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**POWER SECTOR SUPPORT PROJECT PAPER AMENDMENT 5**  
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**SANITIZED VERSION**  
**NO PROCUREMENT SENSITIVE INFORMATION INCLUDED**

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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

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EGYPT - POWER SECTOR SUPPORT

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## **GLOSSARY OF ABBREVIATIONS**

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

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	Piasters
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

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**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.

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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 \$ 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 \$ 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 \$ 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 \$ million advance on the planned FY 92 \$ 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 \$ 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

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: a) equipment and installation services for the Cairo Regional Control Center; and, b) foreign exchange costs of 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).

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						
Equipment/ Construction						
Audit/ Evaluation						
<b>TOTAL</b>						

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:



#### IV. Project Negotiation Status

The two new activities described above require total funding of \$ million. Of this amount, AID will provide \$ million in funding through an increase in the Project Authorization to finance the Abu Rawash substation. The decision to obligate \$ million rather than the \$ 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 \$ million to \$ 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 \$ 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.

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 \$ 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 \$ 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 \$ 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 \$ 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 \$ 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 Hurgghada 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 \$ 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 \$ 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 \$ million of the planned FY 92 \$ 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 \$ 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 \$ 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 \$ 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 now 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 \$ 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 \$ 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 \$ 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 \$ 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 in 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 \$ 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.

## 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 (\$ 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.

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)

Component	US\$		LE		TOTAL	
	(M)	(M)	(M)	(M)	(M)	(M)
Consultant Services						
Equipment/Construction						
Audit/Evaluation						
<b>TOTAL</b>						

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.

3.03 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.

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	TOTAL				ABU RAWASH					TOTAL					
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Consultant Services															
Equipment/Construction															
Audit/Evaluation															
<b>TOTAL</b>															

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

ELEMENTS	TOTAL				ABU RAWASH					TOTAL					
	94	95	96	97	TOTAL	94	95	96	97	TOTAL	94	95	96	97	TOTAL
Cash (BAB III)															
BAB I (Salaries)															
BAB II (Operating Costs)															
Land															
<b>TOTAL</b>															

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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
<b><u>CRCC</u></b>					
Equipment/ Construction	Host Country Contract	Fixed Price	Direct L/Comm		EEA
Audit/ Evaluation	AID Direct	Cost Type	Direct Payment		AID
<b><u>ABU RAWASH</u></b>					
Consultant Services	Host Country Contract	Cost Type	Direct L/Comm		EEA
Equipment/ Construction	Host Country Contract	Fixed Price	Direct L/Comm		EEA
Audit/ Evaluation	AID Direct	Cost Type	Direct Payment		AID

15.

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 \$            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 \$            , which also covers the Abu Rawash component.

TABLE III-5  
UTILIZATION OF AUDIT FUNDS

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

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.

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 <sup>1</sup>	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.

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<sup>1</sup>Consultant services are financed under the fourth amendment to the Project. Consultant selection is in progress.

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.

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

## 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.

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.

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).

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)