 17%, 24%, 11% and 10% respectively.

¹ 1994 is used as the base year for the project because it is the first year of implementation. For economic analyses, prices must be fixed at the base year unless there are real increases in prices. The tariff rate for 1996 is used because tariffs are expected to be subject to real increases up to 1996.



b) Costs:

The foreign exchange component of the investment cost is estimated at \$40 million broken down into \$5 million for technical services, and, \$35 million for the contractor. An additional capital cost for expansion and renovation is expected in the fifth year of operation, amounting to \$5 million to \$10 million. We used \$7.5 million as an estimate. The local component of the investment cost is estimated at LE 9.75 million (\$2.91 million), of which LE 6 million is an in-kind contribution and the remaining LE 3.75 is cash.

Operating costs are estimated at \$300,000 per year, to be increased to \$360,000 after year five due to expansion.

c) Internal rate of return:

Based on the previous assumptions for the benefit and cost streams, the CRCC component is expected to yield an economic rate of return of thirty per cent, which reflects the high economic viability of the project (see attached table).

A sensitivity analysis was done assuming a reduction in outage cost of \$0.4/kwh, rather than the \$1.15/kwh derived from the World Bank. The \$0.4/kwh figure is based on data presented by J. R. Hammond in his presentation on "Private Provision of Electricity" in June 1993. The result of the analysis shows that the component is still capable of yielding a high rate of return of close to nineteen per cent (see attached table).

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ECONOMIC ANALYSIS
The CRCC Power Project
(In US Million)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Energy consumed(mil KWH)					18958	19811	20703	21634	22608	23625	24688	25799	26960	28173
Energy lost (mil KWH) (3% of consumption)					568.7	594.3	621.1	649.0	678.2	708.8	740.6	774.0	808.8	845.2
Benefits: energy saved (20% of lost energy)														
i- In Million kwh of which					113.7	118.9	124.2	129.8	135.6	141.8	148.1	154.8	161.8	169.0
* reduction in outages(10%)					11.4	11.9	12.4	13.0	13.6	14.2	14.8	15.5	16.2	16.9
ii- In \$ Million					19.3	20.1	21.0	22.0	23.0	24.0	25.1	26.2	27.4	28.6
* increase in sales (\$0.0543/kwh)					6.2	6.5	6.7	7.0	7.4	7.7	8.0	8.4	8.8	9.2
* reduction in outages (\$1.15/kwh)					13.1	13.7	14.3	14.9	15.6	16.3	17.0	17.8	18.6	19.4
COSTS: (\$million)														
Investment Cost	2.2	19.76	12.47	8.47					7.5					
Operating costs					0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.36	0.36	0.36
Total Cost	2.20	19.76	12.47	8.47	0.3	0.3	0.3	0.3	7.8	0.36	0.36	0.36	0.36	0.36
Net Benefit	-2.20	-19.76	-12.47	-8.47	18.96	19.82	20.73	21.68	15.16	23.64	24.72	25.85	27.03	28.26
Economic rate of return														30.4%

dp

The CRCC Power Project
 Economic Analysis
 (In US Million)
 (Sensitivity Analysis Outage cost reduced to 0.4\$/kwh)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007-9
Energy consumed(mil KWH)					18958	19811	20703	21634	22608	23625	24688	25799	26960	28173
Energy lost (mil KWH) (3% of consumption)					568.7	594.3	621.1	649.0	678.2	708.8	740.6	774.0	808.8	845.2
Benefits energy saved (20% of lost energy)														
1- In Million kwh of which.					113.7	118.9	124.2	129.8	135.6	141.8	148.1	154.8	161.8	169.0
* reduction in outages(10%)					11.4	11.9	12.4	13.0	13.6	14.2	14.8	15.5	16.2	16.9
11- In \$ Million					10.7	11.2	11.7	12.2	12.8	13.4	14.0	14.6	15.3	15.9
* increase in sales (\$0.0543/kwh)					6.2	6.5	6.7	7.0	7.4	7.7	8.0	8.4	8.8	9.2
* reduction in outages (\$0.4/kwh)					4.5	4.8	5.0	5.2	5.4	5.7	5.9	6.2	6.5	6.8
COSTS (\$million)														
Investment Cost	2.2	19.76	12.47	8.47					7.5					
Operating costs					0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.36	0.36	0.36
Total Cost	2.20	19.76	12.47	8.47	0.3	0.3	0.3	0.3	7.8	0.36	0.36	0.36	0.36	0.36
Net Benefit	-2.20	-19.76	-12.47	-8.47	10.43	10.91	11.41	11.94	4.99	13.01	13.61	14.24	14.89	15.58
Economic rate of return			18.6%											
Net Present Value (10%) (US Million)			23.0											

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ABU RAWASH SUBSTATION COMPONENT

According to EEA, the peak load and energy consumption in the Cairo zone is expected to grow at 4.3 per cent per year. To prevent overloading and the incidence of low voltage, the introduction of new substations and the rehabilitation of existing ones is becoming a necessity. The establishment of the Abu Rawash substation in the Western area of the Great Cairo zone will relieve overloading of the Hadaba and Cairo West substations, which are forecasted to reach 116.8 per cent and 114 per cent respectively in 1996/97.

A) Evaluation of the Benefits:

The Abu Rawash substation is expected to provide three main benefits:

1. Increased energy sales

To forecast the expansion in energy sales, a load flow analysis with and without the project was conducted by EEA. Ideally, the increase in sales should have been calculated as a percentage of energy lost in the whole system before the establishment of the Abu Rawash substation. Due to the complexity of the system, however, it was decided to relate the energy saved to the capacity of the Abu Rawash substation.

The load to be supplied by the Abu Rawash substation is as follows:

	<u>96/97</u>	<u>97/98</u>	<u>98/99</u>	<u>99/2000</u>	<u>2000/2001</u>
In MW	154	162	170	178	181

To convert from MW to KWH, we used the following formula:

$$\text{KWH} = \text{load in MW} \times 8760 \text{ (# of hours per year)} \times 0.71 \text{ (load factor)} \times 1000$$

The increase in energy sales was valued at the tariff rate in 1996/97 estimated at PT 18.18/kwh or \$0.0543/kwh. It is expected that the tariff rate by that year will be equal to the LRMC.

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2. Reduced Outage Cost

By reducing excess loading and the incidence of low voltage for both the Hadaba and Cairo West substations, the forced outage rate is expected to decline from 0.35 per cent to 0.15 per cent, i.e., a reduction of 0.2%, assuming that the voltage in all generating stations will be restored to the acceptable level. The probability of this to occur, however, is ten per cent, and hence, the reduction in outage as a result of installing the Abu Rawash substation will be equal to

$$0.2\% \times 8760 \times 6 \times 125\text{MVA} \times 0.85 \times 0.1 / 1000 = 1.12 \text{ million KWH}$$

where

6 x 125MVA = capacity of the Cairo West and Hadaba substations, and,
0.85 = maximum operating capacity

The cost of outage was estimated by the World Bank in 1984 to be \$1.0/kwh. Adjusting for the exchange rate differentials and the inflation rate, the forecasted cost of outage in 1994 is estimated at \$1.15/kwh (EEA uses a rate of \$1.5/kwh)²

3. Reduction in Line Losses

The establishment of the Abu Rawash substation will result in an improvement in line losses estimated by EEA at 8MW per year, i.e., 24 million kwh/year (8MW x 3000/1000). The reduction in line losses was valued at the LRMC in 1994 (0.0543/kwh)

²Outage cost in 1994 = \$1.0 (cost in 1984) x 0.84 (exchange rate in 1984) / 0.335 (exchange rate in 1994) x inflation rates in 1985-94

Inflation rates used are 13%, 22%, 20%, 17%, 22%, 17%, 24%, 11%, 10%, and 10% respectively for the years 1985-1994

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B) Costs:

1. Investment Cost

The investment cost is estimated by EEA at \$30 million and LE20 million, excluding land which is owned by EEA. We estimated the land value at LE 1 million and included it in our calculations, since it is an economic cost (land has an opportunity cost). At the end of the life of the project, the salvage value of land was included based on an annual five per cent real appreciation of the original value of the land.

The project is expected to be implemented over three years, with twenty per cent of the costs to be incurred in the first year, forty per cent in the second, and forty per cent in the third year.

2 Running Costs

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

3. Incremental Generation Costs

According to EEA, the expansion in energy sales resulting from the Abu Rawash substation has a net generation cost of PT 7/kwh (\$0.029/kwh), to be applied to the volume of increased energy sales plus two per cent estimated losses in the system.

C) Internal Rate of Return:

Based on the previous assumptions regarding the benefit and cost streams, the project is expected to yield an economic rate of return of 62 per cent, which strongly supports the economic justification for the project (see attached table).

A sensitivity analysis was done assuming an increase in the net incremental generation cost to PT 10/kwh (\$0.0299/kwh). The result of the analysis shows that the project is still capable of yielding the significantly high rate of return of fifty per cent (see attached table).

A second sensitivity analysis was done assuming an increase in the investment cost to \$40 million and LE 31 million. The results were still very promising, with an internal rate of return of fifty per cent (see attached table).

ABOU RAWASH SUBSTATION PROJECT

Economic Analysis

	B E N E F I T S						C O S T S (US \$ Million)				NET BENEFITS	
	1 Increased Sales (mil kwh)	Sales (mil US \$)	2 Reduced Outages (mil kwh) (mil US \$)		3 Reduced Line Losses (mil kwh) (mil US \$)		TOTAL BENEFITS	1 Investment Cost	2 Running Cost	3 Incremental Generation Cost		TOTAL COSTS
1994								7 25			7 25	-7 25
1995								14 51			14 51	-14 51
1996								14 51			14 51	-14 51
1997	957 8	51 98	1 12	1 28	24 00	1 30	54 57		0 54	20 41	20 96	33 61
1998	1007 6	54 68	1 12	1 28	24 00	1 30	57 27		0 54	21 47	22 02	35 25
1999	1057 3	57 38	1 12	1 28	24 00	1 30	59 97		0 54	22 54	23 08	36 89
2000	1107 1	60 08	1 12	1 28	24 00	1 30	62 67		0 54	23 60	24 14	38 53
2001	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2002	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2003	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2004	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2005	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2006	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2007	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2008	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2009	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2010	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2011	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2012	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2013	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2014	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2015	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2016	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2017	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2018	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2019	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2020	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2021	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2022	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2023	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2024	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2025	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 54	23 99	24 54	39 14
2026	1125 7	61 09	1 12	1 28	24 00	1 30	65 10		0 54	23 99	24 54	40 56

Internal Rate of Return (%) 62 4
 Net Present Value (10%) 240 0

Total benefits in the last year include the salvage value of land (\$1 42 million)

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ABOU RAWASH SUBSTATION PROJECT

Economic Analysis

(Sensitivity Analysis Incremental generation cost raised to PT10/kwh (\$0 0299/kwh))

	B E N E F I T S				C O S T S (US \$ Million)				NET BENEFITS
	1 Increased Sales (mil kwh) (mil US \$)	2 Reduced Outages (mil kwh) (mil US \$)	3 Reduced Line Losses (mil kwh) (mil US \$)	TOTAL BENEFITS	1 Investment Cost	2 Running Cost	3 Incremental Generation Cost	TOTAL COSTS	
1994						7 25		7 25	-7 25
1995						14 51		14 51	-14 51
1996						14 51		14 51	-14 51
1997	957 8	51 98	1 12	1 28	24 00	1 30		29 16	24 86
1998	1007 6	54 60	1 12	1 28	24 00	1 30	0 54	30 68	26 04
1999	1057 3	57 38	1 12	1 28	24 00	1 30	0 54	32 19	27 23
2000	1107 1	60 08	1 12	1 28	24 00	1 30	0 54	33 71	28 41
2001	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2002	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2003	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2004	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2005	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2006	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2007	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2008	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2009	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2010	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2011	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2012	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2013	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2014	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2015	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2016	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2017	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2018	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2019	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2020	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2021	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2022	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2023	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2024	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2025	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	28 86
2026	1125 7	61 09	1 12	1 28	24 00	1 30	0 54	34 28	30 28

Internal Rate of Return (%) 50 4
 Present Value (10%) 169 3

Total benefits in the last year include the salvage value of land (\$1 42 million)

ABOU RAWASH SUBSTATION PROJECT

Economic Analysis

(Sensitivity Analysis Investment cost raised to \$40 million and LE31 million)

	B E N E F I T S						C O S T S (US \$ Million)				NET BENEFITS	
	1 Increased Sales (mil kwh)	Sales (mil US \$)	2 Reduced Outages (mil kwh)	Outages (mil US \$)	3 Reduced Line Losses (mil kwh)	Losses (mil US \$)	TOTAL BENEFITS	1 Investment Cost	2 Running Cost	3 Incremental Generation Cost		TOTAL COSTS
1994								9 85			9 85	-9 85
1995								19 70			19 70	-19 70
1996								19 70			19 70	-19 70
1997	957 8	51 98	1 12	1 28	24 00	1 30	54 57		0 74	20 41	21 15	33 41
1998	1007 6	54 68	1 12	1 28	24 00	1 30	57 27		0 74	21 47	22 21	35.05
1999	1057 3	57 38	1 12	1 28	24 00	1 30	59 97		0 74	22 54	23 27	36 69
2000	1107 1	60 08	1 12	1 28	24 00	1 30	62 67		0 74	23 60	24 33	38 33
2001	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2002	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2003	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2004	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2005	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2006	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2007	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2008	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2009	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2010	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2011	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2012	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2013	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2014	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2015	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2016	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2017	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2018	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2019	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2020	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2021	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2022	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2023	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2024	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2025	1125 7	61 09	1 12	1 28	24 00	1 30	63 68		0 74	23 99	24 73	38 95
2026	1125 7	61 09	1 12	1 28	24 00	1 30	65 10		0 74	23 99	24 73	40 37

Internal Rate of Return (%) 50 1
 Present Value (10%) 228 1

Total benefits in the last year include the salvage value of land (\$1 42 million)



UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

THRESHOLD DECISION BASED ON
INITIAL ENVIRONMENTAL EXAMINATION

Project Location: Egypt

Project Title/ID: Power Sector Support
Amendment # 5 (263-0215)

Funding (Fiscal Year and Amount): FY93 - FY99 \$65 million

IEE Prepared By: _____ Date: _____

Anne E. Patterson
Environmental Advisor, NE/DR/ENR

June 24, 1993

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

Associate Mission Director's Concurrence: _____ Date: _____

Paul Thorn, AD/DR

June 30, 1993

Decision of Environmental
Coordinator, Bureau for
the Near East:

Approved: Robert S. Joch...

Date: June 30, 1993

Clearances:
GRWhaley, Mission Env. Officer:
RRhoda, OD/PDS/ENV
VMoore, LEG

GPW Date: 6/24/93
perc Date: 6/21/93
... Date: 6/23/93

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INITIAL ENVIRONMENTAL EXAMINATION

- 1 Project Location Egypt
- 2 Project Title/ID Power Sector Support
Amendment # 5 (263-0215)
- 3 Funding (Fiscal Year and Amount) FY93-FY99, \$65 million
- 4 IEE Prepared By _____ Date _____
- Anne E. Patterson*
Anne E Patterson
Environmental Advisor, NE/DR/ENR
- June 30, 1993*
June 30, 1993
- 5 Action Recommended Negative Determination as per 22 CFR
216 3(a)(2)(111)
- 6 Discussion of Major Environmental Relationships of Project
Relevant to Attached Impact Identification and Evaluation Form:

Background

This action will finance the construction of 1) a Cairo Regional Control Center (CRC Center) for \$35 million and 2) a Power Transmission Substation located at Abu Rawash for \$30 million

Cairo Regional Control Center

The demand for electrical power in the Cairo area has increased rapidly in recent years. In order to keep up with the growing demand, the Egyptian Electricity Authority (EEA) has promoted the construction of new power plants, substations, and transmission lines. Presently, Cairo relies upon a very primitive dispatching center for power allocation to the various parts of Cairo. This center does not have telemetric or telecontrol facilities and must rely upon human operators using telephone communication to identify areas where overloading or outages are occurring.

Funding from the Power Sector Support Project will finance the installation of a new control center with computerized facilities to supervise, monitor and control the power system serving the Greater Cairo area. This system consists of a Supervisory Control and Data Acquisition (SCADA) system and a Communication system for data and voice transmission. The benefits from the new CRC Center for the management of the electric power systems serving Cairo are considerable. With proper computer-assisted operation, the EEA will be able to:

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- Increase network reliability through early detection and correction of overload or insecure operating situations,
- Increase equipment safety and reduce outage times through the ability to detect and disconnect overloading or malfunctioning elements of the power network,
- Reduce energy losses in power transmission facilities through improved power management,
- Reduce operation costs, permitting less labor at substations and centralized monitoring and control,
- Increase the reliable availability of electrical power to the Cairo customer base

Transmission Substation at Abu Rawash

The proposed Abu Rawash 2x125M V A 220/66/11 KV Substation is located in the Giza Governorate, 6 0 Km west of Cairo, and is adjacent to the Embada, El Mashtal, and Zenein distribution substations serving high density residential areas. The new substation is needed to relieve the loading on the existing substations in the area as well as the overloading of existing transmission lines. Much of this overloading has been caused by the increased demand for electricity made by the new sewage treatment facilities located at Abu Rawash as well as a growing residential population. This new substation is located 5 Km south-east of the existing Cairo West/Hadaba double circuit overhead transmission line. These lines will be intersected to provide the loop-in and loop-out line terminals at the substation 220KV buses.

Environmental Impacts

Environmental impacts of these activities will be of limited scope and duration and will be associated with the temporary construction phase only. All construction work will take place in heavily developed urban areas with high levels of ambient air and noise pollution. Neither the CRC Center nor the substation will emit air or water discharges and no transformers containing PCBs will be installed. Telephone and power cables will be built along existing utility rights-of-way. Since construction will take place in areas already significantly disturbed, the potential for impacts on cultural antiquities is very low.

During the course of the construction phase of the CRC Center and the Abu Rawash Substation, the U S. Contractors will have oversight responsibility for ensuring that environmental impacts (dust, noise, construction debris, exhaust from equipment, etc..) are minimized to the extent possible and that adequate occupational safety and health practices are followed by the local construction crews. The facilities built for this project will adhere to

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internationally acceptable codes for water supply, electricity, lighting, ventilation, sanitation, and worker safety and health

Discussion

Pursuant to 22 CFR 216 3(a)(2)(111), the originator of the proposed project has reviewed the potential environmental impacts of the action 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 22 CFR 216 3(a)(2)(111), the originator of the proposed project recommends a negative determination of significant environmental effect for the Power Sector Support Project, and requests NE Bureau approval of a negative threshold decision for these activities.

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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	<u>N</u>
	b Construction (roads, buildings, piping)	<u>L</u>
	c Extraction of minerals/natural resources	<u>N</u>
	d Creation of deposits of unwanted materials (waste spoils)	<u>N</u>
2	Alteration of natural barriers (dunes, marshes)	<u>N</u>
3	Foreclosing important future uses	<u>N</u>
4	Potential for endangering populated areas	<u>N</u>
5	Other factors	

B SURFACE AND GROUND WATER

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

C AIR

1	Potential for increased NO _x , SO _x , HC, CO ₂ /CO emissions	<u>N</u>
2	Potential for increased particulate emissions	<u>N</u>
3	Potential increase of noxious odors, vapors, pathogens	<u>N</u>
4	Noise pollution	<u>L</u>
5	Other factors	

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

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