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The World Bank

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Report No: 34779-EG

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF
US$259.6 MILLION EQUIVALENT

TO THE

ARAB REPUBLIC OF EGYPT

FOR THE

EL-TEBBIN POWER PROJECT

January 18, 2006

Middle East and North Africa Region
Finance, Private Sector and Infrastructure Department

CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2005)

Currency Unit = Egyptian Pound (LE)

LE 5.8 = US$1

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
BOT	Build Operate Transfer
CAS	Country Assistance Strategy
CC	Combined Cycle
CCGT	Combined Cycle Gas Turbine
CEPC	Cairo Electricity Production Company
EEHC	Egypt Electricity Holding Company
EEUCPRA	Egyptian Electric Utilities and Consumer Protection Authority
EGEAS	Electric Generation Expansion Analysis System
ERR	Economic Rate of Return
ESIA	Environmental and Social Impact Assessment
EIB	European Investment Bank
EPC	Engineering, Procurement, and Construction
ESMAP	Energy Sector Management Assistance Program
FDI	Foreign Direct Investment
FMU	Financial Management Unit
FY	Fiscal Year
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GWh	Gigawatt hour
GOE	Government of Egypt
IPP	Independent Power Producer
kWh	Kilowatt hour
MEDA Program	Financial and technical measures to accompany the reform of economic and social structures in the framework of the Euro-Mediterranean partnership
MMBTU	Million British Thermal Units
MW	Megawatt
NBI	Nile Basin Initiative
NPV	Net Present Value
O&M	Operations and Maintenance
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
Pt	Piasters (LE 0.01)
SC	Steam Cycle
TA	Technical Assistance
T&D	Transmission and Distribution
Tcf	Trillion Cubic Feet
TOR	Terms of Reference
USAID	United States Agency for International Development
US¢	US cents

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Country Director:	Emmanuel Mbi
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Team Leader:	Anna Bjerde

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EGYPT, ARAB REPUBLIC OF

EG-EL TEBBIN POWER

PROJECT APPRAISAL DOCUMENT

MIDDLE EAST AND NORTH AFRICA

MNSIF

Date: January 18, 2006	Team Leader: Anna Maria Bjerde
Country Director: Emmanuel Mbi	Sectors: Power (100%)
Sector Manager/Director: Jonathan D. Walters	Themes: Infrastructure services for private sector development (P);Analysis of economic growth (S)
Project ID: P091945	Environmental screening category: Full Assessment
Lending Instrument: Specific Investment Loan	

Project Financing Data

[X] Loan [ ] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 259.60
Proposed terms: FSL

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER	151.30	38.70	190.00
INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT	0.00	259.60	259.60
Total:	151.30	298.30	449.60

Borrower:
Ministry of International Cooperation
8 Adly Street
Cairo, Arab Republic of Egypt
Tel: (+20-2) 391-2815

Responsible Agency:
Egyptian Electricity Holding Company
Ramsis Street Extention - Abbassia
Cairo, Arab Republic of Egypt 11517
Tel: (+20-2) 401-2368
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Estimated disbursements (Bank FY/US$m)									
FY	7	8	9	10	11				
Annual	12.70	80.70	95.20	43.40	27.60				
Cumulative	12.70	93.40	188.60	232.00	259.60				

Project implementation period: Start May 3, 2006 End: October 31, 2010
Expected effectiveness date: May 3, 2006
Expected closing date: April 30, 2011

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD A.3***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD D.7***	[ ]Yes [X] No
Have these been approved by Bank management?	[ ]Yes [ ] No
Is approval for any policy exception sought from the Board?	[ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD C.5***	[ ]Yes [X] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD D.7***	[X]Yes [ ] No

Project development objective ***Ref. PAD B.2, Technical Annex 3***

The project development objectives are to: (i) assist the GOE in enhancing the provision of energy supply in a sustainable manner, through investment in new generation capacity, and (ii) help the GOE strengthen sector performance by engaging in policy dialogue and supporting measures aimed at improving financial performance, the functions of the regulator and energy efficiency. Input would also be provided to the development of the legal framework for the sector.

Project description *[one-sentence summary of each component]* ***Ref. PAD B.3.a, Technical Annex 4***

The El-Tebbin Power Plant component involves the construction of a 700 MW power plant comprising of two units of 350 MW steam turbines and boilers using natural gas as fuel.

The technical assistance (TA) component will address key issues facing the sector, such as the need for better financial performance, strengthening the pricing structure and energy efficiency.

Which safeguard policies are triggered, if any? ***Ref. PAD D.6, Technical Annex 10***

Given the project's environmental classification, and in accordance with Operation Policy (OP) 4.01 on Environmental Assessment, a full Environmental and Social Impact Assessment report was prepared for the project.

Significant, non-standard conditions, **if any**, for:
Ref. PAD C.7

Loan/credit effectiveness:
1) Subsidiary Loan Agreement signed between Ministry of International Cooperation and EEHC.
2) CEPC to recruit a qualified financial consulting firm.

Covenants applicable to project implementation:
1) Standard annual auditing requirements.
2) Contractual Agreement signed between EEHC and CEPC no later than three months after the effectiveness date.
3) Establishment of PMU, with qualified staff and in adequate numbers no later than four months after the effectiveness date.
4) Prepare the Procurement Implementation Manual and the Financial Management Manual no later than 2 and 6 months (respectively) after the date of signature of the contractual agreement between EEHC and CEPC.

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

Country Issues

The political system in Egypt can be characterized by stability and continuity. In 2004, a significant change took place in the cabinet when several new officials were appointed to key ministerial positions. This new government has made economic reform its key objective, notably in areas such as finance, investment, trade and industry. It has also stated its keen interest to expand public-private partnerships and to undertake public sector reforms aimed at enhancing the provision of public goods and services, including physical and social infrastructure. The latter includes the power sector.

In the early 1990's, Egypt began moving away from central planning and downsizing its massive public sector. Between 1995 and 1999, the economy responded to the new market-oriented environment and growth increased to around five percent per year. Subsequently internal and external shocks combined to slow growth to around three percent per year. At the same time, there was a loss of momentum in the previous reforms that included the restructuring and privatization of some government-owned businesses.

Inward portfolio investment in Egypt weakened after the South-East Asia economic crisis in 1997. Annual foreign direct investment (FDI) averaged US$1 billion per year from the mid-1990s through 2000, peaking at US$1.5 billion in 1999/2000. During this time, 171 public companies were privatized generating a total of LE 15.45 billion in proceeds (US$ 2.66 billion). After 2000, FDI slowed, ranging from US$400 – US$700 million per year. In the three years leading up to 2003, there were 28 companies privatized with total proceeds of LE 1.3 billion.

Investment further deteriorated with the 2003 devaluation of the Egyptian pound. However, in 2004 the stimulation of foreign and domestic investment became the major priority for the GOE, and as a result FDI has increased by 211% to US$1.26 billion in 2004/05.[1]

The investment needs in infrastructure remain substantial. Approximately 4-6 percent of Gross Domestic Product needs to be invested annually in infrastructure sectors in the Middle East and North Africa (MENA) region to satisfy the requirements of new investment as well as maintenance and replacement spending.[2] The decline in investment in the MENA region, including in Egypt, is reported to have compromised the infrastructure base, which is further challenged by the high growth in demand for modern infrastructure services.

While investment is required to ensure adequate infrastructure, the GOE is increasingly concerned with the rising fiscal deficit and public debt. During FY00-04, the deficit rose from 3.9% of GDP to 5.7%. To counter this, the GOE plans to reduce the deficit over the medium term through restraining public expenditures and increasing public revenues. To do this, it plans to redesign subsidies, control growth in public sector employment and cut unnecessary

[1] Source: www.investment.gov.eg/MOI_Portal. In addition, according to the information in the web site, of the US$1.26 billion, US$419.5 million are proceeds from the sale of stakes in public owned companies and joint ventures in addition to unused public owned assets.

[2] Cited in internal Bank report on "Arab Republic of Egypt: A Short Infrastructure Assessment," December 2004.

expenditures. Some actions have already been taken in this regard (see below on price increases and reduction of subsidies).

Increased efficiency and performance of utilities and greater public-private partnerships are a major part of the GOE's current economic strategy. The new Government has already introduced a number of important reforms for the Egyptian economy, such as:

- Increasing retail utility prices, including electricity, and increases in gas prices.
- Reducing custom tariffs.
- Reducing price controls and subsidies on basic products, including diesel-fuel.
- Increasing interest in the potential for public-private partnerships (PPPs).
- Strengthening and reorganizing the privatization program under the Ministry of Investment established in June 2004.

Against these reforms, the GOE remains committed to providing a public safety net comprising of various subsidies, employment programs and cash transfers and agrees that there is much room for improving the cost-effectiveness of the safety net and its coverage of the poor. Assistance to do this is included in the Country Assistance Strategy (CAS).

Sector Issues

Reliable and reasonably priced electricity is critical to economic growth and poverty reduction. In Egypt, approximately 99% of the population has access to electricity; however, demand for electricity is growing fast and the sector's ability to respond to demand growth and thus play its role in delivering higher growth and alleviating poverty is challenged. Three challenges predominate:

(i). Urgent need for substantial additional generation capacity to keep up with fast growing demand. Installed capacity of electric power was 18,119 MW in 2003/04, of which 84% comprised thermal power (8% of which is provided by the private sector through 3 Independent Power Producers, IPPs). The remaining capacity was attributed to hydropower (15%) and wind (1%). Peak load reached 14,735 MW, and about 90% of the thermal power production was based on natural gas. The increase in demand for electricity in Egypt has averaged about 7% during 1997/98–2003/04 and is expected to remain in the 6%–7% range over the next 10 years. Initiatives are underway to better understand customer consumption patterns and loads to ultimately implement demand-side management measures to reduce the overall consumption and the growth in demand.[3]

Nevertheless, to meet the expected demand, the Egyptian Electricity Holding Company (EEHC), responsible for generation, transmission and distribution of electricity in Egypt, has developed a least cost generation expansion plan. This plan has two phases: a fast track phase (2002–2007), during which 4,500 MW of combined cycle gas turbines will be implemented, and a medium-

[3] Energy intensity in Egypt in 2004, defined as the energy consumption per unit of GDP was equal to 0.22 toe / 000' 95 US$, which is comparable to other oil producing countries in the region (Algeria: 0.20) and lower than others (Iran: 0.33), but higher than Western European countries such as Germany (0.18) and France (0.19).

term phase (2008–2012), during which 6,925 MW of steam and combined cycle turbines will be implemented. The fast track program is estimated to cost about US$1.6 billion, while the medium-term program is estimated to cost US$2.5 billion. Financing for the fast track phase has been secured, while financing for the medium-term phase is currently being put in place, which includes a request to the World Bank to contribute towards the financing of a 700 MW steam cycle plant to be operational in 2009/10 (the proposed El-Tebbin Power Plant).

With this generation expansion plan, the reserve margin will be kept in a range of 19% to 23% of the peak load, excluding the wind units, from 2005 to 2012 (the current reserve margin is 23%), which is considered to be an acceptable level by international standards, including in cases where the increase in demand is slower. For planning purposes, EEHC assumes that the maintenance schedule, forced outages and forced ratings use about 18% of the reserve margin. This leaves a surplus capacity (i.e., operational reserve margin) of about 450 MW during the period of 2004/05 through 2009/10; the latter being the year when the first unit of the proposed El-Tebbin power plant is scheduled to start commercial operation. Thus, a delay in project completion may result in a capacity deficit, which will cause power system outages or load shedding.

(ii). Under-pricing of electricity. This is a critical issue facing the Egyptian electricity sector, and is a contributor to the relatively high growth in consumption, with consequently heavy capital expenditure demands, and as a result the negative impact on the financial position of the sector. Egyptian electricity prices are low by international standards and relative to a number of other countries in the region. Prices for electricity were changed for the first time since 1992 in October 2004 (from an average of 12.8 Pt/kWh to 14.06 Pt/kWh–2.4 US¢/kWh).[4] Prices had declined substantially in real terms over that period and, with the depreciation of the Egyptian pound, in foreign currency terms as well. During this time, the operating costs of existing plant and the capital costs of new plant have increased, resulting in a widening gap between the sector's revenues and costs.

Not only is electricity subsidized overall (i.e., prices do not fully cover costs) there are also substantial, poorly targeted cross-subsidies. An inclining block tariff is used to subsidize residential customers who use the least electricity. While this is a commonly used, if imperfect, mechanism for protecting the poorest customers, it is very generous and poorly targeted in Egypt. The two lowest blocks of 5.0 Pt/kWh (0.86 US¢/kWh) and 8.4 Pt/kWh (1.45 US¢/kWh) cover 32% and 46% of residential energy sales, respectively. This is a significant factor in the very low (by international standards) average retail residential price of 8.5 Pt/kWh (1.4 US¢/kWh).[5] Only customers on the very high voltage enjoy a lower average price (6.55 Pt/kWh). Business tariffs also show a pattern of cross-subsidizing rural and small businesses at the expense of commercial customers in particular. The GOE is fully aware of cross-subsidization in the sector and, although the overall electricity retail tariff has increased, subsidies continue to prevail particularly in politically sensitive customer segments, such as agriculture and households. The GOE is keen to eventually reduce the level of cross-subsidization in the sector and the subsidies in general, but recognizes that this will take time.

[4] The 2004 increase was 8%, with a further 5% increase p.a. for the next 5 years.

[5] Prior to the devaluation the average residential tariff was only 2.5 US¢/KWh in 2002-03. The devaluation did not affect price expressed in local currency, however, it resulted in a decline in the price in terms of US¢/kWh.

EEHC is under increasing pressure to keep investment costs as low as possible, as its financial performance has deteriorated in the past 2 years. This is primarily due to the continued low average price for electricity and the devaluation of the Egyptian pound, which has had a major impact on EEHC's cost, in particular the cost of power purchased from the IPPs. Securing concessionary financing terms is therefore part of the GOE's strategy to keep investment costs down.

A key reason EEHC has been able to avoid losses until 2002/03, is the favorable natural gas price the sector enjoys. The sector has a special price, which has been maintained at 14 Pt/m^3 (2.4 US¢/m^3). Despite recent increases of the gas prices, initially to 18 Pt/m^3 and then to the current price of 21 Pt/m^3, EEHC continues to pay 14 Pt/m^3. Keeping the cost of natural gas low to the sector is a targeted Government policy in the interest of keeping electricity prices down. However and as described above, not increasing the retail tariff became impossible last year due to EEHC's financial position. This increase was based on a continuation of the favorable gas price.

Egypt has an abundance of natural gas reserves. Current proven reserves are estimated at 67.2 trillion cubic feet (Tcf), with an additional 120 Tcf identified as probable and possible reserves.[6] To meet projected domestic demand (industrial, commercial and residential) and export demand (via pipelines and liquefied natural gas terminals) over the next 20 years, about 15 Tcf is estimated to be required. This leaves Egypt with a proven Reserves/Production (R/P) ratio of over 80 years. Domestic gas consumption is dominated by the power sector at 65%, followed by the fertilizer industry, petrochemicals and other industrial sectors. As natural gas is becoming increasingly important to the economy of Egypt, particularly with the growing potential for exports, moving towards cost-based pricing of gas is becoming increasingly important. As a result, the GOE is planning to undertake an assessment to determine the cost of gas and has requested Bank assistance to do so. The objective of the study will be to calculate the economic cost of natural gas for domestic customers at certain off-take points from the network, including at power stations. The study should be completed by April 2006 and will provide important input to the GOE's long-term gas pricing policy and strategy, including to the power sector. Concurrent to this study, sensitivity analysis on the long run marginal cost of electricity will be undertaken by EEHC to assess the possible impact on electricity production cost from changes in the gas price.

(iii). An unfinished policy, legal and regulatory agenda

Although reforms generally slowed down in Egypt since 2000, there have been a number of first stage reforms within the electricity sector:

- The sector has been unbundled under a state-owned holding-company model. The generation, transmission and distribution/retailing segments have been functionally separated within the EEHC with 5 regionally-based generation companies, a transmission company and 9 distribution companies.

[6] Source: Ministry of Petroleum, July 2005.

- A sector regulator, the Egyptian Electric Utilities and Consumer Protection Authority (EEUCPRA), was established in 2000, although its role at this stage is limited, particularly in advising on or setting prices.
- An internal power pool was established in 2002 to replace the previous dispatch processes. Under the pool, the generators provide bids for dispatch, which are scheduled on the basis of these bids. However, the bids are based on costs, and there is an ex-post adjustment to prices that limits the incentives provided.
- There has been significant investment in improved metering at the generation and transmission/sub-transmission level.

While these are positive steps, and provide an important foundation for further sector development, the potential benefits of these reforms have yet to be realized. The sector policy remains somewhat unclear, and the legal and regulatory framework unfinished. In the late 1990s, the GOE introduced private sector participation in the sector through three IPPs. The view then was that the sector should increasingly be financed by the private sector. However, with the devaluation of the Egyptian pound, the cost of the power purchased – which is fixed in US dollars – started to exceed the average retail price for electricity, thus bringing losses to the sector.

The GOE recently engaged in a dialogue with the EU, through the Euro-Mediterranean Partnership, on integration into a regional electricity market. Such integration will require far-reaching reforms of the Egyptian power sector, in order to establish fully liberalized electricity markets (in principle by 2010). Some assistance on how to achieve this is being provided through the MEDA Program (financial and technical measures to accompany the reform of economic and social structures in the framework of the Euro-Mediterranean partnership). Nevertheless, significant work remains on the detailed steps required to meet the liberalization objective, as well as Government policy on how to finance sector investments in the longer term, including the respective roles of the public and private sectors. On the latter, although the GOE remains open to private sector participation, the pressure on the financial status of the sector due to the overall low retail tariffs has led to the GOE opting for public sector financing for the time being. Clearly, tariff/subsidy reform would need to accompany any large-scale re-engagement with private participation. As mentioned earlier, reform of the social safety net is a key priority of the GOE.

As for the legal and regulatory framework, new legislation is being prepared that will provide the basis for the future regulation and operation of the electricity sector consistent with the EU-MEDA agreement on the conditions for a regional electricity market. The Ministry of Energy and Electricity aims to present this law to Parliament within a year. Although the Bank is not assisting formally in the development of the proposed law, it is providing input for its formulation.

The regulatory agency has a wide range of functions, including issuing licenses and monitoring/advising on prices, but it is still very much developing its resources and capabilities, some of which will become better defined only when there is clarity on how the sector will evolve. A background note has been prepared by the Project Team on how the regulatory framework and the functions would need to evolve as the sector strategy develops and in order to

fulfill the EU market conditions. This Note was discussed during the course of project preparation and will form a foundation for continued dialogue on sector reform.

2. Rationale for Bank involvement

The rationale for Bank involvement at this time is (i) there is a need for investment in power generation by the public sector; and (ii) there is momentum and political support for continuing the reforms started in the late 1990s.

In the late 1990s, the GOE, contracted with three private generators to produce electricity. This push for private participation in infrastructure was the result of the GOE's aim to reduce the fiscal burden of power sector investments. While the cost for the IPPs ranged from US$612/kW to US$495/kW (thus yielding the lowest IPP electricity prices in the world), the devaluation in 2003 nearly doubled the cost of power under the Power Purchase Agreements (PPAs) to the EEHC and today exceeds both the retail price and EEHC's estimates of the costs from its own new plant. This is due the tariff policy that has been in place and the associated social safety net issues. While the GOE has not ruled out entering into new IPPs, it is reluctant to do so under the framework of the late 1990s, i.e., with PPAs in US Dollars and where the EEHC is obligated to purchase the power. Therefore, in the near future, the GOE is opting for public sector financing of the power sector generation requirements, including for the proposed El-Tebbin plant.

Nevertheless, while there is significant debate as to whether the private sector projects brought substantially higher efficiency to the sector or not, the growing funding demands of the sector and the concern with the public sector deficit through the debt servicing obligations of continuing to fund publicly owned generators, is becoming more onerous. Thus, private financing of new capacity will most likely become an increasingly important objective and the GOE's framework for IPPs will need to be reviewed and possibly revised. However, even if Egypt undertook all politically-feasible reforms to attract private participation in generation, some capacity would still need to be financed by the public sector in the foreseeable future, given the relatively weak interest of the private sector against the large volume of investment required in Egypt.

Finally, the timing for Bank engagement is good given the new reform minded government in place and the positive experience of the Airport Development Project, which showed the GOE that the Bank can be a financier of large infrastructure investment and add value to the development of overall sector policy. Since the cancellation of the Kureimat Power Loan in 1992 (IBRD Loan Number 34410) the Bank has had limited involvement in the Egyptian power sector, mainly providing support for the development of Egypt's renewable energy resources through the Global Environment Facility (GEF). This meant the Bank played no role in policy or institutional reform in a sector of fundamental macroeconomic importance. Funding for recent power plants and the fast track capacity program has come from sources such as European Investment Bank (EIB), African Development Bank (AfDB) and Arab Funds, while technical assistance has been largely funded by the United States Agency for International Development (USAID).

World Bank involvement in the funding of the El-Tebbin plant can therefore - while contributing to the financing of a key GOE priority investment program - allow for contribution to the

development of sector policy in key areas, such as the legal and regulatory frameworks, future gas and electricity pricing and further implementation of already undertaken reforms. It is envisaged that the proposed project could be the first in a longer-term program of assistance to the sector, where follow-up projects would focus increasingly on sector policy issues at a pace with which the GOE is comfortable; recognizing the time it takes to decide on and implement policy reforms in Egypt and that they have to be country-driven.

3. Higher level objectives to which the project contributes

Access to reliable and affordable electricity services is critical to achieve sustainable growth and economic and social development goals. On technical measures, the Egyptian power sector performs well. Given the strong growth in demand, investment in new capacity of around 1,000 MW per year is estimated to be necessary to continue to meet these objectives, and the El-Tebbin plant is an efficient component of the sector's expansion plan.

The project is therefore expected to contribute to the goals, articulated in the CAS for Egypt, which include enhancing the provision of public goods through, *inter alia*, modernized infrastructure services to achieve higher growth. Furthermore, the proposed project is expected to have a significant positive impact on employment generation in the project area with an additional 2,000 jobs expected to be generated during the construction phase and 800 during the operation period. Finally, the project is supported by and supports the Bank's Infrastructure Action Plan, approved by the Board in July 2003, which calls for more responsiveness to client demands for infrastructure given the central role of infrastructure in the economic growth and poverty reduction process.

B. PROJECT DESCRIPTION

1. Lending instrument

The Borrower has requested a Fixed Spread Loan (FSL), with a 20-year maturity, including a five-year grace period. The Loan will be denominated in US Dollars.

2. Project development objective and key indicators

The project development objectives are to: (i) assist the GOE in enhancing the provision of energy supply in a sustainable manner, through investment in new generation capacity, and (ii) help the GOE strengthen sector performance by engaging in policy dialogue and supporting measures aimed at improving financial performance, the functions of the regulator and energy efficiency. Input would also be provided to the development of the legal framework for the sector.

Key performance indicators are listed in Annex 3.

3. Project components

The El-Tebbin Power Plant

The proposed project is a 700 MW power plant comprising of two units of 350 MW steam turbines and boilers using natural gas as a main fuel and residual oil (mazout) as emergency back-up fuel. The total project costs have been estimated at about US$449.6 million, of which the Bank has been requested to finance US$259.6 million. The plant site is located south of Cairo city and on the eastern side of the Nile River. The plant will be built on an existing site that covers an area of 100,000 m^2, 200 meters from the Nile River. The existing plant comprises three 15 MW steam units operating on mazout and two 23 MW gas turbine units operating on natural gas. The units date back to 1958 and 1979 respectively. The existing plant will be decommissioned and demolished, and the site will be cleaned and prepared for the proposed project. A decommissioning plan has been prepared, and the demolition work has started. One of the 23 MW gas turbine units will remain on the site as a black out start-up generator. The other 23 MW gas turbine unit will be moved another plant site. The remaining assets will be sold or disposed of by demolition contractors. The demolition work is expected to take about 12 months before the land is available for the new units' construction. The gas pipeline already reaches the site, and power can be evacuated to the transmission network. However, some upgrading of the gas pipeline and the transmission network will be required to accommodate the larger power production from the new plant. Make-up and cooling water for the plant will be drawn from the Nile.

The proposed project includes the following: (i) demolition of existing plant and site preparation works; (ii) two units of 350 MW steam turbine-generators; (iii) two units of steam generators (boilers); (iv) electrical equipment including transformers and switchyard; (v) auxiliary mechanical equipment including pumps and drives, heat exchangers and de-aerators, and critical and non-critical piping and valves; (vi) a water and wastewater treatment plant; (vii) the implementation of the Environmental Management Plan (EMP), including environmental monitoring equipment; (viii) distributed control systems and instrumentation, (ix) engineering and project management services including design, procurement and construction supervision as well as commissioning, testing and start-up of the Project; (x) civil works, yard tanks and medium and low voltage switchgear; (xi) insurance; and (xii) transmission lines to interconnect to the national power grid.

The project's technical and economic justification is based on a feasibility study prepared by EEHC, which the Bank has reviewed in detail.

Technical Assistance Component

The technical assistance (TA) component will address key issues facing the sector, such as the need for better financial performance, strengthening the pricing structure and energy efficiency. The assistance would mainly comprise of studies and implementation support as necessary and is estimated at about US$2.45 million. The Energy Sector Management Assistance Program (ESMAP), a multi-donor grant facility managed by the World Bank, will finance US$0.65 million. The components are as follows:

(i) Financial Performance Improvement (US$1.7 million):

The Government has taken steps to improve the financial performance of the sector with the 2004 tariff increase and the approval for a 5% annual increase for the next five years. Additional measures are being taken to further improve the financial situation in the sector (see below under Section D Appraisal Summary). To ensure better monitoring and reporting of the financial position of the sector and to allow for the use of financial information as a decision-making tool for management, an automated financial management system will be implemented at the EEHC. A consultant will be recruited to assist in the design and implementation of the system. This component will be financed by EEHC.

(ii) Support to strengthen the Design and Application of Time-of Use Tariff Structure (US$0.35 million):

The Ministry of Energy and Electricity is interested in reviewing pricing signals to reduce energy consumption. An effective pricing mechanism is the time-of-use tariff aimed at reducing the demand at peak periods and thus relieving the pressure of maintaining investment to meet peak demand. The EEUCPRA has undertaken a comprehensive cost of service modeling to provide a sound reference point for pricing decisions and has reviewed the affordability of electricity services by vulnerable groups. As such, the natural next step is to review the current tariffs relative to costs in order to provide a benchmark for comparison with current tariffs and develop options for future tariff changes, including the design and application of time of use tariffs. This component will be financed by a grant from ESMAP.

(iii) Energy Efficiency (US$0.40 million)

During project preparation, a workshop was held where experts from different countries shared their experiences on energy efficiency measures aimed at reducing consumption of electricity. Based on discussions during the workshop and an assessment of the achievements already made in Egypt in this area, three TA activities have been agreed to:

- Design of a load management program, based on an assessment of data collected on consumption patterns of industrial and large commercial customers (US$0.2 million; financed by a grant from ESMAP).
- Upgrade of Long Run Marginal Cost (LRMC) software (US$0.1 million; to be financed by EEHC).
- Feasibility assessment of an "Interruptability" Scheme (US$0.1 million; financed by a grant from ESMAP).

4. Lessons learned and reflected in the project design

The cancellation of the Kureimat Power Loan in 1992, along with lessons learned globally of undertaking large complex power projects has provided important lessons, such as not loading investment projects with unrealistic policy reform measures or measures which lack Government ownership. The proposed project recognizes the need for further reforms in the power sector in Egypt, but proposes that: (i) the reforms and the pace at which they can be implemented are

Government owned; and (ii) the placement of conditions or rigid covenants on the proposed operation is not appropriate. As such, a policy and sector reform dialogue has developed in parallel to the preparation of the proposed investment operation, gradually demonstrating the value added that the Bank can bring. Indeed the preparation of the project has helped restore confidence between GOE and the Bank, which in turn has facilitated the policy dialogue. This approach has already generated results, such as the requests for assistance to determine the cost of natural gas and the request for Bank assistance to design an energy efficiency program, based on international experience and best practice. This approach is also likely to result in follow-up operations (a second energy project is planned for in the CAS), where the policy dialogue between the GOE and the Bank is likely to deepen.

5. Alternatives considered and reasons for rejection

Various alternatives to the proposed project to meet the need for electricity provision have been considered, including (i) importing electricity, (ii) renewable energy; (iii) rehabilitation of existing power plants; (iv) transmission and distribution investments; and (v) IPPs.

- Importing electricity: Egypt is interconnected to Libya and Jordan, and is exporting electricity to both countries. Interconnection to Libya has a capacity of 300 MW, and that of Jordan has a capacity of 350 MW, which will be increased to 450 MW in 2006. Libya and Jordan are currently paying 4 US¢/kWh for the Egyptian power supply. As they are net importers, there is currently not much scope for electricity imports by Egypt through the interconnected networks. In addition, the cost of electricity generation in both countries is much higher than that of Egypt, making it an uncompetitive alternative. There is currently no south border connection to Sudan, although there is an ongoing discussion in the context of the Nile Basin Initiative whereby Egypt could potentially import hydroelectric power starting in 2010-2012, if the price is competitive. However, considering the abundance of natural gas and thus the low cost electricity provision in Egypt, it may be difficult for imported electricity to be competitive.
- Renewable energy: The cost of wind based electricity is 2.1 US¢/kWh with current grant financing for wind projects, which is higher than the cost from natural gas thermal plants: combined cycle (1.7 US¢/kWh) and steam cycle (1.85 US¢/kWh). Therefore, renewable energy is not an option for large-scale power supply.
- Rehabilitation of existing power plants: EEHC has concluded that the rehabilitation option is cost effective in seven of its existing power plants, and these sites have already been or will be rehabilitated. However, these efforts are not enough to cope with the growing demand for electricity. The Tebbin power plant (3 steam units of 15 MW) is too old (1958 vintage) and not suitable for rehabilitation. The existing gas turbines (23 MW x 2 units) will be used either during black-outs or moved to another site.
- Transmission and distribution investments: EEHC has developed a transmission and distribution (T&D) development plan, and the T&D system is optimized for the current load requirements and generation capacity. To meet the demand growth for the fast track period and medium term expansion, a T&D investment plan has been developed. New electricity generation capacity is required in the network; therefore, strengthening of T&D capacity alone will not replace the need for the generation capacity. Furthermore, T&D losses are at a

relatively low level, around 10% on average, and reducing the losses further would not free up the amount of electricity supply required.

- BOTs/IPPs: Three BOT projects (650 MW each) have been built in Egypt in recent years. The GOE is encouraging private sector participation in order to attract private investment. However, a large increase in private interest in power generation in Egypt will take place only when tariff/subsidy reform is further advanced. This is expected to take some time. In any case, Egypt's capacity requirements are so great, even under tariff reform, that public financing will play a significant role for some time to come.

C. IMPLEMENTATION

1. Partnership arrangements

The GOE had not indicated an interest in seeking partnership arrangements with other donors on this project, except for grant funding for some of the TA components. However, as mentioned above, many donors are active in financing projects in the power sector, and the GOE is actively seeking financing to complete its sector expansion plans. The Bank's team has been in constant contact with donors active in the sector to ensure that there is a common understanding and agreement as to the measures that are needed to ensure the future sustainability of the sector. During these discussions, several donors, notably AfDB and the EIB, have stressed their support for Bank engagement at this time when there seems to be momentum for reforms in Egypt, including in the infrastructure sectors. These donors have unanimously stated improved financial performance and measures to curb demand as key sector sustainability criteria.

It is also worth mentioning that the AfDB, in an effort to harmonize procurement procedures among development institutions, has also agreed to the GOE's request to use a "Two-Envelope" system for procurement (see below under Section D Appraisal Summary) of certain packages under its recently approved generation project. EIB already acknowledges the use of this system and has applied it in several projects with the GOE.

2. Institutional and implementation arrangements

The proposed project will be implemented between 2006 and 2010. The project will be implemented by the Cairo Electricity Production Company (CEPC), an affiliate of EEHC. EEHC will be responsible for the implementation of the TA components and the monitoring of improved sector financial performance (see below under Section D Appraisal Summary) will also be at the level of EEHC, given the lack of financial autonomy of CEPC and the greater importance of holding level financial viability for a liberalization of the market and possible increased private sector participation in the financing and service provision of electricity supply.

There will be a Loan Agreement between the Government of Egypt (Ministry of International Cooperation) and the Bank and a Project Agreement between EEHC and the Bank. By virtue of a Subsidiary Loan Agreement between the GOE and EEHC, the GOE will on-lend the Bank loan proceeds to EEHC.

To establish and solidify the role of CEPC in project implementation, a Contractual Agreement will be in place between EEHC and CEPC. This Agreement, whose terms and conditions will need to be satisfactory to the Bank, will detail procurement and payment processes and other responsibilities for implementing the different activities under the project.

A Project Management Unit (PMU) specifically for the proposed project will be established in CEPC. The CEPC PMU will be assisted in engineering, procurement, construction and project management by an engineering consultant funded by CEPC. The Bank team has reviewed the terms of reference and CEPC is in the process of contracting the engineering company. The PMU will have a project manager, 2-3 engineers, a procurement coordinator, and an accountant.

A separate, but closely coordinated, Financial Management Unit (FMU) will be established in the CEPC main office to better integrate with the other departments in CEPC's financial sector, such as investment audit, planning, treasury, etc. The key functions of the FMU will be to have overall responsibility for the project's financial recording, budgeting, reporting requirements, and handling the loan disbursement arrangements including supporting documentation consistent with Annex 7 of this document. The FMU will comprise an FMU manager and 3 accountants, and it will be assisted by a financial consulting firm for about six months. Smooth coordination between the PMU and the FMU will be ensured by the PMU's accountant.

3. Monitoring and evaluation of outcomes/results

EEHC and CEPC will monitor the progress against the agreed performance indicators listed in Annex 3. Data and statistics on actual project output and outcomes will be gathered, analyzed, and included in periodic progress reports to be submitted to the Bank.

A professional engineering firm will supervise the project's physical implementation; however, CEPC, through the PMU, will monitor overall project progress, including contractors' performance in accordance with the signed contracts. EEHC's environmental department will monitor and ensure adherence to the Environmental Management Plan. EEHC will also monitor progress with the ESMAP funded activities, through the appointment of a monitoring and evaluation expert for the Bank to liaise with during project supervision.

Based on the EEHC, CEPC and Bank's review of the periodic reports and outcomes of the supervision missions, measures will be taken to ensure the project is completed without delay and achieves its planned outcomes.

4. Sustainability

Client commitment to the project and its objectives is strong, as evidenced by the accelerated fashion in which they have prepared the feasibility study, hired an independent firm to undertake the ESIA and arranged for an engineering firm to assist with the engineering, procurement and project management aspects of the proposed project.

Other conditions for sustainability include the availability and access to natural gas for the new plant. This will be secured through the formulation of a gas purchase agreement.

Further improvements to the financial performance are also important for sustainability. The recently approved tariff increase will help towards greater financial sustainability of the sector and project investments. Further measures to improve the sector's financial performance have been agreed to and are discussed in detail under Section D Appraisal Summary. However, sector sustainability will ultimately depend on the overall sector policy framework, to which the Bank engagement with the GOE, catalyzed by this project, will contribute.

Recent steps undertaken by the Government under the Euro-Mediterranean Partnership and the MEDA Program are indicative of the Government's commitment to advancing reforms aimed at improved sector sustainability.

5. Critical risks and possible controversial aspects

The critical risks to the project are:

(i) Delays in the project implementation due to the number of procurement packages (17) and CEPC's inexperience with World Bank procedures and requirements.

CEPC has a good track record in managing the construction of power plants of comparable size to the El-Tebbin power plant, using a contracting strategy based on numerous packages on schedule. As a way to assist in diminishing the learning curve on World Bank procedures, several discussions with CEPC and the selected engineering firm have taken place on the Bank's procurement procedures and standard bidding documents, in addition to formal training sessions.

(ii) Delays in availability of the El-Tebbin site and thus in project implementation due to cleaning up requirements after the demolition of the existing plant.

The ESIA identified a set of mitigation measures related to possible adverse impacts from the demolition of the existing plant. Although the ESIA concluded that it was highly unlikely that PCBs from the transformer oil and asbestos from insulation would be found once the existing plant is demolished, the management plan includes measures to address these issues should they become relevant. Problems associated with the clean-up after the existing plant to make the site available for the new plant are therefore not anticipated.

(iii) Deterioration of the sector's financial performance.

The Government and EEHC have agreed on a number of measures to improve the financial performance and prospects of EEHC and to settle their respective debts. The local loans have been restructured and the terms softened to enable EEHC to better meet cash flow requirements and service its debt obligations in a timely fashion. Furthermore, a large portion of the significant accounts receivables due to non-payment by the Government have been settled and recent changes in the Government's budgeting process (in which appropriate funds are allocated for payment of electricity bills) should result in an improvement of the collection performance in coming years. Likewise, a portion of the significant liabilities from EEHC to the Government in the form on delayed payment of foreign loans borrowed

or guaranteed by the Government are being settled. Discussions are at an advanced stage to convert the local loans, accounting for about 59% of the overall long-term debt, to equity.

(iv) Changes in the availability of grant funds from ESMAP for TA component and thus only partial implementation of the ESMAP funded components.

Grant funds for a total of US$0.65 million from ESMAP have been confirmed to finance 3 distinct activities under the TA component described above. EEHC has confirmed its willingness to finance the other activities under the agreed upon TA component. In the case ESMAP funds do not materialize, this component may have to be scaled down or financed by grant facilities associated with other donors in the sector.

6. Loan/credit conditions and covenants

Conditions of Effectiveness:

- Subsidiary Loan Agreement signed between Ministry of International Cooperation and EEHC.
- CEPC to recruit a qualified financial consulting firm.

Standard Covenants:

- Standard annual auditing requirements.

Dated Covenants:

- Contractual Agreement signed between EEHC and CEPC no later than three months after the effectiveness date.
- Establishment of PMU, with qualified staff and in adequate numbers no later than four months after the effectiveness date.
- Prepare the Procurement Implementation Manual and the Financial Management Manual no later than 2 and 6 months (respectively) after the date of signature of the contractual agreement between EEHC and CEPC.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

Economic Analysis

At a 10% discount rate, the project's net present value (NPV) is US$253 million and it yields an economic rate of return (ERR) of about 20%, therefore it is deemed viable.

Table 1: Summary results

Present values discounted at 10%		Sensitivity – ERR=10% if:
Costs	US$801 million	• Gas price increase beyond US$3.4 per mmbtu
Benefits	US$1,057 million	• Plant's full commissioning delayed by 5 years (to 20175/6)
Net Present Value	US$252.9 million	• Demand addressed to plant falls, reduces plant load factor to 44%
		• Consumer's willingness to pay reduces to 4.2 US¢/kWh or residential demand shrinks by 50% due to higher cost of self-generation
ERR	19.9%	

Source: World Bank.

Given the small size of the plant compared to the overall Egyptian electricity system, the project has been assessed on an individual basis, comparing its costs to its benefits. The costs comprise those required to commission a 700 MW single cycle steam turbine plant, estimated to be US$403 million (US$390 million for the generation plant and US$13 million for the transmission; including physical contingencies but excluding price contingencies and customs), and to operate and maintain the plant. The El-Tebbin plant is expected to produce an average of 3.5 GWh annually over its 25-year lifetime. No salvage value was included, as costs of dismantling the plant at the end of the 25 years are deemed higher than the benefits of selling the aging equipment. The quantified benefits consist of retail sales of additional electricity to the grid valued at willingness to pay less transmission and distribution losses. Willingness to pay of 5.5 US¢/kWh was estimated on the basis of the consumption by using the weighted average cost of diesel-fuelled electricity auto-production located at consumers' premises, with the weights being the consumption increases by industrial and other users on the one hand and residential users on the other. Calculations were undertaken in 2004 prices.

The analysis did not take into account possible external effects on health and job creation. Although there may be positive effects, their impact on the project have been considered limited. The construction of the plant would provide jobs for 2,000 persons for eighteen months. Operation of the plant will not yield large net job creations but will improve the skills of CEPC's operational staff. Health effects are expected to be positive, as the new plant's emissions would be significantly lower per unit of energy produced. However, the impact of net emissions mitigation has been deemed limited, since the new plant is larger than the one it replaces.

The El-Tebbin plant is part of the least cost expansion plan of EEHC, which has been assessed using the Electricity Generation Expansion Analysis System (EGEAS). EEHC puts a 35% limit on the share of Combined Cycle Gas Turbines (CCGT) in this plan due to uncertainty around the operational flexibility of large scale CCGT (see more under Section D - Technical). Under this constraint, the proposed plant is the least cost option to meet energy demand in Egypt. In this plan, demand inputs are calculated by projecting historic trends. The demand forecast uses direct price elasticities from observed demand trends. This implicitly relies upon the low natural gas and electricity prices of the past and current natural gas price of US$0.65 per mmbtu (14 Pt/$m^3$) and the current average electricity price of 2.4 US¢/kWh. One effect of this "underpricing" is the urgent need to build additional capacity to meet additional demand stimulated by the low price. The analysis assessed the sensitivity of demand resulting from

setting electricity prices at a higher level and implications upon the timing for building the El-Tebbin plant. As a result, peak demand would be lower than the initial forecast used in EGEAS reducing the urgency of additional investments in power supply capacity. However, this was not considered as a major risk for the El-Tebbin plant, as it would only defer the plant's construction for about one year and not cancel it.

The analysis also studied the impact on the project's viability from a reduction in total demand represented by a drop in the plant's load factor. The load factor would be reduced as a result of reduced consumption when consumers, especially residential, are forced to shift to diesel-fueled auto-production. This could potentially happen given the high rate of electrification in Egypt. The analysis furthermore explored the impact from a decrease in residential consumers' demand through a lower willingness to pay. As the sensitivity analysis shows, the load factor would have to drop from 70% to 44% and the willingness to pay from 5.5 US¢/kWh to 4.2 US¢/kWh for the ERR to drop to 10%.

Nevertheless, demand management and increased prices may slow the growth in demand and permit a deferral of new projects. This in itself is an important feature of improved sector performance which is why the TA component on energy efficiency is so important.

Financial Analysis

The project will generate financial benefits to EEHC in the form of revenues stemming from the sale of the electricity generated by the new El-Tebbin Power Plant, which account for the increased tariffs to be implemented and will assist the company in meeting the agreed financial performance targets. The analysis has been conducted in current terms based on a net cash flows generated by the project over a 25-year period, and it shows that the project's financial rate of return is 18%, which is above the 10% assumed cost of capital. The detailed analysis is presented in Annex 9.

Table 2: Financial Cost-Benefit Analysis (US$ ' 000)

	PV @10%
Financial Benefits	**$852,769**
Revenue generated by Tebbin	$852,769
Financial Costs	**$532,499**
Investment cost	$326,851
Tebbin salary & administrative cost	$84,600
Tebbin fuel cost	$94,168
Tebbin maintenance spending	$26,880
Net Financial Benefit	**$320,270**
Financial Rate of Return	**18%**

Financial Assessment of the Egyptian Electricity Holding Company (EEHC)

Past and Current Performance of EEHC

EEHC's revenues stem from the sale of electricity generated by its subsidiaries, the sales of electricity purchased from IPPs and the New and Renewable Energy Authority. Based on audited accounts for the past three years, the company incurred losses in the past two years, as costs increased[7] while the retail price of electricity remained unchanged.

The low retail tariff, which has remained unchanged for the past 12 years – coupled with fast growing demand for electricity, which has required large investments over the past few decades – has caused EEHC's financial position to reach an unsustainable level.

As of 2004/5, the company's long-term debt reached LE 29.6 billion (US$5.1 billion), of which the current portion reached LE 2.1 billion (US$359 million). In addition, 72% of the company's current liabilities comprise of past due loan and interest payments owed to the Government and local banks and 15% are due to suppliers mainly for fuel. All together, the current liabilities reached LE 31.8 billion (US$5.5 billion) in 2004/05 against current assets of LE 17 billion (US$2.9 billion).

Furthermore, despite the overall low retail tariff, collection performance has been less than satisfactory at about 74%, mostly due to lack of payment by the Government (including public enterprises). The collection performance of other customer segments is better and stands at about 95%. As a result of payment problems by the Government, accounts receivables reached LE 11.3 billion (US$1.9 billion) in 2004/05.

Future Financial Performance of EEHC

Projections to assess EEHC's future financial position and performance have been carried out for the period 2005/06-2019/20. A summary of the assumptions are presented in Annex 9 and detailed assumptions are recorded in the project files.

In the base scenario, projections for future performance are based on the following key assumptions:

- The natural gas price remains at 14.1 Pt/m^3;
- Gradual increase of the tariff to restore financial profitability;
- An immediate improvement in collection performance to 94% in 2005/06, given the recent changes in the country's budgeting process and instruction from the Ministry of Finance to the government entities for timely payment of electricity bills.

In this scenario, EEHC would continue to have cash flow problems.

[7] Due partly to a substantial increase (596% between 2001/02 and 2003/04) in the costs related to the purchase of electricity from the IPPs. This increase is largely attributed to two factors: (i) two of the three IPPs currently under operation were commissioned and started selling power in the year 2002/03, representing an increase of about 376% in the quantity of electricity being purchased, and (ii) the devaluation of the Egyptian Pound in early 2003 given that the price of electricity purchased from the IPPs is fixed in US Dollars.

During project preparation, discussion on alternative scenarios took place that, in addition to the assumptions highlighted above, could lead to the improvement of the company's financial performance, and agreement was reached on a scenario that includes an action plan to improve the company's performance and boost its long-term viability prospects. This action plan comprises of:

- By the year 2006/07, converting the debt EEHC has with the National Investment Bank (NIB) into equity, including past due amounts and interest. The total amount to be converted is estimated at LE 19 billion (US$3.3 billion), and represents about 59% of the company's forecasted net long-term debt.
- By 2009/10, collecting 20% of the 2005/06 accounts receivables, i.e., 5% per year.
- From 2008/09 onwards, collecting 50% of the non-collected revenue of the previous year.
- Reaching the following settlements on the payment of accounts receivable:
    - Ministry of Finance – payment of balance of LE 2.7 billion by 2006/07
    - Public Utilities – payment of balance of LE 2.47 billion over 10 years starting in 2005/06
    - Public Enterprises – payment of balance of LE 2.57 billion over 10 years starting in 2005/06
- From 2005/06 onwards, swap current year accounts receivables from the Ministry of Finance (estimated to be LE 2.5 billion), applying LE 1 billion towards repayment of past due loans and accrued interest charges due to Ministry of Finance and LE 1.5 billion towards payments for fuel supply to the Petroleum Company.

In this scenario, EEHC has a much improved long-term financial performance. EEHC will be able to meet its financial obligations and have a positive cash flow throughout the project implementation and in the long-term, as shown in the tables attached at the end Annex 9.

In order to monitor EEHC's progress in improving its financial performance, agreement was reached between the Bank and EEHC on key performance indicators to be achieved by the end of the project. These are a current ratio higher than or equal to 1 and a debt service coverage ratio higher than or equal to 1.4.

2. Technical

While the financial performance of the sector is constrained, its technical performance compares favorably with technical performance in other countries. Ninety nine percent of Egyptian households have access to electricity services.[8] Technical and non-technical losses amount to about 10%. Plant availability is high, as the overall availability factor for thermal plants in

[8] MS El Sobki and M Abdel-Rahman, "Electricity Regulation in Egypt Revisited: Objective of Regulation in Egypt" page 2.

2003/04 was 88% compared to 87% the previous year. This compares to the world average for large-scale gas-fired generation plants of 85%.[9]

The steam cycle (SC) technology, which fires natural gas or residual oil (mazout), has been used for decades in Egypt. The efficiency of SC plant is around 40% with 300 MW size drum type sub-critical steam cycle. The investment cost of SC plant, based on recent Egyptian experience, is around US$530/kW (EPC basis).

When natural gas is available, a worldwide trend is to use gas turbine combined cycle (CC) technology due to its relatively lower capital cost, higher efficiency and shorter construction time requirements. However, the application of large-scale (750MW) gas turbine combined cycle technology, which fires natural gas as a main fuel and diesel fuel as a back-up fuel, has just started in Egypt. The efficiency of CC plant exceeds 50% and the investment cost, based on recent Egyptian experience, is around US$300/kW (EPC basis).

Given that CC plants have lower investment cost and higher plant efficiency, detailed discussions have been undertaken as to the justification for the steam cycle technology in the proposed project. The reasons are related to operational flexibility, grid stability and uncertainty of maintenance cost.

(i) Operational flexibility:[10] During the summer (peak load season), hydroelectric generation reaches its maximum load (about 20% of daily peak load) due to high demand from the irrigation sector, pre-occupying the base-load. The daily load curve has a pronounced valley at dawn (typically between 3:00 am to 6:00 am) equivalent to 50%-60% of the daily peak load. In response to that, thermal power plants have to reduce operation to 30%-40% of the peak load.

In terms of CC plant, EEHC's generation strategy is to use large-scale state of the art CC technology (known as "Frame F") due to its high efficiency and low capital cost. EEHC plans to operate these plants at 100% full flat base-load with a possibility of reducing operations to 50% once a week. This is because the cycling capacity of large-scale combined cycle plants is still to be confirmed. Limited information is available on the costs associated with cycling large-scale CC, including in Egypt where it has only recently been added to the generation mix.

Consequently, SC plants, which are known to be able to operate flexibly at 40-100% of peak load, and where EEHC has substantial experience, are used to take the role of reducing the load, while large CC plants are operated at 100% full load.

Therefore, and in line with the daily load curve (see above), EEHC currently sets a limit of CC plants in the generation mix at 30-35%. As a result, the EGEAS model has selected the proposed El-Tebbin SC plant as the least cost option.

(ii) Grid stability: When operated at 100% load, large-scale CC plants cannot provide more power to compensate for frequency drops in the grid, which SC plants can do. With the lack of overload capacity, the grid system is at risk when CC plants dominate the grid capacity and operate at full load. Under such circumstances, the CC plant would need to be put in "spinning reserve mode" (i.e., operating at partial load), resulting in loss of efficiency and loss of available

[9] World Energy Council, Performance of Generating Plant, October, 2001, page 23.
[10] By this is meant both load reduction capability and frequent start and stop capacity.

capacity. In addition, the impact on Egypt's grid stability has not been tested with a dynamic model, making it difficult for EEHC to, at this stage, make a decision on a higher CC ratio in the generation mix.

(iii) Uncertainty of maintenance cost: If the large-scale CC was to be used in a frequent start and stop mode, maintenance cost are estimated to increase significantly. Limited information is available from utilities around the world that operate such plants and Egypt has limited experience of the large scale CC. EEHC is therefore reluctant to increase the ratio of CC in its generation mix until more information is available. Given that many utilities are concerned with the high cost of maintenance of CC related to frequent start and stop, gas turbine manufacturers are nowadays selling CC at low cost and earning money by providing maintenance services to the client. The cost of such long-term service agreements need to be included in lifetime cost analysis to be made to assist in future decision-making on increasing the ratio of CC in the generation mix. EEHC has agreed to contribute to a workshop the Bank team plans to organize around this issue. The workshop will include other large utilities facing the same issue to share experience. This workshop is being planned for outside of the current project and its beneficiaries will be large scale power utilities in a select number of countries where the Bank is active.

If EEHC was to implement smaller CC plants (e.g., 100-300 MW, Frame E), some of the operational concerns raised above would be eliminated since Frame E has a 5% overload capacity. However, an increase of CC, even if it were the smaller scale models, would still need to be tested with a dynamic model for its impact on Egypt's grid stability. Furthermore, limited information is also lacking for maintenance costs related to smaller scale CC plants, although to a less extent than for large-scale CC.

The Government of Egypt recognizes the benefits of CC plants and is currently studying, with the help of Irish consulting firm ESB International, the possibility of increasing the share of large-scale CCGT in the generation mix. Preliminary findings of this study, likely to be one of several on this issue, suggest that large-scale CCGT could be increased in the generation mix of the Egyptian power system. In particular because, based on world-wide experience where Frame F is used, part load operation of CCGT has not increased maintenance cost and has shown to have considerable capacity for frequency response. Nevertheless, increased costs have been experienced with start-up of Frame F. The study suggests that EEHC should be able to add substantial CCGT capacity up until 2012 without disturbing grid stability, but recommends that further analysis is required in particular using a dynamic model. The scope for further study is under discussion with EEHC and EIB with the aim of facilitating the Government's decision to increase the share of CCGT in both large-scale and small-scale CC.

The decision to increase CCGT in the generation mix is likely to take some time, and it will therefore not affect the technology choice for the proposed project, whose capacity is urgently needed to meet the fast growing demand. Associated benefits of the SC technology are minimizing unforeseen risk of new technology, fuel flexibility (mazout instead of imported diesel) and slightly higher local manufacturing capacity.

3. Fiduciary

Financial Management Assessment

An assessment of the financial management capacity of CEPC has been undertaken with the purpose of obtaining an understanding of its overall financial management systems and its ability to implement the project in line with Bank financial management requirements. CEPC, from a financial management perspective, has its financial management responsibilities and activities distributed between different departments within the CEPC financial sector (accounting and budgeting, investment audit, cost accounting) and various sub-sections within these departments. Although the current arrangements may best serve the company's information needs, they do not provide for the proposed project accounts to be compiled and consolidated at any point or stage given the current structure. Additionally, the CEPC does not have recent experience in implementing World Bank financed projects. As a result, it was agreed that a special Financial Management Unit (FMU) be established to have overall responsibility for the project's recording, budgeting, reporting and to handle the loan disbursement arrangements, including supporting filing and documentation. This FMU will recruit a financial consulting firm with experience from previous World Bank projects to assist it in establishing and in implementing the updates required to computer and software capabilities for reporting purposes. This consulting firm needs to be in place by project effectiveness. The overall risk for financial management, after agreed upon mitigation measures are implemented, is moderate.

Procurement

Procurement of all activities financed by the Loan will follow World Bank Procurement Guidelines. However, the GOE requested a procedural change in the bid opening procedures for specific packages, found in paragraph 2.45 of the Bank "Guidelines: Procurement under IBRD Loans and IDA Credits," dated May 2004. The Bank agreed to this request based on agreement with the GOE on certain principles and safeguards to ensure the integrity of the process.

All packages are subject to prior review and will be issued under Bank Guidelines for Procurement using ICB procedures. Procurement will be carried out using the Bank's Standard Bidding Documents for ICB modified to accommodate the two envelop system as requested by the GOE.

CEPC, as the implementing agency, will be responsible for all procurement activities. In order to strengthen its capacity, CEPC will be assisted by an international engineering firm (Power Generation Engineering and Services Co., PGESCo) to provide engineering, procurement, contract and project management services during the implementation of the project.

The procurement capacity assessment of CEPC reviewed the organizational structure for implementing the project and the interaction between the CEPC, EEHC and PEGSCo. The key procurement risks identified during the assessment refer to the possibility of interference in the procurement process and the adoption of the sequential opening of technical and commercial envelopes. These risks will be mitigated by further training, preparation of a Procurement Implementation Manual and by following the agreed upon principles and safeguards. In light of the issues and risks identified, the overall project risk for procurement is high.

4. Social

The proposed project falls under the World Bank environmental category A classification due to its size, location and potential environmental and social impacts. As such, an Environmental and Social Impact Assessment (ESIA) has been carried out. In the process of preparing the ESIA, the borrower consulted with stakeholders twice. The first round of consultations took place during the scoping stage of the ESIA, which was held on June 7, 2005. This meeting helped the consultant define the scope of work, and focus on the most relevant environmental and social issues, in consultation with the participating stakeholders. A widely publicized second consultation took place on September 4, 2005, which was announced in the daily newspaper well in advance, along with invitations sent to ministries, the Egyptian Environmental Affairs Agency (EEAA), NGOs, and the local community. Stakeholders consulted expect the project to have significant positive social impacts as considerable additional local employment will be created. A more detailed description of the findings and methodology for consultation and disclosure is presented in the project's Public Consultation and Disclosure Activities in Annex D of the ESIA.

With regard to social safeguards, OP 4.12 on Involuntary Resettlement is not triggered as no resettlement, land acquisition or loss of income/livelihood will take place as a result of the proposed project (see Annex 10 for further details).

5. Environment

Given the project's environmental classification, and in accordance with Operation Policy (OP) 4.01 on Environmental Assessment, a full ESIA report was prepared for the project by an independent Egyptian consulting firm, Speedotrans, following Terms of Reference cleared by the World Bank. The ESIA includes aspects related to the decommissioning and demolition of the existing plant, in addition to the construction and operation phases of the new plant. No other safeguard policies were triggered, other than OP 4.01. The public consultations are described under the section above on the social assessment. In terms of disclosure, the ESIA report was disclosed at the World Bank's Infoshop website on October 13, 2005. In-country disclosure took place at the same time in easily accessible places to the public, including EEAA, EEHC's Public Relations Department, CEPC's Public Relations Department, the Cairo Governorate Environmental Office and the El-Tebbin Power Plant Site Management Office.

The main potential environmental issues identified during the environmental assessment, are as follows:

- Air quality: The power plant will burn natural gas as its primary fuel. As a result, the principle pollutant during normal operation will be NO_x. During emergency operation (and for no more than 2% of operating time), the burning of light fuel oil will result in emissions of particulate matter and SO_2 along with trace amounts of other pollutants. Emissions from the plant will meet Egyptian and World Bank Guidelines. Air quality dispersion modeling indicates that cumulative ground level concentration, taking into account surrounding industries, are within the World Bank and Egyptian standards.

- Water abstraction: Cooling water and process water for the power plant operation will be abstracted from the Nile river via an intake structure at the rate of 20-26 m^3 per second. The water will be returned to the Nile. A Hydraulic modeling study indicated that the mixing zone for the thermal effect is well within the 100 meters and 150 meters standards set by the World Bank and the Egyptian Ministry of Water Resources and Irrigation, respectively. No wastewater will be discharged to the Nile, but will be discharged instead to either the city sewers or after treatment to plant irrigation.

- Noise impact: The demolition and construction activities is expected to generate a maximum noise level of 59 dB(A) during the day at the fence of the power plant and 57 dB(A) at night, which are within Egyptian and World Bank guidelines. During operation, the predicted operational noise levels, using mathematical modeling, at the site boundary and at all receptors are below the Egyptian and World Bank guidelines during daytime and nighttime. Although this is the case, it is recommended that the fence between the power plant and the residential colony be elevated to a height of 5 meters.

- Solid and Hazardous Waste Management: Private contractors will be assigned for demolishing about 20,000 m^3 of debris materials. The contract covers all fees required. During demolition, construction and operation, all waste including debris waste, general waste, packaging waste, commercial waste, raw-water pre-treatment sludge, tank sludge and interceptor sludge will be disposed of by licensed waste contractors according to the rules set by Law 4-1994 and the Governorate of Cairo. No hazardous wastes are expected. If asbestos were to be found during demolition, mitigation measures are included in the Environmental Management Plan (EMP) in Annex 10.

Appropriate mitigation measures and institutional arrangements were included in the EMP, and are described in Annex 10. The cost of the EMP is approximately US$2.2 million.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[ ]
Pest Management (OP 4.09)	[ ]	[ ]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[ ]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[ ]	[ ]
Forests (OP/BP 4.36)	[ ]	[ ]
Safety of Dams (OP/BP 4.37)	[ ]	[ ]
Projects in Disputed Areas (OP/BP/GP 7.60)*	[ ]	[ ]
Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[ ]

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

7. Policy Exceptions and Readiness

The project will fully comply with Bank policies, and meets the regional criteria for implementation.

Annex 1: Country and Sector or Program Background

Context

Egypt has a rapidly expanding economy that is based on the availability of reliable and low cost electric power. In 2004, about 98% of the country's population had access to electricity. In recent years, three private sector generation projects have been implemented in Egypt adding a capacity of 1,950 MW to the national grid. While the GOE's strategy was very much to continue to award contracts to private investors in order to meet the need for additional capacity, the devaluation of the Egyptian pound to major foreign currencies in early 2003 has resulted in a significant financial burden on EEHC, since many of its loans are denominated in foreign currency, as are the power purchase agreements (PPAs) with independent power producers.

As a result, the GOE has adopted a new policy for private infrastructure projects (referred to as "the new BOT regulations"), which places the entire foreign exchange risk on the investor by requiring that PPAs be denominated in local currency. These new regulations have caused private interest in infrastructure in Egypt to evaporate. Accordingly, most new generation projects are expected to be financed by loans and grants.

Sector Structure

In 2000, the GOE restructured and unbundled the sector and created the Egyptian Electricity Holding Company (EEHC), responsible for generation, transmission and distribution of electric power in Egypt. Today, EEHC is a private company wholly-owned by the GOE with 15 separate subsidiaries covering generation (5), transmission (1) and distribution (9). Besides EEHC, the 3 private generators, contribute about 8% of the power generated, which is sold to the state-owned transmission company based on PPAs. Egypt is fortunate in that it has abundant reserves of low-cost natural gas, which enables it to manage a steady gas-to-power strategy, leaving its diminishing oil reserves for other uses or for export.

Electricity retail prices are set by the Council of Ministers on recommendation of the Minister for Electricity and Energy. With the above-mentioned unbundling of the sector, the GOE also created the Egyptian Electric Utilities and Consumer Protection Regulatory Agency (EEUCPRA), which has a wide range of functions, including issuing licenses and monitoring/advising on prices, but the agency is still developing its resources and capabilities.

Installed capacity of electric power in Egypt was 18,119 MW in 2003/04, of which 84% comprised thermal power (76%, 17% and 7% of which are steam cycle, gas turbine combined cycle, and gas turbine simple cycle respectively). The remaining capacity was attributed to hydropower (15%) and wind (1%). Peak load reached 14,735 MW, and about 90% of the thermal power production was based on natural gas. Transmission and distribution losses are relatively low at around 10% on average, and GOE has established an internal power pool and invested in upgraded metering and information systems.

The rate of growth of electricity demand in Egypt has averaged 7% during the period ranging from 1997 to 2004 and is expected to be in the 6%-7% range over the next 10 years. EEHC's

main consumer groups are industries and households, which amount to a 36% and 37% of the consumption respectively. Peak demand is expected to rise to 20,372 MW by 2008.

To meet this demand, EEHC has developed a least cost generation expansion plan. This plan has two phases: a fast track phase (2002-2007), during which 4,500 MW of combined cycle gas turbines will be implemented, and a medium-term phase (2007-2012), during which 6,925 MW of steam and combined cycle turbines will be implemented. Financing for the first phase is already in place and includes participation by EIB, OPEC, BNP Paribas and the Arab and Kuwaiti Funds. The GOE is seeking financing for the medium-term phase, which includes the proposed El-Tebbin power plant (700 MW) to be operational in 2009/10.

With the significant investments undertaken each year and the fast growing demand for electricity, EEHC and the Ministry of Electricity are under extreme pressure to keep investment costs as low as possible due to the low retail price that has prevailed and continues to prevail in the sector (the average price for electricity was just increased for the first time in 12 years and is now 2.4 US¢/kWh) and to ensure timely availability of electricity supply to avoid supply interruptions and the associated negative economic and social impacts.

There are significant cross subsidies in the tariffs, and thus for most consumer groups the tariffs are either substantially below or above marginal cost. For households, the tariffs are estimated to be half of the marginal cost.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

Sector Issues	Project	PDO Rating
Private Sector Power	Port Said and Suez East (IFC)	
Power Generation	Kureimat Power Project (World Bank 1992)	U
	El Kureimat Power Project (AfDB)	
Power Development	Walidia Thermal Power Station (JBIC)	
	Abou-Zaabal Substation (JBIC)	
	Sidi Krir Transmission and Substation Project (JBIC)	
Clean Energy Development	Solar-Thermal Power Project (GEF)	Under Preparation
	KfW-sponsored Wind Farm	
	Danida-sponsored Wind Farm	
	JBIC-sponsored Wind Farm	
	Spanish-sponsored Wind Farm	
Gas Sector	Gas Investment Project (World Bank 1992)	S

Annex 3: Results Framework and Monitoring

Results Framework

PDO	Outcome Indicators	Use of Outcome Information
(i) Assist the GOE in reaching its goal of providing the country with energy supply in a sustainable manner, trough investment in new generation capacity. (ii) Strengthen sector performance by engaging in policy dialogue and supporting measures aimed at improving financial performance, role of the regulator and energy efficiency.	(i) Increase in total generating capacity to 26,679 MW by 2010. (ii) Improved financial performance of EEHC. (iii) Enhanced role of the regulator in electricity price design and setting. (iv) Reduced energy consumption in particularly energy intensive customer segments as a result of the implementation of Demand Side Management measures.	To track progress of projected project outcomes and identify corrective measures as needed.

Intermediate Results One per Component	Results Indicators for Each Component	Use of Results Monitoring
Component One: Investment in new generation capacity	**Component One:** El-Tebbin Power Plant is completed and operational with a net capacity of 700 MW.	**Component One:** Track implementation progress and, in case of delays, be able to take corrective action.
Component Two: Technical assistance to improve long-term sustainability of the sector: (i) Financial performance improvement (ii) Regulatory support (iii) Energy Efficiency	**Component Two :** • Improved ability to generate accurate financial reports for decision-making • Improved current ratio and DSCR at EEHC • Enhanced contribution by the regulator to design and apply pricing. • Ability to manage peak load better.	**Component Two:** Track implementation progress and, in case of delays, be able to take corrective action

Arrangements for results monitoring

Outcome Indicators	Baseline 2005	Target Values 2006	2007	2008	2009	2010	Data Collection and Reporting: Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Increase in total generating capacity (MW)	18,117	19,672	21,322	22,716	24,086	26,679	Annually, based on reports from EEHC	EEHC operations reports	EEHC
Improved financial performance (i) Debt service coverage ratio (ii) Current ratio	 1.4 0.5					 ≥1.4 ≥1.0	Annually, based on reports from the EEHC	EEHC financial reports	EEHC
Stronger role for the regulator							Annually, based on reports from the EEUCPRA	EEUCPRA operations reports	EEUCPRA
Reduced energy consumption							Annually, based on reports from the EEHC/EEIGR	EEHC/EEIGR operations reports	EEHC/EEIGR
Results Indicators for Each Component									
Component One : El-Tebbin Power Plant is completed and operational with a capacity of 700 MW					**350**	**350**	Semi-annual Implementation Progress Reports from PMU/PGESCO	PMU/Consultant Progress Report	PMU/PGESCO
Improved financial performance			**X**	**X**	**X**	**X**	Annual, after new financial management system has been implemented	TA component committee progress report	EEHC
Stronger role for the regulator		**X**	**X**	**X**	**X**	**X**	Track progress with study from definition of TORs to implementation of recommendations	TA component committee report	EEUCPRA
Reduced energy consumption		**X**	**X**	**X**	**X**	**X**	Track progress with study from definition of TORs to implementation of recommendations	TA component committee report	EEHC/EEIGR

Annex 4: Detailed Project Description

The El-Tebbin Power Plant

The construction of the El-Tebbin Steam Power Plant comprises two identical units of 350 MW capacity each, fired by natural gas as main fuel and residual oil (mazout) as emergency fuel. The following components are part of the new power plant:

i. Demolition of existing plant and site preparation works

The existing plant comprises three 15 MW steam units operating on mazout and two 23 MW gas turbine units operating on natural gas, dating back to 1958 and 1979, respectively. The existing plant will be decommissioned, demolished, and the site will be cleaned and prepared for the proposed project. A decommissioning plan has been prepared, and the demolition work is underway. One of the 23 MW gas turbine units will remain on the site as a black out start-up generator. The other 23 MW gas turbine unit will be moved to another plant. Major assets will be sold by CEPC and the remaining assets will be sold or disposed by demolition contractors. The demolition work is expected to take 12 months before the land is available for the construction of the new plant.

ii. Two units of 350 MW steam turbine-generators

The steam turbine is a tandem compound, double flow, single reheat and regenerative type rotating at 3000 rpm. The normal operating steam conditions are 167 bar and 566°C at the main steam turbine inlet, and 39 bar and 566°C at reheat steam inlet. The exhaust pressure is 0.07 bar. The unit is designed for constant and variable pressure operation. The steam is extracted at eight stages of feed water heating and three electric motor driven boiler feed water pumps, 60% capacity each and one of which will be on stand-by. The electricity output is 350 MW.

The turbines will operate at three stages, one high pressure (HP) stage, one intermediate pressure (IP) stage and one low pressure (LP) stage which has double flow, bottom exhaust and is mounted on the main condenser.

The generator is hydrogen cooled with a short circuit ratio of 0.58 and the maximum available power output is available at a 0.85 power factor lag and 0.90 lead and 50 Hz.

The turbine generator will include the main stop valve, control reheat and intercept valves, oil pumping and purification system, steam seal system, exhaust hood spray, turbine bypass system, protective device, supervisory instrumentation and electro-hydraulic control system, condenser, hot well and condenser vacuum pumps.

iii. Two units of steam generators (boilers)

The steam generator will provide superheated main steam and reheat steam for the main turbine generator, soot blowing, and auxiliary steam. It is an outdoor design, drum type, pressurized furnace unit, consisting of an economizer, primary and secondary superheaters and reheaters.

The normal rating of steam generator will be 181 bar, 570°C superheat steam and 570°C reheat steam. The steam flow rate is 330 kg/sec at maximum continuous rating. This is for base load

unit and designed for continuous operation with the turbine valve wide open and 5% overpressure. The boiler is either natural circulation or forced circulation type.

Forced draft fans, gas circulating fans, regenerative superheaters, gas and oil burners, steam air heaters, and ducts are included. The primary fuel is natural gas with residual oil (mazout) as back up fuel. Natural gas will be used for ignition and light oil for warm-up burners.

iv. Electrical equipment including transformers and switchyard

The main transformers transmit the maximum generated power to the transmission lines. The unit auxiliary transformers are rated to feed all unit auxiliary loads at the maximum load. The switchyard is included, as well as plant control and instrumentation. The other electrical equipment and instruments include UPS systems, Direct Current (DC) equipment, medium and low voltage cables, cable trays, conduits and other miscellaneous electrical and instrumentation equipment. Installation of the equipment is included in the electrical and switchyard packages.

v. Auxiliary mechanical equipment including pumps and drives, heat exchangers and de-aerators, and critical and non-critical piping and valves

This sub-component consists of auxiliary mechanical equipment necessary for the power plant operation. Major pumps and drives are boiler feed pumps, condensate pumps, circulating water pumps, service pumps, raw water pumps and closed cooling water pumps. Feed water heaters and de-aerators in the feed water supplying system are included. Main steam pipes, hot and cold reheat pipes; feed water pipes and valves required outside the steam turbine component are included in this package, as well as the equipment installation.

vi. Water and waste water treatment plant

Pretreatment system, condensate polishing system, hypochlorite system, make up dematerialized water treatment system, chemical feed system, and waste water treatment system with all associated electrical instrumentation and associated piping and valves are included in this package, as well as the equipment installation.

vii. Implementation of the Environmental Management Plan, including equipment for environmental monitoring

The environmental management plan will include institutional, mitigation and monitoring arrangements. The environmental monitoring equipment will measure all required environmental conditions, such as the ambient air, water and noise level at three monitoring stations.

viii. Distributed control systems and instrumentation

Distributed control and instrumentation systems are equipped with the microprocessor and independently control temperature, pressure and flow so that the plant equipment can function properly.

ix. Engineering and project management services including design, procurement and construction supervision, as well as commissioning, testing and start up of the Project

This includes the preparation of the bid documents, bid evaluation, preparation of contracts, coordination and interfacing between contractors, supervision of construction works, commissioning, start-up and the taking over of the plant.

x. Civil works, yard tanks, and installation of medium and low voltage switch gear

The remaining packages include civil works, condensate storage, dematerialized water storage, filtered water storage tanks, mazout storages tanks, solar oil storage tanks, medium and low voltage switchgears and control centers.

xi. Insurance

Includes wrap-up insurance during construction, start up, testing and commissioning phase.

xii. Transmission lines to interconnect to the national power grid.

The El Tebbin plant is interconnected to the national grid through 220/66kW GIS switchgear 1.5 breaker with four bays, and 220 kV overhead transmission lines.

Technical Assistance Component

The TA component will address key issues facing the sector, including financial viability and high energy demand. The assistance will comprise of studies and implementation support as necessary and is estimated at about US$2.45 million. Grant financing for US$0.65 million has been mobilized. The activities under this component are as follows:

Financial Management

Review and implementation of a new automated Financial Management Systems

Objective: Provide an overall assessment of the company's systems and how they can be improved to allow for further improvement in the management of the company's finances and the use of financial information as a decision-making tool for management.

Action: Engage a financial consultant to undertake a review and analysis of the company's financial management systems and the proposed automation plans, and provide a set of concrete recommendations, that can be reviewed and implemented by the finance department as a way to further improve the company's finances. Areas to review include improvement in inventory management, the introduction of activity-based costing, as ways to further reduce operating costs, among others. The budget for the assistance also includes funding for the new system.

Budget: $1.7 million

Regulatory Support

Objective: To enhance the role of the regulatory body in Egypt in pricing. The work will build upon the comprehensive cost of service modeling exercise that has been undertaken with the help of USAID which provide an important benchmark for future pricing proposals. In the interest of

more cost reflective tariffs and, in particular, implementation of pricing mechanisms to reduce demand at peak periods, a study on the design and application of time of use tariffs will be carried out, and include the pricing design to better signal the variability of energy cost over time and encourage more efficient responses from customers. This study will also review the overall tariff structures and levels in Egypt.

Action: Commission a firm with substantial economic, engineering, marketing and energy pricing experience to provide advice on the design, implementation and marketing of innovative pricing that can better reflect the energy costs. The assessment of likely acceptance by customers of alternative tariff structures and effective marketing of tariffs will be critical elements in the project expertise to develop a comprehensive tariff strategy for the EEUCPRA.

Budget: $350,000

Energy Efficiency

(i) Load Management Program

Objective: Design a load management program based on patterns and use by industrial and large commercial users.

Action: Engage a consultant to undertake a review of data collected to date and to assist in the design of the load management program, taking into account when energy supply is required and how to manage around the peak demand points.

Budget: $200,000

(ii) Upgrade LRMC software

Objective: Install a new or upgrades to the current LRMC software to better capture cost of supply.

Action: Identify needs of improvement and procure new software.

Budget: $100,000

(iii) Interruptability Scheme

Objective: Assess the feasibility of implementing an interruptabiltiy scheme.

Action: Engage a consultant to assess the feasibility and requirements to implement schemes by which incentives are set up for participating consumers to shift their load when it coincides with peak demand. When appropriately designed, such schemes have the advantage of yielding immediate impact both on consumption and peak load levels.

Budget: $100,000

Annex 5: Project Costs

Project Cost By Component	Local US$ million	Foreign US$ million	Total US$ million
Power Plant	111.3	253.7	365.0
Environmental Management Plan	0.7	1.5	2.2
Total Costs	**112.0**	**255.2**	**367.2**
Physical Contingencies	11.2	25.5	36.7
Price Contingencies	28.1	17.6	45.7
Total Project Costs	**151.3**	**298.3**	**449.6**

In addition, the TA component will cost US$2.45 million of which $1.8 million will be financed by EEHC and $0.65 million by ESMAP.

Annex 6: Implementation Arrangements:

The project will be implemented between May 3, 2006 and October 31, 2010. April 30, 2011 is the Loan's scheduled closing date. CEPC, an affiliate of EEHC, will be responsible for implementing the project.

In terms of lending arrangements and flow of funds, there will be a Loan Agreement between the Bank and the GOE (Ministry of Foreign Affairs), and a Project Agreement between the Bank and EEHC. By virtue of a Subsidiary Loan Agreement between the GOE and the EEHC, the GOE will on-lend the Bank Loan proceeds funds to EEHC.

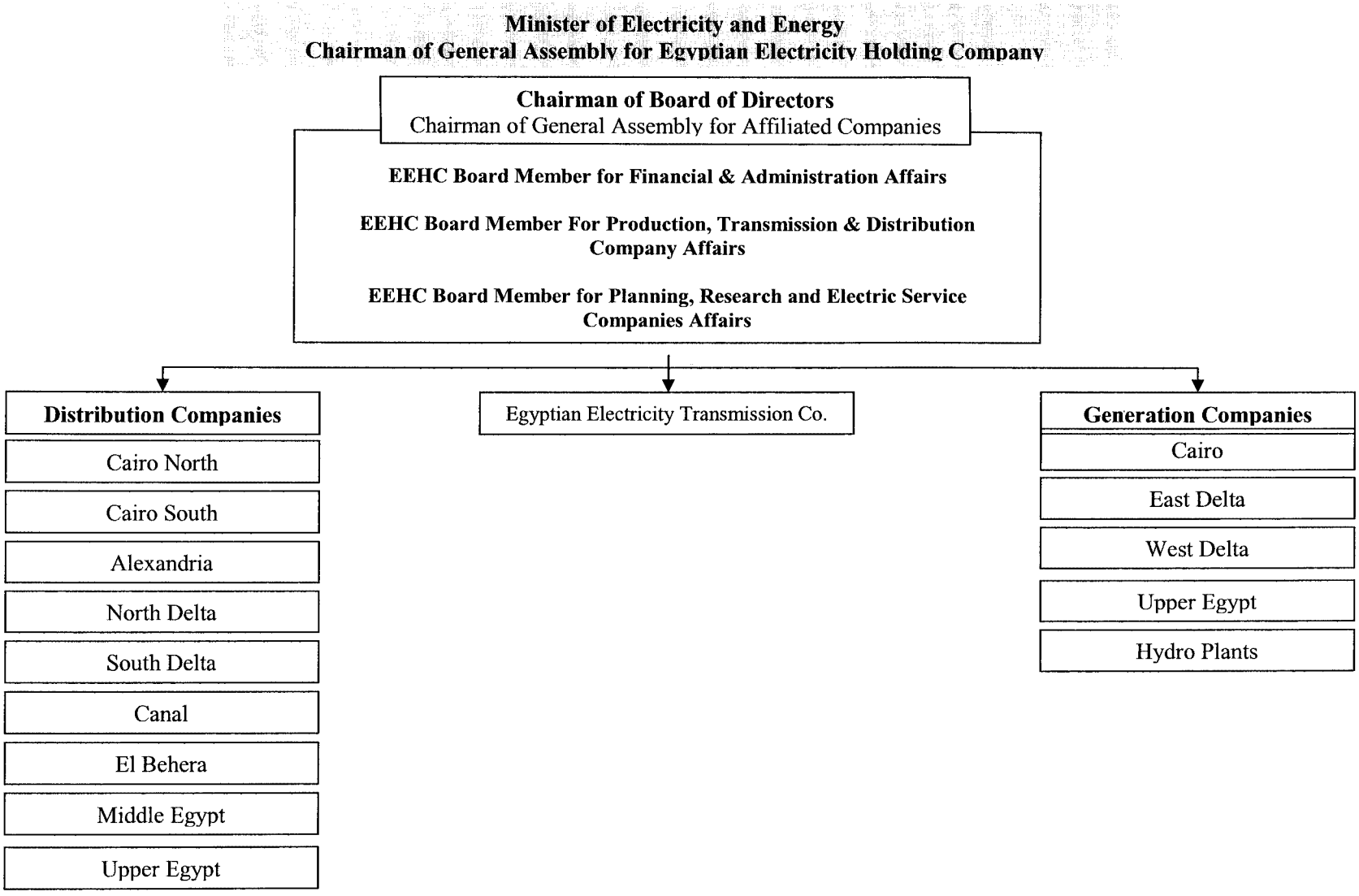
To clarify the respective roles and responsibilities of EEHC and CEPC in project implementation, a Contractual Agreement (CA) will be entered into by EEHC and CEPC. This CA, which should be reviewed and accepted by the Bank, will detail procurement and payment processes and other responsibilities for implementing the project's different activities. This will allow CEPC to sign contracts with the winning bidders. Also, the CA will allow CEPC to issue withdrawal applications to the Bank and make direct payments to the contractors on behalf of EEHC, who will be holding the funds.

As with all other projects of this nature implemented by generation affiliates in EEHC, a Project Management Unit (PMU) will be established at the Tebbin project site to supervise, coordinate and monitor overall implementation of the project. The composition of the PMU staffing will include a qualified Project Manager, who will head the unit, 2-3 Engineers, a Procurement Coordinator and an Accountant. The PMU will be assisted by an engineering firm, which will assist in the design, engineering and procurement process.

A separate, but closely coordinated, Financial Management Unit (FMU) will be established at CEPC's main office to better integrate with the other departments in CEPC's financial sector such as investment audit, planning, treasury, etc. The key functions of the FMU will be to have overall responsibility for the project's financial recording, budgeting, reporting requirements, and handling the loan disbursement arrangements including supporting documentation consistent with Annex 7 of this document. The FMU will comprise an FMU Manager and three accountants. The FMU will be assisted by a financial consulting firm for about six months to implement the project accounting software, prepare the financial management manual and establish reporting and disbursement arrangements. The project accountant, who will be located in the PMU at the project site, will ensure smooth coordination between the PMU and FMU. In accordance with the aforementioned CA between EEHC and CEPC, the PMU will coordinate and supervise project implementation to carry out the project's components.

Weekly meetings will be held in CEPC's main office, chaired by CEPC's chairman, with Project Managers of all on-going projects in CEPC to review progress and identify any issues and potential problems. In addition, each Project Manager will report progress and address day-to-day issues as needed to the Sector head dealing with projects in CEPC.

Organizational Structure of the Egyptian Electricity Holding Company



Annex 7: Financial Management and Disbursement Arrangements

1. Executive Summary and Conclusions:

An assessment of the financial management arrangements for the proposed project was undertaken by the project team in October 2004, updated in April 2005, and finalized in September 2005. The purpose of the assessment was to determine whether the current financial management arrangements are acceptable to the Bank. A detailed financial management assessment was conducted for the CEPC as the implementing entity for the project. In addition, to understand the overall environment for financial management arrangements, discussions also took place with EEHC, the Borrower, on its financial management arrangements.

There will be a Loan Agreement between the Bank and the Government of Egypt (Ministry of International Cooperation) and a Project Agreement between the Bank and EEHC. By virtue of a Subsidiary Loan Agreement between the GOE and EEHC, the GOE will on-lend the Bank loan proceeds to EEHC. A Contractual Agreement will be in place between EEHC and CEPC to cause CEPC to implement part A of the project (the El-Tebbin Power Plant).

The CEPC, from a financial management perspective, has its financial management responsibilities and activities distributed between different departments within the CEPC financial sector (accounting and budgeting, investment audit, cost accounting) and various sub-sections within these departments. Although the current arrangements may best serve the company's information needs, they do not provide for the proposed project accounts to be compiled and consolidated, and CEPC does not have recent experience in implementing World Bank financed projects. As a result, a special Financial Management Unit (FMU) will be established, which will have overall responsibility for the project's financial management activities including recording, budgeting, reporting, and to handle loan disbursement arrangements, including supporting documentation. The structure of this unit was agreed between the Bank and CEPC. The FMU will be headed by a financial manager along with three accountants, seconded from CEPC for the life of the project, for record keeping, finance and disbursements, and planning and reporting. In addition, a qualified and experienced financial consulting firm acceptable to the Bank will be recruited for 6 months to support the FMU in managing the daily activities relating to the financial management function, implement accounting software acceptable to the Bank for the project, provide training to the FMU staff on the software, Bank disbursement procedures and reporting requirements. The firm will also review and help finalize the project financial management manual that will be prepared by CEPC.

The contractual agreement between EEHC and CEPC mentioned above will be crucial from a financial management perspective. This agreement will cause CEPC to, inter alia:

(i) establish and thereafter maintain a financial management unit within CEPC. The said financial management unit shall be composed of a manager and three accountants whose qualifications, experience and terms of reference shall be acceptable to the Bank.

(ii) recruit a financial consulting firm with qualifications and terms of reference acceptable to the Bank;

(iii) prepare annual project financial statements in accordance with International Accounting Standards;

(iv) have its project accounts audited on an annual basis by independent auditors in accordance with International Standards on Auditing;

(v) submit annual audit reports to EEHC, six months from the end of each Fiscal Year;

(vi) for the duration of the Project, make available to EEHC, the Bank and the Project auditors referred to in Section 4.01 of the Project Agreement all documents, books, and records pertaining to the Project activities;

(vii) respond to queries, report findings and comments by EEHC, the Bank and the Project auditors referred to in Section 4.01 of the Project Agreement;

(viii) implement Part A of the Project in accordance with the Environmental Management Plan, Financial Management Manual and the Procurement Implementation Manual.

2. Financial Management Risks

The table below highlights the risks and mitigation measures.

General Risks:

Risk	Risk Before MM	Mitigating Measures (MM)	Risk After MM
The Observance of Standards and Codes (ROSC) report (2002), Country Financial Accountability Assessment (CFAA) report (2003), draft Country Procurement Assessment Report – CPAR (2003) and Country Portfolio Performance Review (CPPR) report (2002) identified some weaknesses.	High	- Hire an independent qualified private audit firm. - Ring-fence the project implementation and funds.	Moderate
The CEPC does not have recent experience with the implementation of World Bank-financed projects. Its financial management systems are based on principles and procedures defined by the legal framework and operational decrees applicable to the public sector in Egypt.	High	- Establish a FMU from CEPC financial management staff to act as the focal point for the project's accounting. - Recruit a financial consulting firm to provide training to FMU staff on Bank procedures and the new software. - Other elements are covered in other sections of this document.	Significant
Lack of coordination between CEPC, the project manager/consultant and the contractors.	Significant	Depend on PGESCo Consultants who has a long term relationship and experience with the Egyptian electricity sector projects.	Moderate
Delay in the availability of Counterpart Funds could be a risk based on the Bank experience in other Bank funded projects.	Significant	- Disbursement financing that ensures counterpart's partnership.	Moderate
Overall Inherent Risk Before MM	**High**	**Overall Inherent Risk After MM**	**Moderate**

Specific Risks

Risk	*Risk Before MM*	Mitigating Measures (MM)	*Risk After MM*
Lack of experienced staff with World Bank-financed projects	High	- Recruit a consulting firm for six months with previous experience in World Bank-financed projects. - The recruited firm will train FMU accountants on World Bank guidelines and procedures. - Provide close supervision by Bank financial management specialist	Significant
Recording may not be in line with the project's categories' classification and/or project components.	Significant	- Develop a chart of accounts that is based on the project's categories, components, activities and subcomponents. - Policies and procedures will clarify accounting treatment and flow of information.	Moderate
Accounting system may not provide comprehensive information on all sources and uses of funds	Significant	- Project accounting will cover all sources of project funds and all utilization of said funds. - All project-related transactions will be recorded in the automated books of accounts and supporting documents will be kept at the FMU (audit trail). - Direct disbursements made by the Bank will be included in the project accounting system. - Funds received from different sources will be identified separately and reflected in the project accounts, quarterly FMR, and annual Financial Statements.	Moderate
Delays in flow of funds	Significant	- Ensure timely submission of withdrawal applications. - Pre-screen applications at country office before sending them for disbursement at headquarters. - Develop annual disbursement plan that is consistently updated.	Moderate
Inconsistent application and adherence to unified and documented policies and procedures	High	The project will have clear, detailed and written financial and accounting policies and procedures in the Financial Management Manual. The manual will cover: (i) treatment of expenditures, including their classification, (ii) eligibility of expenditures to be reimbursed from the loan, (iii) efficient management of funds, (iv) project accounting policies, including those related to the conversion from foreign currency to the local currency and authorization and payments system, and (v) internal control systems.	Moderate
No internal auditor in the FMU	Significant	CEPC Investment Audit department will conduct a 100% ex-ante audit over all expenditures.	Moderate
Lack of timely audit/review reports on Project Financial Statements/FMRs	High	An independent and a qualified private auditor will be hired in accordance with terms of reference acceptable to the Bank.	Moderate

Risk	*Risk Before MM*	Mitigating Measures (MM)	*Risk After MM*
Monitoring reports may not provide useful information that is timely and accurate	High	- FMRs will be designed by FMU with the help of the recruited consultant and the Bank financial management specialist. - The FMRs will be issued on a quarterly basis and reviewed by the independent auditors. -The accounting software will support the above process. - Preparation of full set of FMRs (financial, procurement and physical progress reports).	Significant
Lack of an up and running accounting software in CEPC	High	- The consulting firm to be recruited will help identify and implement appropriate accounting software, and train FMU staff on the purchased software.	Significant
Overall Control Risk Before MM	**High**	**Overall Control Risk After MM**	**Moderate**

3. Accounting system

The project will use the International Public Sector Accounting Standards (IPSAS) cash basis of accounting and the outline of budget components for financial reporting. The books of accounts for the project will be maintained on double-entry bookkeeping principles. Commitments will be monitored and tracked to ensure that a full picture of the projects is available.

It has been agreed that Project Accounting (cash basis) will cover all sources of Bank funded project transactions and all utilization of said funds. All project-related transactions will be recorded in books of accounts and supporting documents will be kept at the FMU in CEPC. Direct disbursements will be included in the project accounting system. Funds received from different sources will be identified separately and reflected in project accounts, quarterly FMR and annual financial statements.

Project-related transactions and activities are distinguished at the data-capture stage. An identifiable Trial Balance for the project capturing all projects receipts, expenditures, and other payments under the project is prepared. A Chart of Accounts for the project will be developed. The Chart of Accounts shall conform to the classification of expenditures and sources of funds as indicated in the project documents (Project Appraisal Document, financial management manual). The Chart of Accounts allows data to be captured in a manner to facilitate financial reporting of project expenditures by: (i) project components; (ii) subcomponents, (iii) expenditure categories, (iv) disbursement categories, and (v) contracts.

4. Information System

The FMU will maintain its books of accounts using a computerized accounting system managed under its responsibility. It will prepare and disseminate the financial management reports, and ensure timely transmission of these documents. The automated accounting books will reflect the local contribution and the balances related to the amounts disbursed, reflecting the project's transactions. The Financial Manager is in charge of the issuance of the annual project financial statements and the quarterly FMRs as well as the submission of these documents on a timely basis to the IBRD and to the auditors.

5. Flow of Funds/Flow of Documents

A. Between the Bank and the Project:

The name and corresponding specimen of signature of authorized signatories will be submitted to IBRD. The project shall apply to get access to the Bank's disbursement website (called "Client Connection") in order to follow up on the status of its withdrawal applications and to reconcile its records with the Bank records.

At the same time, CEPC will maintain a current account for the local contribution to finance exclusively the project's costs. This account will be replenished at least at the beginning of each month based on the month's forecasted costs in order to ensure timely availability of funds.

B. Between the Project and its beneficiaries:

Since the project will be implemented by CEPC, the regular accounting cycle of CEPC will continue as it is. Meanwhile, the FMU will act as a focal point to maintain parallel records for all project related transactions, prepare withdrawal applications from the World Bank and produce project financial reports in accordance with the World Bank requirements. A monthly reconciliation of project costs will take place between the FMU and CEPC records.

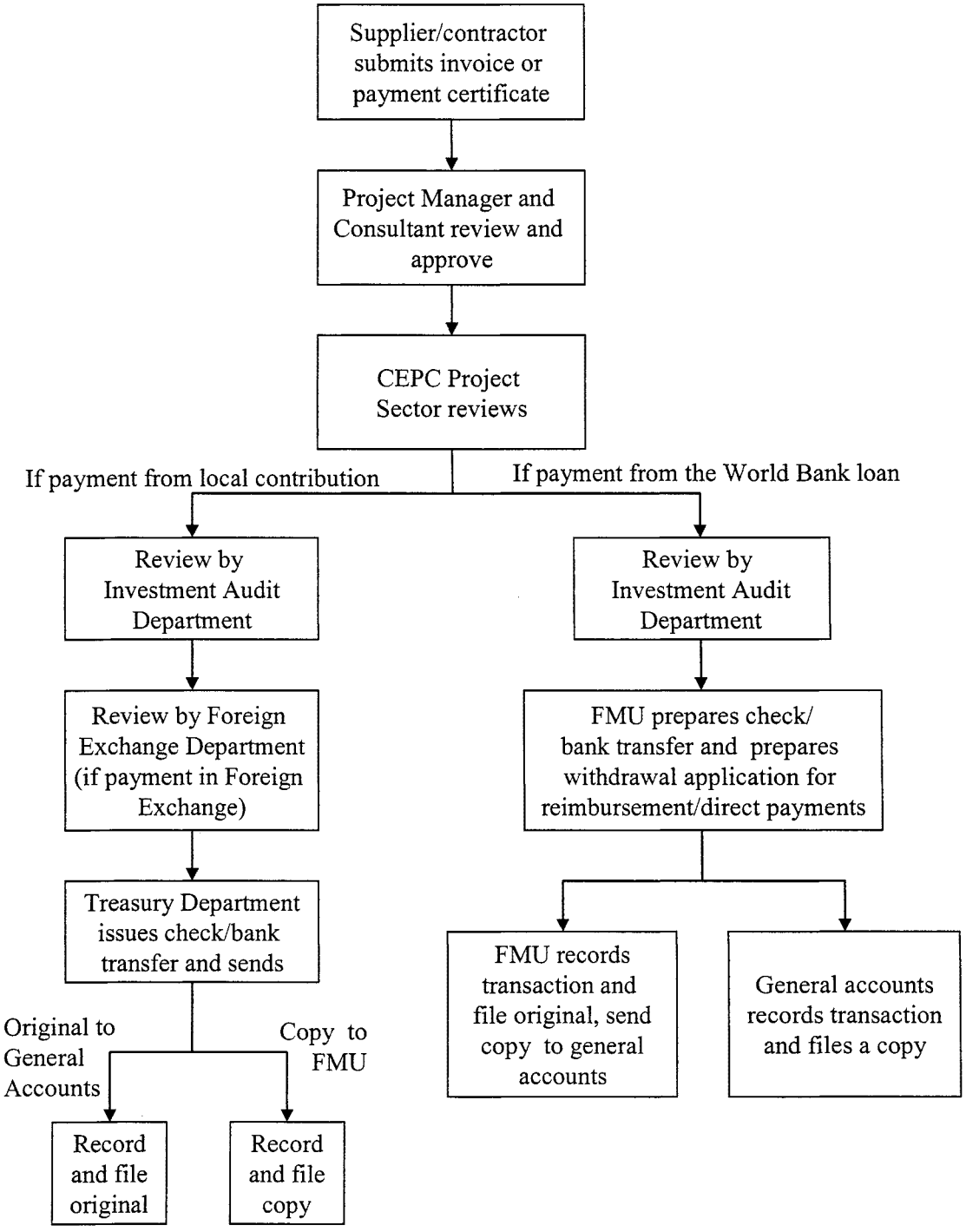
After procurement procedures are concluded and contracts are signed, the original contracts are kept with CEPC projects sector. The original letters of credit (LCs) documents are kept at the LCs department.

The contractor's payment certificate/supplier's invoice is first reviewed and approved by CEPC engineers and project manager in the site and then by the project consultant (PGESCo). The consultant submits the payment certificate/invoice to CEPC projects sector, which reviews it for technical acceptance in accordance with the signed contract. The projects sector then forwards the package to the head of the financial sector where the package follows its cycle throughout different departments within the financial sector.

If the claim is to be paid from the local contribution, the package goes to the investment audit department for review (and then to the foreign exchange department if it is in foreign currency), then to the treasury department to issue checks/bank transfers. The treasury department sends the original payment package to the bookkeeping department for recording and sends a copy to the FMU. The invoice/payment certificate copy would be stamped to indicate that the original is kept at CEPC's filing system. The FMU records the transaction in the project accounting system and files a copy of the payment package at the FMU.

If the claim is to be paid from the World Bank loan, the package goes to the investment audit department then to the project FMU to prepare the payment documents (application for direct payment from the World Bank or reimbursement). The transaction is then recorded in the project accounting system maintained at the FMU and the original payment package is filed with the FMU. The FMU forwards copy of the payment package to the bookkeeping department for recording with the invoice/payment certificate copy would be stamped to indicate that the original is kept at the FMU. At the end of the month, the FMU forwards the reconciliation to CEPC treasury department.

Flow of Funds Arrangements:



6. Internal Controls

An integral part of the internal control system is the development of financial policies and procedures manual. This is crucial for ensuring transparency, providing clarity regarding financial aspects to the various stakeholders and finance staff, ensuring uniformity, and enforcing accountability. These policies shall cover the following aspects: (i) expenditures that would be treated as project expenditures including their classification; (ii) expenditures, which would be eligible for reimbursement from the IBRD Loan; and (iii) project accounting policies. These policies include aspects such as efficient management and deployment of funds, internal control policies, etc.

Financial policies and procedures manual shall also outline: (a) job responsibilities within the financial department, (b) accounting principles and policies (e.g., evaluation of non US$ expenses), (c) accounting system, (d) operational procedures (e.g., for withdrawal from Special Account, replenishment, payments to contractors, etc.), and (e) the accounting cycle and entries, the chart of accounts, and templates of forms to be used.

7. Reporting

The FMU will be responsible for issuing monthly automated financial reports, quarterly FMR and annual project financial statements:

Report	Frequency	Due Date	By	Sent to:	Language
Financial report	Monthly	2 weeks from end of month.	FMU	CEPC	Arabic/English
Financial monitoring report	Quarterly	3 weeks from end of quarter	FMU	Bank/CEPC	English
Project financial statements	Annual	3 months from end of fiscal year (FY).	FMU	Bank/CEPC	Arabic/English

(i) Monthly un-audited financial report. The reports will be prepared and generated from the automated system by the FMU on a monthly basis. They will not be sent to the Bank. They will be reviewed and reconciled with the monthly withdrawal applications and quarterly FMR sent to the Bank. The Bank will follow up during supervision missions. The format of the reports should be quite simple (a trial balance listing all sources and uses of funds and bank reconciliation (s)).

(ii) Quarterly reviewed financial monitoring report. The format and content of the FMR, which will be produced within 3 weeks from each quarter closing date, will be included in the financial management manual. FMRs include financial, procurement, and physical progress information. There should also be introductory narrative discussions of the project's developments and progress during the quarter.

(iii) Annually audited project financial statements. The project financial statements should be ready 3 months from the end of fiscal year to enable the submission of the audit report within 6 months after the closing date of the fiscal year. The project financial statements would have to include: (i) a statement of sources and uses of

funds indicating funds received from various sources, project expenditures, assets and liabilities; (ii) schedules classifying project expenditures by components, sub-components, and category.

8. Attestation Arrangements

The project, EEHC and CEPC will be subject to three types of attestation engagements as follows:

A. Annual Audit: Annual audits for the project will be conducted by independent private auditors acceptable to the Bank and hired by the CEPC no later than 90 days after loan effectiveness (dated covenant). The audit will be performed for the project as a whole (i.e., all components and sources of funds). The audit report, accompanied by a management letter, will cover the project's financial statements, use of direct payments, and withdrawal based on Statement of Expenditures. The report should be submitted by CEPC to the Bank no later than six months following the closing of the fiscal year subject of the audit *(fiscal year July 1 to June 30).* The external audit report should be in accordance with the Bank auditing requirements/TOR and conducted according to International Standards on Auditing (ISA).

B. Quarterly Reviews: The same auditor will also be involved in conducting quarterly reviews of the project's FMRs within 45 days from the end of each calendar quarter. Withdrawals from the loan, whether in the form of Statement of Expenditures or direct payments, that are included in FMRs will be part of the scope of these quarterly reviews.

C. Financial Statement Conversion: In addition, the translation of EEHC's financial statements from the basis of Local Accounting Standards to International Accounting Standards is required. This would not entail a re-audit of EEHC but a mere translation of the financial statements and will be done by the Egyptian Central Auditing Organization. This is deemed necessary especially in light of the fact that EEHC is the continuing and revenue generating entity with regards to this project.

Report	Due Date	Responsibility	Sent to:	Language	Scope
Financial monitoring report	45 days from end of quarter	External Auditor	EEHC,CEPC and Bank	Arabic/English	Review
Project financial statements	6 months from end of the fiscal year	External Auditor	EEHC,CEPC and Bank	Arabic/English	Audit
EEHC consolidated financial statements	8 months from the end of the fiscal year	Egyptian Central Auditing Organization	EEHC and Bank	Arabic/English	conversion to IAS

9. Supervision Plan

Before effectiveness, the hiring of the financial consulting firm will be closely monitored by the Bank financial management specialist until loan effectiveness.

After effectiveness, a Bank-accredited financial management specialist will assist in the supervision process and the development of the financial management system for the FMU will be of key importance in the early stages of the project. At least two supervision missions for the project will be carried out annually in addition to follow up visits as deemed necessary. The FMRs for the Project will be reviewed on a regular basis by the Project financial management specialist and the results or any issues will be followed up during the supervision missions. Financial audit reports and management letters will be reviewed and any issues identified will be followed up by the financial management specialist. Also, during the Bank's supervision missions, the Project's financial management and disbursement arrangements will be reviewed to ensure compliance with the Bank's requirements and to develop the financial management rating to the Implementation Status Report (ISR).

10. Disbursement Arrangements

Disbursement under this loan will be made according to the transaction-based disbursement procedures that include withdrawal applications for direct payment, reimbursement and requests for the issuance of special commitments. Withdrawal applications will be prepared and sent by the FMU signed by authorized signatories. The name and corresponding specimen of signature of each of the authorized signatories will be submitted to the World Bank.

Allocation of loan proceeds: The allocation of loan proceeds by disbursement category and percentage to be financed is shown in the table below:

Category	Amount of Loan Allocated (US$ million)	% of Expenditures to be Financed
(i) Works	216.6	100%
(ii) Goods	43.0	100%
Total Project Cost[1]	259.6	

Direct Payments and Special Commitments: The minimum amount for applications for direct payments and for special commitment will be US$1,000,000.

Annex 8: Procurement Arrangements

A. General

Procurement for goods and works in the proposed project will be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004. As detailed in the following paragraph, the Bank has accepted the use of sequential opening of the technical and financial envelopes for the procurement of some pre-defined packages. This will result in modifications to the bid opening procedures described in the Bank's standard bidding documents, and will include the agreed safeguard procedures as detailed under Section B.

Selection and employment of consultants will be carried out in accordance with the World Bank's "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the Loan, the different procurement methods or consultant selection methods, the need for pre-qualification, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan (Attachment 1 to this Annex). The Procurement Plan will be updated in agreement with the Bank every six months or as required to reflect the actual project implementation needs.

As stated above, the GOE has requested to use the procedure of sequential opening instead of simultaneous opening of the technical and financial envelopes for several packages of supply and installation of equipment and procurement of goods financed under the project. After extensive discussions, the Bank agreed to a sequential opening of the technical and financial envelopes for these packages, which will include the principles and safeguards described below under Section B. Attachment 2 of this Annex is a bar chart showing the cycle for sequential opening of the technical and financial envelopes, which were agreed to by the Bank as, indicated in section E of this Annex.

Country Background

A legal framework anchored in Public Tender Law No. 89/1998 governs public sector procurement in Egypt; the system is described in detail in the Draft Country Procurement Assessment Report (CPAR) dated December 2003.

With regard to the procurement framework under the proposed El-Tebbin Power Project, CEPC operates under the Joint Stock Companies Law 159, and, as a subsidiary of EEHC, follows the procurement by-laws of all electricity production companies owned by EEHC. On April 11, 2004, the Chairman of General Assembly for Electricity Subsidiary Companies issued a decree approving the unified procurement by-laws to be followed by EEHC electricity production subsidiary companies.

Procurement of Works: Works packages procured under this project include contracts for supply and install of the following: (i) environmental management plan, including environmental monitoring equipment, (ii) switchyard, (iii) steam generator, (iv) turbine generator and

condenser, (v) water and waste water treatment, (vi) electrical equipment and instrument installations, and (vii) mechanical and piping installations. The above-mentioned works packages financed under the Bank Loan will be subject to prior review and will be issued under World Bank Guidelines for procurement under International Competitive Bidding (ICB) procedures. Procurement will be carried out using the Bank's Standard Bidding Documents for ICB, including agreed modifications to accommodate the sequential opening of the technical and financial envelopes for five of the above packages (see Section E, 1, (c) below).

The packages for the demolition of existing power plant, site preparation for and construction works of the new power plant are not subject to financing under the proposed Bank Loan. As such, CEPC will award these contracts using its own procurement procedures, as indicated in CEPC's procurement By-Laws.

Procurement of Goods: Goods packages procured under this project include the following equipment: (i) pumps and drives, (ii) heat exchangers, (iii) critical piping and valves, (iv) power transformers, and (v) instruments and plant distributed control systems.

The above-mentioned goods packages financed under the Bank Loan will be subject to prior review and will be issued under World Bank Guidelines for procurement under International Competitive Bidding (ICB) procedures. Procurement will be carried out using the Bank's Standard Bidding Documents for ICB, including agreed modifications to accommodate the sequential opening of the technical and financial envelopes (see Section E, 1, (c) below).

The packages for consulting services, yard tanks, wrap-up insurance, medium and low voltage switchgear and civil works are not subject to financing under the proposed Bank Loan. As such, CEPC will award these contracts using its own procurement procedures, as indicated in CEPC's procurement By-Laws.

Advance procurement: As part of advance procurement, as defined in the relevant provision of the Bank's procurement guidelines, EEHC with the concurrence and assistance of the Bank launched on December 16, 2005 the tender for the Turbine Generator and Condensers Package (CP-106).

Selection of Consultants: Consultants Services under the project will not be financed from the proposed Loan. However, three studies aimed at providing technical assistance to the sector will be carried out and financed by a grant from ESMAP. The procurement for these studies will be executed by the Bank and will follow World Bank Procurement Guidelines.

CEPC will contract international engineering services firm (PGESCo) to provide engineering, procurement, construction management and project management services under the project. The Loan will not finance PGESCo's contract. Nevertheless, during project preparation the Bank reviewed the proposed Terms of Reference for PGESCo and found them acceptable.

B. Assessment of the agency's capacity to implement procurement

During the preparation of this project, the Bank conducted an assessment of CEPC's procurement capacity. This assessment was carried out by Badr Kamel, Senior Procurement Specialist, in March and April 2005. While CEPC has considerable experience in implementing

projects of this size and magnitude, the company does not have recent exposure to World Bank procurement procedures.

CEPC is responsible for the construction of the Tebbin Power Plant, and as stated above, the company will be supported in the procurement process by an international engineering services firm (PGESCo). EEHC, in its function as a holding company, will provide guidance to and monitor CEPC's activities.

PGESCo has been the company of choice for the provision of engineering, procurement, construction management and project management services for power generation projects in Egypt. The company has extensive experience in the procurement of power plant equipment in Egypt and has a continuing services agreement with Bechtel Corporation. PGESCo was established in 1993 and is registered in Egypt under Law 230/1989 as a Joint Stock Company (40% owned by Bechtel International, 40% by the Ministry of Electricity and Energy and 20% by a local bank).

The possibility of interference in the procurement process and the adoption of the sequential opening of technical and financial envelopes represent procurement risks. In order to have these risks mitigated, the Ministry of Electricity and the Bank have agreed on a set of principles and safeguards to be adopted under the Loan, as follows:

Principles

- Bidding is open to all potential and qualified bidders and not exclusively to manufacturers. However, a bid from a non-manufacturer would require a guarantee from the manufacturer.[11,12]

- In addition to clear technical specifications, the bidding documents will include detailed, comprehensive and clear technical and commercial evaluation criteria.

- During the technical evaluation, no meeting with the bidders will take place; clarifications with bidders have to take place in writing only and can neither result in modifications of the bids (e.g., withdrawal of deviations) nor in changes to the bid price.

- The bidding documents will highlight the deviations which are considered as major. The list may not be comprehensive but, in any event, bids with major deviations will be considered substantially non-responsive and will be eliminated. Minor deviations and omissions have to

[11] This takes the form of a Letter of Authorization from the manufacturer. The Letter of Authorization is a standardized form and is part of the Bank's Standard Bidding Documents. The Letter of Authorization serves as a guarantee required for a bidder to bid and as the basis for contract award. In addition, if the owner requires a guarantee for the defect liability and/or functional guarantee directly from the manufacturer, it may put such requirements of guarantee in the Bid Data Sheet of the bidding documents.

[12] In accordance with the World Bank Standard Bidding Documents, Supply and Installation of Plant and Equipment, Instruction to Bidders, Clause 9.3 (c): "in order for a joint venture or consortium to qualify, each of its partners must meet the minimum criteria listed for an individual Bidder for the component of the contract they are designated to perform." Some more detailed information on the qualification criteria for joint ventures can be found in the qualification criteria table in the World Bank's Prequalification Documents, Procurement of Works and User's Guide.

be accepted and will be quantified in monetary terms only for the purpose of financial evaluation and as per detailed method spelled out in the bidding documents. This will neither affect the bid price, nor the contract price.

- The bids will include a list of deviations from terms and conditions or technical specifications in Attachment 6, and the bidders will provide additional price of withdrawal of deviations in the said Attachment 6 (pricing of the withdrawal of the deviations would be part of the commercial bids). Minor deviations or omissions will be quantified, for evaluation purposes only, by using the quotation in the said Attachment 6 to the bid by the bidder. If a minor deviation or omission is identified but not included in Attachment 6, the deviation may be quantified for evaluation purposes based on pricing information available to the owner according to the specifications and methods spelled out in the bidding documents.

- In accordance with Bank guidelines, when the owner awards the contract to the successful bidder, the owner may request the bidder to withdraw any of the deviations listed in Attachment 6 to the winning bid, at the price shown for the deviation in Attachment 6 to the bid.

Safeguards

- After opening the technical envelopes, the commercial envelopes are kept unopened and in a safe place under the responsibility of an independent authority.

- The review process of the technical evaluation needs to be as follows: (i) preparation of the Technical Evaluation report and recommendations by the Borrower, to be sent to the Bank; (ii) review by the Bank and, if needed, clarifications to be sought by the Bank; and (iii) Borrower to then receive no-objection from the Bank. The Borrower will then inform the bidders of the outcome of the technical evaluation. For those bidders rejected due to being substantially non-responsive, the Borrower needs to provide to these bidders clear reasons for the rejection.

- Prior to the opening of the commercial envelopes for bidders deemed responsive, adequate time (a minimum of 5 working days from reception of the rejection letter) has to be provided for bidders deemed non-responsive to complain. Minutes in writing of complaints and responses provided by the Borrower need to be sent to the Bank. The Bank, in consultation with the Borrower, will examine these complaints. If additional data is required to complete this process, they will be obtained from the Borrower. If additional information or clarification is required from the bidder, the Bank will ask the Borrower to obtain it and comment or incorporate it, as appropriate, in a revised version of the Technical Bid Evaluation report. The Bank's review will not be completed until the complaint is fully examined and considered.[13]

[13] Copy of the complaints and responses from the Borrower can be sent to the bidders and the Bank in parallel. Furthermore, should additional information be required from the Bidders, a time limit would be given for them to respond. The time limit would be determined based on the complexity of the issue at hand, and would be not less than 5 working days after reception of the information request.

- Commercial bids of substantially responsive technical bids have to be open in public and bid prices read out. Bids of non-responsive bidders should be kept until contract signing.

- When the full evaluation is completed, the Bid Evaluation Report and contract award recommendation are prepared by the Borrower and sent to the Bank for review. The review process by the Bank is then similar to the one for the Technical Evaluation report, including treatment of complaints, if any.

- The bid validity period has to be sufficiently long (180 days) to cover the entire evaluation process in order to avoid having to request bid validity period extensions given that prices are fixed.

Training

In addition to the principles and safeguards described above, further procurement training for PMU staff as well as EEHC and CEPC staff that will be involved in the procurement process under the project will be offered by the Bank at or prior to Project launch. This training activity will build upon the procurement training workshop already provided to EEHC, CEPC and attended by PGESCo in September 2004 and will focus in particular on procedures for evaluation of bids, contributing to mitigating the risks identified above. The September 2004 workshop focused on presenting and discussing Bank guidelines and procedures, preparing bidding documents for Supply and Installation of Plant and Equipment as well as on procurement planning.

Further training on Bank procurement procedures and preparation of pre-qualification documents and bidding documents for procurement of Works, procurement of Goods and request for proposals for Selection of Consultants will be provided as needed prior to those activities being initiated by CEPC.

Procurement Implementation Manual

As a further risk mitigation measure, CEPC will prepare a Procurement Implementation Manual to include the detailed procurement process and procedures to be implemented under the project. The Manual will include the standard bidding documents for each procurement method and category (Goods, Works and Consultants), standard contracts, pre-qualification documents and standard evaluation reports to be used under the project. This Manual will be available in CEPC's office and the PMU's Project files.

In light of what has been described above, the overall project risk for procurement is rated HIGH.

C. Procurement Plan and Implementation Arrangements

A procurement plan for the project implementation has been developed by CEPC (Attachment 1 to this Annex). This plan has been updated and agreed upon between the Borrower and the project team during appraisal, and it is available in the offices of CEPC. It will also be available in the Project's database and in the Bank's external website. The Procurement Plan will be

updated in agreement with the Bank every six months or as required to reflect the actual project implementation needs.

The Bank will finance 12 packages under this project. Seven packages are Supply & Installation of Plant and Equipment and five are Supply of Goods (equipment). All the packages financed under the Bank Loan will be issued following International Competitive Bidding procedures. The Bank Loan will not finance the Consulting Services, Civil Works, Yard Tanks, Project Insurance and Low and Medium Voltage Switchgear Equipment Contracts, which will be tendered following CEPC national competitive bidding procedures; therefore these contracts will not be subject to the Bank's review.

The PMU's procurement coordinator will be responsible for (i) reviewing all procurement related documents before transmittal to the Bank; (iii) reviewing the project procurement plan before transmittal to the Bank; and (iii) ensuring that procurement of Works and Goods that are financed by the Bank Loan are conducted in accordance with the Loan Agreement.

PGESCo will be responsible for preparing, maintaining and monitoring of the procurement plan. PGESCo will also (i) prepare the bidding documents (including technical designs) to be reviewed by EEHC/CEPC committees before launching the tenders, (ii) independently evaluate technical and financial bids and (iii) provide EEHC and CEPC with an evaluation report and recommendations. In addition, PGESCo will be in charge of monitoring the project's cost, scheduling, coordination and distribution of design data among bidders of the different packages and construction supervision during project implementation.

The following is a summary of PGESCo role.

1. Prepare the bidding documents and addenda which will be reviewed by EEHC and CEPC before transmission to the Bank for clearance.

2. Prepare response to bidders' clarification requests, which will be reviewed by CEPC before transmission to bidders.

3. Evaluate technical bids. Prepare and provide CEPC with evaluation report and recommendations for opening financial bids (CEPC will transmit report to Bank for clearance).

4. Evaluate the financial proposals and provide CEPC with evaluation report and final award recommendations (CEPC will transmit report to EEHC and Bank for clearance).

5. Prepare draft contract which will be reviewed by CEPC before transmission to the Bank for clearance

6. Responsible for coordination of data among the different bidders during the bidding stage. Later during contracts implementation, PGESCo will coordinate all on-site and off-site activities among contractors.

7. Supervise the contractors and review and verify all contractors' invoices before transmitting to CEPC for review and approval (CEPC will forward contractors invoice to Bank for payment).

8. Review contractors' claims and issue recommendations to EEHC and CEPC. Advise contractors of CEPC's response on recommendations.

D. Frequency of Procurement Supervision

In addition to prior reviews to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended quarterly supervision missions to visit the field during the first two years of the project to monitor the implementation of the Procurement Plan and to carry out training on procurement procedures. Procurement supervision missions will be carried out twice a year thereafter.

E. Details of the Procurement Arrangements Involving International Competition and Bank Reviews

1. Goods, Works and Non-Consulting Services

(a) List of contract packages to be procured following International Competitive Bidding (ICB).

Ref. No.	Contract (Description)	Procurement Method	Category	Pre-Qualification	Domestic Preference	Prior Review by Bank	Expected Bid Opening Date
CP103	Environmental Monitoring	ICB	Works	No	No	Yes	01-Aug- 07
CP104	Switchyard	ICB	Works	No	No	Yes	07-Jul-06
CP105	Steam Generator	ICB	Works	No	No	Yes	06-Aug-06
CP106	Turbine Generator and Condensers	ICB	Works	No	No	Yes	26-Feb-06
P0-109	Pumps and Drives	ICB	Goods	No	No	Yes	05-Oct-06
P0-110	Heat Exchanger	ICB	Goods	No	No	Yes	08-Jul-06
CP-111	Water and Wastewater Treatment	ICB	Works	No	No	Yes	04-Nov-06
P0-112	Critical Piping and Valves	ICB	Goods	No	No	Yes	02-Jul-07
P0-113	Power Transformers	ICB	Goods	No	No	Yes	25-Oct-06
P0-114	Instrument and Plant Distributed Control Systems	ICB	Goods	No	No	Yes	12-Feb-07
CP-117	Electrical Equipment/ Instrument Installation	ICB	Works	Yes	No	Yes	01-Feb-07
CP-118	Mechanical Works and Piping Installation	ICB	Works	Yes	No	Yes	30-Dec-06

(b) All ICB contracts financed under the Loan will be subject to prior review by the Bank.

(c) The Bank has agreed to the sequential opening of the technical and financial envelopes for the following bid packages:

1. CP-104 Switchyard
2. CP-105 Steam Generator
3. CP-106 Turbine Generator & Condenser
4. P0-109 Pumps & Drives
5. P0-114 Instrument & Plant Distributed Control Systems
6. CP-117 Electrical Equipments/Instrument Installation
7. CP-118 Mechanical & Piping Installation

2. Consulting Services

(a) List of consulting assignments to be financed by the ESMAP grant

Description	Estimated Costs US$	Method	Expected Proposals Submission Date
Design and application of Time of Use (ToU) Tariffs	350,000	QCBS	September 30, 2006
Assessment of load management potential and design of program	200,000	QCBS	December 31, 2006
Feasibility assessment for Interruptability Scheme	100,000	FBS	July 31, 2007

QCBS: Quality and Cost Based Selection
FBS: Fixed Budget Selection

Attachment 1 - Detailed Procurement Plan

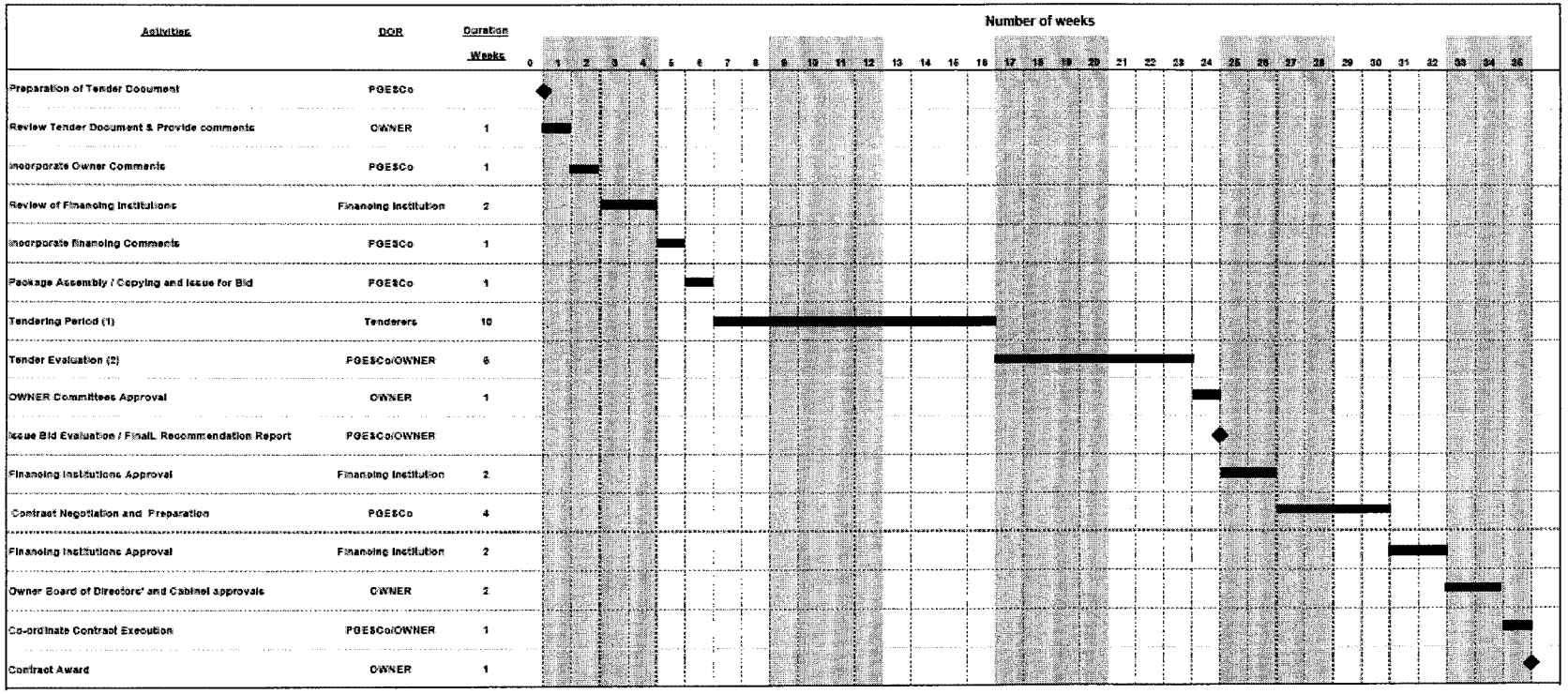
PACKAGE	DESCRIPTION	Financing Source	Procurement Method	Start Package Preparation	Submit For Bank Approval	Bank No Objection (Complete)	Incorporate Financing Comments	Issue For Bid	Bid Due Date	Identify Clarifications	Owner approve Clarifications from contractors.	Obtain Responses From Contractors	Envelope A Report	Owner Approval To Open Envelope B
PQ-102	PREQUALIFICATION FOR CIVIL WORKS	Owner	Local	24-Jun-05 24-Jun-05 A				05-Dec-05 A	16-Jun-06					
CP-102 **	CIVIL WORK	Owner	Local	14-Jan-06				18-May-06	10-Aug-06	31-Aug-06	07-Sep-06	17-Sep-06	27-Sep-06	04-Oct-06
CP-103 *	ENVIRONMENTAL MONITORING	World Bank	International (ICB)	19-Jan-07	25-Apr-07	09-May-07	16-May-07	23-May-07	01-Aug-07					
CP-104 **	SWITCHYARD	World Bank	International (ICB)	25-Dec-05	31-Mar-06	14-Apr-06	21-Apr-06	28-Apr-06	07-Jul-06	28-Jul-06	04-Aug-06	14-Aug-06	24-Aug-06	31-Aug-06
CP-105 **	STEAM GENERATOR	World Bank	International (ICB)	10-Jan-06	16-Apr-06	30-Apr-06	07-May-06	14-May-06	06-Aug-06	27-Aug-06	03-Sep-06	13-Sep-06	23-Sep-06	30-Sep-06
CP-106 **	TURBINE GENERATOR AND CONDENSER	World Bank	International (ICB)	13-May-05 13-May-05 A	30-Aug-05 1-Nov-05 A	13-Sep-05 17-Nov-05 A	25-Nov-05 A	04-Dec-05 A	26-Feb-06	19-Mar-06	26-Mar-06	05-Apr-06	16-Apr-06	23-Apr-06
CP-107 *	YARD TANKS	Owner	Local	05-Mar-06				07-Jul-06	15-Sep-06					
CP-108 *	WRAP-UP INSURANCE	Owner	Local	25-Jun-05 25-Jun-05 A				24-Nov-05 A	02-Feb-06					
P0 -109 **	PUMPS AND DRIVES	World Bank	International (ICB)	25-Mar-06	29-Jun-06	13-Jul-06	20-Jul-06	27-Jul-06	05-Oct-06	26-Oct-06	02-Nov-06	12-Nov-06	22-Nov-06	29-Nov-06
P0 -110 *	FEED WATER HEATERS	World Bank	International (ICB)	26-Dec-05	01-Apr-06	15-Apr-06	22-Apr-06	29-Apr-06	08-Jul-06					
CP-111 *	WATER AND WASTE WATER TREATMENT	World Bank	International (ICB)	24-Apr-06	29-Jul-06	12-Aug-06	19-Aug-06	26-Aug-06	04-Nov-06					
P0 -112 *	CRITICAL PIPING AND VALVES	World Bank	International (ICB)	20-Dec-06	26-Mar-07	09-Apr-07	16-Apr-07	23-Apr-07	02-Jul-07					
P0 -113 *	POWER TRANSFORMERS	World Bank	International (ICB)	14-Apr-06	19-Jul-06	02-Aug-06	09-Aug-06	16-Aug-06	25-Oct-06					
P0 -114 **	PLANT DISTRIBUTED CONTROL SYSTEMS	World Bank	International (ICB)	02-Aug-06	06-Nov-06	20-Nov-06	27-Nov-06	04-Dec-06	12-Feb-07	05-Mar-07	12-Mar-07	22-Mar-07	01-Apr-07	08-Apr-07
PQ-117	PREQUALIFICATION FOR ELECTRICAL WORKS	World Bank	International (ICB)	10-Feb-06	10-May-06	24-May-06	31-May-06	07-Jun-06	19-Jul-06					
CP-117 **	ELECTRICAL EQUIPMENTS / INSTRUMENT INSTALLATION	World Bank	International (ICB)	08-Jul-06	12-Oct-06	26-Oct-06	02-Nov-06	09-Nov-06	01-Feb-07	22-Feb-07	01-Mar-07	11-Mar-07	21-Mar-07	28-Mar-07
PQ-118	PREQUALIFICATION FOR MECHANICAL WORKS	World Bank	International (ICB)	01-Jan-06	07-Apr-06	21-Apr-06	28-Apr-06	05-May-06	16-Jun-06					
CP-118 **	MECHANICAL &PIPING INSTALLATION	World Bank	International (ICB)	05-Jun-06	09-Sep-06	23-Sep-06	30-Sep-06	07-Oct-06	30-Dec-06	20-Jan-07	27-Jan-07	06-Feb-07	16-Feb-07	23-Feb-07
P0 -122 *	SWITCHGEAR	Owner	Local	01-Mar-06				03-Jul-06	11-Sep-06					

PACKAGE	DESCRIPTION	Financing Source	Procurement Method	Submit Envelope A Report To The Bank	Bank No objection (Complete) To Open Envelope B	Open Envelope B	Final Recommendation Report	Owner Approval and Select Contractor	Bank No Objection (Complete)	Complete Discussion / Draft Contract	Bank No Objection (Complete)	Contract Signing
PQ-102	PREQUALIFICATION FOR CIVIL WORKS	Owner	Local				13-Feb-06	20-Feb-06				
CP-102 **	CIVIL WORK	Owner	Local			25-Oct-06	08-Nov-06	15-Nov-06		27-Dec-06		31-Jan-07
CP-103 *	ENVIRONMENTAL MONITORING	World Bank	International (ICB)				19-Sep-07	26-Sep-07	17-Oct-07	14-Nov-07	28-Nov-07	19-Dec-07
CP-104 **	SWITCHYARD	World Bank	International (ICB)	31-Aug-06	14-Sep-06	28-Sep-06	12-Oct-06	19-Oct-06	09-Nov-06	07-Dec-06	21-Dec-06	11-Jan-07
CP-105 **	STEAM GENERATOR	World Bank	International (ICB)	30-Sep-06	14-Oct-06	28-Oct-06	11-Nov-06	18-Nov-06	09-Dec-06	06-Jan-07	20-Jan-07	10-Feb-07
CP-106 **	TURBINE GENERATOR AND CONDENSER	World Bank	International (ICB)	23-Apr-06	07-May-06	21-May-06	04-Jun-06	11-Jun-06	02-Jul-06	30-Jul-06	13-Aug-06	03-Sep-06
CP-107 *	YARD TANKS	Owner	Local				03-Nov-06	10-Nov-06		22-Dec-06		26-Jan-07
CP-108 *	WRAP-UP INSURANCE	Owner	Local				23-Mar-06	30-Mar-06		27-Apr-06		18-May-06
PO -109 **	PUMPS AND DRIVES	World Bank	International (ICB)	29-Nov-06	13-Dec-06	27-Dec-06	10-Jan-07	17-Jan-07	07-Feb-07	07-Mar-07	21-Mar-07	11-Apr-07
PO -110 *	FEED WATER HEATERS	World Bank	International (ICB)				26-Aug-06	02-Sep-06	23-Sep-06	21-Oct-06	04-Nov-06	25-Nov-06
CP-111 *	WATER AND WASTE WATER TREATMENT	World Bank	International (ICB)				23-Dec-06	30-Dec-06	20-Jan-07	17-Feb-07	03-Mar-07	24-Mar-07
PO -112 *	CRITICAL PIPING AND VALVES	World Bank	International (ICB)				20-Aug-07	27-Aug-07	17-Sep-07	15-Oct-07	29-Oct-07	19-Nov-07
PO -113 *	POWER TRANSFORMERS	World Bank	International (ICB)				13-Dec-06	20-Dec-06	10-Jan-07	07-Feb-07	21-Feb-07	14-Mar-07
PO -114 **	PLANT DISTRIBUTED CONTROL SYSTEMS	World Bank	International (ICB)	08-Apr-07	22-Apr-07	06-May-07	20-May-07	27-May-07	17-Jun-07	15-Jul-07	29-Jul-07	19-Aug-07
PQ-117	PREQUALIFICATION FOR ELECTRICAL WORKS	World Bank	International (ICB)				16-Aug-06	23-Aug-06	13-Sep-06			
CP-117 **	ELECTRICAL EQUIPMENTS / INSTRUMENT INSTALLATION	World Bank	International (ICB)	28-Mar-07	11-Apr-07	25-Apr-07	09-May-07	16-May-07	06-Jun-07	04-Jul-07	18-Jul-07	08-Aug-07
PQ-118	PREQUALIFICATION FOR MECHANICAL WORKS	World Bank	International (ICB)				14-Jul-06	21-Jul-06	11-Aug-06			
CP-118 **	MECHANICAL &PIPING INSTALLATION	World Bank	International (ICB)	23-Feb-07	09-Mar-07	23-Mar-07	06-Apr-07	13-Apr-07	04-May-07	01-Jun-07	15-Jun-07	06-Jul-07
PO -122 *	SWITCHGEAR	Owner	Local				30-Oct-06	06-Nov-06	20-Nov-06	18-Dec-06	01-Jan-07	22-Jan-07

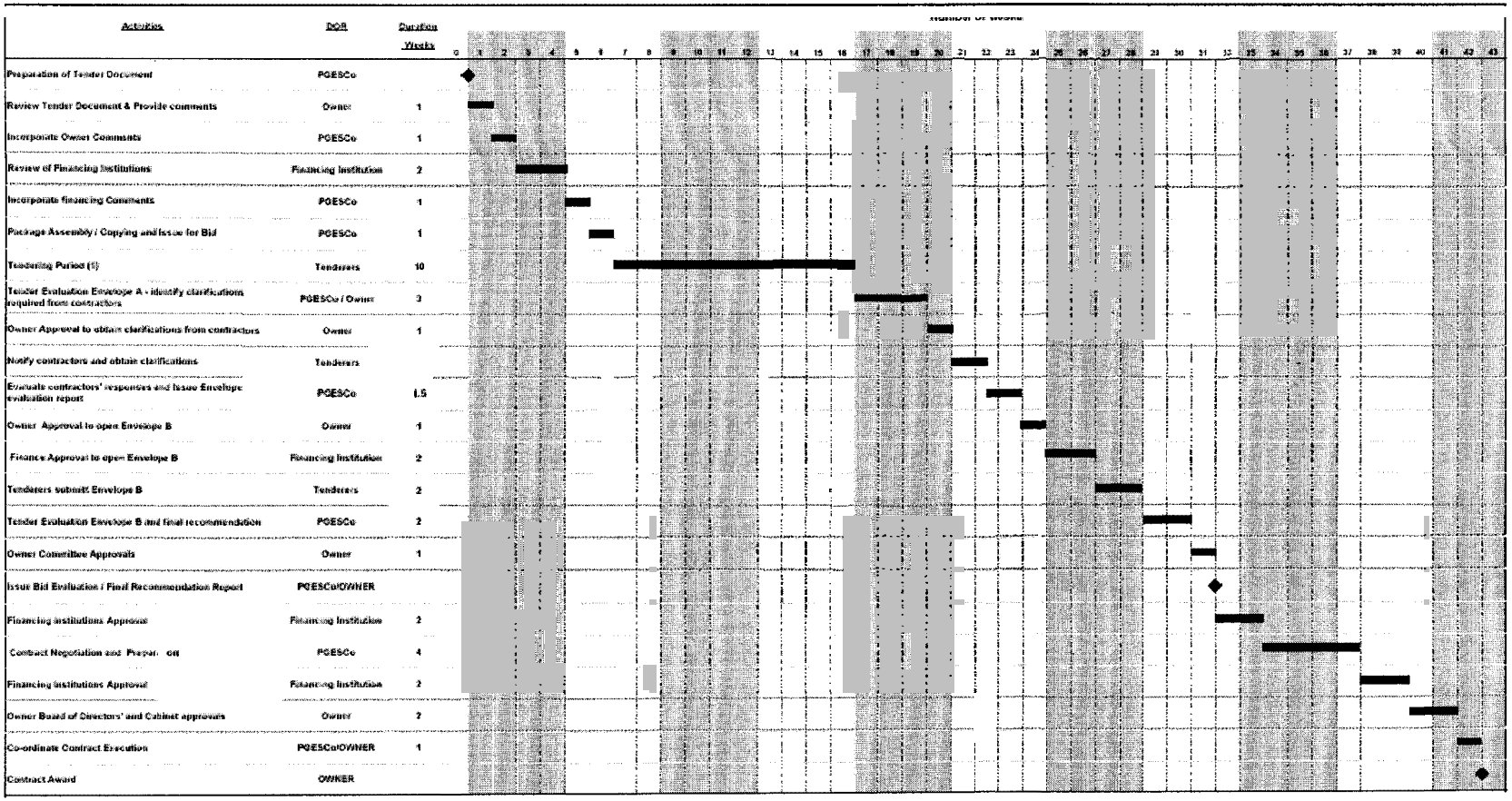
* One envelope Procurement cycle
** Two envelopes procurement cycle

Attachment 2 - Cycle for Sequential Opening of the Technical and Financial Envelopes

One Envelope Procurement Cycle Schedule



Two Envelopes Procurement Cycle Schedule



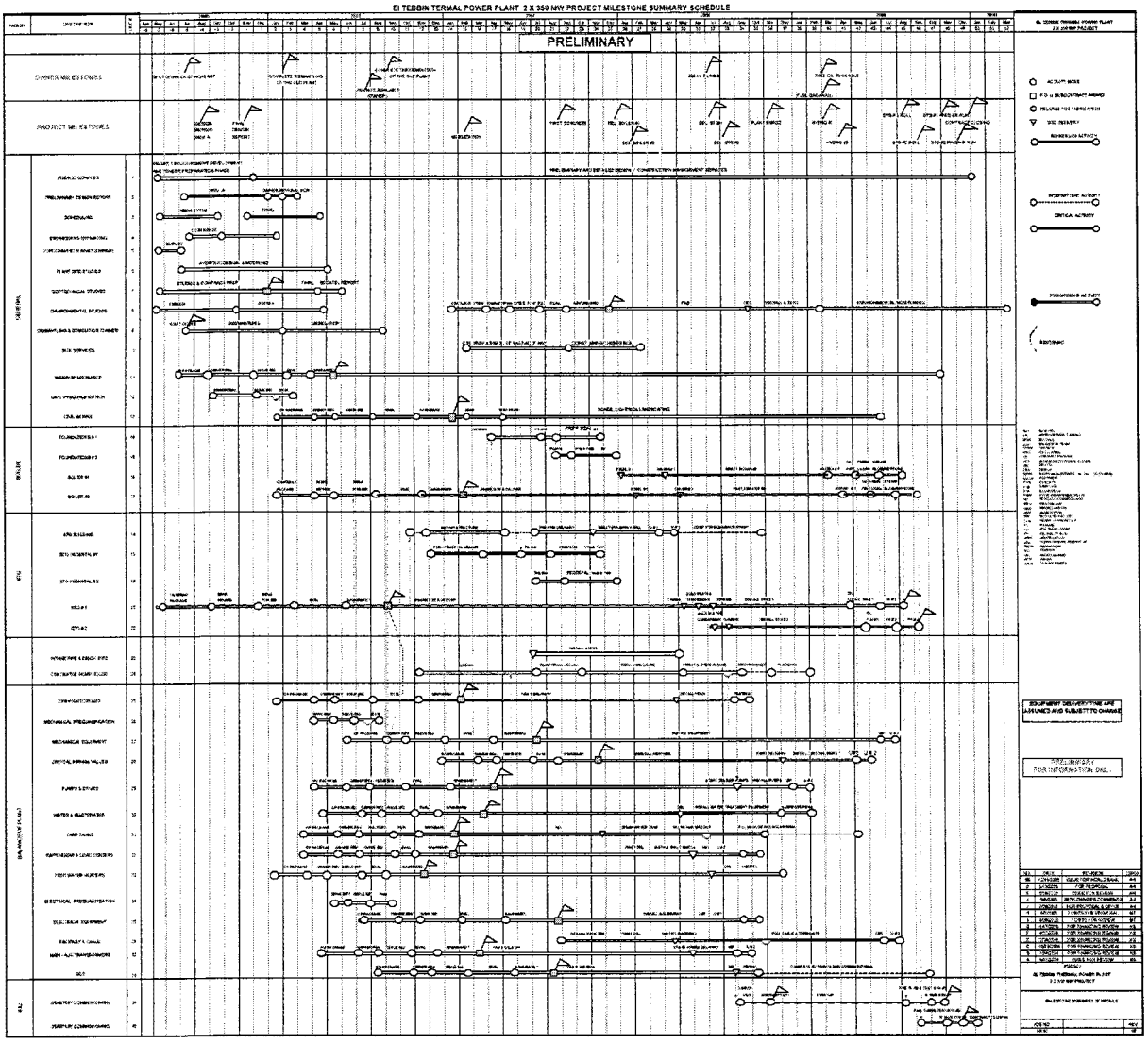
Activities	DOR	Duration Weeks
Preparation of Tender Document	PQESCo	
Review Tender Document & Provide comments	Owner	1
Incorporate Owner Comments	PQESCo	1
Review of Financing Institutions	Financing Institution	2
Incorporate financing Comments	PQESCo	1
Package Assembly / Copying and Issue for Bid	PQESCo	1
Tendering Period (1)	Tenderers	10
Tender Evaluation Envelope A - identify clarifications required from contractors	PQESCo / Owner	3
Owner Approval to obtain clarifications from contractors	Owner	1
Notify contractors and obtain clarifications	Tenderers	
Evaluate contractors' responses and Issue Envelope evaluation report	PQESCo	1.5
Owner Approval to open Envelope B	Owner	1
Finance Approval to open Envelope B	Financing Institution	2
Tenderers submit Envelope B	Tenderers	2
Tender Evaluation Envelope B and final recommendation	PQESCo	2
Owner Committee Approvals	Owner	1
Issue Bid Evaluation / Final Recommendation Report	PQESCo/OWNER	
Financing Institutions Approval	Financing Institution	2
Contract Negotiation and Preparation	PQESCo	4
Financing Institutions Approval	Financing Institution	2
Owner Board of Directors' and Cabinet approvals	Owner	2
Co-ordinate Contract Execution	PQESCo/OWNER	1
Contract Award	OWNER	

Notes:

1- The 2 envelopes procurement cycle is applied to CP-102, 104, 105, 106, 117, 118 and PO-109, 114

2 - For packages CP 102, 105, 106, 117, 118 the tender period will be for 12 weeks

Attachment 3 – Project Milestone Summary Schedule



Annex 9: Economic and Financial Analysis

Economic

The El-Tebbin power plant is part of the least cost expansion plan of EEHC, which has been assessed using the EGEAS model. Alternatives such as electricity imports or additional equivalent capacity built using renewable sources for electricity production have been rejected as their unit cost for electricity production is significantly above the long run marginal cost of power (LRMC) which EEHC uses in its calculations. No additional options for the rehabilitation of existing plant could be identified for inclusion in the least cost expansion plan to add 700 MW of new capacity required to match growing electricity demand.

This annex presents (i) a table of electricity demand projections used in the calculation of weights to estimate the willingness to pay; (ii) the assumptions used to calculate the willingness to pay used in assessing the benefits from additional electricity sales from El-Tebbin; (iii) detailed assumptions to calculate the costs of operating the El-Tebbin plant; (iv) a table with the detailed annual costs used in calculating the cash flow of the plant; (v) a table presenting assumptions for calculating the benefits of the plant; and (vi) results of a sensitivity analysis.

Electricity demand projections

Table 1: Sectoral direct price elasticity of electricity consumption in Egypt

SECTOR	DIRECT PRICE ELASTICITY
Industrial	-0.08
Residential	-0.32
Agriculture	-0.22
Commercial	-0.34

Source: EEHC

Table 2: Electricity demand forecast up to 2012 (MWh)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Industry	26525	28388	28500	29489	30499	31528	32582	33659	34757	35878
Agriculture	2991	3276	3408	3551	3696	3848	4003	4164	4328	4497
Public utilities	8590	9047	10314	11248	12209	13546	14667	15518	16193	17307
Commercial and others	4170	4836	4893	5310	5769	6226	6673	7105	7512	7887
Residential	27717	29807	33317	37368	41641	45352	49618	54425	59582	64531
Government	4040	4384	4509	4755	5011	5275	5547	5828	6118	6416
Others	955	960	839	709	709	709	791	821	871	921
Total sales	74988	80698	85780	92430	99534	106484	113881	121520	129361	137437
Peak Load (MW)	14401	14735	16454	17731	19050	20372	21771	23211	24677	26191
System load factor (net generation)	59.4%	62.5%	59.5%	59.5%	59.6%	59.7%	59.7%	59.8%	59.8%	59.9%
System load factor (gross generation)	70.5%	73.5%	70.5%	70.4%	70.6%	70.6%	70.7%	70.7%	70.8%	70.8%

Source: EEHC and ratios recalculated by World Bank

Assumptions used to calculate the willingness to pay

Table 3: Cost of diesel-based electricity auto-production

	commercial/small industrial	industrial
unit capacity kW	250	10000
unit cost $/kW	500	600
capacity factor %	35	50
unit efficiency %	36	42
fuel cost $/l	0.1	0.1
fuel consumption kg/kWh	0.2778	0.2381
capacity cost $/kWh	0.0151	0.0109
O&M cost $/kWh	0.011	0.010
fuel cost $/kWh	0.033	0.028
total cost $/kWh	0.059	0.049

Source: World Bank

Electricity demand growth shares 2002-2012	
Industry	31%
Agriculture	4%
Public utilities	12%
Commercial and others	6%
Residential	42%
Government	5%
Others	1%
Total sales	100%

Source: EEHC

WTP	**0.055**	**$/kWh**

Source: World Bank.

Assumptions used to calculate El-Tebbin's costs

Cost of fuel is assessed using a shadow price for natural gas equal to US$2 per MBtu. This is the export parity of natural gas used by Egypt's Ministry of Petroleum to value piped gas exported to Jordan. This is also a value of natural gas used in the economic assessment of electricity exports from Egypt through the interconnection with Libya using natural gas as an input. For Operations and Maintenance (O&M), material expenses are assumed to be constant at US$ 1.395 per MWh. This includes the additional O&M costs for evacuating the electricity produced by the plant through the grid. An overhaul maintenance with a value of 55 US¢/MWh is executed every 6 years. The value of the total fixed operation and maintenance expenses (US$18.2 million per year) is divided into 60% for skilled labor, 30% for unskilled labor and 10% for administration. There are no extra labor costs as the existing staff is re-dispatched in

the new plant. The plant is assumed to be commissioned gradually from 2009 and onwards. Overhaul every 6 years reduces the availability of the plant accordingly.

The exchange rate is taken as US$1 = LE 5.82 and is considered to be constant throughout the project life time.

Table 4: Assumptions to calculate El-Tebbin's costs

discount rate	10%	
plant load factor	70%	
Auxiliary consumption	4.0%	
T&D losses	12.0%	
O&M Material cost	1.40	$/MWh
Overhaul	0.55	$/MWh every 6 years
Fixed O&M	18.2	Million per year

Year	% Availability	Btu/kWh heat rate
2006	0%	0
2007	0%	0
2008	0%	0
2009	5%	7738
2010	55%	7792
2011	95%	7808
2012	95%	7823
2013	95%	7838
2014	95%	7784
2015	95%	7800
2016	75%	7815
2017	92%	7831
2018	92%	7847
2019	92%	7862
2020	92%	7793
2021	92%	7809
2022	75%	7825
2023	90%	7840
2024	90%	7857
2025	90%	7872
2026	90%	7803
2027	90%	7819
2028	75%	7834
2029	90%	7849
2030	90%	7866

Table 5: Annual costs

year	M$ capital cost	$/Mbtu fuel price	M$ Fuel cost	M$ Fixed O&M	M$ Variable O&M	M$ Total costs
2006	5.1	2.0	0.0	0.0	0.0	5.1
2007	23.0	2.0	0.0	0.0	0.0	23.0
2008	115.7	2.0	0.0	0.0	0.0	115.7
2009	149.9	2.0	3.1	0.9	0.3	154.2
2010	109.1	2.0	34.2	10.0	3.1	156.4
2011		2.0	59.1	17.3	5.3	81.7
2012		2.0	59.2	17.3	5.3	81.8
2013		2.0	59.4	17.3	5.3	81.9
2014		2.0	58.9	17.3	5.3	81.5
2015		2.0	59.1	17.3	5.3	81.6
2016		2.0	46.7	13.7	5.8	66.2
2017		2.0	57.4	16.7	5.1	79.3
2018		2.0	57.5	16.7	5.1	79.4
2019		2.0	57.7	16.7	5.1	79.5
2020		2.0	57.2	16.7	5.1	79.0
2021		2.0	57.3	16.7	5.1	79.1
2022		2.0	46.8	13.7	5.8	66.2
2023		2.0	56.2	16.4	5.0	77.6
2024		2.0	56.4	16.4	5.0	77.8
2025		2.0	56.5	16.4	5.0	77.9
2026		2.0	56.0	16.4	5.0	77.4
2027		2.0	56.1	16.4	5.0	77.5
2028		2.0	46.8	13.7	5.8	66.3
2029		2.0	56.3	16.4	5.0	77.7
2030		2.0	56.4	16.4	5.0	77.8

Table 6: Annual benefits

year	GWh gross generation	GWh net generation	GWh T&D losses	GWh Net sales	M$ Total benefits
2006	0.0	0.0	0.0	0.0	0.0
2007	0.0	0.0	0.0	0.0	0.0
2008	0.0	0.0	0.0	0.0	0.0
2009	199.3	191.3	23.0	168.4	9.2
2010	2192.2	2104.5	252.5	1852.0	101.7
2011	3786.5	3635.0	436.2	3198.8	175.7
2012	3786.5	3635.0	436.2	3198.8	175.7
2013	3786.5	3635.0	436.2	3198.8	175.7
2014	3786.5	3635.0	436.2	3198.8	175.7
2015	3786.5	3635.0	436.2	3198.8	175.7
2016	2989.4	2869.8	344.4	2525.4	138.7
2017	3666.9	3520.3	422.4	3097.8	170.1
2018	3666.9	3520.3	422.4	3097.8	170.1
2019	3666.9	3520.3	422.4	3097.8	170.1
2020	3666.9	3520.3	422.4	3097.8	170.1
2021	3666.9	3520.3	422.4	3097.8	170.1
2022	2989.4	2869.8	344.4	2525.4	138.7
2023	3587.2	3443.7	413.2	3030.5	166.4
2024	3587.2	3443.7	413.2	3030.5	166.4
2025	3587.2	3443.7	413.2	3030.5	166.4
2026	3587.2	3443.7	413.2	3030.5	166.4
2027	3587.2	3443.7	413.2	3030.5	166.4
2028	2989.4	2869.8	344.4	2525.4	138.7
2029	3587.2	3443.7	413.2	3030.5	166.4
2030	3587.2	3443.7	413.2	3030.5	166.4

Table 7: Cost-benefits results (discounted at 10%)

year	Total costs	Total benefits	Net benefits
2006	5.1	0.0	-5.1
2007	20.9	0.0	-20.9
2008	95.6	0.0	-95.6
2009	115.8	6.9	-108.9
2010	106.8	69.5	-37.3
2011	50.7	109.1	58.4
2012	46.2	99.2	53.0
2013	42.0	90.2	48.1
2014	38.0	82.0	43.9
2015	34.6	74.5	39.9
2016	25.5	53.5	28.0
2017	27.8	59.6	31.8
2018	25.3	54.2	28.9
2019	23.0	49.3	26.2
2020	20.8	44.8	24.0
2021	18.9	40.7	21.8
2022	14.4	30.2	15.8
2023	15.4	32.9	17.6
2024	14.0	29.9	16.0
2025	12.7	27.2	14.5
2026	11.5	24.7	13.2
2027	10.5	22.5	12.0
2028	8.1	17.0	8.9
2029	8.7	18.6	9.9
2030	7.9	16.9	9.0
		NPV M$	**252.9**
		ERR	**19.9%**

Sensitivity analysis

Switching values of critical items that would cause the economic rate of return on the project to fall to the opportunity cost of capital, estimated to be 10%, are:

- A gas price increase to US$ 3.4 per mmbtu.
- A delay in plant commissioning of 5 years (2015/16 for full operation).
- A lower electricity consumption equivalent to reducing the plant load factor to 44%.
- A lower average willingness to pay equivalent to 4.4 US¢/kWh or residential demand contracting by more than 50% as a result of growing supply from self-generation.

Financial Analysis

I. Project Financial Cost-Benefit Analysis

The financial analysis compares the project costs with the project benefits. All costs and benefits are expressed in current terms and are incremental in nature. The analysis was carried out over the period of the average expected life of the investment, which is 25 years. The detailed financial analysis of EEHC presented in this Annex gives the present values of the financial flows, as well as the net present value and the financial rate of return for EEHC.

For the financial benefits, EEHC will have the revenues stemming from sale of electricity of the new Tebbin Power Plant, which increase by the expected increases in output and retail tariff. On the cost side, EEHC will have the outlays for the project's capital cost, expenses with fuel, maintenance, and salary and administrative costs.

II. Financial Assessment of the Egyptian Electricity Holding Company (EEHC)

Past and Current Performance of EEHC

EEHC's revenues stem from the sale of electricity generated by its subsidiaries, the sales of electricity purchased from IPPs and the New and Renewable Energy Authority. Based on audited accounts for the past three years, the company incurred losses in the past two years, as costs increased,[14] while the retail price of electricity remained unchanged.

The low retail tariff, which has remained unchanged for the past 12 years – coupled with fast growing demand for electricity, which has required large investments over the past few decades – has caused EEHC's financial position to reach an unsustainable level.

As of 2004/5, the company's long-term debt reached LE 29.6 billion (US$5.1 billion), of which the current portion reached LE 2.1 billion (US$359 million). In addition, 72% of the company's current liabilities comprise of past due loan and interest payments owed to the Government and local banks and 15% are due to suppliers mainly for fuel. All together, the current liabilities reached LE 31.8 billion (US$5.5 billion) in 2004/05 against current assets of LE 17 billion (US$2.9 billion), resulting in a current ratio of 0.50 (i.e., current assets measured as a portion of current liabilities) and a debt service coverage ratio of 1.4.

Furthermore, despite the overall low retail tariff, collection performance has been less than satisfactory at about 74%, mostly due to lack of payment by the Government (including public enterprises). The collection performance of other customer segments is better and stands at about 95%. As a result of payment problems by the Government, accounts receivables reached LE 11.3 billion (US$1.9 billion) in 2004/05.

[14] Due partly to a substantial increase (59%6 between 2001/02 and 2003/04) in the costs related to the purchase of electricity from the IPPs. This increase is largely attributed to two factors: (i) two of the three IPPs currently under operation were commissioned and started selling power in the year 2002/03, representing an increase of about 376% in the quantity of electricity being purchased, and (ii) the devaluation of the Egyptian Pound in early 2003 given that the price of electricity purchased from the IPPs is fixed in US Dollars.

Accounts Receivables by Consumer Category, 2004/05

Consumer	Receivables LE billion	% of Total
Government	2.70	24
Public Utilities	2.47	22
Government-owned Enterprises	2.57	23
Other	3.56	31

Future Financial Performance of EEHC

Projections to assess EEHC's future financial position and performance have been carried out for the period 2005/06-2019/20. A summary of the assumptions are presented later in this annex and detailed assumptions are recorded in the project files.

In the base scenario, projections for future performance are based on the following key assumptions:

- The natural gas price remains at 14.1 Pt/m^3;
- Gradual increase of the tariff to restore financial profitability;
- An immediate improvement in collection performance to 94% in 2005/06, given the recent changes in the country's budgeting process and instruction from the Ministry of Finance to the government entities for timely payment of electricity bills.

In this scenario, EEHC would continue to have cash flow problems.

Therefore, during project preparation, discussions on alternative scenarios took place that, in addition to the assumptions highlighted above, could lead to the improvement of the company's financial performance, and agreement was reached on a scenario that includes an action plan to improve the company's performance and boost its long-term viability prospects. This action plan comprises of:

- By the year 2006/07, converting the debt EEHC has with the National Investment Bank (NIB) into equity, including past due amounts and interest. The total amount to be converted is estimated at LE 19 billion (US$3.3 billion), and represents about 59% of the company's forecasted net long-term debt.
- By 2009/10, collecting 20% of the 2005/06 accounts receivables, i.e., 5% per year.
- From 2008/09 onwards, collecting 50% of the non-collected revenue of the previous year.
- Reaching the following settlements on the payment of accounts receivable:
    - Ministry of Finance – payment of balance of LE 2.7 billion by 2006/07
    - Public Utilities – payment of balance of LE 2.47 billion over 10 years starting in 2005/06

- Public Enterprises – payment of balance of LE 2.57 billion over 10 years starting in 2005/06

- From 2005/06 onwards, swap current year accounts receivables from the Ministry of Finance (estimated to be LE 2.5 billion), applying LE 1 billion towards repayment of past due loans and accrued interest charges due to the Ministry of Finance and LE 1.5 billion towards payments for fuel supply to the Petroleum Company.

In this scenario, EEHC has a much improved long-term financial performance. EEHC will be able to meet its financial obligations and have a positive cash flow throughout the project implementation and in the long-term, as shown in the tables attached at the end of this Annex.

In order to monitor EEHC's progress in improving its financial performance, agreement was reached between the Bank and EEHC on key performance indicators to be achieved by the end of the project. These are a current ratio higher than or equal to 1 and a debt service coverage ratio higher than or equal to 1.4.

Assumptions for projections of financial performance of EEHC

The analysis is based on actual audited results for the years 2001/02-2003/04 and company estimates for 2004/05. The projections cover the years 2005/06-2019/20. The project implementation period is 2005/06-2010/11.

Key Assumptions for financial statements

Electricity demand	is assumed to be increasing according to the plan received from EEHC with an average annual rate of increase of 5.9% (Source: EEHC).
Electricity losses	include technical and non-technical distribution, transmission and generation losses. Distribution losses were 10.2% in 2003/04 (source: company). These losses are expected to remain constant in 2004/05, and are estimated to be gradually reduced to 9% by the end of the project implementation (i.e., 2010/11). Transmission losses stood at 4.2 in 2003/04, and are expected to be gradually reduced to 3% by 2010/11; while generation losses are estimated at 4% by the end of the project (Source: EEHC).
Electricity resources	as of 2003/04, 87% of the gross electricity supplied is assumed to be generated from EEHC generation companies, and 13% are purchased from the BOTs, the New and Renewable Energy Authority and Industries (Source: EEHC).
Electricity Supply	comprises electricity requirements to meet demand plus losses.

Fuel	the fuels used by EEHC are natural gas, heavy and light fuel oil. The demand for these fuels is adjusted according to the requirements of the implementation of EEHC's expansion plan (Source: EEHC).
Inflation	domestic inflation is assumed to be 6% per year as of 2004/05, while the foreign inflation is assumed to be 2.5% per year as of 2004/05.

Income Statement

Revenues	are mainly derived from electricity sales, other revenues comprise of minor charges, such as maintenance for substations owned by others, etc.
Fuel Cost	the cost for natural gas is assumed to stay constant at 14.1 Piasters/m^3. The cost for the other fuels (i.e., heavy and light fuel oil) used by EEHC in electricity production is assumed to increase annually by 2.5% (i.e., the rate of foreign inflation) (Source: EEHC).
Purchased electricity	the cost for electricity purchased from BOTs, the New and Renewable Energy Authority and Industries and sold by distribution companies. This cost for the New and Renewable Energy Authority and Industries is assumed to increase at the rate of local inflation. The calculation of the BOTs' cost is divided into two components, according to the terms in the BOT contracts: half of the BOT average price is increased at the rate of foreign inflation, while the other half is increased by the annual rate of increase in the fuel price. (Source: EEHC).
Salaries	are assumed to increase with at the rate of 10% per year (Source: EEHC).
Materials and Services	assumed as a percentage of gross fixed assets and assumed to increase gradually towards 3% of gross fixed assets by 2010/11 (Source: industry practice).
Other Operating Expenses	costs include rental of buildings, utility services for administration, vehicles, etc., and it is assumed to increase annually at the rate of local inflation (Source: EEHC).
Provision for accounts receivables	each year starting on 2005/06 includes a provision for doubtful collection equivalent to 6.5% of non-collected billings of the current year.

Depreciation	the current charge is based on the straight line methodology and assumed to continue as such. To this charge, the project assets are added which are assumed to depreciate over 30 years on average, i.e., 3% per year (Source: EEHC).
Financial charge	comprises interest payments on borrowings. For the World Bank Loan, an average interest rate of 5% has been assumed in the projections based on a 10-year forecast of LIBOR and the World Bank spread. A commitment fee of 0.35% for the first four years, and 0.25% thereafter is applied to the un-disbursed amount (Source: World Bank). It is assumed that the front-end fee of 0.25% of the loan amount will be borne by the EEHC.
Profit tax	EEHC tax rate is 10% of its profits (Source: EEHC).

Sources and Applications of Funds

Internal sources	comprise net operating income before financial charges with the depreciation charge added back.
External sources	comprise of borrowings.
Capital investments	comprise the total of capital investments undertaken by the company including the Project (Source: EEHC).
Debt service	comprises interest charges and repayments on borrowings.
Working capital	is the annual change in currents assets (less cash) and current liabilities.

Balance Sheet

Gross fixed assets	represent the previous year's gross fixed assets plus the work in progress as it is completed.
Work in progress	represents the ongoing investments under implementation.
Net Account receivables	represents previous year's receivables and the portion of current years billings not collected less the provision for doubtful revenue (from arrears and current billings). In the audited statements for 2003/04, about LE 8.4 billion represent arrears from the government, public utilities and holding companies owned by the government, and by June 30, 2005, this figure was estimated at LE 7.7 billion.

	For the year 2004/05 a settlement has been reached with the Ministry of Finance to swap LE 3.13 billion of account receivables for past due liabilities from the company, which have been honored by the Ministry of Finance. EEHC has prepared a plan to collect the remainder of arrears that are due from the government, public utilities and holding companies owned by the government, which have been incorporated in the financial model. It is also assumed that these entities will start paying its electricity bill on a timely basis, given recent changes to the country's budgeting process and instruction from the Ministry of Finance for timely payment of electricity bills.
Collection of arrears	In addition to the settlements mentioned above, it is assumed that 20% of the 2005/06 net accounts receivable are collected between 2006/07 and 2009/10 (5% each year), and that from 2008/09 onwards 50% of the non-collected revenue of the previous year is collected.
Inventory	represents fuel and materials. It is assumed that inventory will be kept at a level representing 6 months of supply of fuel and materials (Source: EEHC).
Account Payables	represents previous years payables for suppliers (e.g., fuel and material) and other operating expenses.
Past due loan payments	represent past due loan payments that have been serviced by the Ministry of Finance, or past due loans and from the National Investment Bank (NIB). The past due loans owed to NIB are converted into equity in 2009/10. The portion owed to the Ministry of Finance is reduced to through settlements reached with the government, public utilities and holding companies owned by the government.
Interest on past due loans	represent past due interest charges owed by EEHC to the government and to the NIB. The charges owed to the government, are assumed to be paid off by EEHC over 25 years, and the charges owed to NIB are converted into equity.
Retained earnings/losses	represent accumulated earnings/losses incurred by the company.

Long-term debt	current long-term debt represents current and future loans taken by EEHC to finance its capital investment program. All of the company's future foreign capital investment financing needs and 50% of the company's future local capital investment needs will be financed by loans (Source: EEHC).

Projections of Egyptian Electricity Holding Company's Future Financial Performance

ARAB REPUBLIC OF EGYPT
El-Tobbin Power Project
Egyptian Electricity Holding Company
Key Assumptions for Financial Analysis

	Audited	Audited	Audited	Estimate	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
1. Electricity sales volume (GWh)																			
Very high voltage	10,276	10,330	11,167	12,127	12,151	12,334	12,580	12,832	13,088	13,350	13,617	13,890	14,167	14,451	14,740	15,034	15,335	15,642	15,955
High voltage	4,743	5,199	5,523	5,823	5,957	6,136	6,350	6,573	6,803	7,041	7,287	7,542	7,806	8,079	8,362	8,655	8,958	9,271	9,596
Medium and low voltage																			
Residential	25,673	27,717	29,693	31,994	34,362	36,781	39,263	41,902	44,701	47,673	50,834	54,189	57,744	61,526	65,538	69,798	74,321	79,114	84,201
Commercial	1,700	1,766	1,990	2,021	2,171	2,323	2,480	2,647	2,824	3,011	3,211	3,423	3,648	3,886	4,140	4,409	4,695	4,998	5,319
Other	26,774	29,107	31,358	33,194	35,650	38,160	40,736	43,473	46,377	49,462	52,741	56,222	59,910	63,834	67,996	72,416	77,108	82,082	87,360
Total domestic sales volume	69,166	74,119	79,731	85,159	90,291	95,733	101,410	107,427	113,793	120,537	127,691	135,266	143,275	151,777	160,776	170,312	180,417	191,107	202,430
Exports	256	827	918	750	652	652	652	743	776	831	887	887	887	887	887	887	887	887	891
Total sales volume	69,422	74,946	80,649	85,909	90,943	96,385	102,062	108,169	114,569	121,369	128,577	136,153	144,162	152,664	161,662	171,199	181,303	191,994	203,322
3. Electricity sales revenue (LE thousand)																			
Very high voltage	666,502	678,007	731,845																
High voltage	541,490	597,017	633,364																
Medium and low voltage																			
Residential	2,118,870	2,295,252	2,527,405																
Commercial	433,378	463,697	528,533																
Other	5,082,866	5,546,143	5,959,612																
Total domestic sales revenue	8,843,106	9,580,115	10,380,759	12,049,999	13,414,933	14,934,749	16,611,360	18,476,728	20,550,325	23,074,410	25,910,355	29,094,345	32,666,086	36,680,730	41,186,818	46,247,564	51,930,960	58,308,498	65,469,236
Exports	38,941	191,417	214,161	203,500	181,339	185,873	190,520	222,427	238,247	261,542	286,042	293,193	300,523	308,036	315,737	323,630	331,721	340,014	350,257
Total sales revenue	8,882,047	9,771,533	10,594,920	12,253,499	13,596,273	15,120,622	16,801,880	18,699,155	20,788,572	23,335,952	26,196,397	29,387,538	32,966,609	36,988,765	41,502,555	46,571,194	52,262,680	58,648,512	65,819,493
4. Electricity balance																			
Distribution losses (%)	10.9%	11.1%	10.2%	10.3%	10.2%	10.0%	9.75%	9.5%	9.25%	9.0%	8.9%	8.8%	8.7%	8.6%	8.5%	8.5%	8.5%	8.5%	8.5%
Transmission losses (%)	5.2%	4.4%	3.8%	4.2%	4.2%	4.0%	3.7%	3.5%	3.3%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Generation self consumption/losses (%)	3.95%	3.89%	3.85%	3.80%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Demand (GWh)																			
Distribution demand	53,874	58,315	62,735	66,910	78,139	83,400	88,830	94,595	100,705	107,187	114,073	121,376	129,108	137,326	146,036	155,277	165,081	175,465	186,476
Distribution losses	6,577	7,303	7,141	7,708	7,970	8,340	8,661	8,986	9,315	9,647	10,153	10,681	11,232	11,810	12,413	13,199	14,032	14,915	15,850
Energy required to meet distribution demand	60,451	65,618	69,876	74,618	86,110	91,740	97,491	103,581	110,020	116,834	124,226	132,057	140,340	149,136	158,449	168,476	179,113	190,379	202,326
Self generation and direct purchase from GC's	1,146	1,220	1,132	1,331	3,444	3,670	3,900	4,143	4,401	4,673	4,969	5,282	5,614	5,965	6,338	6,739	7,165	7,615	8,093
Energy required from EETC	59,305	64,398	68,744	73,287	82,665	88,070	93,591	99,438	105,619	112,161	119,257	126,775	134,727	143,171	152,111	161,737	171,949	182,764	194,233
Direct demand (from EETC)	15,589	16,674	17,921	19,009	12,151	12,334	12,580	12,832	13,088	13,350	13,617	13,890	14,167	14,451	14,740	15,034	15,335	15,642	15,955
Total energy transmitted	74,894	81,072	86,665	92,296	94,816	100,404	106,171	112,270	118,707	125,511	132,874	140,665	148,894	157,622	166,851	176,771	187,284	198,406	210,188
Transmission losses	4,075	3,722	3,414	4,046	3,982	4,016	3,928	3,929	3,858	3,765	3,986	4,220	4,467	4,729	5,006	5,303	5,619	5,952	6,306
Total electricity required (GWh)	78,969	84,795	90,079	96,342	98,799	104,420	110,100	116,199	122,565	129,276	136,860	144,885	153,361	162,350	171,856	182,075	192,903	204,358	216,493
Supply (GWh)																			
Cairo Electricity Production Company	17,183	18,493	18,230	22,376	22,726	24,160	25,540	27,102	28,663	30,246	32,077	34,024	36,092	38,295	40,635	43,163	45,852	48,708	51,744
East Delta Electricity Production Company	22,854	24,177	23,760	24,700	25,086	26,670	28,193	29,917	31,641	33,387	35,409	37,558	39,840	42,272	44,855	47,646	50,615	53,767	57,118
West Delta Electricity Production Company	14,759	15,236	15,676	16,993	17,259	18,348	19,396	20,582	21,768	22,970	24,360	25,839	27,409	29,082	30,859	32,779	34,822	36,990	39,296
Upper Egypt Electricity Production Company	10,380	10,296	10,285	11,164	11,338	12,054	12,743	13,522	14,301	15,090	16,004	16,976	18,007	19,108	20,274	21,535	22,877	24,302	25,816
Hydro Plants	15,130	12,859	13,019	12,200	12,391	13,173	13,925	14,777	15,628	16,491	17,489	18,551	19,678	20,879	22,155	23,533	25,000	26,557	28,212
Gross Electricity Supplied (GWh)	80,306	81,061	80,971	87,433	88,800	94,406	99,797	105,898	112,001	118,184	125,339	132,949	141,026	149,635	158,777	168,656	179,166	190,325	202,185
Purchased From BOOT	2,441	7,335	12,673	12,700	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600
Purchased from NREA and others	315	281	444	528	774	981	1,463	1,669	2,151	2,908	3,596	4,285	4,973	5,661	6,349	7,038	7,726	8,414	9,103
Generation Self Consumption & Losses	3,173	3,154	3,114	3,325	3,375	3,567	3,761	3,969	4,187	4,416	4,675	4,949	5,239	5,546	5,870	6,219	6,589	6,980	7,395
Net Electricity Supplied (GWh)	79,889	85,523	90,973	97,336	98,799	104,420	110,100	116,199	122,565	129,276	136,860	144,885	153,361	162,350	171,856	182,075	192,903	204,358	216,493
Fuel Requirements for Own Energy Supply (Amounts)																			
Average Gas Required (m3/kWh)	0.26	0.27	0.27	0.26	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.31	0.31	0.30	0.30	0.30	0.30	0.29
Gas Required (million m3)	15,250	16,530	16,672	17,897	21,105	22,469	24,147	25,203	27,118	28,373	29,871	31,137	33,349	35,356	37,208	39,414	41,641	43,791	46,104
Average Fuel Oil Required (ton/GWh)	2,332	2,473	1,843	1,802	3,692	3,271	2,688	2,200	2,233	2,057	2,156	2,113	1,946	1,993	1,904	1,946	1,977	2,002	2,011
Heavy Fuel Oil Required (thousands of tons)	1,498	1,642	1,213	1,331	2,674	2,514	2,172	1,858	1,994	1,933	2,157	2,248	2,190	2,382	2,421	2,640	2,869	3,102	3,330
Light Fuel Oil (thousand ton)	22	45	39	24	147	143	145	147	158	159	168	169	171	171	180	184	179	176	168
Average Fuel Prices (including transportation)																			
Gas (Piaster/m3)	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
Heavy Fuel Oil (LE/ton)	182.00	182.00	182.00	182.00	182.00	186.55	191.21	195.99	200.89	205.92	211.06	216.34	221.75	227.29	232.98	238.80	244.77	250.89	257.16
Light Fuel Oil (LE/ton)	522.06	522.06	522.06	522.06	522.06	535.11	548.49	562.20	576.26	590.66	605.43	620.56	636.08	651.98	668.28	684.99	702.11	719.66	737.66
Fuel Cost For Own Production ('000 LE)																			
Gas	2,150,220	2,330,795	2,350,743	2,523,477	2,975,805	3,168,129	3,404,727	3,553,623	3,823,638	4,000,593	4,211,811	4,390,317	4,702,209	4,985,196	5,246,328	5,557,374	5,871,381	6,174,531	6,500,664
Heavy Fuel Oil	272,636	298,844	220,766	242,242	486,668	468,987	415,316	364,157	400,583	398,036	455,265	486,334	485,631	541,412	564,033	630,431	702,244	778,258	856,347
Light Fuel Oil	11,345	23,425	20,570	12,701	76,743	76,521	79,531	82,644	91,048	93,915	101,712	104,875	108,770	111,489	120,290	126,038	125,678	126,661	123,926
Total Fuel Cost For Own Production ('000 LE)	2,434,201	2,653,064	2,592,079	2,778,420	3,539,216	3,713,637	3,899,574	4,000,424	4,315,269	4,492,545	4,768,789	4,981,527	5,296,610	5,638,097	5,930,652	6,313,843	6,699,304	7,079,450	7,480,937

ARAB REPUBLIC OF EGYPT
El-Tebbin Power Project
Egyptian Electricity Holding Company
Actual and Forecast Financial Statements for Years Ending June 30 ('000 LE)

INCOME STATEMENT	2001/02 *Audited*	2002/03 *Audited*	2003/04 *Audited*	2004/05 *Estimate*	2005/06 *Forecast*	2006/07 *Forecast*	2007/08 *Forecast*	2008/09 *Forecast*	2009/10 *Forecast*	2010/11 *Forecast*	2011/12 *Forecast*	2012/13 *Forecast*	2013/14 *Forecast*	2014/15 *Forecast*	2015/16 *Forecast*	2016/17 *Forecast*	2017/18 *Forecast*	2018/19 *Forecast*	2019/20 *Forecast*
Operating Revenue																			
Electricity Sales	8,886,845	9,777,070	10,585,906	12,253,499	13,596,273	15,120,622	16,801,880	18,699,155	20,788,572	23,335,952	26,196,397	29,387,538	32,966,609	36,968,765	41,502,555	46,571,194	52,262,680	58,648,512	65,819,493
Other Revenue	616,624	670,619	763,589	839,948	923,943	1,016,337	1,117,971	1,229,768	1,352,744	1,488,019	1,636,821	1,735,030	1,839,132	1,949,480	2,066,449	2,190,436	2,321,862	2,461,173	2,608,844
Government Fuel Subsidy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue	*9,503,469*	*10,447,689*	*11,349,496*	*13,093,446*	*14,520,216*	*16,136,959*	*17,919,850*	*19,928,923*	*22,141,316*	*24,823,971*	*27,833,218*	*31,122,568*	*34,805,740*	*38,938,245*	*43,569,004*	*48,761,630*	*54,584,542*	*61,109,685*	*68,428,336*
Operating Expenses																			
Fuel Cost	2,434,201	2,653,064	2,592,079	2,778,420	3,539,216	3,713,637	3,899,574	4,000,424	4,315,269	4,492,545	4,768,789	4,981,527	5,296,610	5,638,097	5,939,652	6,313,843	6,699,304	7,079,450	7,480,937
Purchased Electricity (BOT, NREA)	235,118	767,990	1,636,665	1,734,865	1,838,957	1,949,294	2,066,252	2,190,227	2,321,641	2,460,939	2,608,595	2,765,111	2,931,018	3,106,879	3,293,292	3,490,889	3,700,342	3,922,363	4,157,705
Salaries and Wages	1,597,065	1,851,748	2,032,000	2,235,200	2,458,720	2,704,592	2,975,051	3,272,556	3,599,812	3,959,793	4,355,772	4,791,350	5,270,485	5,797,533	6,377,286	7,015,015	7,716,517	8,488,168	9,336,985
Materials and Services	990,639	1,022,408	1,154,585	1,257,505	1,353,690	1,682,622	2,013,561	2,297,189	2,720,456	3,035,398	3,264,049	3,309,049	3,354,049	3,429,049	3,504,049	3,579,049	3,748,609	3,823,609	4,009,717
Other Operating Expenses	666,040	864,635	770,542	816,775	865,781	917,728	972,792	1,031,159	1,093,029	1,158,610	1,228,127	1,301,814	1,379,923	1,462,718	1,550,482	1,643,511	1,742,121	1,846,649	1,957,448
Provision for Doubtful Account Receivables	-	98,455	-	-	53,025	49,142	43,685	48,618	54,050	60,673	68,111	76,408	85,713	96,171	107,907	121,065	135,863	152,486	171,131
Total Operating Expenses	*5,923,063*	*7,058,300*	*8,185,871*	*8,822,764*	*10,109,389*	*11,017,014*	*11,970,915*	*12,840,172*	*14,104,256*	*15,167,958*	*16,293,443*	*17,225,259*	*18,317,798*	*19,530,448*	*20,763,668*	*22,163,393*	*23,742,776*	*25,312,725*	*27,113,923*
Net Operating Income Before Depreciation and Financial Costs	3,580,406	3,389,389	3,173,624	4,270,682	4,410,827	5,119,945	5,948,936	7,088,751	8,037,060	9,656,013	11,539,775	13,897,309	16,487,943	19,407,797	22,805,336	26,598,237	30,841,766	35,796,960	41,314,413
Depreciation	1,470,469	1,584,096	1,800,564	1,928,850	2,032,232	2,077,232	2,241,422	2,462,972	2,507,972	2,767,154	3,082,096	3,310,748	3,355,748	3,400,748	3,475,748	3,550,748	3,625,748	3,795,308	3,870,308
Net Operating Income Before Financial Costs	2,109,937	1,805,293	1,373,060	2,341,833	2,378,594	3,042,712	3,707,514	4,625,779	5,529,088	6,888,858	8,457,679	10,586,561	13,132,195	16,007,050	19,329,588	23,047,490	27,216,018	32,001,652	37,444,106
Interest	1,922,503	2,066,214	2,048,836	921,459	1,178,768	1,375,536	1,560,134	1,773,380	1,744,433	1,635,081	1,423,233	1,187,473	1,109,375	898,487	765,510	651,047	539,004	428,900	275,516
Financial Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Operating Income Before Tax	187,434	(260,921)	(675,776)	1,420,373	1,199,826	1,667,177	2,147,379	2,852,399	3,784,655	5,253,777	7,034,446	9,399,088	12,022,820	15,108,563	18,564,078	22,396,443	26,677,014	31,572,752	37,168,590
Extraordinary Income	666,956	754,417	1,057,024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Extraordinary Expense	639,938	556,686	899,268	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Income After Extraordinary Items and Before Tax	214,454	(63,170)	(518,020)	1,420,373	1,199,826	1,667,177	2,147,379	2,852,399	3,784,655	5,253,777	7,034,446	9,399,088	12,022,820	15,108,563	18,564,078	22,396,443	26,677,014	31,572,752	37,168,590
Taxes (Profit tax of 10%)	-	-	-	142,037	119,983	166,718	214,738	285,240	378,466	525,378	703,445	939,909	1,202,282	1,510,856	1,856,408	2,239,644	2,667,701	3,157,275	3,716,859
Adjusted Net Profit	214,454	(63,170)	(518,020)	1,278,336	1,079,844	1,500,459	1,932,641	2,567,159	3,406,190	4,728,400	6,331,001	8,459,179	10,820,538	13,597,707	16,707,670	20,156,799	24,009,313	28,415,477	33,451,731

ARAB REPUBLIC OF EGYPT
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Egyptian Electricity Holding Company
Actual and Forecast Financial Statements for Years Ending June 30 ('000 LE)

CASH FLOW STATEMENT	2001/02 *Audited*	2002/03 *Audited*	2003/04 *Audited*	2004/05 *Estimate*	2005/06 *Forecast*	2006/07 *Forecast*	2007/08 *Forecast*	2008/09 *Forecast*	2009/10 *Forecast*	2010/11 *Forecast*	2011/12 *Forecast*	2012/13 *Forecast*	2013/14 *Forecast*	2014/15 *Forecast*	2015/16 *Forecast*	2016/17 *Forecast*	2017/18 *Forecast*	2018/19 *Forecast*	2019/20 *Forecast*
SOURCES																			
Internal Sources																			
Net Operating Income Before Financial Costs				2,341,833	2,378,594	3,042,712	3,707,514	4,625,779	5,529,088	6,888,858	8,457,679	10,586,561	13,132,195	16,007,050	19,329,588	23,047,490	27,216,018	32,001,652	37,444,106
Extraordinary Income				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation				1,928,850	2,032,232	2,077,232	2,241,422	2,462,972	2,507,972	2,767,154	3,082,096	3,310,748	3,355,748	3,400,748	3,475,748	3,550,748	3,625,748	3,795,308	3,870,308
Total Internal Sources				4,270,682	4,410,827	5,119,945	5,948,936	7,088,751	8,037,060	9,656,013	11,539,775	13,897,309	16,487,943	19,407,797	22,805,336	26,598,237	30,841,766	35,796,960	41,314,413
External Sources																			
Grants				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borrowings				3,106,900	4,216,000	5,360,250	4,868,550	6,804,600	5,329,150	2,298,150	937,500	945,800	2,020,250	2,571,800	3,047,950	3,469,650	2,977,800	2,619,850	1,812,500
Total External Sources				3,106,900	4,216,000	5,360,250	4,868,550	6,804,600	5,329,150	2,298,150	937,500	945,800	2,020,250	2,571,800	3,047,950	3,469,650	2,977,800	2,619,850	1,812,500
TOTAL SOURCES				**7,377,582**	**8,626,827**	**10,480,195**	**10,817,486**	**13,893,351**	**13,366,210**	**11,954,163**	**12,477,275**	**14,843,109**	**18,508,193**	**21,979,597**	**25,853,286**	**30,067,887**	**33,819,566**	**38,416,810**	**43,126,913**
APPLICATIONS																			
Total Capital Investment Requirements				4,095,993	5,514,675	6,816,151	6,359,947	8,949,913	6,984,476	3,304,018	1,500,000	1,510,800	2,727,000	3,418,300	3,961,700	4,433,900	3,867,800	3,436,100	2,500,000
Profit Tax				142,037	119,983	166,718	214,738	285,240	378,466	525,378	703,445	939,909	1,202,282	1,510,856	1,856,408	2,239,644	2,667,701	3,157,275	3,716,859
Debt Service																			
Interest				921,459	1,178,768	1,375,536	1,560,134	1,773,380	1,744,433	1,635,081	1,423,233	1,187,473	1,109,375	898,487	765,510	651,047	539,004	428,900	275,516
Principal				2,081,503	2,005,009	2,035,835	2,109,539	3,185,743	3,860,128	3,895,968	4,280,399	4,558,621	4,961,283	4,526,358	4,087,839	4,128,946	3,915,302	3,741,829	3,742,045
Total Debt Service				3,002,962	3,183,777	3,411,371	3,669,673	4,959,123	5,604,561	5,531,049	5,703,632	5,746,094	6,070,658	5,424,845	4,853,350	4,779,993	4,454,306	4,170,729	4,017,561
Increase (Decrease) in Working Capital				(1,632,324)	(236,397)	945,036	1,343,998	(57,923)	570,299	1,175,818	725,568	1,010,892	720,768	1,344,422	1,717,540	1,412,993	1,831,816	1,990,010	2,028,960
Extraordinary Expense				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL APPLICATIONS				**5,608,569**	**8,582,038**	**11,339,275**	**11,588,356**	**14,136,353**	**13,537,801**	**10,530,263**	**8,632,664**	**9,207,695**	**10,720,709**	**11,698,423**	**12,388,998**	**12,866,530**	**12,821,624**	**12,754,115**	**12,263,380**
Surplus Funds				1,768,914	44,789	(859,080)	(770,870)	(243,002)	(171,591)	1,417,900	3,844,610	5,635,414	7,787,484	10,281,174	13,464,288	17,201,357	20,997,942	25,662,695	30,863,534
Opening Cash Balance				2,257,282	4,026,196	4,070,985	3,211,905	2,441,037	2,198,036	2,026,445	3,444,346	7,288,958	12,924,373	20,711,858	30,993,034	44,457,323	61,658,681	82,656,624	108,319,320
Closing Cash Balance				4,026,196	4,070,984	3,211,905	2,441,036	2,198,035	2,026,445	3,444,346	7,288,957	12,924,372	20,711,857	30,993,033	44,457,322	61,658,680	82,656,623	108,319,319	139,182,854

ARAB REPUBLIC OF EGYPT
El-Tebbin Power Project
Egyptian Electricity Holding Company
Actual and Forecast Financial Statements for Years Ending June 30 ('000 LE)

BALANCE SHEET	2001/02 *Audited*	2002/03 *Audited*	2003/04 *Audited*	2004/05 *Estimate*	2005/06 *Forecast*	2006/07 *Forecast*	2007/08 *Forecast*	2008/09 *Forecast*	2009/10 *Forecast*	2010/11 *Forecast*	2011/12 *Forecast*	2012/13 *Forecast*	2013/14 *Forecast*	2014/15 *Forecast*	2015/16 *Forecast*	2016/17 *Forecast*	2017/18 *Forecast*	2018/19 *Forecast*	2019/20 *Forecast*
ASSETS																			
Fixed Assets																			
Gross Fixed Assets	51,824,385	58,551,009	62,738,382	66,184,475	67,684,475	73,157,462	80,542,451	82,042,451	90,681,867	101,179,925	108,801,648	110,301,648	111,801,648	114,301,648	116,801,648	119,301,648	124,953,648	127,453,648	133,657,248
Less Accumulated Depreciation	13,049,408	14,625,156	16,274,309	18,203,159	20,235,391	22,312,624	24,554,046	27,017,017	29,524,989	32,292,143	35,374,239	38,664,987	42,040,735	45,441,482	48,917,230	52,467,978	56,093,725	59,889,033	63,759,341
Net Fixed Assets	38,774,977	43,925,853	46,464,073	47,981,316	47,449,084	50,844,838	55,988,405	55,025,434	61,156,878	68,887,782	73,427,409	71,636,661	69,760,913	68,860,166	67,884,418	66,833,670	68,859,923	67,564,615	69,897,907
Work-in-Progress	2,077,633	2,505,854	4,276,189	4,926,089	8,940,764	10,283,928	9,250,886	16,706,799	15,050,859	7,859,819	1,738,096	1,748,896	2,975,896	3,894,196	5,355,896	7,289,796	5,505,596	6,441,696	2,738,096
Total Fixed Assets	*40,852,610*	*46,431,707*	*50,740,262*	*52,907,405*	*56,389,848*	*61,128,766*	*65,247,291*	*71,734,233*	*78,210,737*	*76,747,601*	*75,165,505*	*73,385,557*	*72,736,809*	*72,754,362*	*73,240,314*	*74,123,466*	*74,365,519*	*74,006,311*	*72,636,003*
Investments	38,907	39,919	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171	41,171
Long-Term Receivables	97,527	88,132	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685	86,685
Current Assets																			
Cash																			
Gross Accounts Receivable	1,267,195	1,881,986	2,257,282	4,026,196	4,070,985	3,211,906	2,441,037	2,198,036	2,026,446	3,444,347	7,288,958	12,924,373	20,711,858	30,993,034	44,457,323	61,658,681	82,656,624	108,319,320	139,182,856
Less Provision for Bad Accounts	14,559,797	10,239,683	11,301,607	11,354,710	10,145,786	8,372,479	7,865,216	7,097,807	6,376,029	6,219,995	6,553,432	6,958,306	7,442,519	8,016,036	8,936,365	9,969,161	11,128,245	12,428,931	13,888,741
Net Accounts Receivable	-	98,455	-	-	53,025	49,142	43,885	48,618	54,050	60,673	68,111	76,408	85,213	96,171	107,907	121,085	135,883	152,486	171,131
	14,559,797	10,141,228	11,203,152	11,354,710	10,092,761	8,323,337	7,821,531	7,049,189	6,321,978	6,158,322	6,485,321	6,881,898	7,356,806	7,919,867	8,828,458	9,848,076	10,992,362	12,276,945	13,717,610
Inventories	2,876,953	2,917,131	2,831,042	1,598,794	1,996,223	2,137,255	2,285,361	2,383,077	2,611,044	2,752,172	2,928,403	3,042,272	3,207,313	3,390,557	3,549,334	3,753,420	3,974,420	4,176,983	4,408,755
Total Current Assets	*17,703,945*	*14,940,345*	*16,291,476*	*16,979,699*	*18,158,969*	*13,672,498*	*12,547,949*	*11,630,301*	*10,959,468*	*12,354,840*	*16,702,682*	*22,848,543*	*31,275,977*	*42,303,457*	*56,835,115*	*75,260,187*	*97,623,405*	*124,772,759*	*157,309,229*
TOTAL ASSETS	**59,652,589**	**61,497,103**	**67,159,594**	**70,914,968**	**72,676,672**	**74,929,121**	**77,923,897**	**83,492,390**	**87,298,061**	**89,238,297**	**91,996,943**	**96,341,956**	**104,140,641**	**115,185,675**	**130,203,285**	**149,511,509**	**172,116,780**	**198,906,926**	**230,073,079**
EQUITIES AND LIABILITIES																			
EQUITY																			
State Capital	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700	6,387,700
Converted equity						19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973	19,008,973
Legal and Statutory Reserves	1,177,176	1,250,102	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459	1,167,459
Other Provisions	315,481	303,471	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459	331,459
Carried surplus	-	-	11,874	11,874	11,875	11,876	11,877	11,878	11,879	11,880	11,881	11,882	11,883	11,884	11,885	11,886	11,887	11,888	11,889
Retained Earnings/Losses	-	-	(518,020)	760,316	1,840,159	3,340,618	5,273,260	7,840,419	11,246,689	15,975,008	22,306,009	30,765,189	41,585,727	55,183,434	71,891,194	92,047,902	116,057,215	144,472,692	177,824,423
Total Equity	*7,880,357*	*7,941,273*	*7,380,472*	*8,658,808*	*9,738,652*	*30,248,085*	*32,180,728*	*34,747,888*	*38,154,079*	*42,882,479*	*49,213,481*	*57,672,662*	*68,493,201*	*82,090,909*	*98,798,580*	*118,955,379*	*142,964,693*	*171,380,171*	*204,831,903*
LIABILITIES																			
Long-Term Debt	21,777,056	27,355,798	28,499,506	31,606,406	33,740,903	28,078,351	30,911,066	35,606,127	37,749,534	36,187,556	33,229,088	29,894,489	27,356,118	24,866,635	23,488,226	22,870,037	21,718,891	20,423,439	18,494,109
Less Current Portion	-	-	-	2,081,503	2,005,009	2,035,835	2,109,539	3,185,743	3,860,128	3,895,968	4,280,399	4,558,621	4,961,283	4,526,358	4,087,839	4,128,946	3,915,302	3,741,829	3,742,045
Net Long-Term Debt	21,777,056	27,355,798	28,499,506	29,524,903	31,735,894	26,042,516	28,801,527	32,420,384	33,889,406	32,291,588	28,948,689	25,335,868	22,394,835	20,440,276	19,400,387	18,741,091	17,803,589	16,681,609	14,752,065
Current Liabilities																			
Accounts Payables	9,581,409	8,357,863	7,653,754	5,239,159	4,744,638	4,499,368	3,895,834	3,585,492	3,224,151	2,775,750	2,402,321	1,885,617	1,696,011	1,862,485	2,020,720	2,205,369	2,418,175	2,610,922	2,841,158
Current Portion of Long-Term Debt	-	-	2,081,503	2,005,009	2,035,835	2,109,539	3,185,743	3,860,128	3,895,968	4,280,399	4,558,621	4,961,283	4,526,358	4,087,839	4,128,946	3,915,302	3,741,829	3,742,045	3,742,045
Short-Term Debt	877,600	843,161	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953	853,953
Past Due Loan Payment																			
Ministry of Finance	10,754,214	9,380,900	10,755,321	9,151,400	6,626,700	4,102,000	2,927,300	1,752,600	577,900	-	-	-	-	-	-	-	-	-	-
Commercial Loans	1,511,309	1,318,315	3,684,000	4,466,203	5,248,406	2,450,654	2,346,711	2,242,768	2,138,825	2,034,883	1,918,203	1,787,221	1,640,283	1,475,490	1,290,506	1,082,993	850,138	586,824	295,582
Accrued Interest on Past Due Loan Amortization	6,839,345	5,949,541	7,737,702	9,302,108	10,866,514	3,673,086	3,569,143	3,465,200	3,361,257	3,257,315	3,140,635	3,009,653	2,862,715	2,697,882	2,512,938	2,305,425	2,072,579	1,811,266	1,516,014
Deferred Liabilities	277,194	137,904	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175	370,175
Provision for Taxes	194,515	212,348	224,711	396,748	466,731	653,449	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187	868,187
Total Current Liabilities	*30,035,576*	*26,200,032*	*31,279,618*	*31,831,250*	*31,207,126*	*18,638,519*	*16,940,847*	*16,324,118*	*15,254,576*	*14,056,230*	*13,833,672*	*13,333,426*	*13,252,607*	*12,464,490*	*12,004,318*	*11,815,039*	*11,346,499*	*10,845,746*	*10,489,112*
TOTAL EQUITIES AND LIABILITIES	***59,692,589***	***61,497,103***	***67,159,594***	***70,914,960***	***72,676,672***	***74,929,121***	***77,923,897***	***83,492,390***	***87,298,061***	***89,238,297***	***91,996,943***	***96,341,956***	***104,140,641***	***115,185,675***	***130,203,285***	***149,511,509***	***172,116,780***	***198,906,926***	***230,073,079***

ARAB REPUBLIC OF EGYPT
El-Tebbin Power Project
Egyptian Electricity Holding Company
Actual and Forecast Financial Statements for Years Ending June 30 ('000 LE)

FINANCIAL INDICATORS	2001/02 *Audited*	2002/03 *Audited*	2003/04 *Audited*	2004/05 *Estimate*	2005/06 *Forecast*	2006/07 *Forecast*	2007/08 *Forecast*	2008/09 *Forecast*	2009/10 *Forecast*	2010/11 *Forecast*	2011/12 *Forecast*	2012/13 *Forecast*	2013/14 *Forecast*	2014/15 *Forecast*	2015/16 *Forecast*	2016/17 *Forecast*	2017/18 *Forecast*	2018/19 *Forecast*	2019/20 *Forecast*
Working Ratio (%)	62%	68%	72%	67%	70%	68%	67%	64%	64%	61%	59%	55%	53%	50%	48%	45%	43%	41%	40%
Working Ratio with depreciation and interest (%)	98%	102%	106%	89%	92%	90%	88%	86%	83%	79%	75%	70%	65%	61%	57%	54%	51%	48%	46%
Operating Margin (%)	38%	32%	28%	33%	30%	32%	33%	36%	36%	39%	41%	45%	47%	50%	52%	55%	57%	59%	60%
Net Operating Margin (%)	2%	-1%	-5%	10%	7%	9%	11%	13%	15%	19%	23%	27%	31%	35%	38%	41%	44%	46%	49%
Debt Service Coverage Ratio				1.42	1.39	1.50	1.62	1.43	1.43	1.75	2.02	2.42	2.72	3.58	4.70	5.56	6.92	8.58	10.28
Self Financing Ratio (excludes capital investment requirements)				0.71	0.55	0.54	0.49	0.52	0.61	1.18	3.05	6.45	5.74	4.76	4.14	4.40	4.81	7.31	9.00
Debt to Equity Ratio	276%	344%	386%	341%	326%	88%	89%	93%	89%	75%	59%	44%	33%	25%	20%	16%	12%	10%	7%
Current Ratio	0.62	0.57	0.52	0.53	0.52	0.73	0.74	0.71	0.72	0.88	1.21	1.71	2.36	3.34	4.73	6.37	8.60	11.50	15.00
Target current ratio					0.53	0.78	0.81	0.82	0.86	1.07									
Maintenance as a % of GFA	1.9%	1.7%	1.8%	1.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Gross Accounts Receivables (days)	598	382	389	338	272	202	171	139	112	97	91	86	82	79	78	78	78	77	77
Accounts Payables (days)	709	505	397	375	303	265	220	195	165	140	120	100	90	90	90	90	90	90	90
Annual collections from electricity sales ('000 LE)		14,195,639	9,533,982	12,200,396	14,805,196	16,880,929	17,309,143	19,466,565	21,510,350	23,492,985	25,861,968	28,982,664	32,482,396	36,415,247	40,582,228	45,538,398	51,103,597	57,347,825	64,359,683
Annual collection rate% (w/o settlement or collection of arrears)				74%	94%	95%	86%	95%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
Overall Collection rate		145%	90%	100%	109%	112%	103%	104%	103%	101%	99%	99%	98%	98%	98%	98%	98%	98%	98%
Return on Equity (%)	2.72%	-0.80%	-7.02%	14.76%	11.09%	4.96%	6.01%	7.39%	8.93%	11.03%	12.86%	14.67%	15.80%	16.56%	16.91%	16.94%	16.79%	16.58%	16.33%
Return on Net Fixed Assets (%)	0.55%	-0.14%	-1.11%	2.68%	2.28%	2.95%	3.45%	4.67%	5.57%	6.86%	8.62%	11.61%	15.51%	19.75%	*24.61%*	*30.16%*	*34.87%*	*42.06%*	*47.86%*
Inventory turnover	2.06	2.42	2.89	5.52	5.07	5.15	5.24	5.39	5.40	5.51	5.56	5.66	5.71	5.76	5.85	5.90	5.97	6.06	6.15

ARAB REPUBLIC OF EGYPT
El-Tebbin Power Project
Egyptian Electricity Holding Company
Financial NPV and IRR (LE '000)

	NPV @ 10%	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Financial Benefits	$4,946,059												
Revenue generated by Tebbin	$4,946,059												
New Tebbin Output (Gwh)		-	-	-	-	33,070	381,862	698,914	740,596	784,588	831,243	880,721	736,745
Tariff						191	2,105	3,635	3,635	3,635	3,635	3,635	2,870
						17.29	18.15	19.23	20.37	21.58	22.87	24.23	25.67
Financial Costs	$3,088,491												
Investment cost	$1,895,734	16,964	120,728	749,233	1,049,209	806,871	-	-	-	-	-	-	-
Tebbin salary & administrative cost	$490,678	-	-	-	-	5,238	58,200	100,686	100,686	100,686	100,686	100,686	79,734
Tebbin fuel cost	$546,175	-	-	-	-	5,864	64,689	111,788	111,977	112,355	111,409	111,788	88,333
Tebbin maintenance spending	$155,905	-	-	-	-	1,746	18,042	30,846	30,846	30,846	30,846	30,846	33,756
Net Financial Benefit	**$1,857,568**	**(16,964)**	**(120,728)**	**(749,233)**	**(1,049,209)**	**(786,649)**	**240,930**	**455,594**	**497,087**	**540,700**	**588,302**	**637,401**	**534,922**

	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Financial Benefits													
Revenue generated by Tebbin	957,627	1,014,764	1,075,350	1,139,595	1,207,971	1,043,841	1,327,742	1,407,407	1,491,851	1,581,362	1,396,894	1,776,819	1,883,428
New Tebbin Output (Gwh)	3,520	3,520	3,520	3,520	3,520	2,870	3,444	3,444	3,444	3,444	2,870	3,444	3,444
Tariff	27.20	28.83	30.55	32.37	34.31	36.37	38.56	40.87	43.32	45.92	48.68	51.60	54.69
Financial Costs													
Investment cost													
Tebbin salary & administrative cost	97,194	97,194	97,194	97,194	97,194	79,734	95,448	95,448	95,448	95,448	95,448	79,734	95,448
Tebbin fuel cost	108,572	108,761	109,140	108,194	108,383	88,522	106,302	106,681	106,870	105,924	106,113	88,522	106,491
Tebbin maintenance spending	29,682	29,682	29,682	29,682	29,682	33,756	29,100	29,100	29,100	29,100	29,100	33,756	29,100
Net Financial Benefit	**722,179**	**779,127**	**839,334**	**904,525**	**972,712**	**841,828**	**1,096,892**	**1,176,178**	**1,260,433**	**1,350,890**	**1,166,233**	**1,574,806**	**1,652,388**

FNPV	**$1,857,568**	**FRR**	**18%**

Annex 10: Safeguard Policy Issues

Environmental Assessment

The proposed project falls under the World Bank environmental category A classification due to its size, magnitude, severity, and irreversibility of potential environmental impacts. Of the World Bank's ten safeguard policies, only Operation Policy 4.01 on Environmental Assessment is triggered. As such, a full Environmental and Social Impact Assessment (ESIA) was carried out. An Egyptian independent consulting firm, Speedotrans, according to the Terms of Reference approved by the World Bank, prepared the ESIA.

During the ESIA preparation, the borrower consulted with stakeholders twice. The first round of consultation took place during the scoping stage of the ESIA and was held on June 7, 2005. This meeting helped the environmental consultant define the scope of work, and focus on the most relevant environmental and social issues, through feedback of the participating stakeholders. A widely publicized second consultation took place on September 4, 2005, after the draft ESIA was completed, which was attended by sector members, EEAA, NGOs, and local population.

An analysis of alternatives was carried out during the ESIA preparation. The no action alternative to the proposed El-Tebbin power plant would result in the demand for electricity exceeding supply, with an increasing deficit as demand increases in the future. As a result, the "no action" option was not considered to be a viable or acceptable alternative to the proposed project. Alternative electricity supply options such as importing electricity, rehabilitation of existing power plants, transmission and distribution investments, and IPPs were also considered, but it was determined that a new gas-fired plant at Tebbin site was the preferred alternative. Alternative technology and fuel were also considered, and it was determined that the optimal option was gas/oil-fired steam units, on the basis of primarily operational flexibility and grid stability. Finally, the site of the plant was compared to other sites, and it was determined that the Tebbin site has many advantages such as the fact that it is already designated for power generation, there is a presence of a worker colony, proximity to the Nile for cooling water intake, and proximity to substations. The environmental, health, and safety incremental risks that a new power plant at Tebbin would present were determined to be minimal, which makes the site more favorable.

The plant design incorporated various aspects to minimize environmental impacts. These include a stack height of 152 meters, to maximize buoyancy and dispersion of emission, low NO_x burners in the steam generators to minimize emissions of NO_x which is the key pollutant associated with combustion of natural gas, and open system cooling, to maximize generating efficiency, while minimizing cost, visual impact, noise emissions and the potential for visible vapor plumes or ground fogging.

The potential impacts of the demolition, construction, and operation phases of the Tebbin power plant are summarized as follows:

Air Quality. (a) Demolition and Construction Dust. Demolition and construction activities will result in locally high levels of dust. This may affect residential receptors or sensitive environments which lie in the immediate boundaries of the power plant. Existing concentrations

of airborne dust are already high in this urban industrial area. Careful management and the implementation of mitigation measures to reduce dust generation will significantly reduce potential impacts from dust emissions on site.

(b) Stack Emissions and Background Air Quality. The power plant will burn natural gas as its primary fuel, while mazout (heavy fuel) will only be used in emergency situations and for less than 2% of the time. As a result, the principle pollutant during normal operation will be NO_x. During emergency operation, the burning of fuel oil will result in emissions of particulate matter and SO_2 along with trace amounts of other pollutants. Emissions from the plant will meet Egyptian and World Bank Guidelines. To analyze the potential impacts of the plant's emissions during normal operation (firing gas) on ambient air quality in the project area, dispersion modeling has been undertaken.

The assessment indicates that the highest concentrations for each of the averaging periods under consideration (annual, daily, hourly) are found to the southeast of the site. This is because the winds are predominantly from the north and northwest for most of the time. Maximum annual concentration of NO_x emissions in the ambient atmosphere due to operation of the Tebbin power plant will not exceed 10 $\mu g/m^3$ (highest annual maximum is 9.6 $\mu g/m^3$ at the location [300 meters, 300 meters]) and the maximum daily reaches 56.8 $\mu g/m^3$ at a distance of 141 meters southeast of the powerhouse. Also, Maximum "One-hour Average" concentration of NO_x emissions in the ambient atmosphere reaches 96.3 $\mu g/m^3$ at the location [130 meters, 95 meters]. It is recommended that an air quality monitoring system composed of 2 or 3 monitoring stations will be utilized. The monitoring station equipped with meteorological monitoring system will be located near to, or within, the Tebbin power plant site, the other one or two stations will be located one down-wind within the designated area of maximum predicted pollutant concentration and the other (if any) upwind.

Aquatic Environment. Cooling water and process water for power plant operation will be drawn from the Nile River via an intake structure. The quantity of the cooling water that will be returned back to the Nile River is about 20-26 m^3 per second. Process water that will be abstracted from the Nile River is about 0.07% of this quantity. Potable water will be supplied to the power plant via the City potable water system. Cooling water will be returned to the Nile river via a discharge structure whilst waste process water will be disposed of after treatment via a discharge system, which includes two pathways: plantation irrigation network and City sewer system. Sanitary wastewater will be disposed of via the City sewer system. No ground water or other surface water will be used during power plant demolition, construction and operation. Physical hydraulic modeling of heated plume discharge was developed, and reveled that the mixing zone (within which the temperature will be 5 to 8 degrees Celsius above ambient Nile temperature) is well within the 100 meters limit set forth by Law 48 of 1982, for high and low flow conditions. The cross currents were also determined to be less than the 0.3-0.5 meters per second limits.

During construction of the power plant, dredging and construction of the intake and discharge structures could lead to potential impacts on physical aquagraphy, water quality and removal of, or disturbance to, aquatic habitats, flora and fauna. Given that the area of impact is very localized, losses are in many cases temporary and field survey data available do not indicate significant or sensitive habitats, the impacts of power plant construction on the aquatic

environment are not considered to be significant. In addition, good site management and engineering practices during construction will ensure that any residual impacts are reduced to a minimum

Noise. The demolition and construction of the Tebbin power plant is expected to generate a maximum noise level of 59 dB(A) during the day at the fence of the power plant and 57 dB(A) at night. These worst-case demolition and construction noise levels are both within Egyptian and World Bank guidelines, and for most of the demolition and construction periods, the noise levels will be lower than these values. The potential noise emissions from the Tebbin plant during operation have been modeled to provide noise contours in the area around the site. The predicted operational noise levels at the site boundary and at all receptors are below the Egyptian and World Bank guidelines during daytime and nighttime. Although this is the case, it is recommended that the fence between the power plant and the residential colony should be elevated to a height of 5 meters.

Flora and Fauna. No areas protected for their conservation value are located on, or in the vicinity of, the project area. The proposed site itself, excluding its northern part where some valuable old trees exist, and the surrounding land is poorly vegetated with much of the area having been disturbed by urban developments. Given that the potential impacts of demolition, construction and operation on the power plant area likely to be localized, and provided that a plantation ecologist expert will be hired for implementing a conservation/replantation program for the old trees at site, and good site management practices will be implemented, no significant effects are predicted.

Land Use, Landscape and Visual Impacts. The land use at the project site is industrial land. There is no loss of this land to the power plant development, as this land is dedicated for a power generation activity since late 1950s, therefore there is not significant land use impacts due to the Tebbin power project. The surrounding land use is generally industrial, and has been designated as such by the Cairo Governorate in the Comprehensive Development Long-Term Plan- Cairo 2017. As the land is highly urbanized with limited vegetation, all existing views will be insignificantly influenced by the power plant and given the surrounding industrial context; the visual intrusion of the power plant will be minimal. Visual impacts of the power plant from the residential areas to the north and northwest are also not expected to be significant given the orientation of the apartments. The potential landscape and visual impacts of the project are therefore expected to be minor and not significant.

Soils, Geology and Hydrology. Due to the characteristics of the soils and geology of the site, in particular the lack of any sensitive features, and the mitigation measures proposed as part of the demolition, construction and operation of the power plant, no significant impacts are predicted to occur. In addition, preliminary land surface investigations confirmed the site as being uncontaminated. However, soil sample testing is recommended for further geotechnical investigation.

Traffic. The assessment of traffic and transport covered the changes in traffic conditions in terms of delay and congestion during construction and operation. The greatest potential for traffic impacts to occur arises during a short period at peak construction. There is some potential for increased congestion on the main roads to the power plant; however, the impacts will only

occur during the peak construction phase and during peak hours. The overall impact is therefore predicted to be insignificant. Mitigation measures are proposed to reduce the potential for impacts to arise. During operation, a small number of workers and heavy vehicles are associated with operating the power plant and no impacts are predicted to occur.

Archaeology, Historic and Cultural Heritage. No available information was found which identified any archaeological, historic or cultural remains on the site or in the surrounding area. Consequently, no impact is predicted to occur on any known archaeological, historic or cultural resources. Cairo Electricity Production Company have incorporated mitigation measures into the construction program to ensure that any potential finds of significance are recorded and are accorded the required protection in consultation with Supreme Council for Antiquities.

Natural Disaster Risks. An assessment of the risks to the power plant from seismic activity has concluded that given the engineering measures incorporated into the design of the power plant, the potential environmental impacts of a seismic event during power plant operation are not anticipated to be significant. Furthermore, the power plant will be designed to conform to the Uniform Building Code Zone 2 seismic criteria, according to US regulations for earthquake. These design criteria are therefore considered sufficient to withstand the level of seismic activity experienced in the area.

The risks of flooding during power plant demolition, construction and operation were also examined. However, site drainage will be constructed to minimize any risks of contaminated water reaching the surroundings and to properly drain the site, no significant flood risk impacts are anticipated.

Major Accident Hazards. Given the wider land surrounding the Tebbin power plant and the measures incorporated into the design of the plant to minimize the risk from fire and explosion, the plant is not anticipated to pose a potential risk of any significance to any third party facilities.

Solid and Hazardous Waste Management. The management of wastes during demolition, construction and operation of the power plant will include mitigation measures to collect and store waste on-site, record all consignments of solid or contaminated waste for disposal and periodically audit waste contractors and disposal sites to ensure that disposal is undertaken in a safe and environmentally acceptable manner according to the rules set by Law 4-1994 and the Governorate of Cairo.

The only hazardous waste expected to be disposed of, if any, is asbestos. Site survey has indicated that no asbestos containing materials are present. However, during demolition, special management procedures will be followed for any asbestos containing materials, if found, to be disposed of safely. A private sector contractor will be assigned via general bidding process and the contract will include detailed environmental procedures, according to Law 4-1994 and Governorate of Cairo regulations, for demolishing about 20,000 m^3 of debris materials. The contract covers all fees required.

During demolition, construction and operation, all wastes including debris waste, general waste, packaging waste, commercial wastes, raw-water pre-treatment sludge, tank sludge and interceptor sludge will be disposed of by licensed waste contractors according to the rules set by

Law 4-1994 and the Governorate of Cairo. Therefore, solid and hazardous waste management is not predicted to cause any significant impacts.

Occupational Health and Safety. With the provision of a high standard of health and safety management on site, demolition, construction and operation of the power plant in accordance with good industry practice, the occupational health and safety risks associated with demolition, construction and operation of the power plant will be minimized and are not significant.

Associated Infrastructure. Connections to existing gas, oil and electrical facilities will be the responsibility of GASCO, EGPC, EETC and the CEPC, respectively. In regard to the gas connection with the gas reducing station of the site and oil pipeline to the oil tanks on the site no environmental or social impacts are anticipated. EEHC has already submitted a request to GASCO for their needs for the new plant which will necessitate a bigger diameter pipeline, and which will follow the same existing pipeline.

The electricity generated by the proposed power plant will be exported via the 220 kV electricity transmission system. The power plant will be connected to the 220 kV switchyard via step-up transformers. The generated power will be evacuated to the national grid via an overhead transmission line. The 220 kV lines will be tied to a 220 kV cables that will be a double circuit of a length about 5 km, extended from El-Tebbin power plant to Tebbin South 220 kV S/S following an existing route. Transmission line upgrades will follow existing routing, i.e. no land will be expropriated. However, the Bank will be notified if any subsequent changes occur as it is recognized that this may have policy procedural implications. EETC and CEPC will submit Screening Form B to the EEAA concerning this interconnection. No significant impacts are anticipated.

Social:

- EEHC has assured the local authorities that none of the workers currently employed by the existing El-Tebbin power plant will be terminated. Re-employed workers will keep all their benefits (salary, health insurance etc.) and will commute daily from their present location. Incentives for workers to remain in the El Tebbin colony are strong as the rent is heavily subsidized. The re-employment program will therefore not result in resettlement or loss of income.

- Additional workers required during construction will be hired locally, i.e., within daily commuting distance. Appropriate services (water/sanitary facilities etc.) will be provided by the contractor and will be specified in their contracts. In other words, no temporary resettlement will be required during construction.

- All construction-related activities (including land required for the intake for cooling water) will take place on land owned by EEHC as a part of the existing El-Tebbin Power Plant. Transmission lines evacuating power from the new plant will follow existing routing, i.e., no land acquisition will take place as a result of construction-related activities.

- Finally, targeted consultations and interviews with local fishermen have revealed that, based upon their experience, the fish catch is actually better around the cooling discharge zone. Experience from a number of similar power plants along the Nile confirms that the discharge of slightly warmer water has had positive impacts on their livelihood.

In view of the above, OP 4.12 on Involuntary Resettlement will not be triggered.

The Bank's environmental and social experts have worked in close cooperation with the ESIA consultant and the EEHC, and communicated throughout with the Egyptian Environmental Affairs Agency to ensure all key issues have been considered and resolved.

Environmental Management Plan

In the following pages, institutional arrangements necessary for environmental management, environmental management plans during demolition, construction, and operation, and monitoring plans are presented in tabular format.

Institutional Arrangements for El-Tebbin Power Project

Issue/Impact	Mitigation Measures	Implementation Schedule	Type and Frequency of Reporting / Monitoring	Responsibility		Monitoring Indicators	Budget in US$
				Implementation	Supervision		
Demolition Phase							
Institutional capacity to address environmental and social issues	Basic training of CEPC employees responsible for supervising the demolition.	Prior to starting demolition. Ongoing training	Quarterly to EEHC & EEHC Environmental Coordinating Committee (ECC)	CEPC/TPP (EEHC training facility)	EEHC EEHC Environmental Coordinating Committee (ECC)	Training programs Compliance with ESMP	CEPC responsibility(*) Estimated cost of management time is LE 50K
Construction Phase							
Institutional capacity to address environmental and social issues	Establishment of the Environmental Management Unit (EMU), construction phase. Basic training of persons employed to operate the monitoring activities. Basic induction training for all employees on good construction and site management practice.	Prior to starting construction. Ongoing training	Quarterly to EEHC & EEHC Environmental Coordinating Committee (ECC)	CEPC/TPP	EEHC EEHC-ECC	Training programs Compliance with ESMP	Included in air quality monitoring package CEPC responsibility Estimated cost of management time is LE 200K
Operation Phase							
Institutional capacity to address environmental and social issues	Establishment of the Environmental Management Unit (EMU), operation phase. Basic training of persons employed to operate the monitoring activities. Induction, specific and refresher training for all employees on good operation management practice. Training methods, facilities & manuals	Prior to starting operation. Ongoing training	Quarterly to EEHC & EEHC Environmental Coordinating Committee (ECC)	CEPC/TPP	EEHC EEHC-ECC	Training programs Compliance with ESMP	Included in air quality monitoring package CEPC responsibility Estimated cost of management time is LE 200K

Notes:
(*) CEPC responsibility: means that training and capacity building activities are included in the company's organizational structure and budget.

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
AIR QUALITY Dust emissions caused by demolition activities, demolition vehicle movements, and transport of demolished materials.	Implementation of good site practices including: • demolition method is not blasting, but is top-down deconstruction, in the reverse order to that of demolition, progressive, level by level having regard to type of demolition; • wherever possible, external non-load bearing cladding shall be removed first; • debris to be removed at frequent intervals and stockpiles shall not be allowed to build up. Waste shall be removed on a daily basis as far as reasonably practicable; • appropriate siting and maintenance of stockpiles of demolished materials so as to minimize dust blow; • minimizing drop heights for material transfer activities; • roads will be kept damp via a water bowser; • roads will be compacted and graveled if necessary; • site roads will be maintained in good order; • regulation of site access; • sheeting of lorries transporting demolished materials and spoil; • enforcement of vehicle speed limits on dust roads to <35 km/h.	During demolition contract commencing 1st Quarter 2006.	Demolition air quality monitoring of NO_2, SO_2, CO, TSP and PM_{10} using air quality monitors, measurements to be undertaken by the NRC(1). Measurements and analysis of these pollutants to be made on an interval basis, e.g. monthly.	CEPC/TPP/Local Consultants (NRC) Implementation of Good Site Management practices shall be the responsibility of all contractors on site.	CEPC/TPP Assistant Plant Manager EEHC Environmental Management & Studies Sector	Dust levels (TSP and PM_{10}) NO_2, SO_2, CO, levels	CEPC/TPP to check dust suppression measures daily. NRC to measure pollutants monthly. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC responsible for management of the air quality monitoring measurements. Basic training of persons employed to operate and maintain the monitoring system. CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practice.	Mitigation measures and management, Contractor responsibility (included within demolition costs). LE 50K Air Quality measurements: US$ 40K

Notes:
NRC = National Research Center.

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
WATER QUALITY Generation of demolition site run-off. Surplus groundwater during soil remediation and wastewater that may cause adverse water quality impacts on water sensitive receivers.	Mitigation activities will include the following: • no discharge of effluents into the Nile river or El-Khashab canal - all effluents shall be collected and removed off site for treatment by approved firms; • development of a site drainage plan which reduces flow velocity and sediment load; • protection of temporary stockpiles of soil from erosion by using a reduced slope angle where practical, sheeting and by incorporating sediment traps in drainage ditches; • maintenance of well kept demolition site. • proper site management to minimize surface water run-off, soil erosion, soil remediation activities and the impacts of sewage effluents; • adequate maintenance of drainage systems to prevent any overflow; • critical areas within the Site shall be clearly marked and provided with protective measures to control site run-off. • Temporary channels shall be provided to facilitate run-off discharge into the appropriate watercourses, via a silt retention pond; • drainage channels shall incorporate sediment basins or traps and baffles to enhance deposition rates;	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring is required to ensure the implementation of good management practices during demolition.	Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	Fluid effluents within the site. Soil erosion. Surface water run-off. Sewage effluents. Earth, mud and debris depositions on roads.	Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, MWRI, WB, etc.), if required.	CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Costs for mitigation measures included within demolition costs. Estimated at LE 20K for mitigation measures and LE 20K for monitoring

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
	• wheel washing facilities will be installed to ensure no earth, mud and debris is deposited on roads. Sand and silt in the wash water from such facilities shall be settled out and removed before (in line with effluent discharge standards discharging the used water into water drains; • temporary water/toilet facilities will be provided and sewage discharges on site will be connected to the existing sewer or sewage treatment facilities where possible; • the contractor shall not discharge directly or indirectly into any public sewer storm water drain any effluent or contaminated water without the prior written consent of the site engineer in consultation with the Assistant Plant Manager.								

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
NOISE Arising noise impacts related to operation of demolition plant and vehicles.	Implementation of good site practices including: • enforcement of vehicle speed limits; • strict controls of vehicle routing; • demolition plant equipment to be fitted with silencers; • no noisy demolition activities at night; • prohibition of heavy vehicle movements at night; • use of protective hearing equipment for workers.	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring and supervision by CEPC is required to ensure the implementation of good site management practices by the contractor and subcontractors during demolition. Third party audit.	Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP. Auditor (Noise Expert).	EEHC Environmental Management & Studies Sector.	Noise complaints register to identify concerns. Check validity using noise measuring devices already available at CEPC and operated by CEPC noise specialists.	CEPC/TPP will produce a monthly log of valid complaints and actions taken to EEHC. Quarterly audit. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure the contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Management time and costs Cost of third party noise audits US$ 25K

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
FLORA AND FAUNA Site clearance-vegetation removal and habitat disturbance.	• Good site management practices will be observed to ensure that disturbance of habitats off-site are minimized. Specific mitigation measures include restricting personnel and vehicles to within demolition site boundaries, lay down areas and access roads; • Plantation ecologist will work closely with the engineer and/or contractors in order to develop a detailed conservation plan for trees at the site; • Plants near the agricultural drainage banks will be kept due to its important role in accumulating pollutants especially heavy metals. This important ecological role was reported in the literature on the same genera; • Trees growing by the fence of the power plant will be kept since they will not obstruct any demolitions and due to their importance as wind shields.	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring and supervision by CEPC is required to ensure the implementation of good site management practices by the contractor and subcontractors during demolition.	Plantation Ecologist. Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	Good conservation of floral wealth.	Assistant Plant Manager to check status of trees and other floral species daily. No. of trees conserved or replanted.	CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Management time and costs plus ecologist specialist US$ 9K

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Land Contamination Site clearance, excavation and disposal of material, exposure of potentially contaminated soils, spillage or leakage of substances on land, movement of equipment and vehicles on site.	The potential for impacts are largely dependent on management of the demolition site and activities. The following mitigation measures will be implemented: • development of effective site drainage systems; • restriction of access only to demolition site areas; • monitoring and control of spoil; • disposal of waste materials unsuitable for reuse at appropriately licensed sites; • provision of oil and suspended solid interceptors; • management of excavations during demolition to avoid the generation of drainage pathways to underlying aquifers; • provision of impermeable bases in operational areas to prevent absorption of spillages. • machinery and/or any other items that are suitable for reuse on other locations or sold out to a licensed contractor will be transported using safe means so as to keep the soil secured against any hazard; • Hazardous wastes will be disposed of by a licensed contractor, with strict adherence to the EEAA regulations and controls of the Law 4/1994. Disposal procedures will be audited by the project engineer and CEPC.	During demolition contract commencing 1st Quarter 2006.	Site investing-ation, including the collection of subsurface samples will be taken at various depths and a contaminated land specialist shall present during all stages of the sampling to instruct and amend sampling strategies at the time of sampling as necessary to take account of particular site conditions. Groundwater samples will also be taken. Samples will be tested at an accredited laboratory in accordance with standard international methods (USEPA or ASTM or equivalent) in line with best international practice.	Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	• site drainage. • access only to demolition site areas. • spoils. • waste materials. • oily waters. • drainage pathways. • potential spillage in operational areas. • soil sample test, including, but not limited to, total petroleum hydrocarbons and heavy metals.	Continuous monitoring is required to ensure the implementation of good management practices during demolition. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Costs for mitigation measures included within demolition costs with the exception of Management time, estimated at LE 20K. Any additional features may incur additional costs of US$ 30K Subsurface sampling and analysis, approximately US$100K.

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
TRAFFIC AND TRANSPORT Disruption, noise and increased air pollution due to increased traffic, heavy loads and abnormal loads.	Standard good practice measures will be implemented as follows: • adherence of abnormal load movements to prescribed routes, outside peak hours and advance publication of movements if required; • demolition shifts will be staggered; • scheduling of traffic to avoid peak hours on local roads; • transportation of demolition workers by contract bus.	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring is required to ensure the implementation of good site management practices by the contractor and subcontractors during demolition.	Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	Increased congestion Travel time (compared to reasonable daily commute)	Daily	CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Management time

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
SOCIO-ECONOMIC ENVIRONMENT Positive Impacts identified.	Present labor force of the existing old Tebbin power plant have already been granted the right to choose where they will go to work within the overall Cairo Electricity Production Facilities. Quite fair rules for re-employing all members of the old Tebbin staff with no loss of their employment rights, including salaries, overtime, insurance, health care, and social & cultural benefits. Families/homes of considerable number of workers who will be re-employed elsewhere in the greater Cairo Metropolitan area will remain in El-Tebbin, i.e. no resettlement or loss of income will take place of the re-employment. Activities related to demolition work take place on the construction site, i.e. on CEPC land. Public and Industry Relations will be maximized through open dialogue between CEPC (through the Assistant Plant Manager who has direct responsibility for EHS Liaison) and local authority, public and industry representatives.	Before demolition contract commencing 1st Quarter 2006.	Record local employment provided by the project.	CEPC/TPP	EEHC Environmental Management & Studies Sector.	Social satisfaction as measured by staff interviews and complaints submitted.	Interim and closing reports	Responsibility of CEPC.	Responsibility of CEPC.

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
ASBESTOS CONTROL Potential health hazard due to asbestos contamination.	There is a potential for finding Asbestos Containing Materials (ACM) during dismantling and demolition processes. If found, standard good practice measures will be implemented as follows: • any ACM present in the stacks and superstructures shall be removed before commencement of the demolition works; • removal of asbestos materials in certain locations may run more smoothly if both asbestos contractors and civil demolition contractors work in tandem. This is due to the convenience of the main civil demolition contractor providing access (scaffolding etc.) to the ACM, for the asbestos contractor and avoiding duplication of effort; • work actually involving the removal of ACM, that involves the handling of the ACM shall be carried out by a Specialist Asbestos Contractor; • all remaining ACM on the site is not accessible to the general public.	During demolition contract commencing 1st Quarter 2006.	The multi-party nature of the project and the involvement of non-asbestos contractor increase the risk of accidental disturbance of ACM. The CEPC should ensure that there is a reliable supervision and co-ordination mechanism to guard against any accidental disturbance of the asbestos containing material (ACM) by non-asbestos professionals.	The CEPC will control and monitor work progress and make the necessary adjustment to their workforce to meet the work requirements.	EEHC Environmental Management & Studies Sector.	Any ACM to be found	Daily reporting to EEHC Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	An Specialist Asbestos Contractor (SAC) shall be totally responsible for completing the asbestos abatement within the given time frame. It is anticipated that a minimum of 5 competent workers in various trades would be employed over the whole period. A full time Safety Supervisor shall be required to assist the contracting regarding safety and health of the site personnel and to keep the necessary records.	Management time and costs plus ACM specialist US$ 15

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
WASTE MANAGEMENT	Recycling, storage, transportation and disposal measures are recommended to avoid or minimize potential adverse impacts. The Contractor will incorporate these recommendations into a Waste Management Plan that incorporates site specific factors, such as the designation of areas for the segregation and temporary storage of reusable and recyclable materials. Good practice measures such as the following: • wastes should be handled and stored in a manner which ensures that they are held securely without loss or leakage thereby minimizing the potential for pollution; • only reputable waste collectors authorized to collect the specific category of waste concerned will be employed; • appropriate measures will be employed to minimize windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers; • necessary waste disposal permits will be obtained from the appropriate authorities, if they are required, in accordance with the Waste Disposal Regulation and the Government Land Ordinance; • collection of general refuse will be carried out frequently, preferably daily; • waste will only be disposed of at licensed sites and site staff and the civil engineering Contractor will develop procedures to ensure that illegal disposal of wastes does not occur; • waste storage areas will be well maintained and cleaned regularly; • records will be maintained of the quantities of wastes generated, recycled and disposed, determined by weighing each load.	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring is required to ensure the implementation of good management practices during demolition.	Implementation of Good Site Management practices shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	Management contract in place. Functional transfer station.	Monthly reports from management contractor to CEPC. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure the contractor and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good demolition and site management practices.	Management time and costs, plus contracting for waste management US$ 10K

Demolition Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
OCCUPATIONAL HEALTH & SAFETY	Good local and international demolition/demolition practice in Environment, Health and Safety (EHS) will be applied at all times and account will be taken of local customs, practices and attitudes. Measures include: • implementation of EHS procedures as a condition of contract the contractor and subcontractors; • clear definition of the EHS roles and responsibilities of all demolition staff; • management, supervision, monitoring and record-keeping as set out in plant's operational manual; • pre- demolition assessment of the EHS risks and hazards; • completion and implementation of Fire Safety Plan prior to starting demolition to any part of the plant; • provision of appropriate training on EHS issues for all workers; • provision of health and safety information; • regular inspection, review and recording of EHS performance; • maintenance of a high standard of housekeeping at all times.	During demolition contract commencing 1st Quarter 2006.	Continuous monitoring is required to ensure the implementation of EHS Policies, plans and practices during demolition.	Implementation of Good Site Management practices and the EHS policies shall be the responsibility of the contractor and subcontractors on site under supervision of the CEPC/TPP.	EEHC Environmental Management & Studies Sector.	Management procedures in place. Workers health and safety as measured by no. of incidents.	Daily 6- monthly reporting of summary results and submitted to the EEHC and other concerned authority (e.g. EEAA, WB, etc.) if required.	CEPC to ensure the contractor and subcontractors for workers on site include reference to the requirements of the ESMP and are aware of the EHS policies and plans. All employees will be given basic induction training on EHS policies and practices. Contractor is responsible for ensuring that a Fire Safety Plan is prepared and implemented prior to starting demolition to any part of the plant under supervision of CEPC/TPP.	Mitigation measures will require management time, estimated at LE 20K plus costs of up to US$ 10K for preparation of Plans.

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
AIR QUALITY Dust emissions caused by construction activities, construction vehicle movements, and transport of friable construction materials.	Implementation of good site practices including: • appropriate siting and maintenance of stockpiles of friable materials so as to minimize dust blow; • minimizing drop heights for material transfer activities such as unloading of friable materials; • construction phase to begin with construction of access roads; • roads will be kept damp via a water bowser; • roads will be compacted and graveled if necessary; • site roads will be maintained in good order; • regulation of site access; • sheeting of lorries transporting friable construction materials and spoil; • enforcement of vehicle speed limits on unmetalled roads to <35 km/h.	Before construction and during construction	Initiate baseline air quality survey of NO_2, SO_2, CO, TSP and PM_{10} using air quality monitors and continue during construction. Two analyzer stations will be electronically connected to the EEAA ambient monitoring system. Measurements and analysis of these pollutants to be made on a continuous basis by a trained staff assigned by CEPC/TPP and submitted to EEHC for reporting to any concerned authority.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Dust levels (TSP, PM_{10}) NO_2, SO_2, CO levels.	Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority. (e.g. EEAA, WB, etc.).	CEPC responsible for management of the air quality monitoring system. Submission of annual summary reports to EEHC and any other concerned authority. Basic training of persons employed to operate and maintain the monitoring system. CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practice.	Mitigation Measures, Management time and costs (<included in construction costs) Baseline Air Quality Monitoring: Permanent Continuous Monitoring System- approx. US$ 1500K plus management time & reporting, estimated at LE 100K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting / monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
AQUATIC ENVIRONMENT Dredging and construction of the intake structure and pipe-laying for water intake and discharge pipes- increased suspended sediment and pollutant loads, permanent loss and disturbance to aquatic flora and fauna.	The following measures will be taken: • Construction Method Statement to be produced by the Contractor; • dredged areas limited to minimum area required; • disposal of dredged sediments to an agreed site; • all works will be made clearly visible using flags, beacons and/or signals; • bank area will be reinstated following construction.	During construction of intake and discharge structures	Nile survey undertaken April 2005 along 5 profiles fronting the site. Report to be maintained for later monitoring and evaluation during operation. Water quality will be measured monthly (monitoring of temperature, pH, COD, BOD, TOC, DO, TSS, oil & grease, residual chlorine, heavy metals and other pollutants).	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Bank line Dredged areas & dredging waste material.	Daily (for bankline and dredged areas) Monthly (for water quality).	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practice. These mitigation measures must be a condition of any construction contracts commissioned.	Mitigation Measures: Management time and costs and items in construction contract, estimated at LE 300K Water quality measurement costs US$ 15K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting / monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Contamination of the aquatic environment as a result of construction activities on land e.g. spillages, disposal of liquid wastes; surface run-off, exposure of contaminated soils (see also under "Soils and Hydrology").	Mitigation activities will include the following: • no discharge of effluents into the Nile river - all effluents shall be collected and removed off site for treatment by approved firms; • development of a site drainage plan which reduces flow velocity and sediment load; • protection of temporary stockpiles of soil from erosion by using a reduced slope angle where practical, sheeting and by incorporating sediment traps in drainage ditches; • maintenance of well kept construction site.	During construction	Continuous monitoring is required to ensure the implementation of good management practices during construction.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Fluid effluents within the site. Soil erosion. Surface water run-off. Sewage effluents. Earth, mud and debris depositions on roads.	Daily Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Management time and costs (included in construction cost).

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
NOISE Increased noise in the project area as a result of the use of noisy machinery and increased vehicle movements.	Implementation of good site practices including: • enforcement of vehicle speed limits; • strict controls of vehicle routing; • diesel engine construction plant equipment to be fitted with silencers; • limited noisy construction activities at night; • prohibition of heavy vehicle movements at night; • use of protective hearing equipment for workers.	During construction	Continuous monitoring and supervision by CEPC is required to ensure the implementation of good site management practices by all contractors during construction. Third party audit.	Implementation of Good Site Management practices shall be the responsibility of all contra-ctors on site under supervision of the Assistant Plant Manager. Auditor (Noise Expert)	EEHC Environmental Management & Studies Sector. 6-monthly audit.	Noise complaints register to identify concerns. Check validity using noise measuring devices already available at CEPC and operated by CEPC noise specialist.	CEPC/TPP will produce a monthly log of valid complaints and actions taken to EEHC. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Management time and costs, plus cost of third party noise audits US$ 50K
FLORA AND FAUNA Site Clearance-Vegetation removal and habitat disturbance.	• Good site management practices will be observed to ensure that disturbance of habitats off-site are minimized. • Specific mitigation measures include restricting personnel and vehicles to within construction site boundaries, lay down areas and access roads. • CEPC to hire a specialist ecologist to conserve and maintain old valuable trees and vegetation on site during construction phase.	During construction.	Continuous monitoring and supervision by CEPC is required to ensure the implementation of good site management practices by all contractors during construction.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Good conservation of floral wealth. Assistant Plant Manager to check the status of trees and other floral species daily.	Weekly No. of trees conserved or replanted.	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Management time and costs plus ecologist specialist US$ 25K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Soils and Hydrology Site clearance, excavation and disposal of material, exposure of potentially contaminated soils, spillage or leakage of substances on land, movement of equipment and vehicles on site.	The potential for impacts are largely dependent on management of the construction site and activities. The following mitigation measures will be implemented: • development of effective site drainage systems; • restriction of access only to construction site areas; • monitoring and control of spoil; • disposal of waste materials unsuitable for reuse on-site, (e.g., for landscaping) at appropriately licensed sites; • provision of oil and suspended solid interceptors; • management of excavations during construction to avoid the generation of drainage pathways to underlying aquifers; • provision of impermeable bases in operational areas to prevent absorption of spillages.	During construction.	Continuous monitoring is required to ensure the implementation of good management practices during construction.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	• site drainage. • access only to constructio n site areas. • spoils. • waste materials. • oily waters. • drainage pathways. • potential spillage in operational areas. • soil sample test. • ground water sample test.	Continuous monitoring is required to ensure the implementation of good management practices during demolition. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Costs for mitigation measures and management time included within construction costs, estimated at LE 200K for management and LE 50K for monitoring Any additional features (e.g. bunding, interceptors etc.) may incur additional costs of US$ 30K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
TRAFFIC AND TRANSPORT Disruption, noise and increased air pollution due to increased traffic, heavy loads and abnormal loads.	Standard good practice measures will be implemented as follows: • adherence of abnormal load movements to prescribed routes, outside peak hours and advance publication of movements if required; • construction shifts will be staggered; • scheduling of traffic to avoid peak hours on local roads; • transportation of construction workers by contract bus.	During construction.	Continuous monitoring is required to ensure the implementation of good site management practices by all contractors during construction.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Increased congestion Travel time (compared to reasonable daily commute)	Daily	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Management time

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
SOCIO-ECONOMIC ENVIRONMENT Positive impacts identified.	All activities related to the construction of the new plant will take place within the area belonging to CEPC, i.e., there will be no off-site activities or associated land acquisition during construction. The entire labor force will be daily commuters, thus no worker housing or associated facilities will be erected on site during construction. The contractors will be responsible for relevant temporary water / toilet facilities during construction and the need to provide appropriate services will be specified in their contracts. Public and Industry Relations will be maximized through open dialogue between CEPC (through the Assistant Plant Manager who has direct responsibility for EHS Liaison) and local authority, public and industry representatives.	During construction.	Record local employment provided by the project.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Workers satisfaction as measured by staff interviews and complaints submitted.	Editing a special report	Responsibility of CEPC.	Responsibility of CEPC. Management cost estimated at LE 150K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Archaeology Potential chance finds of archaeological remains during construction.	The project site does not lie on, or in the immediate vicinity of any known archaeological areas of interest. If remains are found CEPC is committed to: • cease activities and consult Antiquities authority; • protection in situ if possible; • excavation of areas where protection not feasible; • preparation of a Chance Finds Procedure and Method Statement.	During construction.	Supervision of construction activities.	Construction contractors CEPC will allocate responsibilities in accordance with the Chance Finds Procedure.	EEHC Environmental Management & Studies Sector.	Chance finds (see annex II)	Daily	CEPC to ensure that all workers on site are aware of the importance of archaeological remains and must report any potential finds immediately. Immediate liaison with Competent Administrative Authority should a potential find be uncovered.	Mitigation measures require management time. Should chance finds occur, protection & excavation could add significantly to the cost.
NATURAL DISASTERS Flash flooding.	Good engineering design will incorporate the following mitigation measures: • drainage system designed to direct flood water from main plant areas into the City sewer system and direct potentially contaminated waters through the oil interceptor.	During construction.	No monitoring measures are envisaged.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.			CEPC to ensure that all workers on site receive training in emergency preparedness and response procedures.	Relevant costs are included within the construction costs

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
SOLID WASTE MANAGEMENT	Good practice measures such as the following: • all waste taken off-site will be undertaken by a licensed contractor and CEPC will audit disposal procedure; • collection and segregation of wastes and safe storage; • recording of consignments for disposal; • prior agreement of standards for storage, management and disposal with relevant authorities.	During construction.	Continuous monitoring is required to ensure the implementation of good management practices during construction.	Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Management contract in place Functional transfer station.	Monthly reports from management contractor to CEPC and then to EEHC. These reports are to be submitted to any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.	Management time estimated at LE 200K for management and LE 50K for monitoring, plus waste management contracting costs US$ 10K

Construction Impact Mitigation, Monitoring and Management Measures

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting / monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
OCCUPATIONAL HEALTH & SAFETY	Good local and international construction practice in Environment, Health and Safety (EHS) will be applied at all times and account will be taken of local customs, practices and attitudes. Measures include: • implementation of EHS procedures as a condition of contract all contractors and sub-contractors; • clear definition of the EHS roles and responsibilities of all construction companies and staff; • management, supervision, monitoring and record-keeping as set out in plant's operational manual; • pre-construction and operation assessment of the EHS risks and hazards; • completion and implementation of Fire Safety Plan prior to commissioning any part of the plant; • provision of appropriate training on EHS issues for all workers; • provision of health and safety information; • regular inspection, review and recording of EHS performance; and maintenance of a high standard of housekeeping at all times.	During construction.	Continuous monitoring is required to ensure the implementation of EHS Policies, plans and practices during construction.	Implementation of Good Site Management practices and the EHS policies shall be the responsibility of all contractors on site under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Management procedures in place. Workers health and safety as measured by no. of incidents.	Daily Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC to ensure all contractors and sub-contractors for workers on site include reference to the requirements of the ESMP and are aware of the EHS policies and plants. All employees will be given basic induction training on EHS policies and practices. Contractors are responsible for ensuring that a Fire Safety Plan, which conforms to NFPA 850, is prepared and implemented prior to commissioning of any part of the plant under supervision of CEPC/TPP.	Mitigation measures will require management time estimated at LE 200K plus costs of up to US$ 50K for preparation of EHS Plans.

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
AIR QUALITY Emissions from stack are not expected to exceed standards.	Mitigation measures have already been included in the design of the plant and, given CEPC/TPP's strict commitment to use mazout fuel oil for <2% of operating time, no further mitigation measures are proposed. CEPC/TPP will however demonstrate the validity of the conclusions drawn in the ESIA report.	During first three years of operation.	**Automatic monitoring** of stack emissions for NOx, SO_2, particulate matter and carbon monoxide (CO) via test ports installed in the main stack.	The analyzer stations will be owned and operated by CEPC/TPP. Assistant Plant Manager	EEHC Environmental Management & Studies Sector. Report introduced to EEAA as requested. Third party inspection.	Stack emissions (at least PM_{10}, NOx, SOx and CO).	Continuous Hourly data acquisition. Quarterly reporting to EEHC. Reports are to be available to any of the concerning authorities (EEAA, WB, etc.).	Records must be kept and summary data (including any deviations from Egyptian and World bank standards) will be submitted to the Government and WB on annual basis (or more frequently if required).	Automtic stack monitors: included in included in the project cost. Management time for compilation of reports and performance monitoring: included in operation cost.
Ambient air quality affected by emissions from the power plant.	CEPC/TPP will demonstrate the validity of the conclusions drawn in the ESIA report. If ground level concentrations are found to be above local and World Bank standards options for further mitigation will be discussed.		**Install two continuous** NOx, SO_2, CO, PM_{10} & TSP **monitoring stations** to monitor short-term concentrations in the area predicted to have the highest impacts on humans (as there are no other sensitive environments). The analyzer station near or within the site boundaries will include a **continuous monitor** of meteorological conditions (temperature, wind speed, wind direction and mixing heights). The analyzer stations will be electronically connected to the EEAA ambient monitoring system.			Ambient air pollutants concentrations (at least TSP, PM_{10}, NOx, SOx and CO).		Annual reporting by CEPC/TPP to Government and WB etc. (or more frequently if required) highlighting key features and comparing results with air quality standards and prediction in ESIA report	Purchase of Continuous Monitors (see construction management table). Annual servicing, calibration & running costs: included in operation cost.

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
AQUATIC ENVIRONMENT Discharge of process and cooling water.	The design of the intake and cooling water structures have already incorporated measures to reduce impacts. In addition, good site management practices including the following will be implemented: • neutralization, oil separation, flocculation and filtration of any contaminated water before discharge to either city sewer or the plantation irrigation network; • no disposal of solid wastes or waste water into the discharge structure; • regular maintenance of site drainage system to ensure efficient operation; • all discharges will comply with local Egyptian and World Bank guidelines. In addition, CEPC/TPP will demonstrate the validity of the conclusions drawn in the ESIA report. If pollutant concentrations in the discharge or impacts to the surrounding aquatic environment are found to be above local and World Bank standards or unacceptable, options for further mitigation will be discussed.	Lifetime of the plant	Prepare regular water quality monitoring program including: • quality of all water prior to discharge (**continuous monitoring** of all discharged water for temperature and pH, daily monitoring of process water for COD, TSS, oil & grease and residual chlorine and **monthly monitoring** of heavy metals and other pollutants) • ambient water quality in the area affected by the discharge plume (**3-monthly monitoring** of temperature, pH, COD, BOD, TOC, DO, TSS, oil & grease, residual chlorine, heavy metals and other pollutants. **Annual monitoring** of benthic environment within a 2 km radius of the discharge point (**over a 3 year period**) **Weekly monitoring** of fish catches on intake screens including species, numbers and size (**over a 1 year period**).	CEPC/TPP Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Basic parameters as per the Law the 48/1982 and Law 93/1962	Monthly reports from CEPC/TPP to EEHC Continuous monitoring of water quality etc. Monthly monitoring of heavy metals and other pollutants. 3-monthly monitoring of the plume. Annual monitoring of benthic environment (over a 3 year period). Weekly monitoring of Fish Catches on intake screens (over a 1 year period. Reports are to be available to any of the concerning authorities (EEAA, WB, etc.).	Records will be kept and compared on regular basis against Egyptian and World Bank standards and impacts predicted in ESIA. Summary reports (with any exceptions identified) will be submitted to the Government and WB etc. on annual review basis (or more frequently if required). CEPC/TPP to ensure that all employees are given basic induction training on the requirements of the ESMP, good site management practices and H&S procedures. The Assistant Plant Manager will ensure implementation of procedures.	Management time for implementation of site management practices. (included in operation cost) All costs are included in operation cost.

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
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NOISE	Although noise levels at northern fence of the plant (where residential colony is located beyond it) are complying with law 4/1994, northern fence will be elevated to a height of 5 m for gaining a reduction 3-5 dB(A) in noise levels. Specific design mitigation measures to minimize noise impacts include: • steam turbine generators; air compressors, pumps and emergency diesel engines are enclosed in buildings; • air compressors are equipped with silencers; • noisy outdoor equipment are designed to a noise limit of 85 dB (A) at 1 m. In addition, plant workers will be provided with protective wear in plant areas with high noise levels. The plant will operate in accordance with internationally accepted health and safety measures.	During first year of operation.	Given that sensitive receptors are located in the immediate vicinity of the plant, noise monitoring is envisaged. When the plant is fully operational, noise audit measurements are to be carried out at noise sources and at the fence of the power plant as well as at noise receptors around the plant.	CEPC/TPP Third party audit supervised by Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Power plant compliance with ESMP.	Quarterly to CEPC and EEHC. Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	Should any complaints be received regarding noise, these will be logged and the Assistant Plant Manager will investigate problem. CEPC/TPP to ensure that all employees are given basic induction training on the requirements of the ESMP, good site management practices and H&S procedures. The Assistant Plant Manager will ensure implementation of procedures.	Costs for raising the height of the northern fence included within construction costs. Minimal costs (up to US$ 5K per annum) required for provision of protective wear-included in operation cost. No further mitigation or monitoring costs envisaged with the exception of management time. Noise audit US$ 24K

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
FLORA AND FAUNA Disturbance to habitats as a result of noise, vehicle and personnel movements.	The following mitigation measures will be implemented: • restrict personnel and vehicle movements to access roads and within boundaries of site only; and • control of noise during operation.	Lifetime of the plant.	No monitoring is envisaged.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Good plantation	Yearly	CEPC/TPP to ensure that all employees are given basic induction training on the requirements of the ESMP, good site management practices and H&S procedures. The Assistant Plant Manager will ensure implementation of procedures.	Management time
VISUAL IMPACT Visual image of power plant from surrounding areas.	The visual effect of the power plant will be improved through: • creation of landscaped boundary along the fence of the power plant. • *Ficus elastica var decora* and *Ficus nitida* will be propagated and the resulting plants will be used for decorating and landscaping the site when completing the new power plant. One may obtain 200-300 individual plants from a single tree.	Lifetime of the plant.	No monitoring is envisaged.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Improved visual image		Considered management of landscaped areas to maximize visual image and habitat creation. CEPC/TPP to contract a suitable firm to manage landscaped areas.	Landscaping measures (included in operation cost)

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
SOIL AND HYDROLOGY Spillage of oils, chemicals or fuels on site.	Good site management measures as **described under Aquatic Environment** will minimize any potential risks. As part of this, regular checks of bunds and drainage systems will be undertaken to ensure containment and efficient operation.	Lifetime of the plant	The Assistant Plant Manager will continuously monitor application of ESMP and good site management practices and take corrective action if required.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Quality of bunds and drainage systems. Efficiency of operation.	6-monthly reports from management to EEHC. Annual reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC/TPP, through the Assistant Plant Manager, will implement a Spills Response Plan and all employees will receive corresponding training.	Management time
SOLID WASTE	Good practice measures **undertaken during the construction phase** will be continued into the operation phase (see Table 6).	Lifetime of the plant	Continuous monitoring is required to ensure the implementation of good management practices during operation.	CEPC/TPP Implementation of Good Site Management practices shall be conducted under supervision of the Assistant Plant Manager.	EEHC Environmental Management & Studies Sector.	Management contract in place. Functional transfer station.	3-monthly reports from management to EEHC. Annual reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC/TPP to ensure all employees are given basic induction training on good operation and site management practices.	Management time and costs (included in operation cost)

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
OCCUPATIONAL HEALTH AND SAFETY, ***Risks and Hazards***	Standard international practice on EHS issues shall be employed on site. The mitigation measures summarized in construction management Table apply. In addition, the following measures will be undertaken: • Provision of training in use of protection equipment and chemical handling. • Use of protective equipment. • Clear marking of work site hazards and training in recognition of hazard symbols. • Installation of vapour detection equipment and control systems. • Development of site emergency response plans.	Lifetime of the plant	Regular on-site training. Regular staff checks, system checks and field tests of emergency procedures by on-site management.	CEPC/TPP Assistant Plant Manager	EEHC Environmental Management & Studies Sector.	Management procedures in place. Workers health and safety measured by incidents, injuries and illnesses.	Monthly reports from management to EEHC Annual reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.	CEPC/TPP to ensure that all employees are given basic induction training on H&S policies and procedures, Emergency Preparedness and Response Plan and a Spills Response Plan. The Assistant Plant Manager is to ensure implementation of procedures. CEPC/TPP is responsible for ensuring that the site emergency response plan is complete and implemented prior to commissioning any part of the power plant.	Management time and costs (included in operation cost)

Operational Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Socio-Economic Environment Positive impacts identified	Fish Catch: based upon experience with similar plants elsewhere along the Nile and the opinions of the fishermen, impacts are very likely to be positive.	First year of operation. (possibly 2 other years)	In collaboration with the Fishery Authorities, monitor any changes to the fish catch	CEPC/TPP Assistant Plant Manager Fishery Authorities	EEHC Environmental Management & Studies Sector.	Fish catch no. & quality	Monthly reports from management to EEHC		Included in operation costs.

Transmission System Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Direct Vegetation damage, habitat loss, and invasion by exotic species along the ROW and access roads and around substation sites. Habitat fragmentation or disturbance. Increased access to sensitive lands.	• Utilize appropriate clearing techniques, (e.g., hand clearing versus mechanized clearing). • Maintain native ground cover beneath lines. • Replant disturbed sites. • Manage ROWs to maximize wildlife benefits. • Select ROW to avoid important natural areas such as sensitive habitats. • Maintain habitat (i.e., native vegetation) beneath lines. • Make provisions to avoid interfering with natural fire regimes. • Select ROW to a avoid sensitive lands. • Develop protection and management plans for these areas. • Use discontinuous maintenance roads.	During Construction and Operation	Visual inspections of the materials being used, the construction practices and mitigation measures. Short-term monitoring to assure that negative land use and/or ecological impacts are avoided and proper mitigation measures are employed. Occurs along the line as it is constructed. Monitoring of ROW maintenance activities to assure proper control methods.	Egyptian Electricity Transmission Company (EETC) CEPC/TPP	EEHC management EEHC Environmental Management and Studies Sector	Effects on environmental and human resources involved (negative land uses, ecological damage) Degree to which they are affected.	Weekly (during construction). Maintenance time (during operation)	Environmental training and management will be warranted for ROW maintenance techniques, including the proper use of chemical and mechanical clearing methods. Training will be conducted by EETC and CEPC with assistance from environmental consultant. Staff workers should have an understanding of the rational for the recommended mitigation and monitoring that they may be implementing.	Included in construction and operation cost.

Transmission System Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Runoff and sedimentation from grading for access roads, tower pads, and substation facilities, and alteration of hydrological patterns due to maintenance roads.	• Select ROW to avoid impacts to water bodies, floodplains, and wetlands. • Install sediment traps or screens to control runoff and sedimentation. • Minimize use of fill dirt. • Use ample culverts. • Design drainage ditches to avoid affecting nearby lands.								
Loss of land use and population relocation due to placement of towers and substations.	• Select ROW to avoid important social, agricultural, and cultural resources. • Utilize alternative tower designs to reduce ROW width requirements and minimize land use impacts. • Adjust the length of the span to avoid site-specific tower pad impacts. • Manage resettlement in accordance with World Bank procedures.								
Chemical contamination from chemical maintenance techniques.	• Utilize mechanical clearing techniques, grazing and/or selective chemical applications. • Select herbicides with minimal undesired effects. • Do not apply herbicides with broadcast aerial spraying. • Maintain naturally low-growing vegetation along ROW.								

Transmission System Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Avian hazards from transmission lines and towers. Aircraft hazards from transmission lines and towers. Induced effects from electromagnetic fields. Impaired cultural or aesthetic resources because of visual impacts.	• Select ROW to avoid important bird habitats and flight routes. • Install towers and lines to minimize risk for avian hazards. • Install deflectors on lines in areas with potential for bird collisions. • Select ROW to avoid airport flight paths. • Install markers to minimize risk of low-flying aircraft. • Select ROW to avoid areas of human activity. • Select ROW to avoid sensitive areas, including tourist sites and vistas. • Construct visual buffers. • Select appropriate support structure design, materials, and finishes. • Use lower voltage, DC system, or underground cable to reduce or eliminate visual impacts of lines, structures, and ROWs.								

Transmission System Impact Mitigation, Monitoring and Management

Issue/Impact	Mitigation Measures	Implementation Schedule	Monitoring	Responsibility		Monitoring Indicators	Type and Frequency of Reporting/ monitoring	Management and Training	Indicative Cost Estimate (US$)
				Implementation	Supervision				
Indirect									
Induced secondary development during construction in the surrounding area.	• Provide comprehensive plans for handling induced development. • Construct facilities to reduce demand. • Provide technical assistance in land use planning and control to local governments.								
Increased access to sensitive lands.	• Route ROW away from sensitive lands. • Provide access control.								

Monitoring of the Air Quality and Noise During Operation

Item	Monitoring Parameters	Sampling Frequency	Monitoring Locations	Indicative Cost Estimate (US$)
Demolition and Construction Phasees				
AIR QUALITY Dust emissions caused by demolition and construction activities, demolition and construction vehicle movements, and transport of demolition debris and friable construction materials.	NO_2 , SO_2 , CO, TSP and PM_{10}.	Monthly during demolition. Continuous monitoring during construction.	2 locations minimum: at nearest residence and site boundary during demolition. 2 locations minimum: at nearest residence and site boundary during construction.	Permanent Continuous Monitoring System- approx. US$ 1000-1500K
NOISE	Decibels (dB) A	Monthly	6 locations minimum: at nearest residences	Management time and costs (US$ 10k)
Operation Phase				
AIR QUALITY Emissions from stack are not expected to exceed standards.	**Automatic monitoring** of stack emissions for NOx, SO_2, particulate matter and carbon monoxide (CO) via test ports installed in the main stack. In addition, conduct surrogate **performance monitoring**.	Continuous and/or 24 hour average Continuous and/or passive samples every 2/4 weeks	2 locations minimum: at maximum predicted pollution concentration and downwind. Third location, if any, will be 1 km upwind.	Included in the plant operation
Ambient air quality affected by emissions from the power plant.	**Install (at least) two continuous** NOx, SO_2, CO, PM_{10} & TSP **monitoring stations** to monitor short-term concentrations in the area predicted to have the highest impacts on humans (as there are sensitive environments). The analyzer station near or within the site boundaries will include a **continuous monitor** of meteorological conditions (temperature, wind speed, wind direction and mixing heights).	The analyzer stations will be electronically connected to the EEAA ambient monitoring system.		
NOISE		Bi-annually to annually	6-10 sites at nearest residences and fence around the plant	Noise audit US$ 10-15K

Monitoring of the Aquatic Environment During Operation

Issue	Parameter	Method	Frequency of measurements
Water Quality	Temperature & pH of all discharged water	Continuous automatic monitor in discharge structure	Continuous
	COD, TSS, Oil & Grease, residual chlorine of effluent	Sample taken from water in discharge structure and submitted for lab. Analysis	Daily
	Heavy metals & other pollutants of effluent	As above	Monthly
Ambient Water Quality	Temperature, pH, COD, BOD, TOC, DO, TSS, oil & grease, residual chlorine, heavy metals & other pollutants	Grab sampling and analysis within the area predicted to be affected by the discharge plume	3-monthly
Flora & Fauna (1)	Benthic flora & fauna	Transect sampling (following same method as in baseline monitoring) within a 2 km radius of the discharge point	Annual
Entrainment (2)	Fish entrainment on screens	Removal and analysis of any debris caught in intake screens	Weekly

Notes:

(1) To be undertaken for the first 3 years of plant operation.

(2) To be undertaken for the first year of plant operation.

Abbreviations:

COD: Chemical Oxygen Demand
BOD: Biological Oxygen Demand
TOC: Total Organic Carbon
DO: Dissolved Oxygen
TSS: Total Suspended Solids

Summary of Implementation Cost of the Environmental Management Plan

No.	Phase of Implementation	Cost in US$
1	Demolition Phase	270 K (upper limit)
2	Construction Phase	1,934 K (upper limit)
3	Operation Phase	59 K
	Total	**2,263K**

Annex 11: Project Preparation and Supervision

	Planned	Actual
PCN Review		**30-Sep-04**
Initial PID to PIC		**5-Oct-04**
Initial ISDS to PIC		**6-Oct-04**
Appraisal	30-Sep-05	
Negotiations	20-Nov-05	
Board Approval	16-Feb-06	
Planned Date of Effectiveness	3-May-06	
Planned Date of Mid-Term Review	30-Nov-08	
Planned Date of Closing	30-Apr-11	

Key institutions responsible for preparation of the project:

Cairo Electricity Production Company (CEPC), and the Egyptian Electricity Holding Company (EEHC).

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Anna Bjerde	TL and Senior Infrastructure Specialist	MNSIF
Lizmara Kirchner	Financial Analyst	MNSIF
Pierre Audinet	Senior Energy Economist	MNSIF
Masaki Takahashi	Senior Power Engineer	EWDEN
Richard James	Operations Officer	MNC03
Eric Groom	Senior Regulatory Specialist	IEF
Maged Hamed	Senior Environmental Specialist	MNSRE
Knut Opsal	Senior Social Development Specialist	MNSRE
Andreas Wildt	Procurement Coordinator	MNACS
Badr Kamel	Senior Procurement Specialist	MNACS
Mohamed Yahia Abd El Karim	Financial Management Specialist	MNACS
Sophie Jablonski	Energy Efficiency Expert	MNSIF
Hayat Al-Harazi	Program Assistant	MNSIF

Bank funds expended to date on project preparation:

1. Bank resources:
2. Trust funds:
3. Total:

Estimated Approval and Supervision costs:

1. Remaining costs to approval: US$ 20,600
2. Estimated annual supervision cost: US$ 85,000

Annex 12: Documents in the Project File

1. El-Tebbin Feasibility Study, June 2005
2. Terms of Reference for Environmental Assessment, October 2004
3. Environmental and Social Impact Assessment, October 2005
4. Procurement Capacity Assessment, November 2005
5. Detailed Financial Analysis of EEHC and detailed assumptions, November 2005
6. Energy Efficiency Sector Note, December 2005
7. Power Sector Regulatory Development Framework, January 2006

Annex 13: Statement of Loans and Credits

EGYPT, ARAB REPUBLIC OF: EG-EL TEBBIN POWER

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P082914	2004	EG-AIRPORT DEVELOPMENT	335.00	0.00	0.00	0.00	0.00	335.00	0.33	0.00
P049702	2004	EG-SKILLS DEVELOPMENT	5.50	0.00	0.00	0.00	0.00	5.15	0.25	0.00
P074075	2003	Egypt Second Matruh Resource Mgmt. Proj.	12.35	0.00	0.00	0.00	0.00	12.35	1.53	0.00
P056236	2002	EG-HIGHER EDUCATION ENHANCEMENT PROG	50.00	0.00	0.00	0.00	0.00	47.27	24.01	0.00
P045499	2000	Egypt NATIONAL DRAINAGE II	50.00	0.00	0.00	0.00	0.00	33.23	15.39	0.00
P041410	1999	Egypt P. S. REHAB III	120.00	0.00	0.00	0.00	0.00	81.48	81.48	0.00
P040858	1999	Egypt SOHAG RURAL DEV.	0.00	25.00	0.00	0.00	0.00	17.31	13.21	2.36
P066336	1999	EG-SOCIAL PROT INIT PROJ	0.00	5.00	0.00	0.00	0.00	2.55	1.97	0.00
P050484	1999	EG Secondary Education Enhancement Proj	0.00	50.00	0.00	0.00	0.00	34.05	15.27	9.46
P052705	1999	EG-SOCIAL FUND III	0.00	50.00	0.00	0.00	0.00	5.83	1.97	-3.60
P045175	1998	EG-HEALTH SECTOR	0.00	90.00	0.00	0.00	0.00	81.93	74.50	0.00
P049166	1998	EG East Delta Ag. Serv.	0.00	15.00	0.00	0.00	0.00	11.59	10.25	2.86
P054958	1998	Egypt POLLUTION ABATEMENT	20.00	15.00	0.00	0.00	0.00	8.02	8.14	0.56
P005169	1997	EG-ED.ENHANCEMENT PROG.	0.00	75.00	0.00	0.00	0.00	24.01	27.28	21.33
P005163	1996	EG-POPULATION	0.00	17.20	0.00	0.00	0.00	7.02	7.39	1.86
P005173	1995	EG Irrigation Improvement	26.70	53.30	0.00	0.00	0.00	13.74	19.97	12.58
		Total:	619.55	395.50	0.00	0.00	0.00	720.53	302.94	47.41

EGYPT, ARAB REPUBLIC OF
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
1994/96	ANSDK	1.33	0.00	0.00	0.00	0.62	0.00	0.00	0.00
2004	Alexandria Fiber	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	Amreya	5.18	0.00	0.00	0.00	5.18	0.00	0.00	0.00
1999/04	CIL	0.00	0.33	0.00	0.00	0.00	0.33	0.00	0.00
1992/97/98/00	Carbon Black-EGT	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Ceramica Al-Amir	4.68	0.00	0.00	0.00	4.38	0.00	0.00	0.00
1994	Club Ras Soma	1.92	0.00	0.00	0.00	1.92	0.00	0.00	0.00
1993	Cmrcl Intl Bank	0.00	15.59	0.00	0.00	0.00	15.59	0.00	0.00
2001	EFG Hermes	6.20	0.00	0.00	0.00	6.20	0.00	0.00	0.00
2004	EHF	0.00	1.61	0.00	0.00	0.00	0.40	0.00	0.00
1999	HC Investment	0.00	1.41	0.00	0.00	0.00	1.41	0.00	0.00

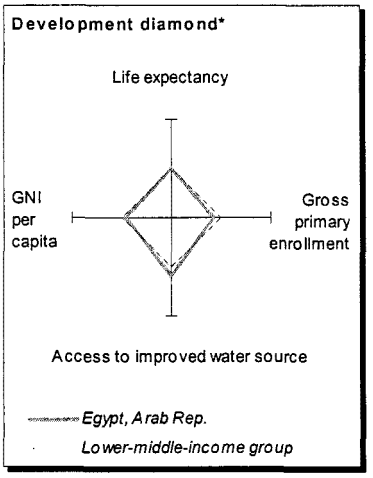
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2001	IT Worx	0.00	2.50	0.00	0.00	0.00	2.50	0.00	0.00
2004	Lecico Egypt	9.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986/88/92	Meleiha Oil	0.00	13.00	0.00	0.00	0.00	2.82	0.00	0.00
2004	Merlon Egypt	15.00	0.00	5.00	0.00	10.00	0.00	5.00	0.00
2002	Metro	15.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00
1992	Misr Compressor	9.70	0.00	0.00	0.00	9.70	0.00	0.00	0.00
2002	OCIC	25.00	0.00	0.00	22.88	25.00	0.00	0.00	22.88
1996/01	Orix Leasing EGT	1.91	0.00	0.00	0.00	1.91	0.00	0.00	0.00
2001	Port Said	43.86	0.00	0.00	146.67	43.86	0.00	0.00	146.67
2002	SEKEM	5.00	0.00	0.00	0.00	2.60	0.00	0.00	0.00
2004	SPDC	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	SUEZ GULF	43.32	0.00	0.00	143.89	43.32	0.00	0.00	143.89
1997/01	UNI	2.81	0.00	0.00	0.00	2.81	0.00	0.00	0.00
	Total portfolio:	223.66	34.44	5.00	313.44	172.50	23.05	5.00	313.44

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2004	ACB Acrylic	0.00	0.00	0.00	0.00
2000	ACB Expansn III	0.00	0.00	0.00	0.00
2004	Melrose Egypt	0.03	0.00	0.01	0.02
2004	Merlon Egypt	0.01	0.00	0.00	0.02
	Total pending commitment:	0.04	0.00	0.01	0.04

Annex 14: Country at a Glance

EGYPT, ARAB REPUBLIC OF: EG-EL TEBBIN POWER

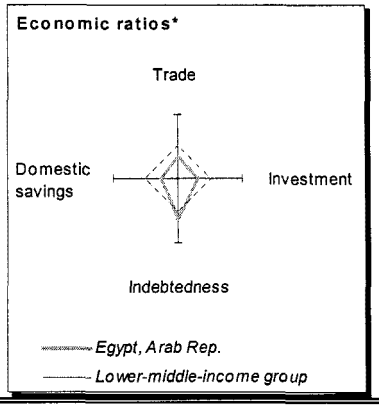
POVERTY and SOCIAL	Egypt	M. East & North Africa	Lower-middle-income
2003			
Population, mid-year *(millions)*	68.1	312	2,655
GNI per capita *(Atlas method, US$)*	1,360	2,210	1,480
GNI *(Atlas method, US$ billions)*	92.9	689	3,934
Average annual growth, 1997-03			
Population *(%)*	2.0	1.9	0.9
Labor force *(%)*	2.9	2.9	1.2
Most recent estimate (latest year available, 1997-03)			
Poverty *(% of population below national poverty line)*	17	..	..
Urban population *(% of total population)*	42	58	50
Life expectancy at birth *(years)*	69	69	69
Infant mortality *(per 1,000 live births)*	33	44	32
Child malnutrition *(% of children under 5)*	4	..	11
Access to an improved water source *(% of population)*	97	88	81
Illiteracy *(% of population age 15+)*	..	31	10
Gross primary enrollment *(% of school-age population)*	97	96	112
Male	100	100	113
Female	93	92	111



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

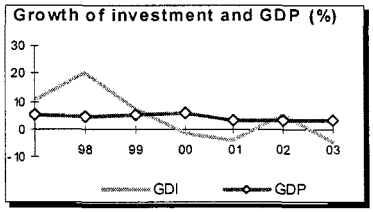
	1983	1993	2002	2003
GDP *(US$ billions)*	28.1	47.2	87.8	82.4
Gross domestic investment/GDP	28.7	16.2	18.3	17.1
Exports of goods and services/GDP	25.5	27.7	18.4	21.7
Gross domestic savings/GDP	17.8	13.2	13.8	14.5
Gross national savings/GDP	..	24.2	18.8	18.6
Current account balance/GDP	-5.4	4.9	0.7	2.4
Interest payments/GDP	1.4	0.8	0.2	0.2
Total debt/GDP	57.2	19.5	34.2	37.4
Total debt service/exports	9.3	7.8	3.8	4.7
Present value of debt/GDP	..	..	30.4	..
Present value of debt/exports	..	..	135.6	..

	1983-93	1993-03	2002	2003	2003-07
(average annual growth)					
GDP	4.2	4.6	3.2	3.2	..
GDP per capita	1.7	2.6	1.2	1.2	..

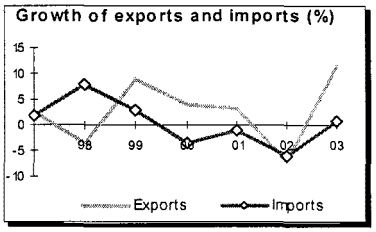


STRUCTURE of the ECONOMY

	1983	1993	2002	2003
(% of GDP)				
Agriculture	19.6	16.7	16.5	16.1
Industry	30.0	33.1	34.8	34.6
Manufacturing	13.2	16.7	19.1	18.9
Services	50.4	50.2	48.7	49.2
Private consumption	65.0	76.6	73.7	73.0
General government consumption	17.2	10.2	12.5	12.5
Imports of goods and services	36.4	30.7	22.8	24.3

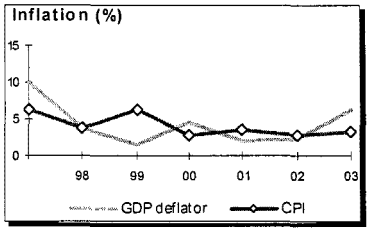


	1983-93	1993-03	2002	2003
(average annual growth)				
Agriculture	2.6	3.5	3.6	4.9
Industry	4.3	4.7	3.6	1.9
Manufacturing	5.3	7.0	4.2	3.4
Services	4.3	4.6	2.4	3.3
Private consumption	4.2	4.1	2.7	2.5
General government consumption	-0.6	2.9	2.6	2.8
Gross domestic investment	-5.4	6.7	5.0	-4.6
Imports of goods and services	-1.6	1.3	-6.0	0.7



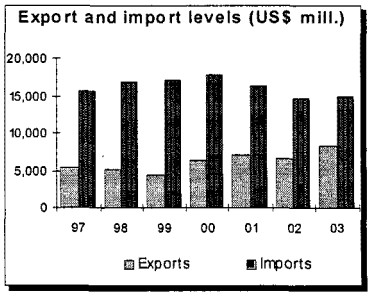
PRICES and GOVERNMENT FINANCE

	1983	1993	2002	2003
Domestic prices				
(% change)				
Consumer prices	..	11.1	2.8	3.2
Implicit GDP deflator	8.3	9.9	2.2	6.2
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	27.8	23.4	23.3
Current budget balance	..	1.5	-2.3	-3.1
Overall surplus/deficit	..	-3.5	-7.5	-8.0



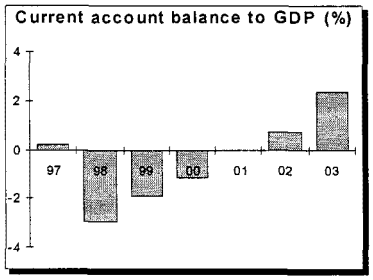
TRADE

	1983	1993	2002	2003
(US$ millions)				
Total exports (fob)	..	3,725	6,643	8,205
Cotton	..	2,111	83	3,195
Other agriculture	..	37	185	199
Manufactures	..	1,167	2,877	2,952
Total imports (cif)	..	10,728	14,644	14,821
Food	..	1,878	1,035	1,521
Fuel and energy	..	1,267	2,961	2,373
Capital goods	..	2,545	3,211	3,179
Export price index *(1995=100)*	..	96	..	..
Import price index *(1995=100)*	..	92	..	..
Terms of trade *(1995=100)*	..	104	..	..



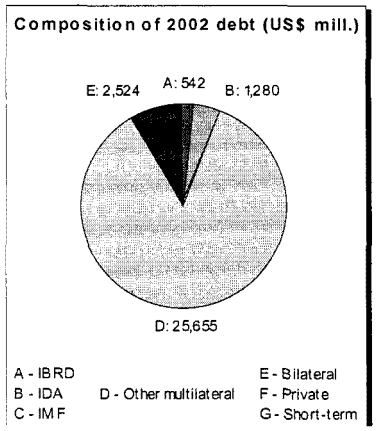
BALANCE of PAYMENTS

	1983	1993	2002	2003
(US$ millions)				
Exports of goods and services	6,682	11,174	15,801	18,006
Imports of goods and services	10,766	14,044	19,535	19,565
Resource balance	-4,083	-2,870	-3,734	-1,559
Net income	-630	-572	95	-107
Net current transfers	3,191	5,737	4,252	3,609
Current account balance	-1,522	2,295	614	1,943
Financing items (net)	1,583	2,016	-1,070	-1,397
Changes in net reserves	-61	-4,311	456	-546
Memo:				
Reserves including gold *(US$ millions)*	..	..	..	..
Conversion rate *(DEC, local/US$)*	0.9	3.3	4.3	5.0



EXTERNAL DEBT and RESOURCE FLOWS

	1983	1993	2002	2003
(US$ millions)				
Total debt outstanding and disbursed	16,090	9,218	30,001	30,863
IBRD	723	1,357	542	539
IDA	649	912	1,280	1,339
Total debt service	961	1,236	745	1,007
IBRD	84	304	100	101
IDA	6	19	43	46
Composition of net resource flows				
Official grants	383	883	650	0
Official creditors	724	388	-212	-130
Private creditors	..	..	..	..
Foreign direct investment	490	493	647	0
Portfolio equity	0	0	-212	0
World Bank program				
Commitments	482	208	50	0
Disbursements	289	163	72	54
Principal repayments	34	200	106	114



MAP SECTION

ARAB REPUBLIC OF EGYPT

- SELECTED CITIES AND TOWNS
- GOVERNORATE CAPITALS
- NATIONAL CAPITAL
- RIVERS
- MAIN ROADS
- RAILROADS
- GOVERNORATE BOUNDARIES
- INTERNATIONAL BOUNDARIES

GOVERNORATES IN NILE DELTA:

1 KAFR EL SHEIKH
2 DAMIETTA
3 PORT SAID
4 ALEXANDRIA
5 BEHEIRA
6 GHARBIYA
7 DAGAHLIYA
8 MENOUFIYA
9 SHARGIYAH
10 QALIUBIYA
11 ISMAILIA
12 CAIRO

Mediterranean Sea
Libyan Plateau
Qattara Depression
Western Desert
Libyan Desert
Eastern Desert
Red Sea
Gulf of Suez
Gulf of Aqaba
Nile River
Lake Nasser
WEST BANK AND GAZA
ISRAEL
JORDAN
SAUDI ARABIA
LIBYA
SUDAN
NORTHERN SINAI
SOUTHERN SINAI
MARSA MATRUH
BENI SUEF
EL FAYOUM
GIZA
SUEZ
AL MINYA
ASSIUT
SOHAG
QENA
ASWAN
AL WADI AL JADID
AL BAHR AL AHMAR
To Darnah
To Tel Aviv
To Jalu
To Dongola
To Berber
To Port Sudan
Salûm
Marsa Matruh
Alexandria
Kafr el Sheikh
Damietta
Port Said
El'Arish
Damanhur
El Mansura
Tanta
Zagazig
Ismailia
Shibin el Kom
Benha
CAIRO
Giza
Suez
Taba
Qâra
Siwa
El Fayoum
Beni Suef
Abu Zenima
Râs Ghârib
El Tur
Al Minya
Assiut
Al Ghurdaqah
Bîr Seiyâla
Sohag
Qena
Quşeir
Luxor
Mût
El-Kharga
Marsa 'Alam
Kom Ombo
Aswan Dam
Aswan
Halaib
25°E
30°E
35°E
30°N
25°N
20°N
0 50 100 150 200 Kilometers
0 50 100 150 Miles

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