See Annex 9 | Economic and Financial Analysis

Document of
The World Bank

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Report No: 54267-EG

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$70 MILLION,

A CLEAN TECHNOLOGY FUND LOAN

IN THE AMOUNT OF US$149.75 MILLION

AND

A CLEAN TECHNOLOGY FUND GRANT

IN THE AMOUNT OF US$0.25 MILLION

TO THE

ARAB REPUBLIC OF EGYPT

FOR A

WIND POWER DEVELOPMENT PROJECT

May 19, 2010

Sustainable Development Department
Middle East and North Africa Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective April 31, 2010)

Currency Unit	=	Egyptian Pound (LE)
LE 5.56	=	US$ 1
USD 0.179	=	LE 1

FISCAL YEAR
July 1 June 30

ABBREVIATIONS AND ACRONYMS

AFD	Agence Française de Développement
AfDB	African Development Bank
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
BOT	Build Operate Transfer
CAS	Country Assistance Strategy
CASPR	Country Assistance Strategy Progress Report
CCGT	Combined Cycle Gas Turbine
CDM	Clean Development Mechanism
CEPC	Cairo Electricity Production Company
CFL	Compact Fluorescent Lamp
CGC	Credit Guarantee Company
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
EEA	Egyptian Electricity Agency
EEHC	Egyptian Electricity Holding Company
EIRR	Economic Internal Rate of Return
EETC	Egyptian Electricity Transmission Company
EEUCPRA	Egyptian Electric Utilities and Consumer Protection Authority
ERA	Electricity Regulatory Agency
EIB	European Investment Bank
ELNG	Egyptian Liquefied Natural Gas
EMP	Environmental Management Plan
EPC	Engineering, Procurement, and Construction
ESIA	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
FDI	Foreign Direct Investment
FM	Financial Management
FMU	Financial Management Unit
FY	Fiscal Year
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GoE	Government of Egypt
GWh	Gigawatt hour
HFO	Heavy Fuel Oil
JICA	Japanese International Cooperation Agency
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IFI	International Financial Institution
IPP	Independent Power Producer
KfW	German Agency for Development Assistance
kWh	Kilowatt hour
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
MENA	Middle East and North Africa Region
MMBTU	Million British Thermal Units
MoEE	Ministry of Energy and Electricity
MIC	Middle Income Country
NPV	Net Present Value
NIB	National Investment Bank
NREA	New and Renewable Energy Authority
Mt	Million Tons
M/S	Meters per second
OCC	Opportunity Cost of Capital
O & M	Operation and Maintenance
OHTL	Overhead Transmission Line
PPA	Purchase Power Agreement
PPIAF	Public Private Infrastructure Advisory Facility
REA	Rural Electrification Agency
RPF	Resettlement Policy Framework
SBD	Standard Bidding Document
SC	Steam Cycle
SOE	State –Owned Enterprise
SWH	Solar Water Heating
TA	Technical Assistance
Tcf	Trillion Cubic Feet
T & D	Transmission and Distribution
TOR	Terms of Reference
US¢	US cents
USAID	United States Agency for International Development
W/M^2	Watts per square meter

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EGYPT, ARAB REPUBLIC OF
Wind Power Development Project

CONTENTS

EGYPT, ARAB REPUBLIC OF

WIND POWER DEVELOPMENT PROJECT

PROJECT APPRAISAL DOCUMENT

MIDDLE EAST AND NORTH AFRICA

MNSSD

Date: May 19, 2010	Team Leader: Chandrasekar Govindarajalu
Country Director: A. David Craig	Sectors: Renewable energy (100%)
Sector Manager/Director: Jonathan Walters	Themes: Climate change (100%)
Project ID: P113416	Environmental category: B
Lending Instrument: Specific Investment Loan	Joint IFC:
	Joint Level:

Project Financing Data

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

For Loans/Credits/Others:
Total Bank financing (US$m.): IBRD 70.00, Clean Technology Fund 149.75, Clean Technology Grant 0.25
Proposed terms: IBRD: Variable spread, denominated in US dollars, 28.5 years maturity with 7 years grace period and level repayment: CTF Loan: Annual service charge of 0.25 percentage on withdrawn loan balance, 40 years maturity with 10 years grace period: CTF Grant: Grant

Financing Plan (US$m)

Source	Local	Foreign	Total
IBRD	9.0	61.0	70.0
CTF	10.2	139.8	150.0
PPIAF		0.5	0.5
kfW		0.7	0.7
EIB/kfW/AfD	10.7	59.3	70.0
BOO	67.5	382.5	450.0
Borrower	54.8	0.0	54.8
Total Financing	152.2	643.8	795.9

Borrower:
Ministry of International Cooperation
8 Adly Street
Cairo, Arab Republic of Egypt
Fax: (202) 391 2815

Responsible Agency:
Egyptian Electricity Transmission Company
Abassia – Naser City
Cairo, Arab Republic of Egypt

Tel: (20-2) 261-8579
Eng. Hassan Gaber Mohamed Negm / www.eetc.net.eg

Estimated disbursements (Bank FY/US$m)									
FY	11	12	13	14	15				
Annual	10.2	35.15	57.60	73.85	43.20				
Cumulative	10.2	45.35	102.95	176.80	220.00				

Project implementation period: Start October 1 2010 End June 2015
Expected closing date: December 31 , 2015

Does this project depart from the CAS in content or other significant respects?	]Yes x] No
Does project trigger any Bank policies?	]Yes x] No
Does the project trigger it	x]Yes]No

Project development objective *Ref. PAD II.D., Technical*

The development objective of this project is to develop infrastructure and business models for scaling-up wind power in Egypt.

Project description ***Ref. PAD II.D., Technical Annex 4***

Component A- Transmission Infrastructure (US$ 342 million, of which IBRD is US$ 70 million, CTF is US$ 148.25 million, EIB is US$ 70million and GoE is US$ 54 million). This component involves several sub-components that together contribute to the full transmission infrastructure development and brings together financing from IBRD/CTF, European donors led by European Investment Bank, but including AfD/NIF and kfW/NIF.

Component B Technical Assistance to support the expansion of Egypt's wind generation program (US$ 2.9 million of which CTF is US$ 1.75 million)

Component C- Gulf of Suez 250 MW BOO project (US$ 450 million): This component will involve development and construction of a 250 MW wind farm in Gulf of Suez by a private sector operator under a BOO approach.

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

This project is classified as category 'B' according to the World Bank's Operation Policy on Environmental Assessment (OP 4.01). Therefore an Environment and Social Assessment (ESA) including preparation of site specific Environmental Management Plan (EMP) and a resettlement

policy framework (RPF) was prepared for this report.
Significant, non-standard conditions, **if any**, for: ***Ref. PAD III.F.*** *Board presentation*: June 15, 2010. *Loan/credit effectiveness*: Subsidiary Loan Agreement signed between Ministry of International Cooperation and the Egyptian Electricity Transmission Company (EETC).

I. STRATEGIC CONTEXT AND RATIONALE

A. Country and sector issues

Country issues

1. Egypt is a Middle Income Country (MIC) with strong ownership of its development strategy. The Government has established a good track record of economic reforms in the Middle East and North Africa Region (MENA). Its reform agenda has included trade liberalization, an overhaul of the tax system and substantial financial sector reforms and privatization. This has led to a friendlier investment climate, which in turn has yielded a strong private sector response. A favorable external environment and increased regional liquidity have further contributed to economic performance. This economic growth has been broad-based, with non-oil manufacturing and wholesale trade contributing to about half the overall total, and with construction, the Suez Canal, communications, and tourism among the fastest- growing sectors.

2. Egypt's economic performance during the period preceding global economic crisis of 2008-09 was very strong. Between Fiscal Year 2005 (FY05) and FY08 its Gross Domestic Product (GDP) grew on average 6.4 percent, reaching about USD 162 billion in 2008 in nominal terms. By FY08, unemployment declined to 8.4 percent and the overall general government budget deficit fell to 7.5 percent, despite increased public spending to accommodate the rise in food and energy prices at the time. The total share of investment in GDP increased from an average of 17.5 percent during FY01-FY04 to 22.3 percent in FY08, with share of private investment increasing from 8 percent to 15 percent and Foreign Direct Investment (FDI) from 0.6 percent to 7.5 percent over the same period.

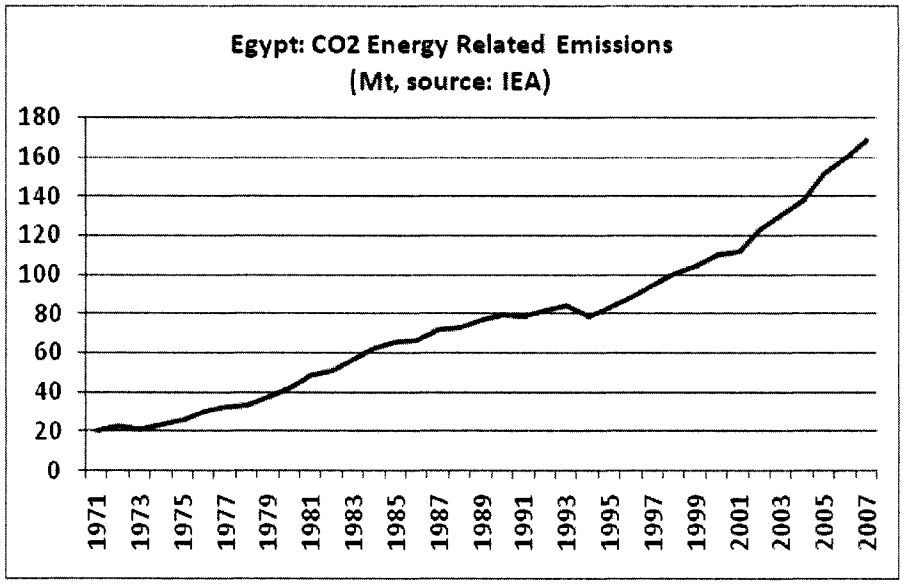
3. The global economic crisis had an adverse impact on Egypt. Earnings from tourism fell as did the traffic through Suez Canal and foreign investment. GDP growth declined to 4.7 percent in FY09 and unemployment increased to 9.4 percent. Declining exports led to a current account deficit of 2.3 percent of GDP, for the first time since FY01. Smaller capital inflows, especially FDI (down by 39 percent), led to an overall balance of payments deficit of 1.8 percent of GDP compared with a 3.3 percent surplus in FY08. The stock market index fell 20 percent from its FY08 close. Inflation increased by August 2009 to 24 percent, decelerating since then but continuing to be high -- 13.6 percent in January 2010.

4. In response to the crisis the Government of Egypt (GoE) implemented a response plan featuring fiscal, monetary and direct support measures. The first stimulus package was approved in October 2008 in the amount of Egyptian Pound (EGP) 15 billion (USD 2.7 billion). The second package of EGP 8 billion (over USD 1.4 billion) was approved in June 2009 simultaneously with the state budget, and the third package of EGP 11.2 billion (USD 2 billion) was announced in January 2010. Most of the stimulus funds have been allocated to infrastructure investments. The funds also supported exports and social programs. The government temporarily suspended the implementation of its plan to increase energy prices for energy-intensive industries, initially due to be accomplished by the end of 2010. On the monetary side, the Central Bank of Egypt cut its lending rates several times in 2009.

5. There are signs that the economic growth is improving. Some exports are increasing and Suez Canal traffic is recovering. The stock exchange has been on the upswing since March 2009. After depreciating by 7.7 percent between August 2008 and March 2009, the Egyptian pound has been stable or appreciating in response to renewed capital inflows. Moody's has changed its outlook for Egypt from negative to stable. This upgrade reflects factors such as easing inflation, contained fiscal pressures as well as a relatively resilient economy and banking system. The economic outlook for the future is cautiously optimistic. GDP growth is forecast at 5.2 percent for FY10, an improvement over the FY09 but still below the pre-crisis level.

6. However, this economic growth has been accompanied by a growth in energy use and, consequently, increased air pollution and greenhouse gas emissions. Egypt ranks among the 11 countries in the world showing fastest growing GHG emission. The growth of the GHG emissions in Egypt is primarily linked to the strong economic growth and the associated increases in energy demand, especially through higher demand for electricity and transport services. Electricity demand is growing at 7-8 percent per year, which implies adding about 1,500-2000 MW per year over the next several years (current installed capacity is close to 22,000 MW). The increase in energy demand has been met primarily by increased use of fossil fuels, leading to the high energy and carbon intensity of the economy. As a result, the CO_2 emissions from energy uses have increased by over 7 percent per year since 2000, reaching about 168 Mt in 2007 (see figure 1).

Figure 1: CO_2 Emissions from Energy Uses

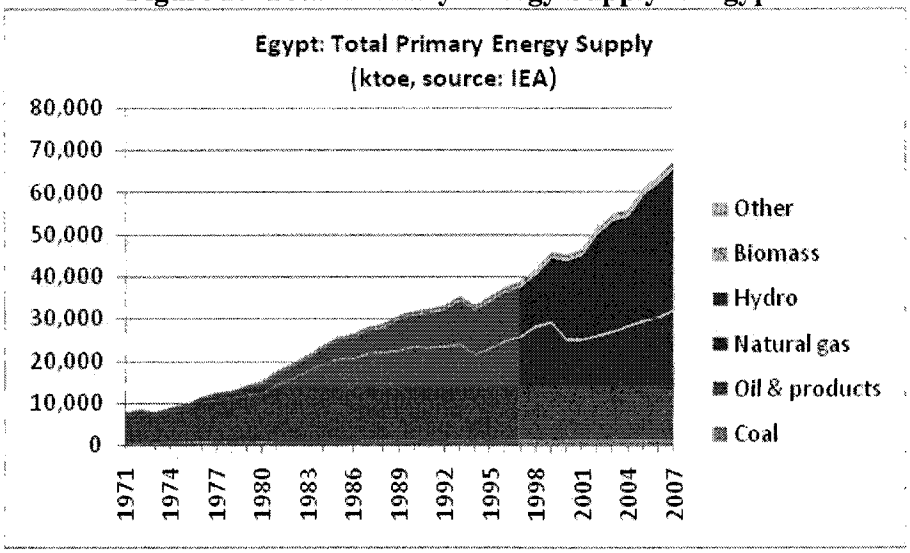


Sector Issues:

7. **Primary Energy Resources**: Among its neighbors in the region, Egypt is considered energy-resource endowed with its crude oil and natural gas reserves meeting 95 percent of its overall needs. Egypt has significant primary energy resources, both in traditional fossil fuels

(especially oil and gas) and in renewable energy. Egypt's proven *oil reserves* stand at 3.7 billion barrels[1] and *natural gas reserves* as of 2007 were estimated at 67 trillion cubic feet (Tcf)[2] with yet-to-find reserves by 2040 at 90 Tcf; Egypt's gas consumption was about 1.3 bcf in FY07. Natural gas is likely to be a key growth engine of Egypt's energy sector, which is illustrated by the fact that its production increased over 30 percent between 1999 and 2007. About 60 percent of the domestic natural gas production is utilized by the power sector and the domestic gas demand is increasing, both in power generation and in other uses, competing with increasing gas exports through pipelines and LNG terminals.[3] The Government's objectives are to (a) reduce the use of fuel oil, gasoline and LPG in the domestic market; (b) to position itself as a global exporter of natural gas; and (c) foster regional integration through the interconnection of natural gas pipelines. However, these trends are placing increasing pressure on the national natural gas reserves (see Figure 2 below). In view of the increasing demand for natural gas, the GoE is actively pursuing more efficient power generation options and renewable energy options. *Hydropower* is the third major energy resource in use, but most of the Nile's hydropower potential, about 85 percent, has already been exploited to generate about 13 TWh of electricity per annum. Egypt also has limited *coal reserves* estimated at about 27 Mt[4] .

Figure 2: Total Primary Energy Supply in Egypt



8. In view of the increasing pressures on fossil fuel resources and the resulting increases in local and global environmental impacts, one of the key pillars of the GoE's energy strategy is greater reliance on renewable energy sources. As renewable energy electricity generation technologies, particularly wind and Concentrated Solar Power (CSP) have matured, the renewable energy strategy of Egypt has given the utmost priority to the large scale renewable energy electricity generation projects which can serve both national and regional objectives of achieving fossil fuel savings, environment protection, creation of jobs and technology transfer. Egypt's *solar* thermal electricity generating potential has been estimated at 73,656 terawatt-hours

[1] U.S. Energy Information Administration, http://www.eia.doe.gov/emeu/cabs/Egypt/Oil.html.
[2] (ECA gas pricing study)
[3] Egypt is connected via the Arab Gas Pipeline with Jordan, Syria and Lebanon and by pipeline to Israel.
[4] The International Development Research Center, http://www.idrc.ca/en/ev-132146-201-1-DO_TOPIC.html.

(TWh)/year which is equivalent to several thousand MWs of installed capacity[5]. The electricity generation expansion plan for Egypt includes achieving a total solar capacity of 150 MW by 2017. Some of the world's best *wind power* resources are in Egypt, especially in the areas of the Gulf of Suez where at least 7,200 MW could be potentially developed by 2022, with further 3,000 MW that could be developed on the West and East banks of the Nile[6].

9. **External Energy Trade:** Egypt has been traditionally a net exporter of oil until 2006, when domestic consumption (645 thousand barrel/day) outstripped production (639 thousand barrel/day)[7], due to a steady decline in domestic production since mid-2006 and increasing domestic demand.

10. Egypt, however, still has a strategic importance in the international oil trade because of its operation of the Suez Canal and Sumed (Suez-Mediterranean) oil pipeline, two routes for export of Persian Gulf oil. Egypt has the largest refining capacity on the African continent with nine refineries and a combined crude oil processing capacity of 726,000 bbl/d. Egypt exports natural gas to Jordan, Syria, and Lebanon through the Arab Gas Pipeline, with further planned connections to Turkey and Europe, and to Israel through the Arish-Ashkelon gas pipeline (completed in 2008). There are three Liquefied Natural Gas (LNG) trains for natural gas exports. Egypt's electricity network is interconnected with neighboring Libya and Jordan and through these countries further on with Maghreb and Mashreq countries, respectively. Given its excellent renewable energy resources, particularly the solar resources, there is also a good potential for trading "green energy" within the region and outside the region, particularly to high paying European markets. This vision has been elaborated in the MENA regional CSP Investment Plan that received endorsement in December 2009. Egypt is also the co-chair of the "Mediterranean Solar Plan," one of the six flagship projects under the Union for the Mediterranean. As such Egypt is not only a leader in wind power development in the region, but also plays a central role in solar scale-up in the region.

11. **Electricity Sector Institutional Organization.** The Ministry of Electricity and Energy (MoEE) is the principal policy agency in the electricity sector[8]. A number of the authorities and companies report to the MoEE, including Egyptian Electricity Holding Company (EEHC), New and Renewable Energy Authority (NREA), Rural Electrification Authority, Hydropower Projects Authority, and nuclear energy agencies. The MoEE thus acts as the owner of the state-owned companies operating in the sector, such as EEHC and NREA. The Supreme Council for Energy, established in 2006 as a Committee of the Prime Minister's Cabinet and reporting to the President, deals with strategic issues in the energy sector, including major policy initiatives, investment programs, and energy pricing. Egyptian Electric Utility and Consumer Protection Agency (EEUCPA) (hereinafter: Electricity Regulatory Agency -- ERA) was established in 1997. Its main functions include licensing and sector supervision, but not electricity tariffs, which are approved by the Cabinet of Ministers at the proposal of the MoEE. Minister of

[5] "Clean Technology Fund Investment Plan for Concentrated Solar Power in The Middle East and North Africa Region", Climate Investment Fund, CTF/TFC.IS.2/2, November 10, 2009

[6] "Clean Energy Investment in Developing Countries: Wind Power in Egypt", by Mohamed Elsobki (Environics, Egypt), Peter Woodersm and Yasser Sherif (Environics, Egypt), International Institute for Sustainable Development, October 2009; http://www.iisd.org/pdf/2009/bali_2_copenhagen_egypt_wind.pdf.

[7] http://www.indexmundi.com/energy.aspx?country=eg

[8] The Ministry of Petroleum manages oil and gas.

Electricity and Energy is also Chairman of the Board of Directors of ERA, with the other nine members of the Board appointed by the Prime Minister and selected to represent the various stakeholders in the industry.

12. **Electricity Industry Structure**. The electricity industry, vertically integrated under Egyptian Electricity Authority (EEA) until 2000, has been structurally unbundled, both "vertically" (along the functional lines of generation, transmission, and distribution/supply) and "horizontally" in the generation and distribution/supply segments, with a number of companies operating in each segment. This unbundled structure is linked together under the umbrella of EEHC, whose subsidiaries include: one hydropower and five thermal electricity generation companies; nine electricity distribution companies; and a transmission-and-dispatch company, Egyptian Electricity Transmission Company – (EETC). In addition, there are three privately owned Independent Power Plants (IPPs) constructed in late 1990s/early 2000s with total capacity of 2,050 MW, operating under Build-Own-Operate-Transfer (BOOT) arrangements underpinned by 20-year Power Purchase Agreements (PPAs) with EEHC/EETC. There are several very small private power suppliers serving isolated load pockets, mainly tourist areas.

13. Renewable energy development has been led by NREA that has developed and operated renewable energy generation facilities with concessional financing from donors, which include about 460 MW of wind power plants and a 150 MW hybrid solar-thermal power plant with a 20 MW concentrated solar power field.

14. **Electricity Market**. Wholesale electricity trading at this stage is based on a "single buyer" model, with EETC acting as the wholesale single-buyer/single-seller of electricity, procuring electricity from generation companies and selling it to distribution companies and transmission network customers ('direct customers") which are connected to the transmission network directly (as opposed to being indirectly connected through a distribution network). All generation companies, including three BOOT projects, wind power plants, and four industrial plants sell their electricity to EETC, which – in turn -- sells it to direct customers and nine distribution companies. This single buyer market relies in dispatch on production cost curves of the plants and, as such and in the context of centralized governance and financial management of EEHC, offers limited space for commercially-based competition for dispatch among the incumbent generation companies. This is intended as an intermediate step towards the establishment of a more liberalized electricity market, which is to start gradually, with liberalization of supply to large industrial consumers.

15. **Electricity Sector Reform**. EEHC and its predecessor, EEA, have been quite successful in developing the sector, as it now serves more than 99 percent of households. Egypt has put in place a number of measures to gradually reform its sector from a vertically integrated state-owned monopoly into a commercially oriented flexible structure, although the transition has been and remains very cautious and gradual. A semi-autonomous electricity regulator agency has been established, although with strong links to MoEE and EEHC through its governance structure and without authority over tariffs. EEHC has been unbundled, but operates as a tightly controlled holding company, with the holding having a strong sway over its subsidiaries in financial and governance matters. EEHC still has strong links to the government, through subsidies, facilitation of investment financing, fuel prices, and electricity tariff regulation. The

three IPPs have been in successful operation since early 2000s. After a pause of about ten years, the government is restarting its private investment program.

16. The government is preparing the ground for advancing the sector reform further. A new Electricity Law, awaiting parliamentary approval, introduces a number of changes toward strengthening sector's commercial orientation and its opening to private investment and competition. The law, inter alia, gives the authority for tariff regulation to the electricity regulatory agency; grants more independence to EETC, converting it to an independent system operator with open access for bilateral trading between generation and consumers; and promotes introduction of a competitive end-user market. On renewable energy, the supreme energy council has already approved several incentives and these are described in a subsequent section and in Annex 4. These provisions are also in the new Electricity Law.

17. **Electricity and Energy Pricing and Subsidies**. The prices of energy products in Egypt are generally below economic cost and the resulting implicit subsidies to the economy are quite large. The government partially compensates energy companies for selling at below-cost prices. In FY08, such energy subsidies in the government budget reached EGP 60.2 billion and in FY09 62.7 billion, largely subsidizing gasoline prices and Liquefied Petroleum Gas (LPG), widely used by households for cooking. Direct budget subsidies for electricity consumption are by an order of magnitude smaller in comparison, as electricity prices benefit from low cost of fuel used in electricity production.

18. In order to bring the sector finances and energy consumption to a more sustainable path and to reduce the fiscal burden of energy consumption, a few years ago the government initiated a series of energy price increases. Gasoline price increased in early 2000s, although they are still below cost. Annual increases of electricity tariffs were approved in 2004 and implemented every year since then except in 2009 due to the global economic crisis. In addition, in June 2008 the government announced an increase in the price of natural gas and electricity for energy-intensive industrial users from USD1.25/mmbtu to USD3/mmbtu, and for other industries an increase from USD1.25/mmbtu to USD2.65/mmbtu to be done in three stages. As a consequence, electricity price for energy-intensive industrial users was also increased at that time to US¢6.1/kWh, US¢4.6/kWh and US¢3.7/kWh for medium, high voltage and ultra high voltage, respectively, with a fixed charge of USD1.9/kw-months for medium voltage users Electricity price for other industrial users was to increase in three stages to US¢5.4/kWh, US¢3.2/kWh and US¢3.2/kWh for medium, high voltage and ultra high voltage, respectively, with a fixed charge of USD1.9/kw-months for medium voltage users.

19. There has been a significant nominal increase in electricity tariff since 2004. Average price of electricity in FY09 was US¢3.4/kWh (0.187 EGP/kWh), compared with US¢3.2/kWh (0.174 EGP/kWh) in FY08, US¢2.9/kWh (0.162 EGP/kWh) in FY07, and US¢2.35/kWh (0.141 EGP/kWh) in FY04. A comprehensive Energy Pricing Study, financed by Energy Sector Management Assistance Program (ESMAP), was completed in June 2009, with recommendations on price adjustment program, including social mitigation measures. The government is expected to resume in 2010 annual adjustments of electricity prices of about 7.5 percent, although it remains to be seen whether any price adjustments in electricity and fuel

prices will take place until the impact of the global economic crisis is fully absorbed and before parliamentary elections in 2010 and presidential elections in 2011.

20. **Energy Efficiency:** The GoE has prepared a National Energy Conservation plan and has set up an inter-ministerial energy conservation coordination group to coordinate activities of energy consumers and suppliers in promoting more efficient use of energy. The current activities are focusing on increasing use of compact fluorescent lamps (CFLs), improving energy efficiency in street lighting and public buildings, and scaling up Solar Water Heating (SWH). An energy efficiency program for small and medium enterprises is under implementation by the Credit Guarantee Company (CGC). On the supply side, the main effort is on improving the use of fossil fuels through the increased use of combined cycle gas turbine power plants and supercritical technology for steam power plants.

21. **Electricity Sector Investment Program and its Financing**. The power system in Egypt needs to grow in tandem with the economy. Even with somewhat lower electricity consumption growth rate in comparison with the GDP growth -- to allow for energy efficiency improvement -- the needs for new investments in the power generation, transmission, and distribution are very significant. The MoEE, with endorsement of the Cabinet, adopted the following strategy: (i) increased use of efficient fossil-fuel generation technologies (CCGT and supercritical steam boilers); (ii) large scale development of Egypt's renewable resources with the goal of having 20 percent of its installed generation capacity in the form of renewable by 2020 (including the existing hydropower); and (iii) stepping up efforts for more efficient consumption of electricity. The government is also considering development of nuclear power plants – the first such plant is planned to be put in operation in about year 2018 -- and the nuclear energy law is under consideration by parliament.

22. EEHC and NREA are executing a number of generation projects that will add in the next five years about 7,240 MW, of which 6,500 in thermal generation, 600 MW in wind power, and 140 MW in hybrid solar thermal technology. These projects, which are part of the FY07-FY12 five-year investment plan, have obtained financing commitments and are at various stages of construction. The FY12-FY17 five-year investment plan includes adding 15,080 MW, of which 11,850 in thermal generation, 3,600 MW in wind power, and 150 MW in concentrated solar power technology. The total investment needs during the FY07-FY12 investment plan amount to about USD24 billion, including USD20 billion for generation and USD 4 billion for transmission and distribution.

23. The accelerating demand growth is causing a significant increase in investment requirements in the coming years relative to the past. The acceleration started in FY08, when the annual investment expenditures grew from about EGP 5 billion (USD 0.9 billion) per year in the preceding years to about EGP 8 billion (USD 1.5 billion) in FY08. In FY09 investment expenditures exceeded EGP 13 billion (USD 2.4 billion) and are projected to average at about USD 3.5 billion per year for the next 6-7 years.

24. With such rapid growth in the investment needs EEHC, already highly leveraged, is becoming increasingly limited in its ability to fund the investment program on its own. To alleviate the pressure on EEHC balance sheet and public investment expenditures, the

government is looking at the private sector to finance a significant portion of the investment program in electricity generation, both in renewable and conventional technologies. In parallel, EEHC has to press ahead with some of its own investments in order to ensure timely increase in generation capacity and mitigate the risk of disruption in power supply.

25. **Private Investment: Restarting IPP program**. In the mid-1990s, Egypt initiated efforts to obtain private investment in generation under the framework of independent power producers (IPP) with 65-70 percent take-or-pay long-term off-take agreement with the utility. This effort yielded to the construction of three privately developed power plants with combined capacity of 2,048 MW, completed in 2002 and 2003, under the build-own-operate-transfer (BOOT) arrangements, with 20-year Power Purchase Agreements (PPA) supported by Central Bank guarantees and prices denominated in USD. Although this was considered as one of the most successful IPP programs in developing countries, there have been no new private investments in power plants since 2003, when currency devaluation led to a significant increase in payments under the PPAs in terms of local currency.

26. In late January 2010 the government invited applications from private developers to prequalify for a tender to construct a 1500-MW combined cycle gas turbine plant (with option to expand its capacity to 2,250 MW) at Dairut (Behera Governorate). The government expects to select a private developer by end of 2010 through a competitive tender. Other private investment projects on conventional generation may follow.

27. **Wind Power Development**: As a means to diversify its energy supply options and mitigate the environmental impacts of fossil fuel based power generation, the GoE has made an ambitious commitment to renewable energy. The 20 percent renewable energy target set by the supreme energy council is expected to be met largely by scaling-up of wind and solar energy as the hydro potential is largely utilized. The council has also recently approved key policy steps related to wind power scale-up in the country. These include: (a) Approval by the supreme energy council of the need to cover additional costs for renewable energy projects; (b) Finalization of the land use policy for wind power developers; (c) Approval of zero customs duty on wind equipment (d) Acceptance of foreign currency denominated PPAs and confirmation of central bank guarantees for all BOO projects and (e) Permitting support for developers with respect to environmental, social and defense clearances. These measures are already being implemented pending their adoption as part of the new electricity law.

28. A focal point of the large scale development of renewable resources will be wind energy. Egypt has some of the best wind resources in the world along the Gulf of Suez with mean wind speeds and power densities of 7-10.5 m/s and 350-900W/m2, estimated for a height of 50 m above ground level in roughness Class 1 (In comparison resources in Yemen, Syria and Jordan are modest at 7-8 m/s). Given the low density of inhabitation, the region can easily host several thousand MW of installed wind capacity. The current approach for developing wind resources relies largely on donor financed public projects implemented by the NREA.

29. In order to accelerate the wind program to be able to achieve the ambitious target, the Government is pursuing a wind commercialization program that will focus on engaging the private sector. The different public and private business models being pursued and planned for

wind scale-up are discussed in Annex 4 (detailed project description)- these include private Build, Own, Operate (BOO) projects, feed-in-tariffs for small projects, public projects, auto generation and joint ventures. One of the key models is the competitive bidding approach where the EETC will issue tenders requesting supply of power from large scale renewable energy resources for specific pre-determined sites on a Build, Own, Operate (BOO) basis. It is expected that the competitive bidding approach will result in additional capacity of about 2500 MW of private sector capacity. The BOO program targets to achieve competitive electricity tariffs through an international tender and stimulate private investment from international and local investors into Egypt's power sector.

30. Egypt's competitive bidding program for wind power consists of initially tendering a 250 MW wind farm on a predetermined site in the Gulf of Suez area in 2010, with 2 x 250 MW to be tendered in each of the subsequent three years and a final 3 x 250 MW in the year thereafter. In 2008 the Ministry of Electricity set up a cross-departmental Steering Committee for the project pipeline. The committee is comprised of top officials and experts from the EEHC, EETC, NREA, the Energy Regulator, and the Ministry of Electricity. The Wind Tender Steering Committee oversees the work of the Gulf of Suez Wind Project task force of the EETC with technical assistance from NREA. Staff and consultants with extensive experience from the previous three thermal BOO projects are working on this task force.

31. The task force has been preparing the tendering process and associated activities for the first 250 MW wind farm to be tendered in the pipeline of projects. A request for prequalification of bidders was issued in May 2009. By December 2009 the EETC completed the pre-qualification of ten bidders, about half of which are among the leading international wind developers. In January 2010, the EETC issued a set of mandatory minimum technical standards for required site measurements for pre-qualified developers, using a set of norms equivalent to best practice in the international wind industry. Simultaneously the EETC proposed a highly innovative voluntary joint wind measurement program to be financed and operated jointly by the pre-qualified bidders, with EETC acting as an agent for the bidders.

B. Rationale for Bank involvement

32. The World Bank has become an increasingly important development partner in the Egyptian electricity sector in recent years, beginning with the El-Tebbin Power Project that was approved by the World Bank Board in February, 2006[9]. This project constituted a re-engagement by the Bank in the Egyptian electricity sector following a long period of limited dialogue due largely to disagreement over policy reform and pricing issues. Since then, the Bank has assisted the Government in the preparation of its first solar-thermal power project (150 MW of which 20 MW is CSP) which includes a grant from the GEF in the amount of US$49.8 million, and represents Egypt's first concentrated solar power plant. Financing has also been provided for the1200 MW Ain Sokhna power plant, and a lending project is in advanced stages of preparation for a 1500 MW CCGT at Giza North. All the ongoing projects are being successfully implemented.

[9] The project is a 700 MW power generation project, with US$259 million of Bank financing.

33. The investment operations have created conditions for the Bank to develop its policy dialogue and technical assistance for a number of priority issues which are part of the government's energy strategy: demand-side management, generation planning, public-private partnership, electricity market financial transactions management, carbon capture and storage, etc. In the policy dialogue, the Bank has focused in particular on the following areas: (a) development of renewable energy; (b) energy pricing and subsidies; (c) private investment in traditional generation technologies (gas-fired power plants); and (d) regional energy integration.

34. After completing a study on commercial framework for large-scale wind power development in 2009, supported by ESMAP, the Bank working with partners helped the government to secure endorsement of a resource envelope of USD 300 million from the Clean Technology Fund in support of an investment plan to scale up development of wind power and promote modal shifts in urban transport (studies were completed on urban transport with funding support from the Japan PHRD grant). In addition, the CTF has also endorsed a regional investment program for scaling up the CSP technology in MENA region. The program, supported by a USD 750 million CTF allocation, envisages development of about 1000 MW of CSP plants in several MENA countries (Algeria, Egypt, Jordan, Morocco, and Tunisia). The government policy is to attract private financing both for wind power and the CSP projects.

35. In the area of energy pricing the Bank, also with assistance from ESMAP, completed studies on domestic gas pricing; time of use pricing for electricity; and a comprehensive study on pricing of all types of energy in the domestic market, with recommendations on a transition path and a methodology for maintaining cost reflective pricing taking into account and mitigating the social impact of such policy. These studies provide a comprehensive analytical base and a set of policy instruments that can be used to derive an appropriate tariff adjustment program.

36. In addition, policy work on private investment in traditional fossil fuel based generation was supported through a grant from Public Private Infrastructure Advisory Services (PPIAF), which financed a study on options for public-private partnership in electricity generation, completed in late 2009. The study is followed by activities on development of a commercial framework for private investment in the context of gradual liberalization of end-user electricity market in Egypt.

37. Activities on regional energy integration in MENA region include Egypt as a key player. In addition to the already mentioned regional CSP investment program, the Bank has prepared a study on integration of electricity and gas networks in the Mashreq region and is collaborating with the Arab League on extending the study to all Arab countries.

38. Through these investment operations and technical assistance activities, the Bank has become an important development partner in Egypt's energy sector and at the forefront of its power sector development. Such deep involvement has helped achieve a number of important outcomes:

- maintaining the security of energy supply, by financing electricity generation projects and thus helping avoid disruptions in electricity supply, which would have had large economic and social costs;

- contributing to the improved financial position of the power and gas sectors by providing analytical background for energy pricing. The average electricity prices have significantly increased since mid-2000s, although still not fully catching up with the costs driven up by the increasing consumption and investment needs;
- scaling up development of renewable energy: with support from the CTF and following up the completed analytical preparatory work, the Bank is involved in initiating a major scaling up of the commercial, privately funded, wind power program. Also, with support of the CTF funds, the Bank is assisting with expanding the use of concentrated solar power as part of the regional CSP program;
- reengagement with private sector: following a study on options for private-public partnership in the power sector, funded by the Public-Private Infrastructure Advisory Facility (PPIAF), the government is calling on the private sector to invest in conventional power plants. The government is also in the process of engaging private sector in funding wind power program;
- regional integration: there is an increasingly active partnership between the government of Egypt and the Bank on regional energy issues, promoting more sustainable energy solutions for the region, including through scaling up renewable energy and regional energy integration, both within MENA region and between MENA and its neighboring regions.

39. There is strong partnership between the Government of Egypt and the World Bank that has developed over the past few years on policy dialogue and investment lending. The rationale for Bank involvement is clear and based on high and sustained demand for Bank assistance in this area by this middle-income client. The Bank's global experience in supporting wind/renewable energy scale-up in client countries is valued by the Government. The Government of Egypt has formally requested support from the Bank and the CTF for scale-up of wind power development.

C. Higher level objectives to which the project contributes

40. Access to reliable and affordable electricity services is critical to achieve the sustainable growth and economic and social development goals articulated by the GoE in its five-year National Development Plan (2007/08-2011/12). Given the strong growth in demand, investment in new generation capacity of around 1,500 MW per year will be needed in order to meet these objectives. Much of this new generation is likely to be government funded and fueled by natural gas, placing further strains on the GoE budget, and on the country's natural gas resources. However, the proposed development of wind power generation in the Gulf of Suez offers an opportunity to provide a substantial share of new capacity from renewable resources, primarily financed by private developers.

41. As described in the 2008 Country Assistance Strategy Progress Report (CASPR), substantial progress has been made towards the goals that were articulated in the Country Assistance Strategy (CAS) discussed by the Board on June 15, 2005. The most pertinent goal for the energy sector has been to enhance the provision of public services. This project also facilitates private sector development of wind projects by providing critical public transmission

infrastructure. Looking forward, the CASPR lists in its Results Framework for FY06 – FY11 funding for a project related to "clean technology for energy." As such, the proposed project is consistent with both the broader CAS goals and the specific lending framework.

42. A key high level objective of the project is to support development of the country's extensive wind resources on the Gulf of Suez and Gabel El-Zait, both to provide additional power supply to meet Egypt's growing electricity demand, and to increase the share of renewable resources in the country's generation mix. An adequate and reliable supply of electricity is necessary to sustain the country's rapid economic growth. Equally important, however, is providing support for the GoEs objective of increasing the share of renewables to 20 percent of total generation over the next 10 years. The proposed intervention will support both of these outcomes by providing the necessary transmission linkages between wind power resources in the Gulf of Suez region and Gabel El-Zait and the main load centers.

43. The project will make a substantial contribution to the reduction of global GHG. The Government of Egypt prepared and presented an Investment Plan in support of scaling-up of wind power and urban transport programs to the CTF and received its endorsement in January 2009. In addition to this project, the investment plan included support for developing other public-private models for wind power development such as concept that is being developed by the GoE together with the MASDAR (Future Energy Company of Abu Dhabi).

II. PROJECT DESCRIPTION

A. Lending instrument

44. The proposed operation is a Specific Investment Loan (SIL). The Bank Group will provide funding totaling US$220 million of which US$ 70 million will be a Specific Investment Loan (SIL); US $149.75 million will be a CTF loan and US$ 250,000 will be provided as CTF grant. The Government of Egypt has opted for a Variable Spread Loan (VSL) in US dollars with a 28.5 year term including a 7 year grace period. Terms of repayment for the CTF loan are a 40 year term, including 10 years grace, with an annual service charge of 0.25 percent on the withdrawn loan balance and a lump-sum 0.25 percent management fee.

B. Project development objective and key indicators

45. The development objective of this project is to develop infrastructure and business models for scaling-up wind power in Egypt.

46. The project will connect the future wind parks at Gulf of Suez and Gabel El-Zait to the national network. All project components are interrelated and the completion of these components expected to bring up the following outcomes:

- Implementation of the first private sector investments in wind power generation and progress of the competitive bidding program
- Infrastructure to evacuate over 3000 MW of wind power from the Gulf of Suez and Gabel El-Zait to the main load centers; and

- Reducing GHG emissions through facilitating the development of clean energy resources (wind power) which result in displacing thermal (fossil fuel-based) generation
- Leveraging of public and private funds for the transmission and the first BOO project.

47. The following monitoring indicators are proposed for this project:
- Annual reduction in GHG emissions (tons)
- Status of implementation of first 250 MW BOO wind project
- Wind competitive bidding program status
- Construction status of the transmission line
- Total job creation in the wind industry
- Wind power supply chain development
- Provision of wind energy to households

C. Project components

48. The project comprises transmission infrastructure development and support for the construction of the first 250 MW BOO wind project along with technical assistance for (i) facilitating the competitive bidding and (ii) to establish procedures to enable the system operator to manage the integration of large blocks of intermittent wind generation within the power system. The transmission infrastructure development for wind power development in the Gulf of Suez and Gabel El-Zait area requires 220kV and 500kV transmission lines and associated substations to evacuate about 3000 MW of wind energy. By 2015 wind power would reach 2,530MW at El-Zait and Ras Gharib in addition to the existing 545MW in Zafarana (1) and (2) and 540MW at Gulf of El-zait by 2013. The new 500 kV transmission line funded under the project would be required by 2015 to reinforce the capability of the grid to enable the evacuation of an additional 2,530 MW of wind power from Suez Gulf to distant load at the national network. The 500kV transmission line would initially transmit the power from the 250MW IPP wind farm along with another two upcoming wind farms to reach 2,530MW by 2015 in the Ras Gharib (Gulf of Suez).

49. The project Component A will be financed through IBRD and CTF loan proceeds. Component B will be financed through CTF proceeds and in particular CTF grant proceeds will finance sub-component B4.

50. In particular, the project will be undertaken through the following major components:

Component A- Transmission Infrastructure (US$ 342 million, of which IBRD is US$ 70 million, CTF is US$ 148.25 million, EIB is US$ 70million and GoE is US$ 54 million). This component involves several sub-components that together contribute to the full transmission infrastructure development and brings together financing from IBRD/CTF, European donors led by European Investment Bank (EIB), but including Agence Française de Développement (AfD)/Neighborhood Investment Funds (NIF) and Kreditanstalt für Wiederaufbau (KfW)/NIF.

- **A1- 500kV double-circuit Overhead Head Transmission Line (OHTL):**

This sub-component involves construction of the transmission line from Ras Gharib 500 kV substation to Samallout (about 280 km). This includes the single responsibility Design, Supply and Installation rate based contract for all components (towers, cable, insulators and materials, ground wires with fiber optics communication links, and foundations for the complete construction of the transmission line. Tendering for the transmission line will be based on the preliminary route survey that has been completed to provide estimated quantities of tower types, foundations, conductors etc. provided by EETC's consultant EPS.

- **A2 Construction of 500kV/220kV GIS Substation in Ras Gharib (at Suez Gulf)**:

This sub-component to be financed by the EIB includes a single responsibility Design Supply and Install contract for the provision of all components (switchgear, breakers, switches, protection, control, telecommunication, etc.) for the complete construction of the Substation based on design details provided by EETC's consultants. The sub-component also includes one Supply and Install contract for one transformer 500kV/220kV, 375 MVA.

- **A3 Extension of Samallout 500kV/220kV Conventional substation**: This sub-component to be financed by EIB includes a single responsibility Design, Supply and Install contract for the provision of all components (switchgear, breakers, switches, protection, control, telecommunication, etc.) to accommodate a new 500MVA 500/220kV transformer and the associated conventional busbars. This contract will be based on a design provided by EETC's consultants that includes the supply and installation of one 500kV/220kV, 375 MVA transformer.

- **A 4 Construction of double–circuit 220 kV line from Ras Gharib to Gabel El-Zait:**

This sub-component involving construction of about 50 km of 220 kV transmission line that will be financed by EETC according to its standard procurement practice.

Component B Technical Assistance to support the expansion of Egypt's wind generation program (US$ 2.9 million of which CTF is US$ 1.75 million)

- **B1 Consultancy services for the development of the wind BOO program (US$ 1.5 million of which CTF is US$ 1 million):** This component would provide consultant support to the EETC in the competitive bidding program for the first 250 MW project. The advisory services are being provided in two phases with the first phase having already commenced with support from the PPIAF to provide support in the preparation of the Request for Proposals (RFP) and the second phase to be supported under the CTF to provide legal and financial advisory support through financial closure.

- **B2 Consultancy services to support Management of Wind Power Integration in Egyptian Power Market (CTF $500,000):** The objective of this component is to support the rapid development of the wind energy market in Egypt by recommending guidelines to the system operator (load dispatch) for the optimal scheduling of complementary generation and demand so as to integrate wind generated power into the Egyptian power market while ensuring the security of the transmission system operations.

- **B3 Technical Assistance to perform Environmental Assessment including Ornithological survey (KfW $650,000)** An environmental and social assessment including ornithological survey is underway covering roughly 200 Sq km area (roughly 1000 MW) including the site of the proposed 250 MW BOO project with support from the KfW. This is being implemented in cooperation with NREA.

- **B4 Knowledge Management (CTF $ 250,000)** This sub-component would be expected to address *three basic elements* related to the wind program: (i) communications with local stakeholders, including Civil Society Organizations (CSOs) and the private sector on project activities, results and lessons; (ii) capture of lessons during the project implementation process; and (iii) the sharing of such lessons with other CTF country partners.

Component C- Gulf of Suez 250 MW BOO project (US$ 450 million): This component will involve development and construction of a 250 MW wind farm in Gulf of Suez by a private sector operator under a BOO approach. As described earlier, the pre-qualification of bidders has been completed and the wind measurement program is scheduled to begin during July 2010. This will be the first in a series of competitive bidding tenders for wind power. The EETC is considering monetization of the GHG benefits of the overall competitive bidding program including this first project through the development of a CDM program of activities.

D. Lessons learned and reflected in the project design

51. One key lesson learned through prior engagement with the Egyptian energy sector is that, while there is a willingness to consider and implement substantial sector reform (pricing, restructuring, etc.), the agencies involved prefer that these to be part of general sector dialogue rather than conditions of lending projects. With respect to transmission projects in general, prior Bank experience has highlighted the advantages of single responsibility design supply and install contracts, particularly for complex components. At the same time, the project management capacity of the implementing agency is critical to ensure that Bank-financed and Borrower-financed components are fully coordinated. Careful attention to environmental issues during route selection is another lesson that will help to avoid later problems with stakeholders.

52. The project design has also drawn extensively on the lessons learned from prior government sponsored wind farm developments. A core lesson is the need for considerable risk sharing on the part of the government, particularly in the early stages of new PPP initiatives. In the planning and design of private wind development in the Suez Gulf area the GoE has already financed a substantial amount of site research and presented it to the client. The GoE proposes that the initial wind projects be done on a tender basis, with EETC requesting bids from developers for a defined number of megawatts, and signing PPAs at the tendered prices. Finally, the EETC intends to purchase the energy at the high voltage side of the wind farm substation covering the cost of the transmission lines from its own budget.

E. Alternatives considered and reasons for rejection

53. The Wind Atlas of Egypt identifies several geographic regions with wind resource potential including along the Gulf of Suez, large regions of the Western and Eastern Desert- in particular west and east of Nile valley, and parts of Sinai Peninsula. But wind resources in

particularly high along the Gulf of Suez and comparable to those of the most favorable regions in NW Europe. In view of this favorable resource base, Gulf of Suez has been chosen for scaling-up wind power development.

54. Eight alternative routings for the transmission line were investigated by EETC's consultants (Tractebel of Belgium) as part of the project feasibility work and the proposed route offered the best combination of cost effectiveness and minimized environmental impacts. A range of options were also considered in terms of location and financing of substations, and extension of feeder lines north and south towards other areas of high wind potential along the Gulf of Suez coastline. Taking into consideration the likely timing of wind power development, and the amount of risk/investment cost that developers were likely to be willing to carry, the components described above were selected as appropriate for inclusion in the current project.

55. The idea of requiring developers to contribute to the construction of the transmission line was rejected at an early stage as being an unacceptable burden to impose, especially given that the transmission line will have a capacity far in excess of the first stage wind farm development. The concept of allowing developers to sign power purchase agreements (PPAs) directly with wholesale customers was also given serious consideration but ultimately rejected. One of the lessons learned from prior experience was that projects with several developers worked best when there was a single arrangement in place for power sales. Except in the case of autogeneration, it was believed that only EETC had the capacity to serve as the single buyer for all of the power that could be made available from the wind farm development.

III. IMPLEMENTATION

A. Partnership arrangements

As the project involves parallel financing of sub-components from European donors led by EIB, close coordination has been maintained during project preparation and these arrangements will continue during project implementation. The EIB is the lead European donor and working with Agence Française de Développement (AFD) and Kreditanstalt für Wiederaufbau (KfW) to finance large number of transmission components in Egypt including the two substations in this project[10]. The larger EIB led project, involving a number of other donors, has already been appraised and is expected to get EIB Board approval in mid 2010. Beyond this project, a number of donors have been supporting wind power development in Egypt including Denmark, Germany, Japan and Spain. In addition, it is likely that wind resource assessment in areas East and West of upper Nile will be undertaken with Japanese development assistance.

B. Institutional and implementation arrangements

56. The project will be implemented over a (5) year period from 2011 to 2016. The Egyptian Electricity Transmission Company (EETC), which is one of the companies under the EEHC will

[10] The large transmission project includes the financing of large number of transmission components for three main purposes: (1) reinforcing the national grid, (2) promoting renewable energy, and (3) facilitating regional interconnections, All of these components including the wind development project are part of the Power Transmission Network Master Plan (2008-2030).

be the main executing agency. The EEHC has strong institutional capacity with respect to the Bank's policies and procedures having two large Category-A projects under supervision and a similar one under preparation. EETC, however, has not implemented any prior bank projects. The following agreements will govern the project financing and implementation:

(i) a Loan Agreement (LA) between the Government of Egypt (Ministry of International Cooperation-MOIC) and the World Bank for the IBRD;
(ii) a Loan Agreement between the GoE (MOIC) and the World Bank on behalf of CTF;
(iii) a Grant agreement between the GoE (MOIC) and the World Bank on behalf of the CTF;
(iv) a Project Agreement between EETC and the World Bank;
(v) a *subsidiary loan agreement* between the GoE (MOIC) and EETC, by which the GoE will on-lend the Bank loan proceeds to EETC.

57. **Project Implementing Unit (PIU)**: EETC has established a Project Implementation Unit (PIU) to manage, co-ordinate, expedite, supervise, monitor and cost control the project implementation as detailed below. The PIU will be responsible for ensuring that the technical support and various reports by other departments of EETC and its consultants are prepared in a timely manner. The PIU will also coordinate project preparation activities with the other International Financing Institutions (IFIs) to ensue an early start to project implementation.

58. The PIU carries out its tasks through three main teams under a Project Manager. The initial set-up of the teams comprises three procurement/technical engineers, two financial specialists, and two environmental engineers. EETC advised that they have commissioned their consultant Electric Power Systems Engineering (EPS) to undertake a preliminary transmission route survey of the 500kV lines. EPS is similarly involved with the project design, engineering, procurement, and supervision of the under-construction Cairo region 500kV Abu Quir interconnection project. EPS have completed the transmission line preliminary right of way survey and estimated the initial quantities and types of towers. The preliminary transmission line survey was used for the ESIA. The PIU will oversee the activities of its engineering consultant (EPS) to prepare draft tender documents for submission to the Bank.

59. During implementation, PIU and EPS staff will be responsible for carrying out procurement in accordance with Bank Guidelines. The PIU will be assisted in engineering, procurement, construction and project management by an engineering consultant (EPS) funded by EETC own resources. The selected firm, EPS, has several contracts with similar role in other large power transmission projects in Egypt. The PIU will also be responsible for project Financial Management, including the maintenance of project accounts, arrangement of annual audits, and preparation of quarterly and annual progress reports to the Bank. Assessments of the PIU's capacity has been carried out in procurement and financial management functions the necessary areas of capacity building and operational arrangements have been identified and discussed with the PIU (for details see Procurement and Financial Management Annex).

C. Monitoring and evaluation of outcomes/results

60. The PIU will monitor progress and achievements against the agreed indicators laid out in Annex 3. Data and statistics on actual project output and outcomes will be gathered, analyzed, and included in progress reports to be submitted to the World Bank.

D. Sustainability and Replicability

61. The GoE is strongly committed to renewable energy development as evidenced by the 20 percent target set by the Supreme council on energy (including 12 percent from wind energy) and the actions being taken to meet this objective through scaling-up of wind and solar energy development. Local institutions have gained sound operational experience related to wind power over the course of the last 15 years and this foundation would be adequate to launch the scale-up of the wind program. Much of the new generation will be privately financed and operated which removes it from one level of dependence on the budget. A second level of budget dependence, government subsidies to cover the differential between the cost of wind power and the retail power tariff is addressed as part of the ongoing tariff reform in the medium term whereby the government has committed itself to an average annual increase of about 7.5 percent which is being implemented. The GoE also established a "Petroleum Fund" that provides economic incentives to producers of non-fossil fuel based energy although the incentive of 2 Pt/kWh is insufficient to mobilize significant investment.

62. Therefore, the Supreme council on energy has decided that additional costs linked to renewable energy to be covered in the interim by the Government. This could be implemented either directly through a tariff mechanism or through the Renewable Energy Fund (REF), to be created under the new Electricity law. In view of the fact that wind resources in Egypt are of unusually high quality, long-term costs are likely to be highly competitive. As discussed in a previous section, the GoE is also undertaking efforts in the area of energy efficiency that will help transition to cost-reflective pricing (by keeping consumer electricity expenditures close to existing levels).

63. In addition, the World Bank is closely engaged with the government to enhance the overall sector policy framework and advance reforms aimed at improving sector commercial environment and financial sustainability. The government recognizes that EEHC operates under tight financial constraints and has demonstrated its willingness to gradually increase tariffs toward cost covering levels and provide budget and other support in the meantime. Tariff and non-tariff measures to improve the sector's financial performance are discussed in detail under Section IV Appraisal Summary and in Annex 9 which presents road map for enhancing sector financial performance.

64. The project has several elements that make a strong case for replicability; (a) The project supports development of the first large scale private sector competitively bid project in renewable energy. The experience in preparation of bid documents, development of grid code, and legal agreements will all be helpful for future renewable energy projects, including solar projects. The joint wind resource measurement program will also provide valuable experience for future wind projects. Thereby, this project would make a direct and significant impact on the

7200 MW of wind projects that the Government hopes to achieve by 2020(and 150 MW of CSP projects by 2017); (b) The Egyptian experience, being the most extensive in the region, will be applicable for many of the other MENA countries and several of countries such as Jordan, Syria and Yemen are already beginning to look closely at the BOO approach to wind development; (c) The policies being introduced by the GoE in course of development of the first BOO project such as land use, customs duties, bank guarantees, foreign exchange denominated PPAs, and permitting are likely to help future development of wind as well as solar projects.

E. Critical risks and possible controversial aspects

Risks	Risk Mitigation Measures	Risk Rating with Mitigation
To Project Development Objectives		
Weakened financial sustainability of renewable energy in Egypt due to the political economy of prices for fossil fuels and higher than expected capital costs	The Govt. has made a commitment at the highest level to incorporate 20 percent renewable by 2020. Energy sector dialog will help move this forward. The Government has a commitment to reforms and is currently implementing a reform program with average annual increase of about 7.5 percent in the electricity sector. Further, the government has announced a strategy for comprehensive energy price reforms in 2007.	Moderate
Reduced private and public sector interest in wind power development as a result of global economic slowdown	The Government has put in place an interdepartmental task force that is integrating global best practices in providing clear information to the bidders. The program will closely interact with the private sector through pre-bid meetings to monitor the situation. The GoE, through NREA, is actively pursuing donors and developing a pipeline of public projects s well	Moderate
Inadequate Capacity to manage the first Wind BOO project	The EETC will incorporate lessons from the implementation of the thermal BOO projects and a steering committee including staff with previous experience has been created at the level of the Ministry. The proposed framework for wind development allows different PPP models. The project also includes technical assistance to support the BOO program.	Substantial
To Component Results		
Technical Design: Suboptimal technical performance	This Project will utilize technologies that have been implemented globally and in Egypt. Based on the experience in developing over 400 MW of capacity, there is substantial local capacity in wind power (within the	Low

Risks	Risk Mitigation Measures	Risk Rating with Mitigation
	Government and in the private sector) ranging from resource assessment to wind farm operation and maintenance.	
Procurement Delays in view of the limited experience at EETC with Bank procurement	The Project will benefit from the experience of the EEHC and its engineering consultants who have good experience in procurement, including applying World Bank procurement guidelines to limit any delays that can increase risks. Project schedule can accommodate some delays and physical implementation comprises only one large, single responsibility contract.	Moderate
Social and Environmental Safeguards:	The implementing agency has undertaken an environmental impact assessment and developed a mitigation plan, which have been reviewed by the Bank. Social impacts are relatively limited.	Low
Risk that implementation of wind projects would be slow and the transmission capacity built would not be utilized suitably	Given the large scale potential in the Gulf of Suez region and the active development of projects there, it would be important to develop adequate transmission capacity in advance of the project development which would otherwise be constrained as in many parts of the world today.. Transmission investments are only a small fraction of the total investments for development of over 3000 MW of wind energy. If required, the EETC will install suitable reactive power compensation to manage optimal operation of the transmission lines in case the wind power development is slower than expected.	Moderate
Overall Risk Rating	This is a high return project with an accompanying element of risk.	Moderate

F. Loan/credit conditions and covenants

65. Conditions of Effectiveness:

- The Subsidiary Loan Agreement signed between Ministry of International Cooperation and EETC;

Standard Covenants:

- Safeguards, reporting and annual auditing requirements as standard.

66. All co-financing agreements to be executed before December 31, 2011.

IV. APPRAISAL SUMMARY

A. Economic and financial analyses

Economic Internal Rate of Return(EIRR) Analysis

67. The proposed project is expected to benefit the Egyptian economy both through the additional energy provided to consumers, and through capture of the value of avoided global GHG emissions. An assessment of customer willingness to pay (WTP) for power supply in Egypt was recently carried out for the proposed Giza North Power Project. The wind project used this as a basis for computing the consumer benefits, multiplying the calculated unit benefit of the additional electricity supplied in each year of the project by the net amount of electricity from the wind farm that is delivered to customers. With respect to the value of avoided GHG emissions, forecasts of long term prices for carbon credits and the assumptions on which they are based vary so widely that it is impossible to set a single figure, or even a narrow range, as the basis for judging the viability of the project. Similarly, while the Giza North project assumed a base case price elasticity of -0.30, there is at least an equal probability that the price elasticity is higher. Owing to these uncertainties, the valuation of carbon credit benefits for the project covered a wide range of prices from US$5 to US$50 per ton, and the price elasticity of demand was tested at both -0.30 and -0.40 without offering in either case a "most likely" option.

68. The economic analysis also used two discount rates as a basis for assessing the economic viability of the proposed project. The first discount rate is 10 percent, which is generally considered to be the opportunity cost of capital for government investments in Egypt. The second discount rate reflects the inclusion of CTF concessional financing and results in and Opportunity Cost of Capital (OCC) of 5.7 percent.

69. The table below summarizes the highlights of the economic analysis. The first column shows the Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project including only the WTP benefits of increased power supply. The subsequent columns show the project returns at different assumed levels of carbon prices. Net Present Value is shown at discount rates of 10 percent and at the project OCC of 5.7 percent. Table 2 also shows the project's benefit-cost (BC) ratios based on discount rates of 10 percent and the CTF weighted OCC. BC ratios are not generally used as a criterion for economic viability in Egypt; however, they are often applied for public and public/private sector projects elsewhere (e.g., the Mid-west ISO in the US uses a 1.25 BC ratio for transmission projects)

Table 2: Highlights of Economic Analysis

Carbon Price	0		$5		$13		$20		$30		$50	
E	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4
EIRR (%)	9.2	2.6	9.9	3.3	11.2	4.4	12.5	5.5	14.6	7.3	21.1	11.9
NPV at 10% (without CTF)	(279)	(2,199)	(22)	(1,942)	389	(1,531)	748	(1,171)	1,262	(658)	2,289	370
NPV at OCC (CTF case)	2,764	(1,987)	3,233	(1,518)	3,983	(767)	4,640	(110)	5,579	828	7,455	2,704
BC at 10%(without CTF)	0.97	0.72	1.00	0.76	1.05	0.81	1.09	0.85	1.16	0.92	1.29	1.05
BC at OCC(CTF case)	1.20	0.86	1.23	0.89	1.29	0.94	1.33	0.99	1.40	1.06	1.54	1.19

70. The economic analysis indicates that there are some scenarios under which the proposed project is economically viable without CTF financing. However, the analysis also demonstrates that the investment faces risks to its viability as a result of potential changes in the price of carbon and price elasticity of demand. Assuming a low price elasticity of -0.30, the EIRR does not exceed 10 percent until the value of carbon benefits approaches $13 per ton. , Assuming a higher price elasticity of -0.40, the EIRR only exceeds the 10 percent threshold for viability in Egypt when the price of carbon exceeds US$50 per ton. Similarly the break-even NPV, without CTF financing, will require a carbon price between $5 and 13 per ton, if price elasticity is -0.30; however, the carbon price would have to be more than $30 per ton for the NPV to be positive if price elasticity is -0.40. Therefore, the CTF concessional loan plays a critical role in mitigating risks and thereby improving prospects of attaining economic viability of the investment.

Project Financial Rate of Return (FIRR)

71. The question of project Financial Rate of Return (FIRR) was an important issue in the project appraisal as it provided a basis for determining whether the proposed CTF financing was both necessary and sufficient to ensure the project's financial viability. The assessment was complicated, however, by the fact that the finances of the implementing agency, EETC, reflect only part of the true cost of the services provided. The GoE, through a system of non-cash subsidies, actually bears a large part of the cost of supply, including a significant proportion of the costs of power generation. EETC is assured a positive margin on the purchase-resale of electricity, and is insulated from increases in the average cost of generation. To assess the financial impacts of the project solely from the perspective of EETC would fail to capture the effect that the relatively high purchase price of wind energy will have on the weighted average cost of supply. In order to capture all of the financial impacts of the project, it was decided to examine the project's financial returns from the perspective of the GOE which is not only the primary borrower and ultimate owner of the consolidated sector but also the entity which will, either directly or indirectly, receive the incremental revenues and bear the full burden of incremental costs.

72. The financial analysis used the same assumptions as the EIRR analysis with respect to capital and operating costs of the transmission line, as well as the purchase price of incremental power from the wind farm and the system average costs of transmission and distribution. Rather than using customer willingness to pay to measure benefits, however, the financial analysis used the incremental revenue from retail sales of the power. Since Egypt is in the process of adjusting its retail selling tariffs, average tariffs were assumed to increase at an annual rate of 2.5 percent in real terms (i.e. in addition to inflation), a rate which is consistent with, albeit slightly higher than recent and proposed tariff adjustments.

73. The financial NPV of the project was calculated at two discount rates – one representing the real Weighted Average Cost of Capital (WACC) associated with the proposed project financing plan, and a second which assumed that the CTF financing was replaced with additional funds from IBRD[11]. In both cases, nominal borrowing rates were converted to real rates assuming a long term international inflation rate of 1.5 percent. As with the EIRR, the financial

[11] The financial cost of GoE financing was assumed to be 6.95 percent, which is the yield on a recent issue of GoE 30 year dollar bonds.

analysis also looked at different values for carbon credits associated with the project. The table below summarizes the results. CTF funding is included in WACC-1, but excluded in WACC-2.

Carbon Price	$0	$5	$13	$20	$30	$50
FIRR	-1.2%	-0.4%	0.9%	2.0%	3.8%	8.0%
NPV@WACC-1(CTF case)	($3,013)	($1,789)	$169	$1,883	$4,330	$9,226
NPV@WACC-2 (Without CTF case)	($3,868)	($3,044)	($1,725)	($571)	$1,078	$4,375

74. The table shows that with CTF funding at the proposed level of US$150 million (WACC-1), the project is financially viable from the GOE perspective as long as the value of carbon credits approaches or exceeds $13/t. Without the CTF funding (WACC-2), the project only becomes financially viable when the carbon price exceeds $20/t. If there are no carbon credits, or if their value falls below $13/t, the proposed level of CTF financing is insufficient to make the project financially viable from the perspective of the GOE. The above analysis is subject to a number of uncertainties. It does, however, indicate that under a reasonable set of assumptions, the proposed CTF financing increases the likelihood that the project will yield a positive financial return to the GOE.

Financial Assessment of EEHC and EETC

75. EETC, along with six electricity generation companies and nine distribution companies, are wholly-owned subsidiary of EEHC. This group of companies represents the majority of the electricity supply industry in Egypt, accounting for about 90 percent of electricity supply. As the companies are closely managed and financially interdependent, a financial analysis of EEHC on a consolidated basis evaluates the overall financial situation of the group. This is followed by a brief assessment of EETC financial performance on an individual basis.

Past and Current Performance of EEHC (Consolidated Basis)

76. **Overall profitability in recent years.** EEHC's revenues stem from the sale of electricity generated by its subsidiaries and purchased from IPPs and NREA. Based on audited accounts of the past five fiscal years (FY 2004/05 – FY 2008/09), the company has been profitable mainly due to rising average selling tariff (regular annual increases in electricity tariffs resumed in 2004, after a 12-year period in which the retail price of electricity remained unchanged).

77. **Rising operating cash flow as a result of prolonged repayment of current liabilities.** Operating cash flow has been positive and rising, although this is substantially a result of prolonged repayment of current liabilities, including past due and accrual debt obligations owed to the Ministry of Finance, other governmental entities and local banks. The accumulated prolonged repayment reached EGP 35.2 billion in FY2008/09, equaling 1.5 times EEHC's annual revenue and about two-third of its long-term debt.

78. **Long bill payment and collection time. Bills collection averaged over 300** The average collection rate was 90 percent in the past three years. On the other hand, bill payment averaged over 375 days Inventory holding averaged about 225 days in the past five years. Collectively, working capital requirement associated with business activities (changes in

receivables and inventory relative to current payables) rose by EGP 2.2 billion in FY 2008/09, equivalent to about 35 days of revenue.

79. **Past due receivables and payables are being offset.** On receivables side, about EGP 8 billion are due from governmental entities (42 percent of business receivables). As for payables, about EGP 35.3 billion (72 percent of current liabilities) are considered past due, including EGP 13.56 billion of payables owed to the Ministry of Finance. According to EEHC, it has been offsetting electricity sales to governmental entities with past due payables at a rate of EGP 1 – 2 billion per year (about 6 percent of revenue in FY2008/09). The company is contemplating a larger annual offset amount of EGP 3 – 4 billion per year in the coming years, however, this is subject to an agreement with the authorities.

80. **Rising indebtedness (leverage).** The rapid growing demand for electricity required large investments over the past years. These investments have been substantially funded by borrowings. As a result, EEHC's long-term debt reached LE 51.7 billion (about US$9.4 billion) in 2008/09, pushing up the long-term debt-to-equity ratio to 4.4 times. As indicated above, a large portion of the company's current liabilities comprise of past due loan and interest payments owed to the government and local banks. All together, EEHC's total liabilities-to-equity ratio reached 8.3 times in FY 2008/09.

81. **Financial performances targets under risk.** Financial performance targets set in the earlier projections – getting current ratio above 1 and maintaining a debt service coverage ratio higher than or equivalent to 1.4 by about FY14 – are at risk, especially for current ratio. For the fiscal year 2008/09, adjusted current liabilities reached LE 48.8 billion (US$ 8.9 billion) against current assets of LE 28.9 billion (US$5.3 billion), resulting in a current ratio of 0.6. The debt service coverage ratio on current debt obligations is estimated at 1.14 on the EBITDA basis and at 1.7 on the basis of net operating cash flow.

Summary of EEHC Financial Results and Indicators

	Unit	FY2004/05	FY2005/06	FY2006/07	FY2007/08	FY2008/09
		actual	actual	actual	actual	actual
GWh sold	GWh	85,781	92,829	98,812	107,226	112,660
Average tariff	EGP / kWh	0.141	0.152	0.162	0.174	0.187
Natural gas used in EEHC plants	BCM	15.3	17.3	18.2	19.1	20.0
HFO used in EEHC plants	Ton million	3.9	3.7	4.3	4.6	5.0
Diesel used in EEHC plants	Ton million	0.1	0.1	0.1	0.1	0.1
INCOME STATEMENT SUMMARY						
Electricity sales	EGP million	12,074	14,072	15,968	18,687	21,024
Total revenue	"	12,861	15,134	17,285	20,357	23,003
Fuel expenses	"	(2,977)	(3,202)	(3,630)	(4,287)	(4,939)
Purchased electricity expenses	"	(1,782)	(1,808)	(1,902)	(1,897)	(1,996)
EBITDA	"	3,966	5,004	5,961	7,224	8,081
Financing expenses	"	(2,141)	(2,705)	(2,868)	(3,166)	(4,000)
Depreciation	"	(1,880)	(2,087)	(2,301)	(2,477)	(2,665)
Net income	"	415	508	768	874	1,742
CASH FLOW STATEMENT SUMMARY						
Increase (decrease) in working capital, excluding cash	"	252	2,224	(1,761)	(2.874)	(2,241)
Operating cash flow, net	"	2,286	3,073	3,666	6,701	7,249
Investing cash flow, net	"	(3,339)	(4,213)	(3,362)	(6,993)	(10,976)
Financing cash flow, net	"	661	1,349	223	1,961	4,325
Change in cash	"	(392)	209	527	1,669	599
Cash ending balance	"	1,777	1,986	2,513	4,182	4,781
BALANCE SHEET SUMMARY						
Total assets	"	68,629	75,836	82,902	96,638	109,182
Total liabilities, of which	"	60,771	67,346	73,696	86,807	97,498
Long-term debt, gross	"	30,307	36,470	39,294	46,107	51,689
Current liabilities (total), of which	"	30,465	30,876	34,402	43,902	48,029
Past due liabilities*	"	11,870	12,478	27,020	31,166	35,289
Total equity	"	7,857	8,490	9,206	9,831	11,684
Financial ratios						
EBITDA margin	%	31%	33%	34%	35%	35%
Net margin	%	3%	3%	4%	4%	8%
DSCR - EBITDA**	times	1.0	1.1	1.1	1.2	1.1
DSCR - net operating cash flow***	times	1.1	1.2	1.2	1.7	1.6
Current ratio	times	0.5	0.6	0.6	0.6	0.6
Cash on hand (# day of revenue)	days	50	48	53	75	76
Liabilities-to-equity raio	times	7.7	7.9	8.0	8.8	8.3
Long-term debt-to-equity ratio	times	3.9	4.3	4.3	4.7	4.4
Annual % change - GWh sold	%	6.4%	8.2%	6.4%	8.5%	5.1%
Annual % change - average tariff	%	7.1%	7.7%	6.6%	7.8%	7.1%

Notes:

* Past due liabilities are largely obligations to the Ministry of Finance and other governmental agencies. Part of the amount is gradually being offset against the cost of electricity supplied to governmental users.

** EBITDA divided by estimated previous year current portion of long-term debt and interest expenses for the year.

*** Operating cash flow -- net of changes in working capital, excluding cash and current portion of long-term debt, divided by estimated previous year current portion of long-term debt and interest expenses for the year.

Source: EEHC

Past and Current Performance of EETC.

82. EETC's financial results reflect electricity purchase and sales arrangement between EETC and the generation companies on the one hand, and the distribution companies, high-voltage transmission customers and interconnected countries on the other. The average EETC selling tariff was 14 piasters per kWh of sold electricity in FY2009 (2.5 US cents), while the average purchase cost was 10.3 piasters per kWh of sold electricity (2 US cents).

83. EETC's main revenue stems from electricity sales to distribution companies, high-voltage transmission customers and interconnected countries. Electricity sales reached LE 16.7 billion (US$ 3.1 billion) in FY2009. In the same year the major expense was the cost of purchased electricity of LE 12.9 billion (US$ 2.3 billion), equaling about 77 percent of revenue. The company has been profitable in the past three fiscal years, with EBITDA[12] margin averaged 12 percent and net profit margin averaged 3 percent. The cost of purchased electricity from the first 250 MW wind IPP is estimated to be less than five percent of the cost of purchased electricity in recent years. As such, EEHC is in a position to financially absorb the incremental cost of the project.

84. Operating cash flow before changes in working capital reached LE 1.5 billion (US$ 0.3 billion) in FY2009. However, capital expenditures in the past three years exceeded operating cash flow, thus requiring more debt financing. In the same period, self-finance ratio (after deducting debt services) averaged 29 percent, and the company maintained capital expenditures at a level of 13 percent of net-fixed assets per year to balance high depreciation rate of 23 percent of gross assets.

85. The company's main creditors are the National Investment Bank, Misr Bank, National Bank of Egypt and JICA. Higher debt financing resulted in rising long-term debt to equity ratio of 2.6, 3.6 and 3.1 in FY2007-2009. As of 2009, the long-term debt outstanding was LE 12.4 billion (US$ 2.3 billion), of which current portion was LE 672 million (US$ 122 million). Debt service coverage ratio (based on EBITDA) averaged 1.2 in the past three years.

86. Regarding receivables and payables, an unbalanced situation exists with 144 receivables-days and 524 payables-days. This is also reflected in the low current ratio, which averaged 0.5 in the past three years.

87. The government recognizes the sector financial problems -- high debt and low tariffs -- and the need to address these problems. To reduce further borrowing, the government is now turning to the private sector to help fund the investment program. Regular tariff increase has been in effect since 2004, interrupted only last year due to the global financial and economic crisis which affected Egypt as well. Since 2004, the average selling tariff increased by about 50 percent, and for some consumer categories almost tripled. The government has opted to combine tariff increases with explicit and implicit subsidies to the sector (through debt rescheduling, fuel pricing, allowing EEHC to retain profits, etc.), carefully managing the political risks of social reaction if tariffs were to increase too quickly. This remains a critical area where further improvements are needed, especially if the government is to attract private investors, as it intends

[12] Earnings before interest expenses, taxes, depreciation and amortization.

to do. The fiscal pressures, which have increased -- in part due to the government's stimulus program to counter the effects of the global economic crisis - will also strengthen the need to reduce energy sector subsidies. With respect to strengthening commercial orientation of the sector, the new Electricity Law which the Cabinet has adopted, has a number of important provisions in this regard, such as including separation of the transmission company, strengthened role of the regulator in tariff setting, and establishment of a decentralized, more competitive trading arrangements with stronger participation of private investors. The team will continue to pursue this agenda as part of project preparation and implementation.

B. Technical

88. *Technology development:* Currently majority of wind turbines in Egypt at Zafarana are Gamesa 850 kW turbines in addition to Vestas 660 kW and Nordex 600 kW turbines. All these turbines are very reliable and proven designs. It is expected that the current state of the art wind turbine technology of the 2 to 2.5 MW class will become a standard also for Egypt with this program. These turbines have a track record of several thousands of turbines and a number of manufacturers have already gained experience with high temperature versions which are able to operate at conditions up to 45°C ambient temperature. These turbines have a rotor diameter of 80 to 93 m for the high wind versions which are approved for IEC Class 1. As the wind conditions exceed IEC Class 1 for the average wind speeds but without gusts, the manufacturers have to apply for a special type certification for these projects. Currently most of the suppliers also offer low wind versions with rotor diameters extended by up to 10 m in the range of 90 to 100 m. The hub height may be 80 m or 100 m for the Nile region.

89. *On the transmission infr*astructure, there is good experience in Egypt in the implementation and operation of 500 kV transmission lines and associated substations, including GIS based substations. EETC currently operates over 2,400km 500kV lines and over 15,600km 220kV and their associated substations. The Egyptian transmission system is interconnected with Jordan and Libya through the 500kV and 220kV respectively which are part of the seven-country consortium (EIJLLST) interconnection project[13]. The Egyptian Power System Engineering Company (EPS) has been hired by EETC as Project Management Coordinator for this project, financed by its own resources. One of EPS's recent projects Abu Quir Power Station Interconnection which includes double-circuit 500kV OHTLs and the associated substations. As such, no technical issues are envisaged during appraisal.

C. Fiduciary

90. Procurement of all contracts financed by the Loan will follow the Bank Procurement Guidelines. The procurement will be done using the Bank's Standard Bidding Documents (SBD) for all ICB including the agreed modifications to accommodate the simultaneous receipt but sequential opening of the technical and commercial envelopes ("Two Envelope Bidding"). All packages financed by the Bank are subject to prior review. The packages not financed by the Bank will be procured in accordance with the guidelines of the corresponding financial institution (IFI) or the Egyptian law.

[13] EIJLLST interconnection represents the power grids of Egypt, Iraq, Jordan, Lebanon, Libya, Syria, and Turkey. The interconnection would over 400kV and 500KV OHTLs.

91. An assessment of the capacity of the Implementing Agency to implement procurement actions for the project was carried out by the Bank. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff responsible for procurement and the relevant unit for administration and finance. The overall project risk for procurement after mitigation measures is expected to be moderate.

92. An assessment of the financial management (FM) arrangements for the Project was undertaken in February 2010, to assess existing financial management arrangements and whether or not such arrangements are acceptable to the Bank and also agree on the risk mitigating measures.

93. The EETC, from a financial management perspective, has its FM responsibilities and activities distributed between different departments within the EETC 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, yet they do not provide for the proposed project accounts to be compiled and consolidated at any point or stage given the current structure. Also the EETC has no recent previous experience in implementing World Bank financed projects. As a result, it was agreed with the Head of the Financial Sector of EETC to maintain the special Financial Management Unit (FMU) within the envisaged project PIU that will have the overall responsibility for the project's FM activities including recording, budgeting, bank reporting requirements, and handling the loan disbursement arrangements including supporting documentation. The structure of this unit will be headed by a financial officer along with two accountants, seconded from EETC for the life of the project, for record keeping, finance and disbursements, and planning and reporting. Acceptable accounting software will be procured, from EETC local resources, and installed within a maximum period of three months after project's effectiveness. Such software will be used for the recording and reporting purposes of the project. It was accentuate during the assessment that the project reporting should set out the sources and uses of funds by category and component in addition to a six month disbursement forecast and deviation analysis for differences that exceed 15 percent between actual and planned figures. Also it was agreed, that as soon as the financial team for the FMU is determined and assigned, a manual will be developed for the financial management arrangements of the project and such manual will be reviewed and approved by the Bank. During the meeting, reference was made to the Tebbin project's FMU and it was recommended to the EETC team to visit the Tebbin FMU and benefit from the already established model for possible replication under this project.

D. Social

94. Land acquisition along the expected 280 km transmission line will be limited to compensation for tower footings, along a distance of about 30-35 km near the Nile River where the 500kV double circuit east-west line would cross agricultural land. The number of towers in this area will be approximately 75, avoiding en-route cultivated land as much as possible. Less than 30 farmers are expected to be affected. And each person will lose a very small percentage of the land cultivated. The remainder of the 280 km transmission line passes through uninhabited desert land owned by the State.

With regard to crop compensation Egypt has a well-established system for providing affected farmers with compensation for land areas that may be temporarily put put out production during the construction period. To ensure OP 4.12 compliance an RPF has been prepared that will guide the preparation of any subsequent resettlement action plan.

E. Environment

95. This project is classified as category 'B' according to the World Bank's Operation Policy on Environmental Assessment (OP 4.01). Therefore, an Environment and Social Assessment (ESA) was undertaken. The ESA scope covered: (a) 280 km 500 kV transmission line from Suez Gulf to Samallout; (b) 50 km 220 kV transmission line from Ras Gharib to Gabel El-Zait; and (c) 500kV/220 kV substation in Ras Gharib and new 500 kV/220 kV transformer at Samallout including access roads. The ESA study was undertaken in a consultative manner and led to preparation of site specific Environmental and Social Management Plan (ESMP) and a Resettlement Policy Framework (RPF), which has been disclosed by the EETC. The EA for the wind power generation, a component not financed by the World Bank will be undertaken after completion of the feasibility study.

96. The ESA indicates that the proposed transmission schemes and substation are expected to be generally environmentally clean and non-polluting in nature as most of the area is characterized by uninhabited and uncultivated desert land. The anticipate environment and social impacts on the surrounding environment will be restricted to rights of way (ROW) and land acquisition for substations. The EA study presents baseline of flora and fauna known to exist in the region, particularly around Red sea and Nile valley as well analyses of alternative routes. The ESA does not indicate presence of any sensitive habitat (mangroves, wetlands or coral reef); receptors or archeological sites within or along the proposed alignment that may be affected by the proposed project activities. The ESA does indicate that some part of the anticipated 500 KV transmission line route between Samallout and Suez Gulf, particularly at Gabal El-Ziatt may fall under the known migratory route of birds with potential to impact migratory birds if project results in removal and destruction of surrounding vegetation near tower footings or sub stations. These impacts will be mitigated by avoiding removal or clearance of vegetation in the Gabal El-Ziat area, where strain towers will provide additional roosting and nesting platform for large raptors such as vultures and Eagles. The design of transmission lines under the project will also include providing colored markers on the transmission lines to deflect any potential birds and providing bird friendly design of towers. The EA indicate that the impact of potential collision of birds with T- line is, however, unlikely.

97. ESA assessed current and anticipated environmental impacts during the construction phase of power transmission line including impacts on terrestrial and aquatic habitat and humans due to electric and magnetic fields and hazardous materials. Given the geographical and ecological features of the area through the proposed transmission routes as well as transmission line route selection based on principles of avoidance, the project environmental impacts are expected to be construction related and not significant. The ESMP details measures to minimize environmental, health and safety impacts during planning, design, construction and supervision, including recommendations for mitigating habitat loss, vegetation damage and fragmentation;

avoid inconvenience to local community due increased access to wild lands, paths/access roads; avoid run off and sedimentation from grading of access roads; fully avoid chemical contamination by using only manual maintenance techniques; avoid procuring or using PCBs in electrical equipment; mitigate the impact as a result of change in land use and population relocation due to location of towers and substations, including induced secondary development during construction; minimizing avian hazards by selecting appropriate design for transmission lines and towers; avoid impairment of cultural and aesthetic resources, health and safety, fire hazards and pollution; prevent loss of agriculture/community land by avoiding physical displacement of population, and minimize, if not avoid, displacement of population and ensure that the livelihood of those affected is improved or restored.

98. Implementation and monitoring of the ESMP will be overall responsibility of implementation of the Egyptian Electricity Holding Company (EEHC), which has strong institutional capacity with respect to Bank's safeguard policies through their involvement in two Bank-financed Category A and Category B project currently under supervision. The Project Management Unit will have the overall responsibility for implementation of Environment and Social management plan and the RPF. Additional supervision and monitoring of implementation will be ensured through Egyptian environmental regulations on ESIAs, which requires formal approval by the Egyptian Environmental Affairs Agency (EEAA), including supervision. The PMU will designate a Safeguards coordinator and hire environmental and social management specialists who will work closely with contractors and sub-contractors to ensure that all environment and social impact mitigation measures including occupation, health and safety guidelines are mainstreamed into the project design; monitored and supervised. Safeguards Coordinator will have direct responsibility for implementation of the Environment, Health and Safety measures as well as the RPF for the site during construction and operation. Relevant staff will be trained in identification of key environment and social issues as well as in implementation of management, mitigation and monitoring measures, including occupational health and safety; and contingency plans and emergency procedures.

F. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[x]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[x]
Pest Management (OP 4.09)	[ ]	[x]
Indigenous Peoples (OP/BP 4.10)	[ ]	[x]
Physical Cultural Resources (OP/BP 4.11)	[ ]	[x]
Involuntary Resettlement (OP/BP 4.12)	[x]	[ ]
Forests (OP/BP 4.36)	[ ]	[x]
Safety of Dams (OP/BP 4.37)	[ ]	[x]
Projects on International Waterways (OP/BP 7.50)	[ ]	[x]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[x]

G. Policy Exceptions and Readiness

No exception to Bank policies are sought.

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

Annex 1: Country and Sector or Program Background

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Country Issues:

1. Over the last four years the government has implemented structural reforms including trade liberalization, a complete overhaul of the tax system, restructuring of the financial sector, and privatization of State-Owned Enterprises (SOEs) and banks. This led to a friendlier investment climate which, supported by a favorable global economic environment, yielded a strong private-sector supply response. Real Gross Domestic Product (GDP) growth increased from an average of 3.5 percent during FY01-04 to around 7 percent between FY06 and FY08, a record over the previous twenty years. The strong supply response was driven largely by an expansion of private investment. It increased from an average of 8 percent of GDP in FY01-04, to 15 percent in FY08. Also, Foreign Direct Investment (FDI) increased from an average of 0.6 percent of GDP during FY01-04, to 8.1 percent in FY08. This increased total investment from an average of 17.6 percent of GDP over FY01-04, to 22.3 percent in FY08. Real GDP growth is expected to fall in tandem with the rest of the world particularly in the United States and Europe, Egypt's two main trading partners. GDP growth is expected to be about 4.5 percent in FY09 and slightly lower in FY10. Assuming that the global economy will begin recovering in 2010, Egyptian growth is expected to stabilize around 5.5 percent in FY11, closer to its potential growth rate.

Energy Sector Issues:

2. Egypt began exports of LNG in January 2005, and soon after that commenced exports of piped natural gas, through the Arab Gas Pipeline, initially to Jordan. Recently, Egyptian piped natural gas also started flowing via Jordan to Syria and Lebanon. Despite the large increase in hydrocarbon and other energy resource prices, cost of energy products in Egypt continues to be largely subsidized, this subsidy has reached 63 Billion LE (11 B$) in FY07/08 (or 8 percent of GDP).
The energy base of Egypt has more than doubled since the early 1980s to reach 84 million tons of oil equivalents (MToE) in FY08/09 of which local consumption has reached 63 MToE (75 percent). This expansion is expected to continue. Egypt is aggressively shifting to natural gas in thermal electricity generation (80 percent of power produced uses natural gas), industry and for domestic consumption, as a result of major gas discoveries in recent years. Energy and water are two of the most vital issues in this country.

3. The energy base of Egypt has more than doubled since the early 1980s to reach 73.3 million tons of oil equivalent (MTOE) in 2006/07 and local consumption has reach 54.7 MTOE, this expansion is expected to continue. Egypt is aggressively shifting to natural gas in thermal electricity generation (80 percent), industry and for domestic consumption, thanks to major gas discoveries in recent years, this trend will be accelerated in view of an increase in reserves of this clean source of energy. Energy and water are two of the most vital issues in this country. Egypt's 75 million people live on 5 percent of the land area along the Nile Valley and the Delta region. A rapidly growing population is now posing a huge challenge for Egypt to boost the productivity and sustainability of its energy and water use. Egypt has become an oil importer once again, with its oilfields being in steady decline.

4. The latest forecasts show that the country will account for 5.73 percent of MNA regional oil demand by 2010, while providing just 1.57 percent of supply. MNA regional oil demand rose to 10.7 Mb/d last year and should average 10.9 Mb/d in 2006, before reaching 12.2 Mb/d by 2010 [14]. Local oil consumption has risen to 575,000 b/d while Egypt's crude oil production has fallen to 570,000 b/d, causing the government to increase the import of these fuels. Egypt's proven reserves of natural gas having reached 72 TCF, is helping to improve the environment. Egypt's gas production in 2006-07 was 41 million tons/year, up from 23 Million tons/year in 2001-02, with Mediterranean fields accounting for 60 percent of the total, the Western Desert for 24 percent, the Gulf of Suez for 10 percent and the Nile Delta for 6 percent. Gas consumption rose from 19 Million tons/year in fiscal 2001-02 to the average of 26.6 Million tons/year in fiscal 2006-07, with the power sector accounting for 63 percent of the total. The national gas transmission network by 2006 had reached 16.156 km, and the number of users then had reached 2.4 million, including industries, households and the transportation sector.

5. Egypt became a gas exporter for the first time in 2004, with the sale of gas to Jordan through a pipeline to the Aqaba power plant. An Egyptian consortium is currently extending the pipeline north through Jordan to supply the country's other power stations. The Mashreq pipeline has already reached Syria to Der Ali PP and will continue to Lebanon. Also Egypt has developed its LNG exports. SEAGAS LNG exports from January 2005 in Damietta with capacity of 5 Mt/Y were joined in March and September by exports from the country's other LNG producer, Egyptian Liquefied Natural Gas (ELNG). ELNG is behind the $1,900 million development of two 3.6 Mt/y trains at Idku, which went on stream in March and September. Further additions to trains in Idku and Damietta were put on hold pending the state of gas production and pipeline exports.

6. A key issue for gas firms selling to the domestic market is subsidy cuts. The government is phasing cuts in gasoline subsidies, but gasoline is generally still below the cost price. This is the key risk factor, with Egypt paying a lot in energy subsidies. It is also importing many oil products at high world prices and selling them at subsidized rates. So a major concern is that the financial burden on the government from increasing oil prices means it will have less money to spend on infrastructure. It also limits growth in the energy sector, because the subsidies mean there is no incentive to use energy efficiently, and to switch from oil (LPG) to gas.

7. The transportation sector is the largest energy consumer with 27.1 percent followed by the industrial and electricity sectors with 20.7 percent and 15.7 percent respectively. Egypt's gas production in FY06/07 was 41 million tons of oil equivalent, up from 23 million tons in FY01/02. Domestic gas consumption rose from 19 million tons/year in fiscal FY01/02 to 26.6 million tons/year in fiscal FY06/07, with the electric power sector accounting for 63 percent of the total.

Energy institutional structure and pricing:

8. Egypt's energy sector falls under the responsibility of two Ministries, namely (i) the Ministry of Petroleum (MOP), and, (ii) the Ministry of Electricity and Energy (MOEE). The

[14] Oil & Gas Report from BMI, 2008

MOP is responsible for exploration, production, refining, transportation and marketing of oil and natural gas. The MOEE is responsible for electricity generation, transmission and distribution through 6 generation companies, one transmission company and 9 distribution companies organized under a holding company structure and company (the Egyptian Electricity Holding Company, see more below). In addition to these two ministries, the Transportation, Water Resources and Irrigation, Trade and Industry and Environmental Affairs (MOSEA) ministries are also involved in setting policies for the sector. Furthermore, the Egyptian Electric Utilities and Consumer Protection Regulatory Agency (EEUCPRA) regulates activities in the electricity sub-sector and the Egyptian Environmental Affairs Agency (EEAA) handles issues related to environmental protection, including issuing permits to construct power plant and associated infrastructure based on environmental impact assessments (Law 4/1994). Finally, in 2006, the Prime Minister issued Decree No. 1395 for the formation of the Supreme Council for Energy to oversee the various policies and strategies of the sector. The supreme council is responsible for setting energy strategies, approving tariffs and any major energy regulations and policies.

9. In August 2007, the Egyptian government announced a 3 year plan to remove subsidies from Gas and electricity tariffs for energy-intensive industries (targeting specifically the steel, cement, aluminum and fertilizer companies). In June 2008, this plan was accelerated for the increases to be implemented with immediate effect at the following prices: 20.2 Pt/kWh (3.8US¢/kWh), 24.5 Pt/kWh (4.6US¢/kWh) and 33.4 Pt/kWh (6.3US¢/kWh) for UH, HV and medium voltage respectively. For other industrial consumers (e.g., engineering, food, textile and pharmaceutical sectors), the energy prices will increase to 17.8 Pt/kWh (3.35US¢/kWh), 21.6 Pt/kWh (4.08US¢/kWh) and 29 Pt/kWh(5.47US¢/kWh) for the UHV, HV and medium voltage respectively over a three year period.

10. For natural gas, the price to the energy-intensive firms will increase to US$3/mmbtu, while for other industries the increase will be US$2.65/mmbtu. In 2009 and due to the financial crises increase in regular industry prices for electricity and Gas was put on Hold. It was announced in October 2009 that the second phase of regular industry increase will be resumed in 2010 with a 27 percent increase in electricity and gas.

Electricity sector structure:

11. In early 2000, the Egyptian Electricity Authority (EEA) was transformed into the Egyptian Electricity Holding Company (EEHC) under the ownership of the Ministry of finance. EEHC was restructured into 16 affiliated companies, including 6 generation, one transmission and 9 distribution companies and still operating within a single buyer model. All companies remain state owned under EEHC, although the forthcoming law envisages and allows for a sale of up to 49 percent. Indeed, the new law aims at encouraging the private sector to invest in generation and distribution projects. It will also establish the regulatory agency as the entity for tariff approvals and monitoring the performance of service providers. The law furthermore paves the way for the creation of a competitive electricity market, development of renewable energy, and encouraging the private sector's involvement in renewable energy through competitive bids and feed-in tariffs. The law will also re-enforce the use of the renewable energy fund and provide mechanisms to encourage co-generation and other EE measures. The

electricity law is under discussion in the Cabinet and is being prepared to be presented to the Parliament for ratification during its next session (from November 2009 to June 2010).

12. EEHC plays a strong role in coordinating the plans and investments in the sector, and also manages the sectoral finances. To manage overall cash-flow, EEHC relies on cross-subsidies between the affiliated companies to achieve a levelized return on investments. Each company operates as a commercial entity with a management team, board, and a balance sheet. The EEHC board selects senior management for the affiliated companies. Therefore, to date several levels of unbundling has taken place with the exception of ownership unbundling. The EEUCPRA approves regulations under which the companies operate as well as issues and renews licenses. To date, given that the scope of sector regulation activities is limited, it also monitors the companies' performance through financial and technical benchmarking.

Electricity sector issues and strategies:

13. The electricity sector is facing a number of challenges and constraints in securing electricity demand for Egypt in the coming decade. The most pressing issues include having sufficient base and peak load capacity, ensuring the availability of natural gas for power production (at price levels that can be absorbed by the retail electricity tariff), succeeding with the ambitious renewable energy, as well as other energy efficiency measures and continuing the path of tariff and subsidy reform.

14. In response to the rapid electricity demand, EEHC has developed a least-cost generation expansion plan. This plan has two phases: a fast track phase (2002–07) and medium-term phase (2007-12), during which 4,500 MW and 7,375 MW of capacity have been and are being installed respectively. Financing for the medium-term phase is completed. The North Giza power plant is part of the 2012-17 planning cycle.

15. Private generation is also becoming a key element in the expansion of the generation capacity and to supply the needs of several heavy industry requirements. A framework is being prepared, by which private generation can enter into the market, contract industrial firms, build its own generation plants and deliver electrical energy to its customer.

16. To complement the implementation of conventional power projects, Egypt is working very hard to develop its renewable energy (RE) resources, including hydro, wind and solar. Hydro-electric power capacity has been almost fully explored with an installed capacity of 2,780 MW and annual energy production of about 12,650 GWh. Wind and solar energy are in the early stages of exploration and utilization. In April 2007, the Supreme Council for Energy adopted an ambitious plan which aims at having 20 percent of the country's installed capacity in the form of RE by 2020. Notably, over 12 percent of this is expected to come from wind energy, which translates into about 7,200 mega watts (MW) of grid- connected wind farms. The development of this at such a large-scale is being designed based on a private-sector led strategy, of which the World Bank is providing technical assistance.

17. The New and Renewable Energy Authority (NREA), established in 1983, is the main agency for promoting RE technologies. At present, wind and solar energy projects are at the

core of NREA's current and future plans. A Wind Atlas for the entire country was issued in 2005 indicating about 20,000MW of wind potential in the Gulf of Suez area. A series of large-scale wind energy projects were constructed with a current operational capacity of 430 MW connected to the national grid. Egypt is also implementing its first solar thermal power plant of 140MW (solar share of 20MW) south of Cairo, planned to be operational by 2010.

18. In wind, a competitive bidding process has been initiated for a 250 MW wind farm in Ras Gharib as a first phase to a series of competitive bidding farms in the region. The first stage which included a prequalification has been finalized. A second stage which includes measurements and bidding preparation is underway.

19. In 2007, the President of Egypt announced that nuclear power will become an integrated part of the local energy production system, with multiple new nuclear plants to be built. The first being 1,000 MW by 2017, and another comprising 4,000 MW by 2027. The nuclear plants are envisaged to be constructed using local expertise in cooperation with foreign partners. Legislative and structural modifications to the sector structure are also envisaged to implement the nuclear generation plan. A Supreme Council for peaceful uses of Nuclear Energy was given an additional role in setting policies and approving nuclear energy projects by a presidential decree. An RFP was issued by the Nuclear Power Plant Authority (NPPA) in early 2008 for consultants to review and update previous data prepared 25 years ago for the Dabaa site and to prepare the tender for the first plant. The consultant has been selected and is preparing the report.

20. Egypt has some of the best wind resources in the world along the Gulf of Suez with mean wind speeds and power densities of 7-10.5 m/s and 350-900 W/m2, estimated for a height of 50 m above ground level in roughness Class 1. Given the low density of inhabitation, the region can easily host several thousand MW of installed wind capacity. The current approach for developing wind resources relies largely on donor financed public projects implemented by the NREA and a total of 430 MW of plants are either commissioned or under implementation. The 20 percent renewable energy target is expected to be met largely by scaling-up of wind and solar energy as the hydro potential is largely utilized.

21. In order to accelerate the wind program to be able to achieve the ambitious target, the Government is pursuing a wind commercialization program that will focus on engaging the private sector. The different public and private business models being pursued and planned for wind scale-up are discussed in Annex 4 (Detailed Project Description)- these include private Build, Own, Operate(BOO) projects, feed-in-tariffs for small projects, public projects, autogeneration and joint ventures. One of the key models is the competitive bidding approach where the EETC will issue tenders requesting supply of power from large scale renewable energy resources for specific pre-determined sites on a Build, Own, Operate (BOO) basis. It is expected that the competitive bidding approach will result in additional capacity of about 2530 MW of private sector capacity and a total of about 3000 MW capacity. The commercialization programme targets to achieve competitive electricity tariffs through an international tender and stimulate private investment from international and local investors into Egypt's power sector.

22. Policies and institutional arrangements ensure that development of renewable energy resources and the associated reduction in GHG emissions is a central focus of all power sector

institutions and is supported by extensive technical and administrative expertise. This will facilitate technology transfer within the country, while Egypt's growing reputation as a center for renewable energy development will facilitate transfers within the broader region. Sustainability, however, will require continued focus on sector finances. In the short term, it is extremely unlikely that wind energy will be financially viable when compared with the cost of gas-fired generation. The marginal electricity production cost in Egypt is about US cents 3.75/kWh (based on a gas price of $3/mmbtu), whereas the cost of wind power cost is estimated to be in the range of 7-11 US cents/kWh, depending on site conditions. Over time it is likely that the gap between gas fired and wind generation will narrow as tariffs increase. In view of the fact that wind resources in Egypt are of unusually high quality, long-term costs are likely to be highly competitive. In the interim, support from concessionary financing sources to develop the transmission infrastructure and thereby offset some of the cost and risk premiums associated with private development of wind generation, is critical to support the scale-up effort.

23. The competitive bidding program targets to achieve competitive electricity tariffs through an international tender and stimulate private investment from international and local investors into Egypt's power sector. In addition, large scale wind development will also encourage Egyptian participation in the projects through local manufacturing and transfer technical know-how to Egypt by including state of the art operation and maintenance practice from international developers.

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

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Sector Issue	Project	Latest Supervision (PSR) Rating (Bank-financed Projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-Financed	**Ongoing Projects**		
Power Generation	El-Tebbin Power Project (P091945) IBRD	S	S
	Ain Sokhna Power Project (P100047) IBRD	MS	S
Renewable Energy	Kureimat Solar Thermal Hybrid Project (P050567) GEF/WB	S	S
Gas Sector	Natural Gas Connections Project (P095392) IBRD	S	S
Other Development Agency Financed			
Power Generation	Kureimat 3 (AfDB)		
	Nubaria 3 (EIB, Arab Fund)		
	Sidi Krir (EIB)		
	Cairo West (Arab Fund, Kuwaiti Fund, OPEC)		
	Abou Qir (AfDB, Arab and Kuwaiti Fund, Islamic Bank for Development, OPEC)		
	Atef (EIB, Arab and Kuwaiti Fund)		
	Suez (AfDB)		
Power Transmission	Abou-Zaabal Substation (JBIC)		
	Sidi Krir Transmission and Substation Project (JBIC)		

IP/DO Ratings: HS (Highly Satisfactory); MS (Moderately Satisfactory); S (Satisfactory); MU (Moderately Unsatisfactory); U (Unsatisfactory); HU (Highly Unsatisfactory)

Annex 3: Results Framework and Monitoring

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Results Framework

PDO	Project Outcome Indicators	Use of Project Outcome Information
• Infrastructure and business models developed for scaling up wind power	• Transmission infrastructure to evacuate 3,000 MW of wind power • Financial close of first private sector investment in wind power (250 MW) • Percentage progress in implementing remaining wind competitive bidding program (2,250 MW) • Projected GHG emission reductions from 2,500 MW of new wind capacity • Public and private investments leveraged for transmission and first BOO wind project • Total job creation in the wind industry • Wind power supply chain development • Provision of wind energy to households	• Progress toward govt. renewable energy commitments • Progress towards economic development impacts
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
• Construction of transmission infrastructure	• 500 kV transmission line from Suez Gulf to Samallout	• Monitoring development of transmission infrastructure for wind

	• 500kV/220 kV substation in Ras Gharib • New 500 kV/220 kV transformer at Samallout • 220 kV transmission line from Ras Gharib to Gabel El-Zait	power development
• Technical assistance for wind program	• Legal and financial advisory services to EETC for first 250 MW BOO wind project • Procedures for wind power integration by system operator	• To monitor building of institutional capacity at EETC capacity for wind scale-up
• Wind competitive bidding program launched	• Development and construction of 250 MW BOO project at Gulf of Suez • Competitive tendering of 2X250 MW 2011, 2012 and 2013, and 3X250 MW in 2014	• Monitoring the involvement of private sector in wind power development in Egypt

Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Project Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Transmission infrastructure to evacuate 3,000 MW of wind power	0%	0%	30%	60%	85%	100%	6 monthly reports as part of Bank supervision missions	Reports from EETC	EETC/NREA
% progress in implementing remaining wind competitive bidding program (2,250 MW)	0%	10%	20%	40%	50%	60%	Same as above	Same as above	Same as above
Projected GHG emission (MT annually) reductions from 2,500 MW of new wind capacity	1.2	1.9	2.4	4.1	5.5	7.0	Same as above	Same as above	Same as above
Public and private investments leveraged for transmission and first BOO wind project	Transmission line reaches financial closure			BOO project reaches financial closure			Same as above	Same as above	Same as above
Total job creation	200		900	10,200	16,700	15,200	yearly	Input-output	EETC

Supply chain development	2.6 MUD		12 MUSD	133 MUSD	217 MUSD	198 MUSD	yearly	analysis of supply chain figures Budget information and accounts from developers & contactors	EETC
Household's benefitting from wind energy	525,000	300,000	600,000	700,000	700,000	700,000	yearly	EEHC data	EETC
Intermediate Outcome Indicators									

Annex 4: Detailed Project Description

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

1. The Government of Egypt has been actively engaged in wind power development for about 25 years, beginning with the construction of the Hurghada test station for wind power built in the early 1980s, financed by Danish development grants and managed by NREA. This early start led to a close cooperation in capacity building between NREA and Risoe National Laboratory, Denmark. Risoe has been extensively engaged in mapping the Egyptian wind resource in cooperation with NREA, initially publishing a wind atlas for the Gulf of Suez area, and culminating with the publication of the Wind Atlas for Egypt in 2005. The wind atlas includes a modern state-of-the-art numerical GIS-based atlas based on both ground-based precision measurements over 15 years, satellite (remote sensing) mesoscale data, and microscale (high spatial resolution) modeling of six of the most promising zones.

2. The Government's power sector development is based on a strategy comprising the following: (i) increased use of efficient power production technologies (CCGT and supercritical boilers); (ii) large scale development of its renewable resources with the goal of having 20% of its installed capacity in the form of renewables by 2020; and (iii) stepping up efforts for more efficient consumption of electricity including demand side management. The current plan for the next five years is as follows:

Egypt's Electricity Generation Expansion Plan(2008/2009- 2015/2016)

Generation Type	2008/2009 MW	2009/2010 MW	2010/2011 MW	2011/2012 MW	2012/2013 MW	2013/2014 MW	2014/2015 MW	2015/2016 MW
C. Cycle+ Gas	8819	10843	10843	10843	11469	13719	14969	15469
Thermal	11458	12158	12858	13508	15008	16308	16958	18908
Hydro	2800	2800	2800	2800	2800	2800	2832	2832
Solar	-	-	140	140	140	140	140	140
Total Wind	Zafl+zaf 11 425	add 60 at Zafl1 485	add 60 at Zaf 11 545	add 320 at Zait 865	add 220 at Zait 1085	add 780 at Zait 1855	add 700 at Ras Ghareb 2555	add 1060 at Ras Ghareb 3615
connection	Total Zafarana = 545 MW on Zafarana (I ,II) S/S evacuated through existing 220 K.v network in this area.(Fig3)			Total E1Zait 540 MW year2012/2013 evacuated through the under construction 220 kv O.H.T.L Zafarana / Hurghada (Fig 7)		From year 2013/2014 until 2015/2016 we need to construct a new 500/220 kv substation to evacuate the new wind farm at E1Zait 780MW capacity , and Ras Ghareb 1750MW capacity		

3. NREA is continuing its pre-project wind prospecting activities in two additional zones that the Wind Atlas for Egypt has deemed as potentially promising, even if not at the wind speed

level found at the Red Sea coast: The areas East and West of the upper Nile, a largely unpopulated 7,000 km2 area, which NREA as of 2010 has the right to administer for wind development purposes, plus an area near Kharga in South-Eastern Egypt. This work is likely to be financed by Japanese development assistance.

4. The GoE is currently pursuing five parallel strategic programs (described in paras 5-9 below) for wind power development. Two of the programs are in actual operation, while the final three are in the planning stage. The GoE also recognizes that timely transmission investment is the main facilitator of the rapid development of wind farms. Like most other transmission operations in the world, the GoE accepts that in the event of slower than expected investment in wind generation the lower risk/cost of investing too early in transmission will be outweighed by the much higher risk/cost (to the BOO investors) of investing late. It is also important to appreciate that over the 40-60 year projected lifetime of a transmission line its function will change over time depending on load growth and system expansion. In the case of the Samallout-Ras Gahrab 500kV line this is very likely in the next decade to also provide greater diversity to facilitate the evacuation of solar power generation planned in Southern Egypt and to support a possible future HVDC line across the Red Sea to Sharm el Shiekh and onwards to Jordan and Saudi Arabia.

5. **Public Program:** NREA soft loan financed wind projects have been the basis of all wind power development in Egypt until the present, based on loans from Denmark, Germany, Japan and Spain. The area around Zafarana in the Northern end of the windy Gulf of Suez area has now been completely exploited for wind farms under this program. Additional wind farms are planned for the Southern area of the Gulf of Suez, all of which will ultimately be connected to the planned 500 kV grid extension (through local 220 kV circuits). A 200 MW project financed by KfW, Germany, is close to announcing an Engineering Procurement and Construction (EPC) tender. Electricity sold to EETC from these projects is basically charged on the basis of a cost-plus principle.

6. **BOO (Build Own Operate) Competitive Bidding Program:** In 2006 NREA began preparations for a 5-year pipeline of 2,500 MW of commercial wind farms to be tendered as BOO/IPP projects with technical assistance from the World Bank. Trust funds administered by the World Bank ESMAP unit financed a feasibility study for the program, which was completed in 2008. The project consists of initially tendering a 250 MW wind farm on a predetermined site in Ras Gharib (at Gulf of Suez) area in 2010, with 2 x 250 MW to be tendered in each of the subsequent three years and a final 3 x 250 MW in the year thereafter. In 2008 the MoEE set up a cross-departmental Steering Committee for the project pipeline. The committee is comprised of top officials and experts from the EEHC, EETC, NREA, the Energy Regulator, and other members from the MoEE. The Wind Tender Steering Committee oversees the work of the Gulf of Suez Wind Project PIU with technical assistance from NREA. A consultant with extensive experience from the thermal BOO/IPP projects in Egypt heads this task force. The task force has been preparing the tendering process and associated activities for the first 250 MW wind farm to be tendered in the pipeline of projects. A request for prequalification of bidders was issued in May 2009. By December 2009 the EETC completed the pre-qualification of ten bidders, about half of which are among the leading international wind developers.

7. In January 2010 the EETC issued a set of mandatory minimum technical standards for required site measurements for pre-qualified developers, using a set of norms equivalent to best practice in the international wind industry. Simultaneously the EETC proposed a highly innovative voluntary joint wind measurement program to be financed and operated jointly by the pre-qualified bidders, with EETC acting as an agent for the bidders. The lessons learned from the experience from other countries like China and Morocco have been incorporated. In these programs, wind projects were attempted based on predetermined sites with wind measurements undertaken only by the electricity off taker. The wind measurement tasks in the program, which includes wind measurements, a topographical survey and a geotechnical survey of the site are to be executed by an independent third party, i.e. a top ranking bankable international wind resource assessment firm at the choice of the bidders. The proposal was accepted by the bidders, who after a two-day site measurement workshop in Cairo in January 2010 approved the statutes and modalities of the joint measurement program. The plans call for starting wind measurements by August 2010. In late autumn 2009 the EETC started international procurement of consultants to assist the EETC in drafting the RFP package for the first 250 MW wind farm. The pre-qualification of consultants has now been completed and ToRs and commencement of work by the consultants is expected by August 2010.

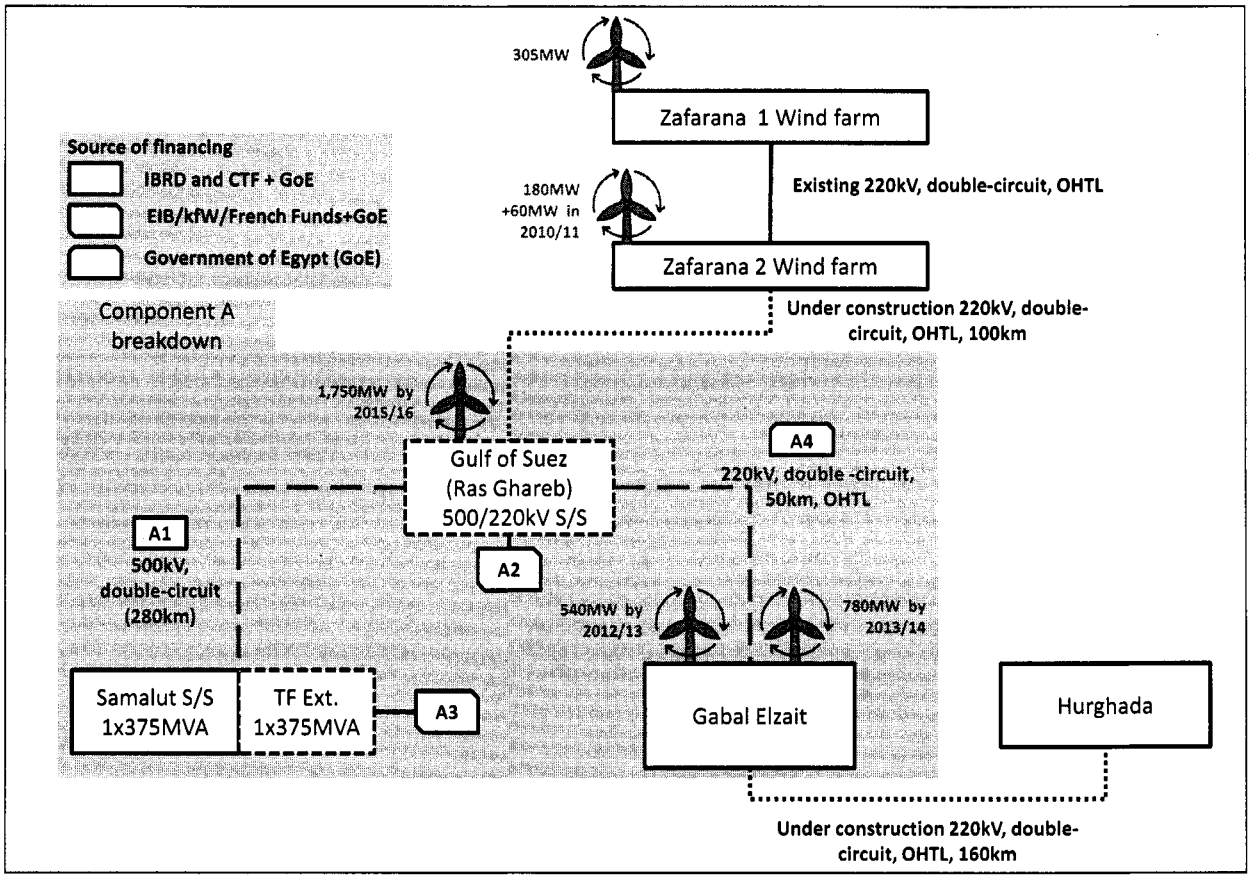
8. **Feed-in-Tariff:** A fixed-tariff scheme for smaller wind projects outside the Gulf of Suez area, possibly with a size limit of 25-50 MW is being prepared by the Energy Regulator with assistance from consultants. Preparations began in late 2009 with a report expected by end 2010.

9. **Joint-Ventures:** A NREA-MASDAR joint venture for government-to-government cooperation in wind development has been in the planning phase throughout 2009 and in early 2010. Based on equal partnership terms between NREA and MASDAR, the proposal is to initially develop a 200 MW wind farm in the Gulf of Suez area, with potential subsequent development in the East and West Nile area with some 200 MW per year. The tariff for energy sold by the project to EETC has not been determined but will presumably be some form of cost-plus tariff similar to the soft loan projects of NREA. The initial project would share the 500 kV system for its grid connection.

10. **Autogeneration:** A 100-300 MW wind project for autogeneration is under preparation by a private developer in the Gulf of Suez. Wind measurements and an environmental impact assessment including a bird study for the site were in progress in early 2010 for an area adjacent to the site for the commercial 250 MW wind farm. The developer has a major cement factory Northwest of the Gulf of Suez area. Although this project in principle is an autogeneration project, rules governing wheeling and balancing power services from the EETC are to be decided The project would share the 500 kV system for its grid connection.

11. This project comprises support for infrastructure development and provides technical assistance for facilitating the competitive bidding for the first 250 MW BOO wind project. The transmission infrastructure development for wind power development in the Gulf of Suez and Gabel El-Zait area requires 220kV and 500kV transmission lines and associated substations to evacuate about 3000 MW of wind energy. Initially the project will interconnect 250 MW IPP wind farm and another two upcoming wind farms in the Gulf of Suez with the main 500kV grid. In particular, the project will be undertaken through the following major components:

12. **Component A- Transmission Infrastructure (US$ 342.30 million, IBRD US$ 70 million, CTF US$ 148.25 million, EIB 70m and GoE 54million).** This component consists of four sub-components that together contribute to the full transmission infrastructure development to evacuate the wind energy from Suez Gulf and Gabel El-zait to the national grid. The sub-components will bring together financing from IBRD/CTF, European donors led by European Investment Bank, but including AfD/NIF and kfW/NIF. The physical position of these sub-components as part of the Wind Power Development Project is highlighted in the following schematic diagram.



- **A1- 500kV double-circuit Overhead Head Transmission Line (OHTL):**

This sub-component involves construction of the transmission line from Ras Gharib 500 kV substation to Samallout (about 280 km). This includes the supply of all components (towers, cable, insulators and materials, ground wire lightning protection, and high frequency carrier communication) and Installation (including civil works) for the complete construction of the Transmission Line based on a basic design given by EETC's consultants but having the Contractor full responsibility for the final design. The justification for the voltage level and line transfer capacity have been selected (as part of the Egyptian Power Transmission Network Master Plan) according to the load flow and contingency analysis studies to assure the best utilization of line capacity up to at least 2030 at minimum cost. The sequencing of the OHTL and wind farms construction would be reflected in a project timeline. Different technical options of operating the OHTL will be considered by EETC's consultant to mitigate any uncertainties in loadings that might result in a requirement for additional investment to ensure power system

stability. These options include (1) the possibility of operating the OHTL at 220kV until adequate generation capacity is available at the wind farms (2) installation of switchable reactive compensation if required.

- **A2 Construction of 500kV/220kV GIS Substation in Suez Gulf**: This sub-component to be financed by the EIB includes Supply and Install contracts for the supply of all components (switchgear, breakers, switches, protection, control, telecommunication, etc.); and the Installation (including civil works) for the complete construction of the Substation based on a basic design given by EETC's consultants but having the Contractor full responsibility for the final design. The sub-component also includes one Supply and Install contract for the supply and installation of one transformer 500kV/220kV, 375 MVA.

- **A3 Extension of Samallout 500kV/220kV Conventional substation**: This sub-component to be financed by EIB includes one Supply and Install contract for the supply of all components (switchgear, breakers, switches, protection, control, telecommunication, etc.); and Installation (including civil works) for the complete construction of the substation based on a basic design given by EETC but giving the contractor full responsibility for the final design to accommodate one new 500 MVA transformer 500/220kV and their associated conventional busbars.

- **A 4 Construction of double-circuit. 220 kV line from Ras Gharib to Gabel El-Zait:** This sub-component involving construction of 50 km of 220 kV transmission line is being financed by the EETC from its own resources.

Component B Technical Assistance to support the expansion of Egypt's wind generation program (US$ 2.9 million of which CTF is US$ 1.75 million)

- **B1 Consultancy services for the development of the wind BOO program (US$ 1.5 million of which CTF is US$ 1 million)** This component would provide consultant support to the EETC in the competitive bidding program for the first 250 MW project. The advisory services are being provided in two phases with the first phase having already commenced with support from the PPIAF to provide support in the preparation of the Request for Proposals (RFP) and the second phase to be supported under the CTF to provide legal and financial advisory support through financial closure.

- **B2 Consultancy services to support Management of Wind Power Integration in Egyptian Power Market (CTF $500,000).** The objective of this component is to support the rapid development of the wind energy market in Egypt by recommending guidelines to the system operator for the optimal scheduling of complementary generation and demand to integrate wind generated power into the Egyptian power market while ensuring the security of the transmission system operations.

- **B3 Technical Assistance to perform Environmental Assessment including Ornithological survey (KfW $650,000)** An environmental and social assessment including ornithological survey is underway covering roughly 200 Sq km area (roughly

1000 MW) including the site of the proposed 250 MW BOO project with support from the KfW. This is being implemented in cooperation with the NREA.

- **B4 Knowledge Management (CTF $ 250,000)** This sub-component would be expected to address *three basic elements* related to the wind program : (i) communications with local stakeholders, including Civil Society Organizations (CSOs) and the private sector on project activities, results and lessons; (ii) capture of lessons during the project implementation process; and (iii) the sharing of such lessons with other CTF country partners.

Component C- Gulf of Suez 250 MW BOO project (US$ 450 million): This component will involve development and construction of a 250 MW wind farm in Gulf of Suez by a private sector operator under a BOO approach. As described earlier, the pre-qualification of bidders has been completed and the wind measurement program is scheduled to begin during July 2010. This will be the first in a series of competitive bidding tenders for wind power. The EETC is considering monetization of the GHG benefits of the overall competitive bidding program including this first project through the development of a CDM program of activities.

Annex 5: Project Costs

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Project Costs By Component and/or Activity

Project Costs By Component and/or Activity			Local US$ Million	Foreign US$ Million	Total US$ Million	% Total
Component A- Transmission Infrastructure						
A1 500kV double-circuit Overhead Transmission Line (OHTL)			56.9	135.5	192.4	24.2%
A2 Construction of 500kV/220 kV Substation at Ras Gharab (at Suez Gulf)			5.5	55.0	60.5	7.6%
A3 Extension of Samalut Substation			3.6	31.4	35.0	4.4%
A4 Construction of Double Circuit 220kV Line from Ras Gharab to Gabel El-Zait			5.9	5.9	11.8	1.5%
Component B - Technical Assistance for the Development of Wind BOO program						
B1 Consulting Services for Development of Wind BOO program				1.5	1.5	0.2%
B2 Consulting Services for TSO Management of Wind Integration				0.5	0.5	0.1%
B3 Environmental Assessment and Bird Migration Study				0.7	0.7	0.1%
B4 Knowledge Management			0.1	0.1	0.3	
Subtotal Base Costs for EETC			**71.9**	**230.6**	**302.5**	**38.0%**
Physical Contingencies		10%	7.2	23.1	30.3	3.8%
Price Contingencies	**LC**	7%	5.5	7.6	13.1	1.7%
	FC	3%				
Subtotal Costs of Transmission Project			**84.7**	**261.3**	**345.9**	**43.5%**
Component C BOO Wind Project			**67.5**	**382.5**	**450.0**	**56.5%**
Total Project Costs			**152.2**	**643.8**	**795.9**	**100%**

Project Financing Plan

	Project Comp	Local US$ Million	Foreign US$ Million	Total US$ Million	% Total
IBRD	A1	9.0	61.0	70.0	9%
CTF	A1,B1,B2,B4	10.2	139.8	150.0	19%
PPIAF	B1		0.5	0.5	0.1%
kfW	B3		0.7	0.7	0.1%
EIB/kfW/French Funds/NIF	A2,A3	10.7	59.3	70.0	9%
BOO	C	67.5	382.5	450.0	57%
GoE	A2,A3,A4	54.8	0.0	54.8	7%
Total Financing		152.2	643.8	795.9	100%

Annex 6: Implementation Arrangements

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

1. The project will be implemented between October 31, 2010 and June 31, 2015. December 31, 2015 is the Loan's scheduled closing date. EETC, an affiliate of EEHC, will be responsible for implementing the project.

2. In terms of lending arrangements and flow of funds, there will be a Loan Agreement between the World Bank and the GoE (Ministry of International Cooperation-MOIC), and another Loan Agreement between the World Bank (on behalf of CTF) and the GoE (MOIC); a Project Agreement between the Bank and EETC. The latter would be consistent with intended arrangements to be considered by the EIB's co financed project. By virtue of a Subsidiary Loan Agreement between the GoE and the EETC, the GoE will on-lend the Bank Loan proceeds funds to EETC.

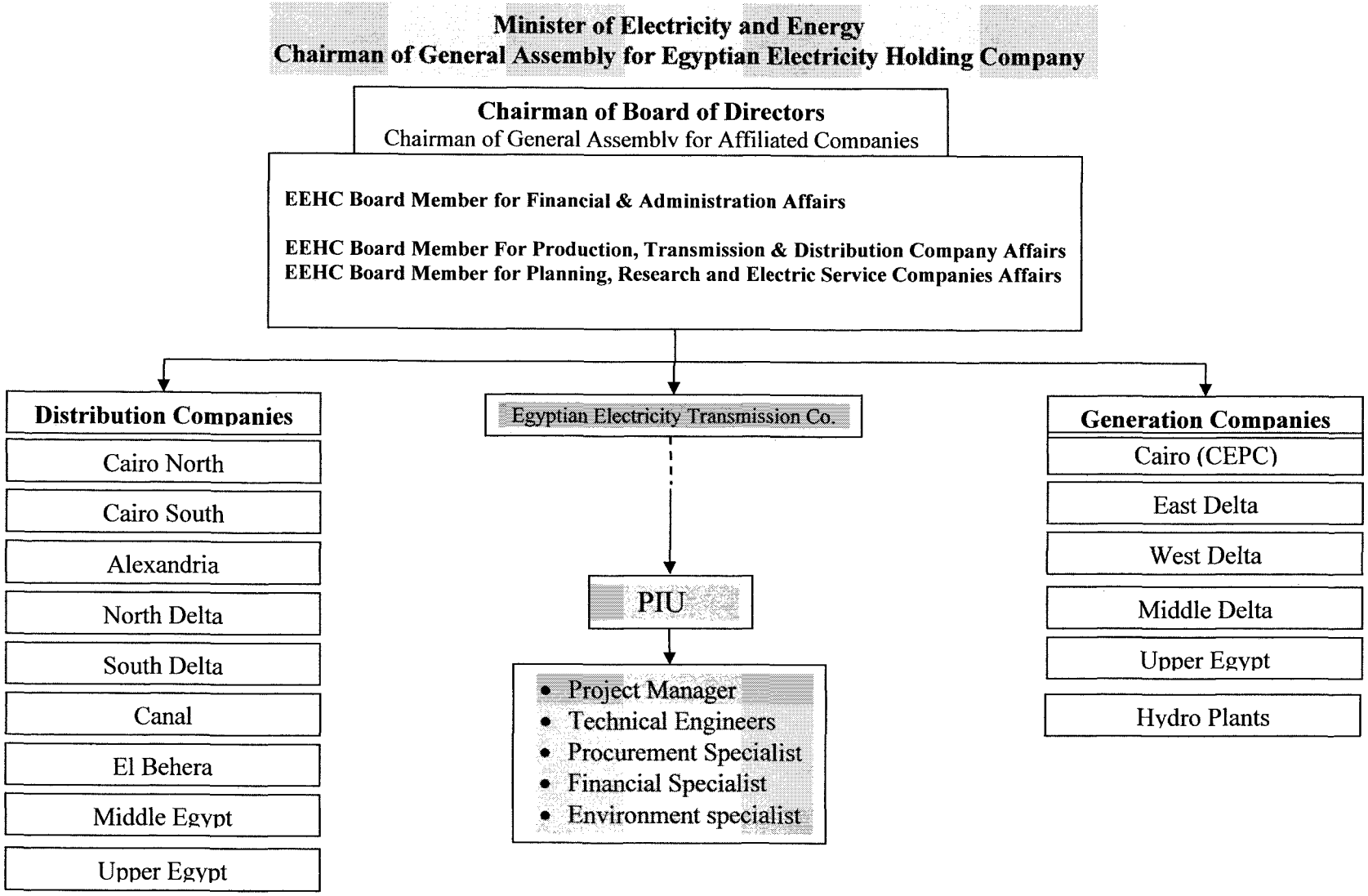
3. The New and Renewable Energy Authority (NREA) under the ministry of Electricity and energy MOEE coordinates the expansion and implementation of the wind development program in Egypt. Their role is to keep EETC updated on all wind farms activities that will be established and connected to the grid. They also offer technical advice from past and present experience on grid connected wind farms performance and operation. In 2008 the MoEE set up a cross-departmental Steering Committee for the project pipeline. The committee is comprised of top officials and experts from the EEHC, EETC, NREA, the Energy Regulator, and other members from the MoEE. The Wind Tender Steering Committee oversees the work of the PIU with technical assistance from NREA.

4. As with all other projects of this nature implemented by generation affiliates in EEHC, a Project Implementation Unit (PIU) has been established at EETC to supervise, coordinate and monitor overall implementation of the project. The composition of the PIU staffing includes a qualified Project Manager, who will head the unit, three procurement/technical engineers, two financial specialists, and two environmental engineers. The PIU will be assisted by an engineering consultant, which will conduct the project design, engineering, procurement, and supervision.

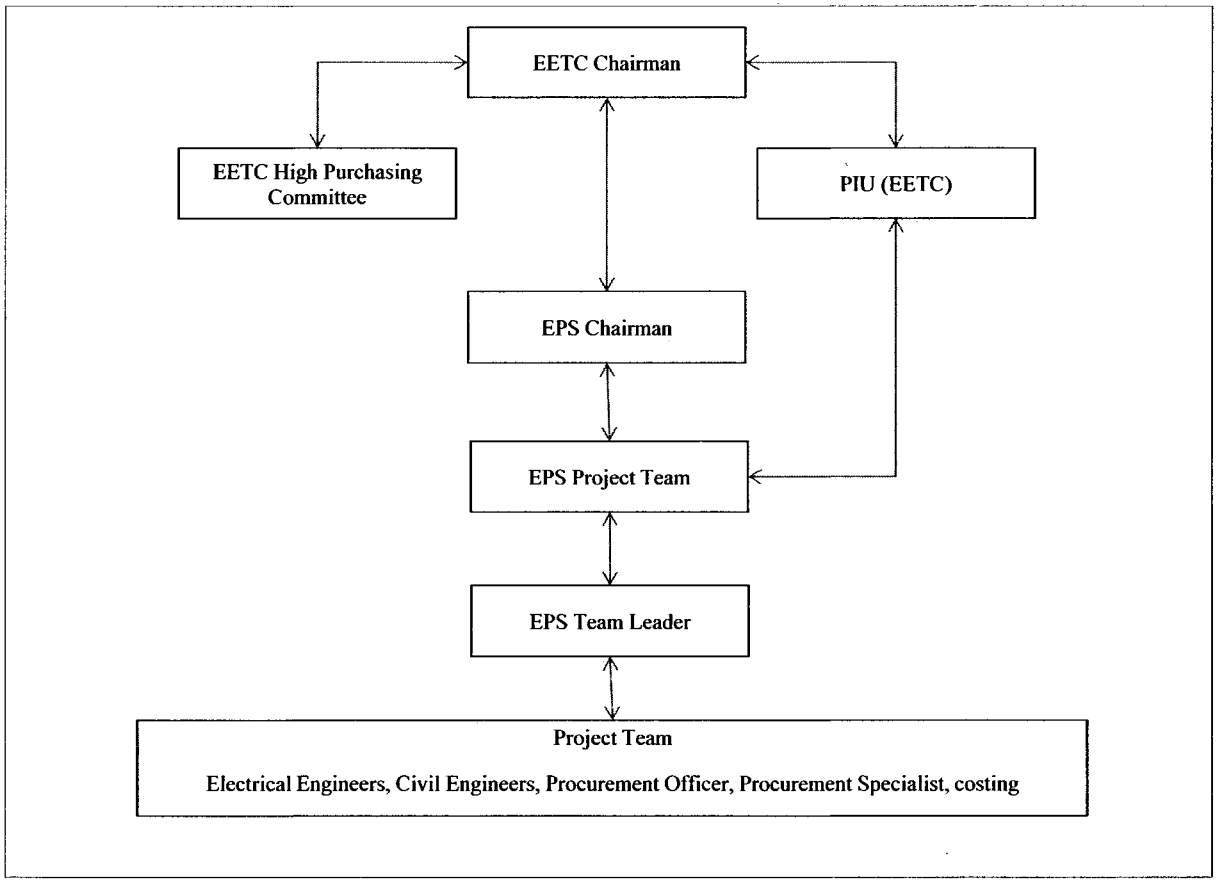
5. In addition, within the PIU, a Financial Management Unit (FMU) will be established at EETC main office to better integrate with the other departments in EETC's financial sector such as investment audit, planning, treasury, etc. The key functions of the FMU will be to have overall responsibility for the project's financial recording, budgeting, reporting requirements, and handling the loan disbursement arrangements including relevant supporting documentation.

6. Regular meetings are held in EETC's main office, chaired by EETC's chairman, with Project Managers of all on-going projects in EETC 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 EETC.

Organizational Structure of the Egyptian Electricity Holding Company



Preliminary fluxogram between PIU and Engineering Consultant (EPS)



Annex 7: Financial Management and Disbursement Arrangements

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Executive Summary and Conclusion:

1. An assessment of the financial management (FM) arrangements for the Project was undertaken in February 2010, to assess existing financial management arrangements and whether or not such arrangements are acceptable to the Bank and also agree on the risk mitigating measures.

2. The EETC, from a financial management perspective, has its FM responsibilities and activities distributed between different departments within the EETC 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, yet they do not provide for the proposed project accounts to be compiled and consolidated at any point or stage given the current structure. Also the EETC has no recent previous experience in implementing World Bank financed projects. As a result and as agreed for the purpose of the envisaged project, the Head of the Financial Sector of EETC appointed a special Financial Management Unit (FMU) within the envisaged project PIU. Such unit will have the overall responsibility of the project's FM activities including recording, budgeting, bank reporting requirements, and handling the loan disbursement arrangements including supporting documentation. The unit is headed by a financial officer along with two senior accountants, seconded from EETC for the life of the project, heading the preparation and recording sub-units respectively and each sub-unit is supported by two accountants. The FMU and its two sub-units will handle the record keeping, finance and disbursements, and planning and reporting. The procurement process of acceptable accounting software, from EETC local resources, has been initiated. Such software will be installed within a maximum period of three months after project's effectiveness. The software will be used for the recording and reporting purposes of the project. As the project will receive funds from IBRD and the CTF and as most of the project's disbursements will be through the direct payment method, one Designated Account will be opened. However, it was accentuated during the assessment that the project reporting should set out and separate the sources from IBRD and CTF, the uses of funds by category and component in addition to a six month disbursement forecast and deviation analysis for differences that exceed 15 percent between actual and planned figures. The project's designated FMU has already developed a draft Financial Manual for the financial management arrangements of the project. Such manual was reviewed by the Bank.

2. Financial Management Risks

General Risks:

Risk	Risk *Before MM*	Mitigating Measures (MM)	Risk *After MM*
The Observance of Standards and Codes (ROSC) report (2007), Country Financial Accountability Assessment (CFAA) report (2007), identified weaknesses in the Egyptian financial accountability, in both the public and the private sector.	Substantial	- Hire an independent qualified private audit firm. - A project Financial Management Unit is assigned within EETC which will be responsible for the FM arrangements and carry out the project's FM activities	Moderate
Overall Inherent Risk Before MM	Substantial	***Overall Inherent Risk After MM***	***Moderate***

Specific Risks

Risk	*Risk Before MM*	Mitigating Measures (MM)	*Risk After MM*
Lack of experienced staff with WB-financed projects	Substantial	- Part of the FM staffs who are assigned for this project have previous experience in other donors' financed projects. In addition, the project FM team coordinates meetings with the Tebbin project FM unit to benefit from their experience and replicate the FM design. - The Bank FM team will convene with the project's FM team before and right after effectiveness to provide guidance on the Bank's FM guidelines. - Quarterly reviews of the project reports will be conducted by the external auditor to ensure accuracy of reported information.	Moderate
Recording may not be in line with the project's categories' classification and/or project components.	Substantial	- Develop a chart of accounts that is based on project's financing sources, categories, components, activities and subcomponents. - Project's policies and procedures manual, which is developed by the	Moderate

		project FM team, clarifies accounting treatment, controls and flow of information.	
Accounting system may not provide comprehensive information on all sources and uses of funds	Substantial	- Project accounting will cover all sources of project funds and all utilization of said funds. - All project-related transactions would be recorded in the automated books of accounts and supporting documents will be kept at the FMU (audit trail). - The project financial reports will be subject to quarterly reviews by the external auditor to ensure comprehensiveness and accuracy of information before submission to the Bank. - Funds received from different sources, would be identified separately and reflected on the project's accounts, quarterly IFR, and annual Financial Statements.	Moderate
Delays in flow of funds	Substantial	- Ensure timely submission of withdrawal applications. - Develop annual disbursement plan that is consistently updated.	Moderate
Inconsistent application and adherence to unified and documented policies and procedures	Substantial	The FMU is developing a clear, detailed and written financial and accounting policies and procedures in the FM Manual. The manual ensures coverage of: (i) treatment of expenditures, including their classification, (ii) eligibility of expenditures to be reimbursed from the loan and the CTF, (iii) efficient management of funds, (iv) project accounting policies, including those related to authorization and payments system, and (v) internal control systems.	Moderate
No internal auditor in the FMU	Moderate	- EETC Investment Audit department will conduct ex-ante review over expenditures.	Moderate
Reporting and budgeting	Substantial	A financial management system will be installed to assist the project in recording and reporting its transactions in a timely and accurate manner. As part of the quarterly project IFRs, the FMU will prepare a forecast of the project's expected	Moderate

		disbursements for the next 6 months for proper cash management with a deviation analysis of differences exceeding 15 percent between actual and planned figures of previous periods.	
Lack of timely audit/review reports on Project FS/IFRs	Significant	An independent and qualified private auditor will be hired in accordance with TOR acceptable to the Bank. Part of the audit ToR will be the review of project's IFRs before submission to the Bank. Such review is to ensure issues are dealt with in a timely manner which will contribute to achieving yearend audit compliance.	Moderate
Overall Control Risk Before MM	Significant	***Overall Control Risk After MM***	***Moderate***

3. Accounting system

3. The project will use 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 for the projects is available.

4. It is agreed that Project Accounting (cash basis) will cover all sources of IBRD and CTF 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. Direct disbursements made by the Bank and from DA will be included in the project accounting system. Funds received from different sources would be identified separately and reflected in project accounts, quarterly IFR and annual Financial Statements.

5. 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 will be prepared. A Chart of Accounts for the project will be developed. The Chart of Accounts will conform to the classification of expenditures and sources of funds as indicated in the project documents. 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

6. The FMU will maintain its books of accounts using 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 government contribution, the balances related to the amounts disbursed, reflecting the transactions of the designated accounts and the remaining balance at the end of each period. The Financial Officer of the FMU will be in charge of the issuance of the annual project financial statements and the quarterly Interim Financial Reports (IFRs) as well as the submission of these documents on a timely basis to the IBRD and to the auditors.

5. Budgeting:

7. The Project's Finance Officers at the FMU will prepare, on annual basis, budgets and disbursement plans reflecting the project cash needs per quarter. The initial plan will be developed based on the initial procurement plan, implementation schedules and estimated payments cycles, and revised thereafter. The budget will be used as a monitoring tool to analyze variances and manage cash. Updating the annual budget will be the responsibility of the FMU through the quarterly forecasts that will be developed as part of the quarterly Interim Financial Reports (IFRs).

6. Flow of Funds/Flow of Documents

A. Between the Bank and the Project:

8. It is expected that high percentage of expenditures under this project will follow the direct payment method. However, to ensure that funds are readily available for project implementation and as the project will receive funds from IBRD and the CTF, one Designated Account will be opened with separate sub-accounts for each financing instrument, the FMU would open, maintain and operate the Designated Account (DA) at a bank acceptable to the IBRD. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the legal agreements of the project. 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 and replenishments of the DA will be prepared and sent by the FMU signed by authorized signatories. Each withdrawal application will be signed by two authorized representatives. 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.

B. Between the Project and its beneficiaries:

9. Since the project will be implemented by EETC, the regular accounting cycle of EETC 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 IBRD and produce

project financial reports in accordance with IBRD requirements. A monthly reconciliation of project costs will take place between the FMU and EETC records.

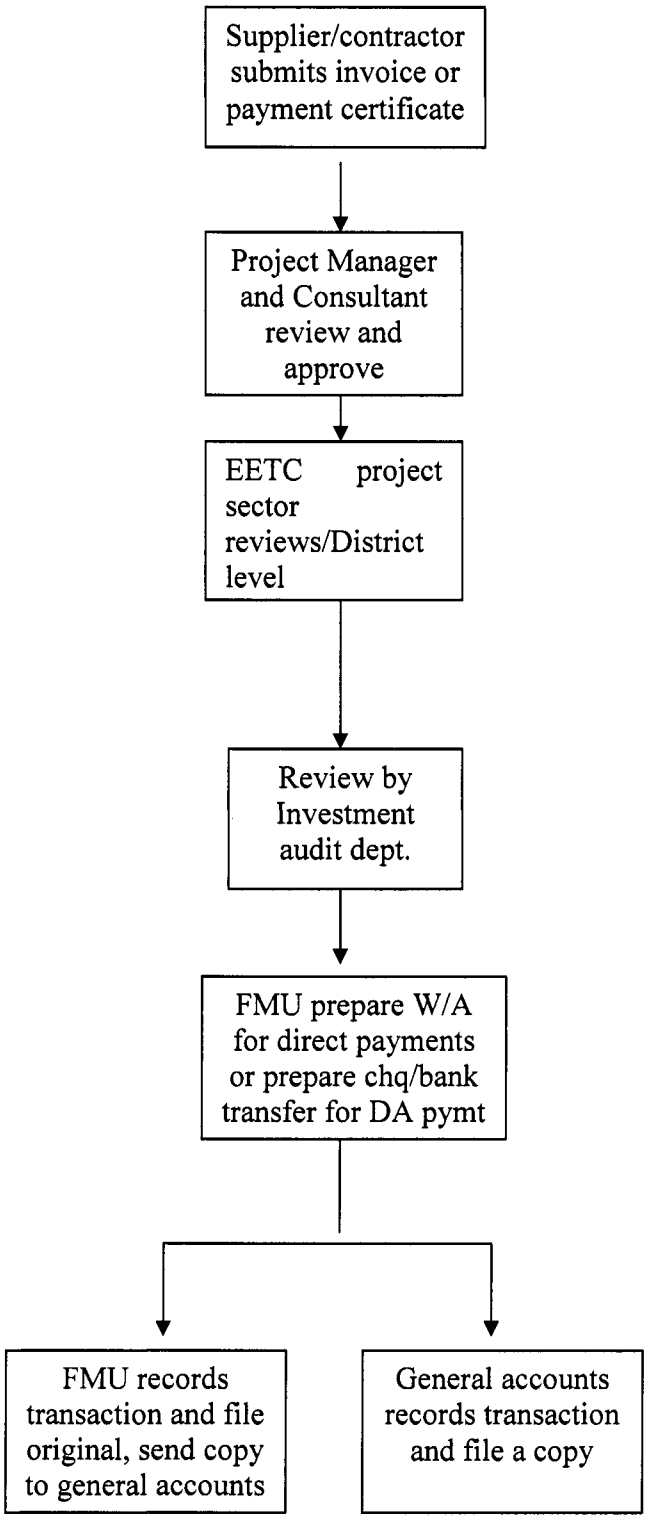
10. After procurement procedures are concluded and contracts are signed, the original contracts are kept with EETC projects sector. The original LCs documents are kept at the LCs department.

11. The contractor's payment certificate/supplier's invoice is first reviewed and approved EETC engineers and project manager in the site and then by the project consultant. The invoice/certificate is then submitted to EETC district head office for additional technical and financial review before submission to the EETC General Administration for Foreign Financing (FOREX Department) at the Head Quarter for further technical and financial reviews.

12. If the claim is to be paid from the local contribution, if any, the package goes to the investment audit department for review (and then to FOREX 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 EETC's filing system. The FMU records the transaction in the project accounting system and files a copy of the payment package at the FMU.

13. If the claim is to be paid from the IBRD loan or the CTF, the package goes to the investment audit department then to the project FMU to prepare the payment documents (application for direct payment from IBRD or disbursement from the special account). 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 month end, FMU forwards the DA reconciliation to EETC treasury department.

Documents flow cycle:



7. Internal Controls

14. 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. The FMU team has been assigned and the FM manual is being developed for the project (a draft was submitted to the Bank and comments were provided). The final FM manual will reflect the project's categories, components and activities. The manual will 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 IBRD loan; and (iii) project accounting policies. These policies include aspects such as efficient management and deployment of funds, internal control policies, etc.

15. 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 USD expenses), (c) accounting system, and (d) operational procedures (e.g. for withdrawal from Designated Account, replenishment, payments to contractors, etc), (e) the accounting cycle and entries, the chart of accounts, and templates of forms to be used.

16. The assigned FMU team, which is comprised of the head of the FMU, the head of the preparation sub-unit supported by two accountants and the head of the recording sub-unit supported by 2 accountants, is considered adequate to maintain proper segregation of duties throughout the life of the project and such duties are outlined in the FM manual.
The FMU will maintain separate register for all goods procured under the project and will track on monthly basis the project's commitments to avoid over commitment of project's categories.

8. Reporting

17. The FMU will be responsible for issuing monthly automated financial reports (FR), quarterly Financial Monitoring Reports (IFRs) and annual Project Financial Statements (PFS):

Report	Frequency	Due Date	By	Sent to:	Language
FR	Monthly	2 weeks from end of month.	FMU	EETC	Arabic/English
IFR	Quarterly	3 weeks from end of quarter	FMU	Bank/EETC	English
PFS	Annual	3 months from end of FY.	FMU	Bank/EETC	Arabic/English

(i) Monthly un-audited FR. The reports will be prepared, generated from the automated system, by the FMU on a monthly basis. They will not be sent to the Bank, however as part of the Bank supervision, they will be reviewed and reconciled with the monthly withdrawal applications and quarterly IFRs sent to the Bank. 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 IFRs. The format and content of the Interim Financial Reports (IFRs), which will be produced within 45 days from each quarter closing date will be agreed by negotiations, and included in the financial management manual. IFRs include sources and uses of funds by category and component, financial commitment

information, Designated Account reconciliation as well as six month cash flow and deviation analysis.

(iii) Annually audited PFS. The PFS 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 PFS 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; (iii) a DA reconciliation statement and (iv) detailed statement of withdrawals made on the basis of SOEs.

(iv) EETC Audit: As the continuing entity entrusted with project implementation, EETC is required under Bank rules to have its financial statements audited on an annual basis. Since it is required by the Egyptian law, such audits will be conducted by the Egyptian Central Audit Organization. Copies of the annual financial statements and their respective audit reports are required to be submitted to the World Bank within six months after the closing of EETC's fiscal year.

9. Attestation Arrangements

18. The project and EETC 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 procured by the EETC no later than 90 days after loan effectiveness. The audit would 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, reconciliation and use of the DA, use of direct payments, and withdrawal based on SOEs. The report should be submitted by EETC 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 IFRs within 45 days from the end of each calendar quarter. Withdrawals from the loan, whether in the form of SOEs or direct payments, that are included in IFRs will be part of the scope of these quarterly reviews.

Report	Due Date	Responsibility	Sent to:	Language	Scope
IFR	45 days from end of quarter	External Auditor	Bank/EETC	Arabic/English	Review
PFS	6 months from end of FY	External Auditor	Bank/EETC	Arabic/English	Audit
EETC	6 months from end of FY	CAO Audit Report	Bank	Arabic or English	Audit

10. Supervision Plan

19. A Bank-accredited FMS will assist in the supervision process. At least two supervision missions for the project will be carried out annually in addition to follow up visits as deemed necessary. The IFRs for the Project will be reviewed on a regular basis by the Project FMS and the results or issues will be followed up during the supervision missions. Financial audit reports and management letters will be reviewed and issues identified will be followed up by the FMS. Also, During the Bank's supervision missions, the Project's financial management and disbursement arrangements (including a review of a sample of SOEs and movements on the Special Account) will be reviewed to ensure compliance with the Bank's requirements and to develop the financial management rating to the Implementation Status Report (ISR).

11. Disbursement Arrangements

20. To ensure that funds are readily available for project implementation, the EETC, through the FMU, would open, maintain and operate a Designated Account (DA) at a bank acceptable to IBRD. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the loan agreement. 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 and replenishments of the DA 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 IBRD.

21. 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 IBRD Loan Allocated (Expressed in USD)	Amount of CTF Loan Allocated (Expressed in USD)	Amount of CTF Grant Allocated (Expressed in USD)	Total amount	Percentage Expenditures to be Financed
(i) Goods and Works	66.50	148.25	0.00	214.75	100
(ii) Consulting services, Technical Support, Studies and training	0.00	1.50	0.25	1.75	100
(iii) Technical support and studies	0.00	0.00	-	0.00	100
(vi) Unallocated	3.50	0.00	0.00	3.50	100
Total Project Cost	70.00	149.75	0.25	220.00	100

22. Use of Statements of Expenditures (SOEs): Withdrawals from the loan account may be made on the basis of SOEs. All records and documents must be made available for the review of the external auditor and the visiting World Bank supervision missions. For SOEs, the following thresholds are proposed: (i) contracts valued at less than $500,000 for goods, works and consulting services (2) all training and workshops.

23. Designated Account (DA): There will be one pooled Designated Account for the project, with sub-accounts for the IBRD Loan, CTF Loan and CTF Grant. The DA would be maintained

in a bank in Egypt acceptable to IBRD and would be operated by the EETC, through FMU. The DA would be operated in accordance with IBRD's operational policies. The authorized ceiling of the Designated Account would be US$ 500,000, and the amount to be advanced under each of the sub-accounts for the IBRD loan, the CTF loan and the CTF Grant would be determined by EETC based on project needs. The Designated Account would be replenished monthly or when half of the advance to the DA has been utilized, whichever occurs first.

24. Direct Payments and Special Commitments: The minimum amount for applications for direct payments and for special commitment will be 20 percent of the authorized allocation to the DA.

12 Corruption

25. Fraud and corruption may affect the project resources. The above fiduciary arrangements including ring-fencing, reporting and audit arrangements will reasonably tackle the risk of corruption from a technical perspective through the fiduciary arrangements but may not be effective in case of collusion.

Annex 8: Procurement Arrangements

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

A. General

1. Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004 revised October 2006; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004 revised October 2006, 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, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

2. **Procurement of Works**: Works procured under this project would include the only contract the Bank will finance under a single responsibility Design, Supply and Installation rate based contract for all components (towers, cable, insulators and materials, ground wires with fiber optics communication links, and foundations) for the complete construction of the Transmission Line [500kV double-circuit OHTL from Suez Gulf to Samallout (280km)] based on a basic design given by EETC but having the Contractor full responsibility for the final Design, Supply and Installation of all components. The procurement will be done using the Bank's Standard Bidding Documents (SBD) for ICB including the agreed modifications to accommodate the simultaneous receipt but sequential opening of the technical and commercial envelopes ("Two Envelope Bidding").

3. **Procurement of Goods:** Goods procured under this project would be financed by other International Financial Institutions (IFI). The procurement will be done using the guidelines of the funding IFI.

4. **Selection of Consultants:** Consultant services will include: Phase II of a consultancy assignment of technical assistance to the EETC to support the development of the BOO project. Phase I funding is being provided by the PPIAF. Phase I is funded under a client executed trust fund agreement and is already following Bank procurement guidelines for QCBS. Short lists of consultants for services estimated to cost less than $ 200,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

5. **Procurement of non-consulting services:** This loan will not finance non-consulting services.

6. **Operating Costs:** This loan will not finance operating costs.

7. The procurement procedures and SBDs to be used for each procurement method, as well as model contracts for works and goods procured, are presented in the Procurement Implementation Manual.

Summary:

Expenditure category	Contract value threshold (US$ thousands)	Procurement method	Contracts subject to prior review
Works	>25,000	ICB	All processes above US$15 million
Consulting (firms)	>500	QCBS/QBS	All processes
	<500 &>200	QCBS/LCS	All processes
	>100 & ≤ 200 ≤ 100	QCBS/LCS CQ/LCS	First process for each selection method.

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

8. An assessment of the capacity of the Implementing Agency to implement procurement action for the project has been carried out during pre-appraisal. The assessment concentrated on EPS since the procurement function will be centralized there. The assessment reviewed the organizational structure of EPS, the proposed structure for implementing the project, the relationship with the various departments within EPS and its interaction with EETC. EPS does not have a procurement unit established within its organizational structure. The procurement function is carried out by the responsible technical units.

9. EG- Wind Power Development Project will be implemented by Egyptian Electricity Transmission Company (EETC). EETC is one of the subsidiary companies of Egyptian Electricity Holding Company (EEHC) whose subsidiaries are implementing the El Tebbin and the Ain Sokhna Power Projects with great success. This will facilitate project implementation because EEHC is already familiar with Bank procedures and especially Bank procurement guidelines. As is usual in the Power Sector in Egypt, the projects are implemented having a strong consulting firm acting as Project Management Coordinator with the role of: (i) defining the number of packages for procurement under supply and install (single responsibility) contracts for the different parts of the project; (ii) carrying out all procurement actions (with EETC signing the contracts); (iv) overall project management on behalf of EETC. The Egyptian Power System Engineering Company (EPS) has been hired by EETC as Project Management Coordinator for this project, financed by its own resources. EPS is a much respected consulting firm. EPS is a publicly owned Egyptian Company established in October 1982. The company is specialized in carrying out engineering and construction services in the field of Electric Power Systems and specifically in Transmission. Although it doesn't have specific experience with World Bank procurement procedures, since its establishment, EPS has executed more than 1150 engineering projects in the fields of electric power generation, transmission and distribution in Egypt and in Arab Countries. It also played a role in the execution of the transmission line in the Ain Soknha project financed

by the Bank. The services cover power system planning, techno-economic feasibility studies, power system analysis and preparation of specifications and supervision of construction[15]]. It has been agreed with EEHC, that EPS will coordinate closely with the Power Generation Engineering and Services Company (PGESCo) with which the Bank has had experience of working with in the Tebbin Power Project and in Ain Sokhna Power Project, both under successful implementation where PGESCo has the role of Project Management Coordinator.

10. Project Management Unit (PIU): EETC has established a Project Management Unit (PMU) to manage co-ordinate, expedite, supervise, monitor and cost control the project implementation. The PMU will be responsible for preparing a Project Implementation plan and ensuring that the technical support and various reports by other departments of EETC and its consultants are prepared in a timely manner as well as playing a coordinating role with EPS in procurement. The PMU will also coordinate project preparation activities with other the International Financing Institutions (IFIs) to ensure an early start to project implementation. EETC has hired Electric Power Systems Engineering (EPS) to act as the main consultant for project implementation and consequently, all procurement actions for the project will be carried out by EPS.

Training

11. Procurement training for PMU staff is EETC as well as in EPS 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 focus in particular on procedures for evaluation of bids, contributing to mitigating the risks identified above, presenting and discussing Bank guidelines and procedures, preparing bidding documents for Supply and Installation of Plant and Equipment as well as on procurement planning.

12. 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 EPS.

Procurement Implementation Manual

13. As a further risk mitigation measure, EPS will finalize by effectiveness a Procurement Implementation Manual to include the detailed procurement process and procedures to be implemented under the project (a draft has already been prepared). 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 EETC's office and the PMU's Project files.

[15] EPS was established in Egypt in 1982 and is Stock Corporation. EPS services since then covered activities for Project Management in the following main projects: (a) Thermal power plants: Attaka (300 MW), Suez (200 MW), Damanhour (325 MW), Abu Kir (300 MW), Cairo West (300 MW), El Kuremait (1200 MW), Cairo South (600 MW), Sidi Krir (600 MW), Assiout (300 MW),; (b) Wind farms: Zafarama plants [Danish – 2x 30 MW; German – 33 + 47 + 80 MW; Spanish 85 MW and JBIC 120 MW]; and (c) Substations: Damanhour, Abu-Kir, Cairo West, Tebbin, Abu Zaabal, and Bani Seuiti.

14. The key issues and risks concerning procurement for implementation of the project have been identified and the corrective measures which have been agreed are:

Description	Responsible	Time frame
Hire an experienced procurement consultant on an ad-hoc basis to assist the PMU during critical stages of the procurement process.	PMU	2 months after effectiveness
Complete the General Procurement Plan and a specific procurement plan for the first 18 months of project implementation	PMU	Negotiations
Prepare a Procurement Implementation Manual to include the detailed procurement process and procedures to be implemented under the project	PMU	Effectiveness
Implement a procurement planning and monitoring system capable of capturing and consolidating all relevant procurement information.	PMU	Effectiveness

15. The overall project risk for procurement is SUBSTANTIAL. The procurement risk is expected to be reduced to MODERATE after the above actions are implemented.

C. Procurement Plan

16. Procurement Packages: The capital cost of EG- Wind Power Development Project will be broken down in 7 packages as follows:

(i) **A1- 500kV double-circuit Overhead Head Transmission Line (OHTL):**
This sub-component involves construction of the transmission line from Ras Gharib 500 kV substation to Samallout (about 280 km). This includes the single responsibility Design, Supply and Installation rate based contract for all components (towers, cable, insulators and materials, ground wires with fiber optics communication links, and foundations for the complete construction of the Transmission Line. Tendering for the transmission line will be based on a preliminary route survey to provide estimated quantities of tower types, foundations , conductors etc provided by EETC's consultant EPS.

(ii) **A2 Construction of 500kV/220kV GIS Substation in Ras Gharib (at Suez Gulf)** :
This sub-component to be financed by the EIB includes a single responsibility Design Supply and Install contract for the provision of all components

(switchgear, breakers, switches, protection, control, telecommunication, etc.) for the complete construction of the Substation based on design details provided by EETC's consultants. The sub-component also includes one Supply and Install contract for one transformer 500kV/220kV, 375 MVA.

(iii) **A3 Extension of Samallout 500kV/220kV Conventional substation**:
This sub-component to be financed by EIB includes a single responsibility Design, Supply and Install contract for the provision of all components (switchgear, breakers, switches, protection, control, telecommunication, etc.) to accommodate a new 500MVA 500/220kV transformer and the associated conventional busbars. This contract will be based on a design provided by EETC's consultants that includes the supply and installation of the 500kV/220kV, 375 MVA transformer.

(iv) **A 4 Construction of double–circuit 220 kV line from Ras Gharib to Gabel El-Zait:**
This sub-component involving construction of about 50 km of 220 kv transmission line that will be financed by the borrower in accordance with EETC's standard procurement practice.

(v) **B1 Technical Assistance for the development of the wind BOO program (US$ 1.5 million, CTF US$ 1 million)** This component would provide consultant support to the EETC in the competitive bidding program for the first 250 MW project. The advisory services are being provided in two phases with the first phase having already commenced with support from the PPIAF to provide support in the preparation of the Request for Proposals (RFP) and the second phase to be supported under the CTF to provide legal and financial advisory support through financial closure.

(vi) **B2 Technical Assitance to support Management of Wind Power Integration in Egyptian Power Market (CTF $500,000). This objective of this component** is to support the rapid development of the wind energy market in Egypt by recommending guidelines to the system operator for the optimal scheduling of complementary generation and demand so as to integrate wind generated power into the Egyptian power market while ensuring the security of the transmission system operations

(vii) **B3 Technical Assistance to perform a Bird Migration Study (KfW $650,000)-** A bird migration study is underway covering roughly 200 Sq km area including the site of the proposed 250 MW BOO project with support from the KfW. This will be implemented in cooperation with the NREA.

(viii) **B4 Knowledge Management (CTF $ 250,000)** This sub-component would be expected to address *three basic elements* related to the wind power program: (i) communications with local stakeholders, including Civil Society Organizations (CSOs) and the private sector on project activities, results and lessons; (ii) capture

of lessons during the project implementation process; and (iii) the sharing of such lessons with other CTF country partners.

17. Procurement Plan: The Borrower, has developed a procurement plan for project implementation which shall provide the basis for the procurement methods. This plan shall be available at the EETC offices in Abbasia, Cairo. 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 Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

18. In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended yearly supervision missions to visit the field to carry out post review of procurement actions.

E. Details of the Procurement Arrangements Involving International Competition

19. The procurement method to be used is ICB for the Bank's financed package and ICB and NCB for other packages. The Bank Loan will finance the packages indicated in the Procurement Plan attached. The procurement for contracts funded by Loan proceeds will be carried out using the Bank's SBD for ICB. The bidding processes will be advertised in the Development Business of United Nations and in Dg-Market as required by the Bank's Guidelines as well as in the National Gazette of Egypt (El Ahram) as required by local procedures.

Procurement Strategy

20. The Bank team discussed with EETC and EPS the procurement strategy to be followed. Four issues were discussed:

(i) *The two envelope system.* - The borrower's position is clear in that the 1-envelope system, consistent with Bank Procurement Guidelines, would not be acceptable, and that the Bank should consider allowing the use of the 2-envelope system described above. In the past and for projects like this (El Tebbin, Ain Sokhna and Giza North), the Bank has allowed the client to adopt the 2 envelope system, whereby the financial proposal is opened after the technical evaluation has been completed. The financial envelopes are only opened for bids that are considered technically responsive. The financial envelopes of the bids that are not technically responsive are returned to the bidders un-opened. The government now insists to adopt this procedure in the proposed project due to their past experience, as explained below and the fact that this is the system used in Egypt. The borrower has substantial experience in tendering for these types of projects with the 2 envelope system and consider that it is efficient, economic and transparent. In their view, it allows for the technical evaluation not to be influenced by the financial proposals. In addition, by not making the financial proposals known, they avoid accusations of subjective technical evaluations. In their experience, these accusations tend to be

widespread (e.g., politicians and the media) and cause disruptions, delays and pressure on the evaluating committee members.

(ii) *Prequalification vs post qualification.* - The advantages and disadvantages of prequalification vs post qualification were discussed. These included the risk that the high costs of preparing detailed bids could discourage competition, the assurance to the employer that invitations to bid are extended only to those who have adequate capabilities and resources thus simplifying the bids evaluation process. Prequalification shall be based entirely upon the capability and resources of prospective bidders to perform the particular contract satisfactorily, taking into account their (a) experience and past performance on similar contracts, (b) capabilities with respect to personnel, equipment, construction facilities, and (c) financial position. All applicants that meet the specified criteria shall be allowed to bid. The Borrower shall inform all applicants of the results of prequalification. As soon as prequalification is completed, the bidding documents shall be made available to the qualified prospective bidders. A decision was made that prequalification will be done in this case.

(iii) *Option of having a bidding process with one lot versus the use of several lots* - Both options have advantages and disadvantages. A bidding process with one lot will result in a single contract with the biggest advantage to have the design, procurement, construction and final commissioning under the single responsibility of one contractor. This however, implies in fewer number of qualified contractors able to take this technical and financial responsibility and the high risk involved. The option of procuring the transmission line in several lots may attract more competition and reduce the financial risk to the bidders. This option brings additional coordination work to the employer and the responsibility for the overall supervision and coordination – role performed by EPS in this project. A decision on which option to choose will have to be taken by appraisal.

(iv) *The use of fixed prices versus adjustable prices* - in previous projects, EEHC has asked bidders to offer fixed prices. It is well known that this practice results in bidders including a premium in their prices since they incorporate the financial risk of potential price increases of labor and materials such as aluminum and cement during the execution of the contract especially because it is expected to have a duration of approximately two years. During pre-appraisal, the Bank team advised against the use of fixed prices. However, EEHC argued that on the other hand the use of adjustable prices creates additional burdens to the employer – like (a) the need to find additional funding for price increases; (b) the need for contract amendments to adjust the final contract price; and (c) the need (in the case of public entities like EEHC) to have additional budget authorizations for contract price increases. For all those considerations, despite Bank arguments in favor of the use of price adjustments, it is EEHC decision to continue using fix prices in their bids.

21. For project implementation the same procurement arrangement will be used in line with those that were agreed on under the El Tebbin, Ain Sokhna and Giza North projects. The following special provisions should be used in project implementation:

a. In addition to clear technical specifications, the bidding documents shall include detailed and clear technical evaluation criteria.

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

c. The bidding documents shall include a list of 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 may be accepted and may be quantified in monetary terms only for the purpose of evaluation and as per detailed method spelled out in the bidding documents. This will neither affect the bid price, nor the contract price.

d. For contracts where technical deviations may, with due justification, bring additional competition to the bidding process, the bidding documents may allow bids to include a list of deviations from terms and conditions or technical specifications, and, in such event, the bidders shall provide additional price of withdrawal of deviations (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 given by the bidder, or, if not quoted, the deviation may be quantified for evaluation purposes based on pricing information available to the owner according to the specifications in the bidding documents in other similar and recent bidding.

e. If bidders are allowed to offer deviations, and 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 the winning bid, at the price shown by the bidder for the deviation in attachments to the bid.

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

g. After opening the technical envelopes, the commercial envelopes shall be kept unopened and in a safe place.

h. The review process of the technical evaluation shall 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 from the Borrower; and (iii) Borrower to then receive no-objection from the Bank. 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 shall provide clear reasons for the rejection to these bidders who request.

i. Prior to the opening of the commercial envelopes for bidders deemed responsive, adequate time (a minimum of 5 business days) has to be provided to allow opportunity for bidders deemed non-responsive to complain, if they wish. The agreed bidding documents will establish clearly this period of five business days for bidders to complain. Any complaint letter or communications and responses provided by the Borrower need to be sent to the Bank for information. 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 any complaint submitted is fully examined and considered.

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

k. 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.

l. The Bank shall, if it determines that the intended award would be inconsistent with the Loan Agreement and/or the Procurement Plan, promptly inform the Borrower and state the reasons for such determination. Otherwise, the Bank shall provide its no objection to the recommendation for contract award. The Borrower shall award the contract only after receiving the "no objection" from the Bank.

m. If after publication of the results of evaluation, the Borrower receives protests or complaints from bidders, a copy of the complaint and a copy of the Borrower's response shall be sent to the Bank for information.

n. If as result of the analysis of a protest the borrower changes its contract award recommendation, the reasons for such decision and a revised evaluation report shall be submitted to the Bank for no objection. The Borrower shall provide a republication of the contract award in the format of paragraph 2.60 of these Guidelines.

1	2	3	4	5	6	7	8
Ref. No.	**Contract (Description)**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Estiamted Award Date**	**Estimated Price in Million US$**
	Construction of 500kV/220kV Substation in Gabal El-zait	Not Financed by the Bank	N.A.	N.A.	N.A.		
	Transformer for Substation in Gabal El-zait	Not Financed by the Bank	N.A.	N.A.	N.A.		
	Constructing of 500kV/220kV Substation in Suez Gulf	Not Financed by the Bank	N.A.	N.A.	N.A.		
	Transformer for the Substation in Suez Gulf	Not Financed by the Bank	N.A.	N.A.	N.A.		
	Expansion of Samalut substation	Not Financed by the Bank	N.A.	N.A.	N.A.		
	Construction of 500kV double-circuit OHTL from Suez Gulf to Samallout (280km)	ICB	YES	No	Prior	June 2011	218.25

o. The terms and conditions of a contract shall not, without the Bank's prior approval, materially differ from those on which bids were asked or prequalification of Contractors, if any, was invited.

p. The ICB contract will be subject to prior review by the Bank.

F. Consulting Services

(a) List of consulting assignments with short-list of international firms.

2	3	4	5	6	7
Description of Assignment	**Estimated Cost (US$)**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**	**Comments**
Wind Farm Advisory Services for 250 MW	1.3 mil	QCBS	Prior	July 2010	
Wind Farm Integration	0.5 mil	QCBS	Prior	Dec 2010	

(b) Consultancy services estimated to cost above US$ 200,000 per contract and all single source selection of consultants will be subject to prior review by the Bank.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than US$ 200,000 equivalent per contract, may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Annex 9: Economic and Financial Analysis

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

General

1. Standard Bank procedure for economic analysis of a new power project would involve comparing the stream of economic costs of the project with the stream of economic benefits and determining whether the net benefits were sufficient to provide a rate of return equal to or greater than the government's opportunity cost of capital. Quantifiable benefits would typically be measured as the net increase in consumer surplus accruing to electricity customers in Egypt over the life of the project (the difference between their willingness to pay for the electricity and the electricity tariff), while costs would include the capital and operating costs of the generation, transmission and distribution facilities required to deliver the electricity to customers. The actual tariff paid could either be added to the customer willingness to pay or deducted from the cost of supply. Quantifiable environmental benefits – typically in the form of GHG emission reductions - would also be included, and valued at a current market price for carbon credits. While this was the general procedure followed in the economic analysis of the proposed project, there was concern that an overly simplified application of the methodology risked overlooking or misrepresenting some of the unique features of the project and consequently misrepresenting its economic viability.

2. Two factors were particularly believed to potentially distort the results of the analysis. The first area of concern was that increasing technical efficiencies were likely to lead to a decline in the cost of wind generation – and hence in the real operating cost of the project - over the life of the transmission investments. The expected economic life of the transmission line is 50 years; the expected duration of a PPA with a wind energy provider is 20 years. Hence, the second round of contracts for wind energy is likely to be at a much lower tariff than the initial round. The analysis therefore assumed a technology bonus on the cost of wind energy after year 20 – reducing the tariff from US8 cents to US5 cents/kWh.

3. The second concern was that, while there is always a measure of uncertainty attached to the assumptions used in the economic analysis of projects, in the present case there were two areas where the level of uncertainty was so high that it was considered excessively risky to define a "most likely" scenario. These were long run carbon prices, and the price elasticity of demand for electricity in Egypt. Forecasts of long term prices for carbon credits and the assumptions on which they are based vary so widely that it is impossible to set a single figure, or even a narrow range, as the basis for judging the viability of the project. Projections depend on the actions of governments regarding the imposition of cap and trade systems, assumptions regarding the amount of low cost mitigation opportunities that are available, and the cost of "high tech" mitigation options such as carbon sequestration that could cap the value of carbon credits. Owing to this uncertainty, the valuation of carbon credit benefits for the project covered a wide range of prices from US$5 to US$50 per ton of CO2, without offering a "most likely" option. . Estimates of the price elasticity of demand are equally uncertain. A range of empiric studies have come up with values ranging from -0.1 to greater than -1.0. However, mean and median values have been concentrated in the -0.30 to -0.40 range. Since the project benefits

were highly sensitive to the choice of elasticity, the analysis was carried out under both scenarios, again without offering a "most likely" option.

Assumptions Regarding Project Costs

4. The capital cost of the project was assumed to include the costs of all transmission links connecting the Suez Gulf wind resources to the grid. These were measured net of taxes, duties and price contingencies, but including physical contingencies. The base estimate was US$332.5 million. Operating and maintenance costs of the new transmission links were included at 2 percent of capital cost per year. The operating life of the transmission line was assumed to be 50 years. The economic cash flow analysis extended for 40 years, at the end of which time the project was credited with the residual value of the transmission investments. The investment cash flow, in millions of US$, is shown below:

	Total	2011	2012	2013	2014
A1 500kV (OHTL)	211.6	21.2	63.5	84.6	42.3
A2/A3 Substations	105.0	10.5	63.0	21.0	10.5
A4 220kV line	13.0	1.3	3.9	5.2	2.6
B1/B2 TA - BOO Wind Studies	2.2	2.2	0.0	0.0	0.0
B3 TA EIAn	0.7	0.7	0.0	0.0	0.0
Total Transmission Components	**332.5**	**35.8**	**130.4**	**110.8**	**55.4**

5. The capital and operating costs of the wind farm itself were included in the form of tariffs charged by the developers. Most of the new wind capacity is expected to be privately developed and purchased by EETC under long-term PPAs so the generation cost will effectively be the agreed tariff. It was assumed that the agreed tariff for the first 20 years would be US$0.08/kWh (similar to tariffs agreed in other projects with similar risk profiles), and that 80 percent of the tariff will be constant in nominal terms over the life of the PPA (i.e. declining in real terms in line with international inflation which was assumed to b). In the second 20 years, tariffs were assumed to be US$).05/kWh. Costs must also include the average system cost of transmission and distribution to the end users, since the consumer benefits are measured as customer willingness to pay for power supplied. These were estimated to be US$0.015 per kWh, based on national averages drawn from the accounts of EEHC.

Assumptions Regarding Project Benefits

6. The proposed project is expected to benefit the Egyptian economy both through the additional energy provided to consumers, and through capture of the value of avoided global GHG emissions.

7. The additional energy provided by the project was valued at the consumers' willingness to pay (WTP) for electricity supply. An assessment of customer willingness to pay in Egypt was recently carried out for the proposed Giza North Power Project (see Attachment 1 for a detailed description of the methodology). The Wind Power Development used the same methodology to

compute the consumer benefits, multiplying the calculated unit benefit of the additional electricity supplied in each year of the project by the net amount of electricity from the wind farm that is delivered to customers. The key assumptions used in calculating the WTP benefits were as follows:

- Timing of new capacity additions. New capacity to be served by the investments includes wind turbines at both El Zait and at Ras Ghareb. The assumed timing is summarized below:

	2011/12	2012/13	2013/14	2014/15	2015/16
El Zait	320	540	920	1,320	1,320
Ras Ghareb	0	0	0	1,050	1,750
Total	320	540	920	2,370	3,070

- Plant capacity factors. Wind measurements in the Suez Gulf region indicate that plants in the area could operate at capacity levels well in excess of norms. There is some uncertainty about the annual output of the new wind capacity, but as a base case, a 50 percent capacity factor was assumed.

- System losses. Because the willingness to pay benefits apply only to electricity that is delivered to customers, the gross output from the wind farm needs to be adjusted to take into account system losses from transmission and distribution. Based on national averages, T&D losses were assumed to be 11 percent of generation.

- Parameters of derived demand curve. The WTP analysis is based on computing the area under a derived demand curve during each year of the project's life. The key parameters needed to determine the area under the curve include total demand in each year of the project, the price elasticity of demand, and the marginal tariff. Future demand projections for the period through to 2026/2027 were provided by EEHC. After 2027, demand was assumed to grow at 5.4 percent per year. The marginal tariff was assumed to stay constant in real terms at $0.035/kWh.

8. The assessment of global benefits from reduced GHG emissions made use of a recent analysis of the tons of carbon that would be produced by the projected mix of thermal generation in Egypt. This was prepared in 2004 for the Zafarana Wind Farm, which is a registered CDM project, but the available mix of alternative generation has not changed substantially. The grid emissions factor for Zafarana was estimated at 0.55, or 550 tons of carbon per GW.h. As noted earlier, estimating a unit value of the avoided carbon emissions was a particular challenge. The range in long term forecasts of carbon prices is extreme and there does not appear to be a strong consensus regarding either the appropriate forecasting methodology or price. Using current international market prices to determine the annual benefit (currently US$13 per ton on the EU-A market) has merit in that the value at least has a recognizable basis, but the case for applying this price in the long term is weak. Carbon benefits were therefore assessed as scenarios with prices ranging from US$5 to US$50 per ton of CO2 and no specific probability assigned to any one of the selections.

Project Economic Returns

9. Table 1 below shows the capital and operating costs of the project as well as the cost of purchasing wind power and delivering it to end users. Table 2 shows the project benefits associated with willingness to pay for electricity at elasticities of both -0.30 and -0.40. Table 2 also compares the willingness to pay benefits with the project cost, and shows that at a 10 percent discount rate, costs exceed benefits by US$279 million at an elasticity of -0.30 and by US$2.2 billion at an elasticity of -0.40. At a blended opportunity cost of capital (OCC) which includes the high grant element of CTF funding , the benefits exceed the costs by US$2.8 billion under the -0.30 elasticity scenario, but costs still exceed benefits by US$2.0 billion under the -0.40 elasticity scenario. The estimated EIRR of the project, excluding any benefits associated with reductions in carbon emissions, is 9.2 percent assuming an elasticity of -0.30 but only 2.6 percent at an elasticity of -0.40.

Table 1

WPDP Economic Costs - (US$ million)					
	Capital	O&M	Power Purchase	T&D	Total Cost
Fiscal Year Ending					
2011	35.82				35.82
2012	130.38				130.38
2013	110.84				110.84
2014	55.42	6.65	322.37	60.90	445.34
2015		6.65	820.63	156.88	984.16
2016		6.65	1,050.48	203.21	1,260.34
2017		6.65	1,038.14	203.21	1,248.00
2018		6.65	1,025.97	203.21	1,235.84
2019		6.65	1,013.99	203.21	1,223.85
2020		6.65	1,002.18	203.21	1,212.05
2021		6.65	990.55	203.21	1,200.42
2022		6.65	979.09	203.21	1,188.96
2023		6.65	967.80	203.21	1,177.67
2024		6.65	956.68	203.21	1,166.54
2025		6.65	945.72	203.21	1,155.59
2026		6.65	934.93	203.21	1,144.79
2027		6.65	924.29	203.21	1,134.15
2028		6.65	913.81	203.21	1,123.67
2029		6.65	903.48	203.21	1,113.35
2030		6.65	893.31	203.21	1,103.17
2031		6.65	883.29	203.21	1,093.15
2032		6.65	873.42	203.21	1,083.28
2033		6.65	863.69	203.21	1,073.55
2034		6.65	672.33	203.21	882.19
2035		6.65	664.38	203.21	874.24
2036		6.65	656.55	203.21	866.41
2037		6.65	648.83	203.21	858.70
2038		6.65	641.23	203.21	851.10
2051		6.65	552.06	203.21	761.92
2052		6.65	545.88	203.21	755.75
2053	(66.49)	6.65	539.80	203.21	683.17

Table 2

WPDP Benefits - Willingness to Pay (US$ millions) - e = -0.30

	Incremental Wind Energy - Suez Gulf						
	MW	GWh Generated	GWh Supplied	Benefit/ Incremental GWh	Total Benefit	Total Cost	Net Cash Flow
Fiscal Year Ending							
2011			-		-	35.82	(35.82)
2012	320	1,402	1,247	0.0386	48.10	130.38	(82.29)
2013	540	2,365	2,105	0.0425	89.47	110.84	(21.37)
2014	920	4,030	3,586	0.0467	167.57	445.34	(277.76)
2015	2,370	10,381	9,239	0.0511	472.03	984.16	(512.13)
2016	3,070	13,447	11,967	0.0556	665.06	1,260.34	(595.29)
2017	3,070	13,447	11,967	0.0601	719.43	1,248.00	(528.57)
2018	3,070	13,447	11,967	0.0649	776.46	1,235.84	(459.38)
2019	3,070	13,447	11,967	0.0697	834.33	1,223.85	(389.52)
2020	3,070	13,447	11,967	0.0747	893.42	1,212.05	(318.63)
2021	3,070	13,447	11,967	0.0797	953.53	1,200.42	(246.89)
2022	3,070	13,447	11,967	0.0848	1,014.50	1,188.96	(174.45)
2023	3,070	13,447	11,967	0.0899	1,076.15	1,177.67	(101.51)
2024	3,070	13,447	11,967	0.0951	1,138.29	1,166.54	(28.25)
2025	3,070	13,447	11,967	0.1003	1,200.77	1,155.59	45.19
2026	3,070	13,447	11,967	0.1056	1,263.44	1,144.79	118.65
2027	3,070	13,447	11,967	0.1107	1,324.96	1,134.15	190.80
2028	3,070	13,447	11,967	0.1159	1,386.56	1,123.67	262.89
2029	3,070	13,447	11,967	0.1210	1,448.09	1,113.35	334.74
2030	3,070	13,447	11,967	0.1261	1,509.39	1,103.17	406.21
2031	3,070	13,447	11,967	0.1312	1,570.32	1,093.15	477.17
2032	3,070	13,447	11,967	0.1363	1,630.75	1,083.28	547.47
2033	3,070	13,447	11,967	0.1413	1,690.55	1,073.55	617.00
2034	3,070	13,447	11,967	0.1462	1,749.61	882.19	867.42
2035	3,070	13,447	11,967	0.1511	1,807.82	874.24	933.58
2036	3,070	13,447	11,967	0.1558	1,865.09	866.41	998.68
2037	3,070	13,447	11,967	0.1605	1,921.33	858.70	1,062.63
2038	3,070	13,447	11,967	0.1652	1,976.46	851.10	1,125.37
2051	3,070	13,447	11,967	0.2151	2,573.98	761.92	1,812.06
2052	3,070	13,447	11,967	0.2181	2,610.31	755.75	1,854.56
2053	3,070	13,447	11,967	0.2210	2,645.31	683.17	1,962.13
NPV at 10%	10%		83,120.48		$7,713.30	$7,992.28	($278.99)
NPV at OCC	5.7%		151,826.61		16,657.60	13,893.84	2,763.76
						EIRR	9.2%

10. Table 3 below summarizes the present value of the carbon benefits associated with the project at a range of prices and discount rates. The "OCC" is the blended opportunity cost of capital of 5.7 percent.

Table 3 – Present Value of Carbon Benefits

CO2 price per metric ton	$13	$20	$30	$50	$5
NPV at 10%	$1,219.73	$1,876.51	$2,814.76	$4,691.27	$469.13
NPV at OCC	$1,979.93	$3,046.05	$4,569.08	$7,615.13	$761.51
NPV at 0%	$3,783.41	$5,820.63	$8,730.94	$14,551.56	$1,455.16

11. The last row is included for interest and reflects the arguments have been put forward in favor of applying a zero or very low discount rate to environmental benefits such as reduced GHG emissions on the grounds that the people who will be most affected by decisions to invest or not invest in mitigation are not a part of the decision making process.

12. The table 4 below summarizes the highlights of the economic analysis. The first column shows the EIRR and NPV of the project including only the WTP benefits of increased power supply. The subsequent columns show the project returns at different assumed levels of carbon prices. Net Present Value is shown at discount rates of 10 percent and at the project OCC of 5.7 percent. Table 2 also shows the project's benefit-cost (BC) ratios based on discount rates of 10 percent and the CTF weighted OCC. BC ratios are not generally used as a criterion for economic viability in Egypt; however, they are often applied for public and public/private sector projects elsewhere (e.g., the Mid-west ISO in the U.S uses a 1.25 BC ratio for transmission projects).

Table 4: Highlights of Economic Analysis

Carbon Price	0		$5		$13		$20		$30		$50	
E	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4
EIRR (%)	9.2	2.6	9.9	3.3	11.2	4.4	12.5	5.5	14.6	7.3	21.1	11.9
NPV at 10% (without CTF)	(279)	(2,199)	(22)	(1.942)	389	(1.531)	748	(1.171)	1,262	(658)	2,289	370
NPV at OCC (CTF case)	2,764	(1.987)	3,233	(1,518)	3,983	(767)	4,640	(110)	5,579	828	7,455	2,704
BC at 10% (without CTF)	0.97	0.72	1.00	0.76	1.05	0.81	1.09	0.85	1.16	0.92	1.29	1.05
BC at OCC (CTF case)	1.20	0.86	1.23	0.89	1.29	0.94	1.33	0.99	1.40	1.06	1.54	1.19

Conclusion

13. The economic analysis indicates that there are some scenarios under which the proposed project is economically viable without CTF financing. If long term carbon benefits are valued at or above current market prices, the EIRR exceeds the 10 percent discount rate normally applied to government investments in Egypt. However, the analysis also demonstrates that the investment faces risks to its viability as a result of potential changes in the price of carbon and price elasticity of demand. Decreasing the long-term price elasticity of demand to -0.25 increased the EIRR of the project by approximately 2 percentage points. However, increasing

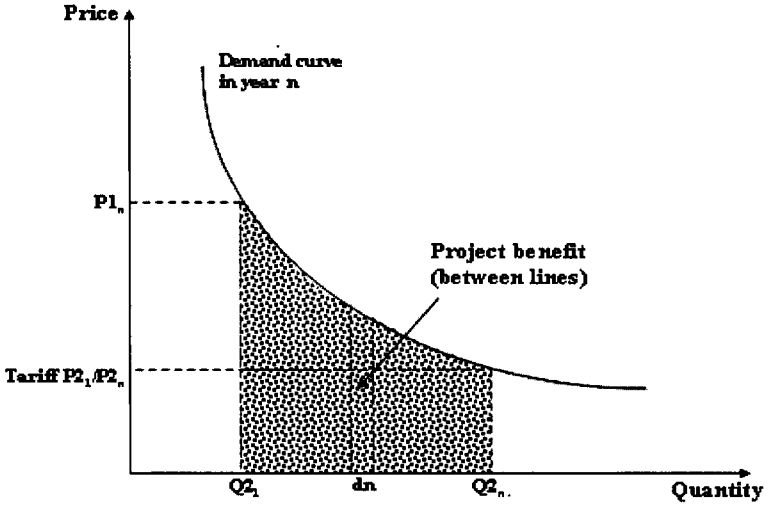
the price elasticity to -0.40 dropped the EIRR by almost 7 percentage points. Assuming a higher price elasticity of -0.40, the EIRR only exceeds the 10 percent threshold for viability in Egypt when the price of carbon exceeds US$50 per ton. Similarly the break-even NPV, without CTF financing, will require a carbon price between $5 and 13 per ton, if price elasticity is -0.30; however, the carbon price would have to be more than $30 per ton for the NPV to be positive if price elasticity is -0.40. Therefore, the CTF concessional loan plays a critical role in mitigating risks of reduced carbon prices and increased price elasticity of demand, and thereby improving prospects of attaining economic viability of the investment.

Attachment 1

Willingness to Pay Methodology – Giza North
(extracted from Draft PAD, Egypt: Giza North Power Plant, Annex 9)

Project economic benefits. The economic benefits for the project are derived in terms of the willingness to pay (WTP) by Egyptian electricity consumers for the forecast increase in electricity consumption from the time that the Giza North project starts to generate electricity. This value is illustrated in Figure 4 by the area under the power system price-demand curve for a given amount of consumption at a particular electricity tariff.[16]

Figure 4. Project Economic Benefit is based on Value of Electricity Consumption



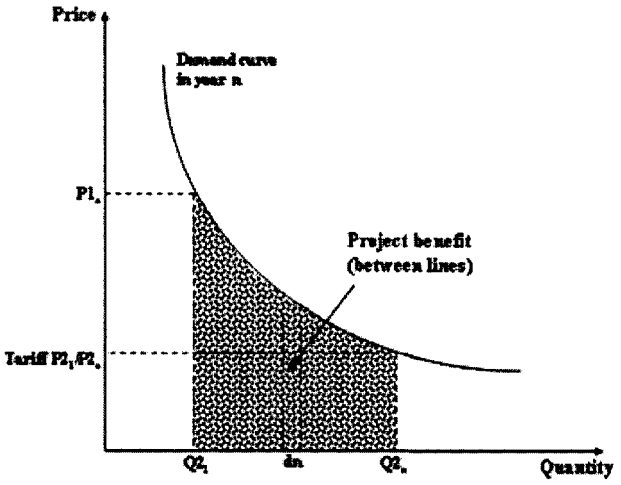
By using the average value of the benefit from consuming electricity, this approach recognizes that the electricity that reaches consumers is a mixture of electricity that is supplied from a large number of generating sources whose outputs are dispatched as an integrated system. This means that a specific generation source of supply cannot be allocated to a particular portion of the demand curve and hence cannot be directly linked to a particular segment of WTP for electricity. The observable values for evaluating the economic benefit are the projected increase in total consumption of energy based on the power demand forecast, the amount of this energy that is provided from the project, and the average regulated retail tariff. The base case for the economic evaluation uses the average tariff for the year 2008/2009, which is equivalent to about US$0.035/kWh.[17] Additional information about power demand, however, is needed to calculate the area under the price-demand curve. For this purpose, a demand function was selected with a

[16] For each year of the project's economic life, the value of electricity consumed from the Giza North plant is computed from the value of the total increase in electricity consumption in that year from the time that the Giza North project is fully commissioned multiplied by the ratio of the energy consumed from this plant to the total increase in electricity consumption.

[17] This level is very low compared to electricity tariffs in the Mediterranean region See Chapter 4 of "*Tapping a Hidden resource: Energy Efficiency in the Middle East and North Africa*", World Bank Report No. 48329-MNA. February 2009.

semi-log relationship between demand and price[18] with a price elasticity of demand equal to -0.3 for the level of demand at the prevailing electricity tariff.

Table 6. Values for the variables used in the economic evaluation of the Giza North Project – Base Case



Demand function $Q_n = a_n + b_n * \log P_n$ **in year n of Giza N. project operation**

where subscript or superscript n denotes year n of Giza North project operation

a_n is a constant $= (1 - \varepsilon_n * \log P2_n) * Q2_n$ b_n is a constant $= Q2_n * \varepsilon_n$

$P2_n$ = Average marginal tariff faced by electricity consumers -assumed unchanged in real terms from year 1 onwards to the end of the project evaluation period (25 years)

$Q2n$ = System consumption of electricity at price $P2_n$

ε_n = price elasticity of demand on the Egyptian power system at point ($P2_n$, $Q2_n$)

dn = System consumption supplied from the Giza North project

$P2_1$ = Regulated average retail tariff in year 1 of Giza N. project operation

$Q2_1$ = System consumption at price $P2_1$ in year 1 of Giza N. project operation

$P1_n$ = consumers' marginal willingness to pay for quantity $Q2_1$ $[P1_n = \exp((Q_n - a_n)/b_n)]$

$Q2_n = Q2_1 * (1 + r)^n$ where r is the forecast annual rate of growth of system demand

The project economic benefit in year n (X_n):

$X_n = B_n * MIN[d_n, Q2_n - Q2_1]/(Q2_n - Q2_1)$

= portion of total economic benefit B_n attibutable to the project

$B_n = b_n * [\exp((Q2_n - a_n)/b_n) - \exp((Q2_1 - a_n)/b_n)]$

= total economic benefit from increase in consumption in year n over year 1

[18] A semi-log form for a demand curve such as is used for this project economic evaluation (see Table 6 for details) is chosen because it provides a sensible compromise between two critical properties. One is its curvilinear shape that differs sufficiently from a purely linear relationship to provide a credible model of the variation in consumers' willingness to pay for electricity consumption with changes in the price of electricity within consumers' overall budget constraints; the other is that this form is not overly sensitive to the selected value of price demand of elasticity – a key parameter whose value has to be imputed from little available empirical information about consumers' consumption response to price changes and is therefore subject to substantial uncertainty.

Table 6, cont.

Values for the evaluation variables:				Note
System consumption in base year for power demand forecast (FY08/09)		112,660 GWh cons.		a
System demand grows to first year of project operation (FY13/14) at r		6.02% /year		b
System consumption in first year of project operation (FY13/14) ($Q2_1$)		150,879 GWh cons.		c
Regulated average retail tariff (P2n)		$0.035 /kWh cons.		d
Price elasticity ε for total system power demand		-0.3		e
Opportunity cost of capital to Egypt (OCC)		10%		f
System demand met from 2x750MW CCGT at Giza N.(dn)		8,600 GWh cons.		g
except for year 1		4,150 GWh cons.		h
except for year 2		7,440 GWh cons.		h
Project operating life (n)		25 years		i
Project construction cost for 2x750MW CCGT		$1,290.7 million		j
Disbursements of project construction cost:		FY15 =	30%	k
FY11 = 10% FY12 = 15% FY13 = 20%		FY14 =	25%	k
Cost of natural gas consumed by CCGT at Giza N.		$3.13 /MMBtu		l
Heat rate of GT for natural gas generation: year 1 each unit		10,035 BTU/kWh/gen.		m
Heat rate of CCGT for natural gas generation: years 2-15 each unit		6,562 BTU/kWh/gen.		n
Heat rate of CCGT for natural gas generation: years 16-25 each unit		6,690 BTU/kWh/gen.		n
Cost of natural gas to produce 1 GWh by CCGT		$20,538		o
Cost of natural gas to produce 1 kWh by CCGT		$0.0205		o
Plant non-fuel annual O&M cost -	fixed	$2 /kW/yr		p
	variable	$0.0025 /kWh gen.		p
Incremental transmission cost of energy sales from Giza N.		$0.006 /kWh gen.		q
Incremental distribution cost of energy sales from Giza N.		$0.010 /kWh cons.		q
Consumers' marginal willingness to pay for quantity $Q2_1$:	$P1_1$ =	$0.043 /kWh cons.		
Values of demand function constants in year 1:	a_1 = -863	b_1 =	-45,264	

Source: World Bank staff

Notes to Table 6

a	For EEHC year 2008/09.
b	Source: EEHC.
c	Computed from the base year consumption forecast and forecast growth rate of consumption to the first year of project operation (FY2013/14).
d	Estimated 2008/2009 average retail electricity tariff for all consumer categories.
e	Based on various estimates from studies
f	World Bank standard rate
g	Based on annual gross generation at 85 percent capacity factor for two 750MW CCGTs with 8 percent derating for site ambient conditions and 13 percent station consumption plus technical losses in T&D networks.
h	Based on expected commissioning schedule for the CCGTs in Giza N. power station.
i	Based on operating life until investment to extend the life of the plant will be required - the plant's operating role in the power system cannot be projected beyond then with reasonable confidence. No salvage value is attributed to the plant after operating for 25 years, because extending the plant working life may not yield a positive economic return under the conditions prevailing at that time.
j	Source: World Bank PAD: total cost including connection facilities to gas and

	electricity networks, engineering services and 10 percent physical contingency, excluding customs duties. Local costs components are converted at US$1 = LE 5.5.
k	Based on appraisal estimate (year 1 = FY2013/2014).
l	Based on the estimated economic costs of natural gas given in the report "Egypt: Economic Costs of Natural Gas - Final Report" of February 2007 by Economic Consulting Associates: Adopted the average of two estimates in the report: (i) based on LRMC production plus depletion premium - $2.38/MMBtu; (ii) opportunity cost based on netback value from LNG exports - $3.77/MMBtu. Add US$0.05/MMBtu for pipeline transport to a site in Lower Egypt. (pages 11/12 of the report).
m	Based on assumed efficiency of 34 percent for the 250MW GTs operating in single cycle mode before Giza N. plant operates in CC mode.
n	Based on appraisal estimate for the Giza N. CCGT units.
o	Derived from heat rate for years 2-15 and the cost of natural gas used in the Giza N. plant.
p	Based on appraisal estimate.
q	Based on appraisal estimate.
	No economic costs are charged for (i) atmospheric emissions from the Giza N. plant because the CCGTs will be fitted with low NOx burners; (ii) water used in the plant, because it will be recycled from natural sources; and (iii) the land occupied by the plant, because it is sandy ground that has no agricultural or other uses. See Chapter 6 of EEHC's Giza N. feasibility study.

Source: World Bank staff

Project FIRR

14. The question of project financial rate of return (FIRR) was an important issue in the project appraisal as it provided a basis for determining whether the proposed CTF financing was both necessary and sufficient to ensure the project's financial viability. The assessment was complicated, however, by the fact that the finances of the implementing agency, EETC, reflect only part of the true cost of the services provided. The GoE, through a system of non-cash subsidies, actually bears a large part of the cost of supply, including a significant proportion of the costs of power generation. EETC is assured a positive margin on the purchase-resale of electricity, and is insulated from increases in the average cost of generation. To assess the financial impacts of the project solely from the perspective of EETC would fail to capture the effect that the relatively high purchase price of wind energy will have on the weighted average cost of supply. In order to capture all of the financial impacts of the project, it was decided to examine the project's financial returns from the perspective of the GOE which is not only the primary borrower and ultimate owner of the consolidated sector but also the entity which will, either directly or indirectly, receive the incremental revenues and bear the full burden of incremental costs.

15. The financial analysis used the same assumptions as the EIRR analysis with respect incremental power and the system average costs of transmission and distribution. Rather than using customer willingness to pay to measure benefits, however, the financial analysis used the incremental revenue from retail sales of the power. Since Egypt is in the process of adjusting its retail selling tariffs, average tariffs were assumed to increase at an annual rate of 2.5 percent in real terms (i.e. in addition to inflation), a rate which is consistent with, albeit slightly higher than recent and proposed tariff adjustments.

16. The financial NPV of the project was calculated at two discount rates – one representing the real Weighted Average Cost of Capital (WACC) associated with the proposed project financing plan, and a second which assumed that the CTF financing was replaced with additional funds from IBRD[19]. In both cases, nominal borrowing rates were converted to real rates assuming a long term international inflation rate of 1.5 percent. As with the EIRR, the financial analysis also looked at different values for carbon credits associated with the project. The table below summarizes the results. CTF funding is included in WACC-1, but excluded in WACC-2.

Carbon Price	$0	$5	$13	$20	$30	$50
FIRR	-1.2%	-0.4%	0.9%	2.0%	3.8%	8.0%
NPV@WACC-1 (with CTF)	($3,013)	($1,789)	$169	$1,883	$4,330	$9,226
NPV@WACC-2 (without CTF)	($3,868)	($3,044)	($1,725)	($571)	$1,078	$4,375

17. The table shows that with CTF funding at the proposed level of US$150 million (WACC-1), the project is financially viable from the GOE perspective as long as the value of carbon credits approaches or exceeds $13/t. Without the CTF funding (WACC-2), the project only becomes financially viable when the carbon price exceeds $20/t. If there are no carbon credits,

[19] The financial cost of GoE financing was assumed to be 6.95 percent, which is the yield on a recent issue of GoE 30 year dollar bonds

or if their value falls below $13/t, the proposed level of CTF financing is insufficient to make the project financially viable from the perspective of the GOE. The above analysis is subject to a number of uncertainties. It does, however, indicate that under a reasonable set of assumptions, the proposed CTF financing increases the likelihood that the project will yield a positive financial return to the GOE.

Financial Analysis of EETC and EEHC

20. EETC, along with six electricity generation companies and nine distribution companies, are wholly-owned subsidiary of EEHC. This group of companies represents the majority of the electricity supply industry in Egypt, accounting for about 90 percent of electricity supply. As the companies are closely managed and financially interdependent, a financial analysis of EEHC on a consolidated basis evaluates the overall financial situation of the group. This is followed by a brief assessment of EETC financial performance on an individual basis.

Main Financial Risks Facing EEHC

21. **Increase indebtedness impacting debt service ability.** EEHC's leverage has increased substantially in the past eight years, as liabilities-to-equity ratio rose to 8.3 times in FY 2008/09 (from 6.6 in FY02). As of December 2009, the contemplated loan to equity conversion from the National Investment Bank of Egypt (NIB) has not progressed and this is expected to be replaced by a debt rescheduling instead. At the same time, EEHC has taken on more debt to finance on-going projects. Without the loan to equity conversion or new equity, EEHC's leverage is estimated to exceed ten times (higher than 8.3 times in FY09), which may jeopardize the ability of EEHC to fully service its debt obligation in the next few years.

22. **Revenue and cash flow pressure stemmed from tariff freeze.** The latest round of tariff increase became effective in October 2008, resulting in an average increase of 7.1 percent in FY2008/09. The expected tariff increase in October 2009 did not happen, which put pressure on revenue and cash flow. If tariff increase is not resumed, EEHC would start incurring a loss within the next few years. The importance of tariff increase is underlined by the fact that electricity generated by the recently developed power plants is more costly in comparison to the electricity from the older depreciated facilities.

23. **Potentially higher cost of fuels in power generation.** Natural gas and heavy fuel oil (HFO) are primary fuels used in power generation in Egypt. In FY 2008/09 EEHC-owned power plants used about 20 billion cubic meters (bcm) of natural gas and 5 million metric tons of heavy fuel oil. In this same year, the average cost of natural gas to EEHC was LE 0.184 per cubic meter (about US$ 0.92 per MMBtu). There is a prior standing agreement between EEHC and the Egyptian Natural Gas Holding Company on annual increases of 9 percent to the cost of natural gas to better reflect the economic cost of Egypt natural gas. An increase in gas price without accompanying increase in electricity tariff would lead to immediate financial losses for EEHC.

24. **Large investment plan.** The sector is in need of large investments during the FY2010 – FY2020 period. The double impact of high indebtedness and lower revenue will impact EEHC's ability to carry out this investment plan. Therefore, EEHC may outsource some new investment to the private sector to reduce its debt burden.

Roadmap towards meeting financial indicators target

25. **Tariffs increases and demand management.** Tariff increases should be resumed, with adequate provisions for the adverse social impact. Due to the effect of the tariff freeze in fiscal year 2009/2010 and the rising cost of fuels, the required annual tariff increase would need to be higher than recent years' increases (the average selling tariff increases 7.3 percent over the fiscal years 2003/04 to 2008/09). This would also help moderate increase in demand, especially if coupled with pro-active measures to reduce demand through energy efficiency investments.

26. **Outsourcing of capital expenditures.** EEHC can significantly reduce its own financing requirement by having some of the planned investment financed by the private sector.

27. **Recapitalization of EEHC.** The previously contemplated loan-to-equity conversion would substantially reduce interest burden by about EGP 2 billion per year, which is about a half of total interest expenses in FY2008/09. The conversion would reduce EEHC's leverage from over 8 times to about 2, and enable EEHC to fully service other debt obligations sooner. A smaller conversion would also be beneficial, although its broader economic implications would need to be carefully assessed.

28. **Grace period from new loans.** EEHC benefits from grace period on principal repayment of new loans. The grace period will reduce debt servicing obligation in the next five years.

29. **Cost control.** There appears to be limited scope for cost reduction. Fuel cost is the largest cost component (21 percent of revenue). Newer power plants coming online will be more fuel efficient and thus the fuel requirement per the unit of production (kWh) will decrease. The cost of materials and services (13 percent of revenue) has increased on average 21 percent per annum in the last five years and may have room for improvement, although such increase has been driven in large part by the larger asset base of EEHC. The wages and salary item, representing 16 percent of revenue, has increased on average 13 percent per annum in the last five years as a combination of salary increases and hiring of new staff.

30. **Other cost items may even be more rigid.** The purchased electricity cost (mainly from BOOTs) is quite fixed per the power purchase agreements, thus there is limited room for cost savings. Depreciation rate is already low (12 percent of revenue; steam units depreciated over 40 years and CCGT units over 25 years). Lastly, financing cost is a considerable 17 percent of revenue. Since the overall average interest rate is quite low at 8 percent, EEHC's large financing expense is a result of its high debt level.

31. Base-case financial projections have been carried out for the period 2009/10 – 2019/20. The projections are based on assumptions that will allow EEHC to achieve the revised financial indicators target (current ratio higher than or equal to 1.0 and a debt service coverage ratio – defined on both the EBITDA and net operating cash flow basis -- higher than or equivalent to 1.2) by FY2020. Two base case scenarios are presented. The first scenario assumes one thermal IPP of 3x750 MW (for a total of 2,250 MW), while the second assumes four thermal IPPs (for a total of 6,250 MW) over the forecast period. A sensitivity analysis illustrates that EEHC's

financial results depend significantly on its ability to achieve higher average selling tariffs over the projections period. This can be supplemented by cost savings measures.

Past and Current Performance of EETC

32. EETC's financial results reflect electricity purchase and sales arrangement between EETC and the generation companies on the one hand, and the distribution companies, high-voltage transmission customers and interconnected countries on the other. The average EETC selling tariff was 14 piasters per kWh of sold electricity in FY2009 (2.5 US cents), while the average purchase cost was 10.7 piasters per kWh of sold electricity (2 US cents).

33. EETC's main revenue stems from electricity sales to distribution companies, high-voltage transmission customers and interconnected countries. Electricity sales reached LE 16.8 billion (US$ 3.1 billion) in FY2009. In the same year the major expense was the cost of purchased electricity of LE 12.9 billion (US$ 2.3 billion), equaling about 77 percent of revenue. The company has been profitable in the past three fiscal years, with EBITDA[20] margin averaged 12 percent and net profit margin averaged 3 percent. The cost of purchased electricity from the first 250 MW wind IPP is estimated to be less than five percent of the cost of purchased electricity in recent years. As such, EEHC is in a position to financially absorb the incremental cost of the project.

34. Operating cash flow before changes in working capital reached LE 1.5 billion (US$ 0.3 billion) in FY2009. However, capital expenditures in the past three years exceeded operating cash flow, thus requiring more debt financing. In the same period, self-finance ratio (after deducting debt services) averaged 29 percent, and the company maintained capital expenditures at a level of 13 percent of net-fixed assets per year to balance high depreciation rate of 23 percent of gross assets.

35. The company's main creditors are the National Investment Bank, Misr Bank, National Bank of Egypt and Japanese International Corporation Agency **(JICA).** Higher debt financing resulted in rising long-term debt to equity ratio of 2.6, 3.6 and 3.1 in FY2007-2009. As of 2009, the long-term debt outstanding was LE 12.4 billion (US$ 2.3 billion), of which current portion was LE 672 million (US$ 122 million). Debt service coverage ratio (based on EBITDA) averaged 1.2 in the past three years.

36. Regarding receivables and payables, an unbalanced situation exists with 144 receivables-days and 524 payables-days. This is also reflected in the low current ratio, which averaged 0.5 in the past three years.

[20] Earnings before interest expenses, taxes, depreciation and amortization.

Egyptian Electricity Transmission Company
Summary Financial Statements
Billion Egyptian Pound

Balance Sheet	**2007** *Audited*	**2008** *Audited*	**2009** *Audited*
Assets			
Cash	0.2	0.3	0.6
Current assets, net	9.9	11.6	10.2
Fixed assets, net	21.5	24.8	25.8
Total assets	31.4	36.3	35.9
Liabilities & Equities			
Current liabilities, net	18.6	19.9	20.1
Long-term liabilities, net	9.1	12.8	11.8
Total liabilities	27.7	32.7	31.9
Retained earnings	-	-	-
Total Equity	3.7	3.7	4.1
Income Statement			
Revenue			
Electricity	12.7	15.2	16.8
Expenses			
Operating expenses	11.3	13.4	14.5
Financing expenses	0.9	1.1	1.4
Depreciation	0.6	0.7	0.8
Net Income	**0.3**	**0.4**	**0.7**
Financial Ratios			
EBITDA margin	11%	12%	14%
Net margin	2%	2%	4%
Debt service coverage ratio	1.2	1.2	1.2
Self finance	25%	30%	33%
Current ratio	0.5	0.6	0.5
OPEX/Gross fixed assets	0.5%	0.5%	0.5%
Receivables day	264	256	191
Payables day	577	583	524
Long-term debt to equity	2.6	3.6	3.1
Liabilities to equity	7.6	9.0	7.8
RoE	8%	10%	17%
Physical Units			
GWh sold	105,827	114,669	120,198
GWh purchased	110,086	119,460	125,107
Revenue (LE) / kWh sold	0.120	0.133	0.140
Purchase cost (LE) / kWh sold	0.093	0.103	0.107
Purchase cost (LE) / kWh purchased	0.089	0.099	0.103

Future Financial Performance of EEHC (Consolidated basis)

37. Projections to assess EEHC's future financial position and performance have been carried out for the period 2009/10 – 2019/20. Further details are recorded in the project files.

38. Two base scenarios are presented. The first scenario assumes one thermal IPP (3 x 750 MW) while the second assumes four thermal IPPs (6,250 MW total) over the forecast period. For both scenarios, projections for future financial performance are based on the following key assumptions:

a. The natural gas price increases from 18.4 Pt/m^3 (about US$ 1/MMBtu) in FY2009 to 60 Pt/m^3 by FY2020 (US$ 3/MMBtu).[21] The prices for heavy fuel oil and diesel are increased pro-rata with natural gas price.

b. Annual increases to the electricity tariff of 7.5 percent on average for consumers as agreed by the Cabinet to improve financial performance. Higher increases of 12 percent were assumed for FY 2012 – 2015. This would mean that the average electricity tariff would increase from 18.6 piasters/kWh in FY2009 to about 45 piasters/kWh in FY2020.

c. Final sold electricity increases on average 6 percent per annum per the load forecast by EEHC.

d. No restructuring of debt from the National Investment Bank into equity.

e. Increased collection performance to 95 percent (now at about 90 percent).

f. Zero tax liabilities as a result of accelerated depreciation (over a 4-year period) of new fixed assets for tax purposes per the applicable tax regulations.

39. The projections yield the following key results:

a. Under the above assumption EEHC would have positive cash flow and a net profit in most years, which enables the company to meet its current operating expenses and allows for a gradual reduction in the levels of accounts payables.

b. The projections indicate that the company's debt service cushion is limited in the coming years, with debt service coverage ratio reaching a low of 1.1 times[22].

c. The projections show that more IPPs can help reduce the level of indebtedness. The estimated long-term debt would increase from EGP 51.7 billion to over EGP 126 billion in the one thermal IPP scenario compared to about EGP 104 billion in the four IPPs scenario. In addition, the four IPPs scenario would allow EEHC to repay its

[21] There is an agreement between EEHC and E-Gas on annual increases of 9 percent to the cost of natural gas. In addition, for the electricity generated for industrial consumers, there is a pass-through arrangement in place, in which EEHC collects the equivalent natural gas price of US$3 per mmbtu for the gas used to generate electricity to these consumers, and passes on the payment to E-Gas. This base case assumption assumes a higher increase of fuel prices of about 12 percent per year.

[22] Debt service coverage ratio is estimated based on net operating cash flow, which includes changes in non-cash working capital.

loan faster from incremental cash on hand, which would reduce financing expenses and leverage.

40. The current ratio target of 1 is likely to take until close to the end of the projections (FY2020) to be met. The debt service coverage ratio target of 1.2 can be met in most years of the projections. For both ratios, this is based on the assumption that larger tariff increases than 7.5 percent on average per year are permitted.

41. **Sensitivity of financial results**. EEHC's financial results are highly sensitive to the average selling tariffs. Other cost savings will be required for EEHC to attain similar financial results if tariff increases are lower than planned.

a. A lower average tariff increase of 6 percent per annum (instead of a combination of 7.5 and 12 percent in the base case) would incur financial losses for EEHC for most years of the forecast period. This would also mean lower ability to service debt obligation, with debt service coverage ratio falling below 1. Without recapitalization, EEHC's projected accumulated losses would gradually reduce its equity to zero in six or seven years.

b. The effect of lower tariff increase can be mitigated by certain cost savings. For instance, at 6 percent annual tariff increase (instead of a combination of 7.5 and 12 percent in the base case) over 60 percent annual reduction in fuel costs will be required for EEHC to attain similar financial results as in the base case.

Base-case Financial Projection Results for FY 2009/10 to FY 2019/2020

1. Assumed a 2,250 MW IPP online in FY2014

	Unit	FY2008/09	FY2009/10	FY2010/11	FY2011/12	FY2012/13	FY2013/14	FY2014/15	FY2015/16	FY2016/17	FY2017/18	FY2018/19	FY2019/20
		actual	projection	projection	projection	projection	projection	projection	projection	projection	projection	projection	projection
GWh sold	GWh	112,660	119,532	126,824	134,560	142,768	151,477	160,717	170,521	180,923	191,959	203,668	216,092
Average tariff	EGP / kWh	0 187	0 187	0.201	0.225	0 252	0 282	0.316	0.339	0 365	0.392	0 422	0.453
Natural gas used in EEHC plants	BCM	20.0	22 4	27.0	29 9	33 5	36 9	38.4	39.2	44.2	47 1	48 2	49 4
HFO used in EEHC plants	Ton million	5 0	5 0	5.0	5 0	5 0	5 0	6 1	8.4	9.6	9 6	10 7	11 9
Diesel used in EEHC plants	Ton million	0 1	0 1	0.1	0.1	0 1	0.1	0.1	0.1	0 1	0.1	0.1	0.1
Average fuel price	US$ / MMBtu	0.9	0 9	1.0	1.2	1.3	1.5	1.7	1.9	2 1	2.4	2.7	3.0
INCOME STATEMENT SUMMARY													
Electricity sales	EGP million	21,024	22,307	25,443	30,234	35,928	42,694	50,734	57,866	66,000	75,278	85,861	97,930
Total revenue	"	23,003	24,285	27,569	32,616	38,595	45,681	54,080	61,463	69,867	79,435	90,329	102,734
Fuel expenses	"	(4,939)	(5,259)	(6,874)	(8,419)	(10,422)	(12,730)	(15,301)	(18,525)	(23,528)	(27,816)	(32,660)	(38,282)
Purchased electricity expenses	"	(1,996)	(2,011)	(2,195)	(2,312)	(2,589)	(6,458)	(8,757)	(9,474)	(10,262)	(14,641)	(15,591)	(16,633)
EBITDA	"	8,081	8,274	8,826	11,283	14,019	13,774	16,054	18,270	19,538	19,063	22,758	27,089
Financing expenses	"	(4,000)	(4,360)	(4,967)	(5,513)	(6,035)	(6,565)	(7,017)	(7,394)	(7,730)	(7,939)	(7,988)	(7,934)
Depreciation	"	(2,665)	(3,187)	(3,611)	(3,983)	(4,335)	(4,822)	(5,340)	(5,766)	(6,236)	(6,653)	(7,009)	(7,269)
Net income	"	1,742	1,059	586	2,131	4,001	2,745	4,062	5,483	5,953	4,860	8,156	12,291
CASH FLOW STATEMENT SUMMARY													
Increase (decrease) in working capital,	"	(2,241)	901	1,219	1,676	1,877	(183)	1,547	3,144	3,567	2,415	5,290	6,212
Operating cash flow, net	"	7,249	3,893	2,978	4,438	6,459	7,751	7,855	8,105	8,622	9,097	9,876	13,347
Investing cash flow, net	"	(10,976)	(14,149)	(12,386)	(11,752)	(16,244)	(17,258)	(14,196)	(15,674)	(13,881)	(11,881)	(8,652)	(8,652)
Financing cash flow, net	"	4,325	10,422	8,876	8,324	10,248	11,028	7,584	8,466	6,327	3,796	220	(120)
Change in cash	"	599	166	(531)	1,010	463	1,521	1,243	896	1,067	1,012	1,444	4,575
Cash ending balance	"	4,781	4,947	4,416	5,426	5,889	7,410	8,654	9,550	10,617	11,629	13,073	17,649
BALANCE SHEET SUMMARY													
Total assets	"	109,182	119,227	126,265	133,725	144,894	162,220	176,228	191,609	206,201	218,419	228,280	241,989
Total liabilities, of which	"	97,498	106,483	112,936	118,265	125,432	140,013	149,960	159,857	168,496	175,854	177,559	178,978
Long-term debt, gross	"	51,689	62,112	70,988	79,312	89,559	100,588	108,172	116,638	122,965	126,760	126,981	126,861
Current liabilities (total), of which		48,029	46,480	44,032	43,376	40,466	44,592	47,458	49,349	52,317	56,427	58,252	59,176
Past due liabilities*	"	35,289	34,789	30,933	26,768	22,208	21,708	21,208	20,708	20,208	19,708	19,208	18,708
Total equity	"	11,684	12,743	13,329	15,461	19,462	22,207	26,269	31,752	37,705	42,565	50,721	63,012
Financial ratios													
EBITDA margin	%	35%	34%	32%	35%	36%	30%	30%	30%	28%	24%	25%	26%
Net margin	%	8%	4%	2%	7%	10%	6%	8%	9%	9%	6%	9%	12%
DSCR - EBITDA**	times	1.1	1 3	1.2	1.5	1 3	1.2	1.3	1.4	1.4	1.3	1.5	1.7
DSCR - net operating cash flow***	times	1.6	1.3	1.1	1.3	1 2	1.3	1 2	1 2	1 2	1.2	1.2	1.4
EBITDA interest coverage ratio	times	2 0	1 9	1.8	2 0	2 3	2.1	2.3	2.5	2.5	2.4	2 8	3.4
Current ratio	times	0 6	0 6	0.6	0.6	0 6	0.7	0.7	0.8	0 9	1.0	1.1	1.3
Cash on hand (# day of revenue)	days	76	74	58	61	56	59	58	57	55	53	53	63
Liabilities-to-equity raio	times	8.3	8.4	8 5	7 6	6 4	6.3	5.7	5.0	4 5	4.1	3 5	2 8
Long-term debt-to-equity ratio	times	4.4	4 9	5.3	5.1	4.6	4.5	4.1	3 7	3 3	3.0	2.5	2 0
Annual % change - GWh sold	%	5.1%	6 1%	6 1%	6.1%	6.1%	6.1%	6.1%	6 1%	6 1%	6.1%	6.1%	6.1%
Annual % change - average tariff	%	7.1%	0 0%	7 5%	12 0%	12 0%	12.0%	12.0%	7.5%	7 5%	7.5%	7 5%	7 5%

2. Assumed four thermal IPPs (6,250 MW) online in FY2014, FY2015, and FY2017, respectively.

	Unit	FY2008/09	FY2009/10	FY2010/11	FY2011/12	FY2012/13	FY2013/14	FY2014/15	FY2015/16	FY2016/17	FY2017/18	FY2018/19	FY2019/20
		actual	projection	projection	projection	projection	projection	projection	projection	projection	projection	projection	projection
GWh sold	GWh	112,660	119,532	126,824	134,560	142,768	151,477	160,717	170,521	180,923	191,959	203,668	216,092
Average tariff	EGP / kWh	0.187	0.187	0.201	0.225	0.252	0.282	0.316	0.339	0.365	0.392	0.422	0.453
Natural gas used in EEHC plants	BCM	20.0	22.4	27.0	29.9	33.5	36.9	37.7	38.1	38.8	38.8	40.0	41.2
HFO used in EEHC plants	Ton million	5.0	5.0	5.0	5.0	5.0	5.0	6.1	8.4	9.6	9.6	10.7	11.9
Diesel used in EEHC plants	Ton million	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Average fuel price	US$ / MMBtu		0.9	1.0	1.2	1.3	1.5	1.7	1.9	2.1	2.4	2.7	3.0
INCOME STATEMENT SUMMARY													
Electricity sales	EGP million	21,024	22,307	25,443	30,234	35,928	42,694	50,734	57,866	66,000	75,278	85,861	97,930
Total revenue	"	23,003	24,285	27,569	32,616	38,595	45,681	54,080	61,463	69,867	79,435	90,329	102,734
Fuel expenses	"	(4,939)	(5,259)	(6,874)	(8,419)	(10,422)	(12,730)	(15,039)	(18,082)	(21,253)	(23,923)	(28,278)	(33,350)
Purchased electricity expenses	"	(1,996)	(2,011)	(2,195)	(2,312)	(2,589)	(6,458)	(9,699)	(10,857)	(15,823)	(23,462)	(24,980)	(26,626)
EBITDA	"	8,081	8,274	8,826	11,283	14,019	13,786	15,548	17,711	16,841	14,856	18,559	22,836
Financing expenses	"	(4,000)	(4,360)	(4,967)	(5,513)	(6,026)	(6,421)	(6,590)	(6,657)	(6,752)	(6,822)	(6,843)	(6,781)
Depreciation	"	(2,665)	(3,187)	(3,611)	(3,983)	(4,335)	(4,810)	(5,167)	(5,386)	(5,647)	(5,932)	(6,201)	(6,460)
Net income	"	1,742	1,059	586	2,131	4,010	2,913	4,157	6,041	4,824	2,491	5,911	9,999
CASH FLOW STATEMENT SUMMARY													
Increase (decrease) in working capital, excluding cash	"	(2,241)	901	1,219	1,676	1,877	(177)	1,054	3,000	1,366	805	5,151	6,024
Operating cash flow, net	"	7,249	3,893	2,978	4,438	6,468	7,901	8,270	8,427	9,104	7,617	6,961	10,435
Investing cash flow, net	"	(10,976)	(14,149)	(12,386)	(11,752)	(15,845)	(11,882)	(7,295)	(8,698)	(9,499)	(8,966)	(8,652)	(8,652)
Financing cash flow, net	"	4,325	10,422	8,876	8,324	9,881	6,096	1,340	2,260	2,601	1,477	796	902
Change in cash	"	599	166	(531)	1,010	505	2,115	2,316	1,989	2,207	128	(895)	2,685
Cash ending balance	"	4,781	4,947	4,416	5,426	5,931	8,046	10,361	12,350	14,557	14,685	13,790	16,475
BALANCE SHEET SUMMARY													
Total assets	"	109,182	119,227	126,265	133,725	144,537	157,091	165,285	175,038	186,026	194,334	202,407	214,759
Total liabilities, of which	"	97,498	106,483	112,936	118,265	125,066	134,707	138,744	142,456	148,620	154,438	156,599	158,953
Long-term debt, gross	"	51,689	62,112	70,988	79,312	89,193	95,289	96,629	98,890	101,491	102,968	103,764	104,666
Current liabilities (total), of which	"	48,029	46,480	44,032	43,368	40,358	44,358	47,451	49,312	53,500	58,227	59,486	60,116
Past due liabilities*	"	35,289	34,789	30,933	26,768	22,208	21,708	21,208	20,708	20,208	19,708	19,208	18,708
Total equity	"	11,684	12,743	13,329	15,461	19,471	22,384	26,541	32,582	37,406	39,896	45,807	55,806
Financial ratios													
EBITDA margin	%	35%	34%	32%	35%	36%	30%	29%	29%	24%	19%	21%	22%
Net margin	%	8%	4%	2%	7%	10%	6%	8%	10%	7%	3%	7%	10%
DSCR - EBITDA**	times	1.1	1.3	1.2	1.5	1.3	1.3	1.3	1.5	1.3	1.1	1.4	1.7
DSCR - net operating cash flow***	times	1.6	1.3	1.1	1.3	1.2	1.3	1.3	1.3	1.3	1.1	1.0	1.3
Current ratio	times	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.2
Cash on hand (# day of revenue)	days	76	74	58	61	56	64	70	73	76	67	56	59
Liabilities-to-equity ratio	times	8.3	8.4	8.5	7.6	6.4	6.0	5.2	4.4	4.0	3.9	3.4	2.8
Long-term debt-to-equity ratio	times	4.4	4.9	5.3	5.1	4.6	4.3	3.6	3.0	2.7	2.6	2.3	1.9
Annual % change - GWh sold	%	5.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
Annual % change - average tariff	%	7.1%	0.0%	7.5%	12.0%	12.0%	12.0%	12.0%	7.5%	7.5%	7.5%	7.5%	7.5%

Notes:

* Past due liabilities are largely obligations to the Ministry of Finance and other governmental agencies. Part of the amount is gradually being offset against the cost of electricity supplied to governmental users.

** EBITDA divided by estimated previous year current portion of long-term debt and interest expenses for the year.

*** Operating cash flow -- net of change in working capital, excluding cash and current portion of long-term debt, divided by estimated previous year current portion of long-term debt and interest expenses for the year.

Sensitivity of EEHC's Financial Results - Comparative Financial Indicators at Mid-point and at End of Projections

1. Assumed a 2,250 MW IPP online in FY2014

FY 2014/15		Base Case	Lower Tariff	Lower Tariff + Fuel Savings*	Tariff & Fuel Price Frozen
EBITDA margin	%	30%	11%	33%	3%
Net margin	%	8%	-17%	5%	-35%
DSCR - EBITDA**	times	1.3	0.4	1.1	0.1
DSCR - net operating cash flow***	times	1.2	0.3	1.1	0.0
Current ratio	times	0.7	0.2	0.9	(0.2)
Liabilities-to-equity raio	times	5.7	367.5	4.0	(12.9)
Long-term debt-to-equity ratio	times	4.1	265.1	3.0	(9.6)
Annual % change - GWh sold	%	6.1%	6.1%	6.1%	6.1%
Annual % change - average tariff	%	12.0%	6.0%	6.0%	0.0%

FY 2019/20 (end of projections)		Base Case	Lower Tariff	Lower Tariff + Fuel Savings*	Tariff & Gas Fuel Frozen
EBITDA margin	%	26%	0%	30%	-14%
Net margin	%	12%	-19%	11%	-49%
DSCR - EBITDA**	times	1.7	0.0	1.5	(0.4)
DSCR - net operating cash flow***	times	1.4	(0.3)	1.2	(0.5)
Current ratio	times	1.3	(0.8)	1.2	(2.2)
Liabilities-to-equity raio	times	2.8	(2.9)	2.9	(1.7)
Long-term debt-to-equity ratio	times	2.0	(2.1)	2.2	(1.3)
Annual % change - GWh sold	%	6.1%	6.1%	6.1%	6%
Annual % change - average tariff	%	7.5%	6.0%	6.0%	0.0%

2. Assumed four thermal IPPs (6,250 MW) online in FY2014, FY2015, and FY2017, respectively.

FY 2014/15		Base Case	Lower Tariff	Lower Tariff + Fuel Savings*	Tariff & Fuel Price Frozen
EBITDA margin	%	29%	10%	33%	1%
Net margin	%	8%	-17%	6%	-35%
DSCR - EBITDA**	times	1.3	0.4	1.2	0.0
DSCR - net operating cash flow***	times	1.3	0.4	1.2	0.0
Current ratio	times	0.8	0.2	1.0	(0.1)
Liabilities-to-equity raio	times	5.2	204.0	3.4	(12.1)
Long-term debt-to-equity ratio	times	3.6	142.1	2.5	(8.7)
Annual % change - GWh sold	%	6.1%	6.1%	6.1%	6.1%
Annual % change - average tariff	%	12.0%	6.0%	6.0%	0.0%

FY 2019/20 (end of projections)		Base Case	Lower Tariff	Lower Tariff + Fuel Savings*	Tariff & Fuel Price Frozen
EBITDA margin	%	22%	-5%	23%	-29%
Net margin	%	10%	-22%	6%	-59%
DSCR - EBITDA**	times	1.7	(0.3)	1.3	(0.9)
DSCR - net operating cash flow***	times	1.3	(0.6)	1.0	(1.1)
Current ratio	times	1.2	(0.9)	1.1	(2.3)
Liabilities-to-equity raio	times	2.8	(2.3)	2.9	(1.3)
Long-term debt-to-equity ratio	times	1.9	(1.5)	2.1	(0.9)
Annual % change - GWh sold	%	6.1%	6.1%	6.1%	6%
Annual % change - average tariff	%	7.5%	6.0%	6.0%	0.0%

Annex 10: Safeguard Policy Issues

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

1. **The Project:** The proposed project is designated as a **category 'B project as per the World Bank** safeguards categories (triggering policies on Environmental Assessment OP4.01 and Involuntary Resettlement OP4.12) and as a category 'A' project under European Investment Bank (EIB) rules and a category 'B' project under the Egyptian environmental regulations. In order to comply with requirements of various partners, a full Environmental Impact Assessment was completed for this project, as financing from the WB & EIB is conditional upon obtaining the environmental clearance from all the Egyptian regulatory authorities, the WB & the EIB. The EA studies for the transmission lines were completed using a consultative process compliant with the World Bank requirements.

2. Wind power development in Egypt is expected to be done in stages and involving several development partners and private investors, while the World Bank is financing only the strengthening of transmission system. The scope of the project included a) wind power generation to be financed by EIB, KfW etc and b) Transmission lines and substation financed by the World Bank. Wind power development is expected in the "NREA concessionary area" that comprises about 625 km2. This area is located to the **West of the Hurghada** - Suez road and extending about 70 km from North to South and about 9 to 10 km to the inland. The area starts about 60 km in the North of Hurghada. The wind power target capacity for the overall area is around 2000-3000 MW, which is expected to be developed by 2026/2027. Wind Power would be developed in south-west to north-east rows perpendicular to the dominant wind energy direction at distances of about 1 km. Typically the area required for wind project is limited and includes the wind turbine foundations (of about 2 m depth and a surface of up to 20 x 20 m'), the turbines itself (with tubular tower diameters of up to 4.5 m at the footing and maximum blade tip heights of about 100m), the wind park (internal grid through cable trenches), small transformer stations (next to the wind turbines or inside the turbines) and wind park internal earth roads (of 5 m width). Typically at central locations MT/HT substations are erected. The NREA also plans to develop an additional service area consisting of a control building, storage buildings and housing facilities for staff. The environmental and social footprints of wind power projects extend from generation site to transmission sites. The EA studies for wind power generation sites will be supported by the KfW using a ToR prepared in consultation with the World Bank.

3. **Transmission Lines Route and Alignment**: In order to evacuate the electrical energy generated at the Gulf of Suez into the 500 kV network, the World Bank financed project will interconnect the Wind Farms in the Suez Gulf / Gabel El-Zait to Samallout substation at the Nile valley, via installing 500 kV parallel lines of 280 km length, approximately. The line Route starts at ***Samallout*** 500 kV S/ST on desert land, then goes through agricultural area until the ***Nile river***. When it crosses the Nile it goes through desert lands till Suez Gulf, including ***Gabel El-Zait*** area. The area beyond Nile is characterized by desert lands till Suez Gulf (El-Sheikh Fadl/ Ras Ghareb Road), including Gabel El-Zait area. The desert segment of the transmission line route is approximately 89% of the total length of the line, while the remaining 11 percent lies on cultivated lands at Samallout area. The EA study included the stretch between Ras Gharib in the

Red Sea Coast along the southern boundary of El-Galala El-Qibliya Plateau and the West Sammalut area in the Nile Valley. The entire stretch is motorable along the high way from Sammalut in the Nile Valley in the west (North of El-Minia City) through El-Sheikh Fadl - Wadi Tarfa to Ras Gharib in the Red Sea Coast via Wadi Abu-Had.

4. The ESA indicates that the proposed transmission schemes and substation are expected to be generally environmentally clean and non-polluting in nature as most of the area is characterized by uninhabited and uncultivated desert land. The anticipate environment and social impacts on the surrounding environment will be restricted to rights of way (ROW) and land acquisition for substations. The EA study presents baseline of flora and fauna known to exist in the region, particularly around Red sea and Nile valley as well analyses of alternative routes. The ESA does not indicate presence of any sensitive habitat (mangroves, wetlands or coral reef); receptors or archeological sites within or along the proposed alignment that may be affected by the proposed project activities. The EA provides guidance to minimize environmental impacts, including recommendations for:

- Mitigating habitat loss, vegetation damage and fragmentation
- Avoid increased access to wild lands, paths/access roads
- Avoid run off and sedimentation from grading of access roads
- Avoid chemical contamination from chemical maintenance techniques
- Ensure that there is no PCBs in electrical equipment
- Mitigate the impact as a result of change in land use and population relocation due to towers, substations and induced secondary development during construction
- Minimizing avian hazards from transmission lines and towers, aircraft hazards from transmission lines and towers
- Avoid impairment of cultural and aesthetic resources, health and safety, fire hazards and pollution
- Prevent loss of agriculture/community land by avoiding physical displacement of population, and
- Minimize, if not avoid, displacement of population and ensure that the livelihood of those affected is improved or restored

5. Land acquisition along the expected 280 km transmission line will be limited to compensation for areas covered by the tower footings, if located on private land. However with the exception of the first 30-35 km near Samallout on the Nile River which may affect agricultural areas, most of the proposed routing passes through uninhabited desert land. At Samallout, 500 KV/220/132/66/33 substation is located at the desert edge, west of Nile river. This substation will be expanded to house new equipment associated with the construction and operation of new transmission lines. No land taking or resettlement is associated with this site of substation. At Suez Gulf and Gabel El-Zait, area for the substations has been allocated and has been transferred to EETC by the local authorities of Red Sea Governorate. The area is free of encumbrance and on an uncultivated desert land. The site of the sub stations and the entire route of transmission line is accessible through the regional road from El-Sheikh Fadl ro Ras Gareb, therefore no access road is envisaged as part of the project. Overall the social and environmental impacts of the project interventions are not significant, unprecedented or irreversible.

6. In order to construct the transmission line, only small pieces of land for the transmission line's towers' footings all along the route will be acquired. The land requirements are likely to be limited. No land acquisition is associated for almost 89 percent of the route as it passes through uninhabited, uncultivated, State-owned desert land. Only in the cultivated area of Markaz Samallout, along the remaining 11 percent of the route, small pieces (of area around 20x20 m2 each) of the agricultural land will be occupied by TL towers' footings. For these footings, fair land acquisition compensation and crop compensation system will be applied for which a Resettlement Policy Framework is in place.

7. **Description of area along the Transmission Line:** The transmission line project route will be between Samallout area to the west of the River Nile and extended along El-Sheikh Fadle/ Ras Ghareb Road to the eastern desert. With the exception of a length of about 32 km near the Nile River, where the 280km 500 kV double circuit east-west line would cross agricultural land, virtually all the rest of the line, will go through uninhabited uncultivated state-owned desert land. On the east-west route no population or human settlements were observed between the Samallout 500 kV Substation and the Gulf of Suez (Ras Ghareb) oil terminal and township. The route is far enough from the nearest residential areas.

Suez Gulf / Gabel El-Zait Area, Red Sea Governorate

8. The project siting will extend from Samallout 500 kV S/S, west of the Nile River, to the Gulf of Suez, including the Gulf of El-Zait area and will end at the proposed site of Gabel El-Zait S/S, which is about 7 km to the west of the Suez Gulf and about 4.5 inward km south west of Ras Shuqayr in the Red Sea Governorate and about 370km south east of Cairo. The route all along the Red Sea Governorate is an empty, uninhabited, uncultivated, state-owned land area. Total population of about 288,233 reside the Red Sea Governorate and represent about 0.4 percent of the total population in Egypt. The population at the Ras Ghareb administrative city is approximately 31,922.

9. The Gabal El-Zait Wind Farm - Power Plants will be connected to the Egyptian Unified Power System (EPS) at Samallout, El-Minia Governorate, which is owned and operated by the Egyptian Electricity Transmission Company (EETC), an affiliate company to the Egyptian Electricity Holding Company (EEHC), via connecting transmission lines.

10. It is not foreseen that any of the activities of the transmission line project, or its attachments, would result in involuntary resettlement, particularly with most of the routing pathways of the electrical transmission lines (around 89 percent of its routing pathway) are located within uninhabited uncultivated State-owned desert lands with a very limited pieces of land to be occupied by transmission towers' footings against fair compensation and no alternative proposed routing is envisaged as shown clear in the map of the surveyed routes.

11. **Analyses of alternative routes**. The EA studied three alternative routes and recommended the 3rd alignment, as the best option. There are three proposed routes in the green area at Samallout route segment, where:

- The first options included alignment that would have passed close to existing housing blocks and crossing the Nile River at 600 m width, and therefore rejected.
- The second option was not preferred as it passes through mining area located at the eastern side of the Nile River and constitutes a source of pollution, which may adversely affect the line insulators, in addition to crossing the Nile River at 900m width.
- The third option, which is the preferable and the selected alignment route allows the project in avoiding all housing blocks and passes far from the mining area and crosses the Nile River at its narrowest width, i.e. 600 m distance.

12. **Traffic and Associated Infrastructure:** During the construction more than unusual transport of equipment and personal is expected. The road system of the greater area does not show any bottleneck to the size and frequency of such transports. Therefore, the impact due to traffic congestion resulting in inconvenience to local communities, as well as dust and noise pollution will be temporary and not significan. These impacts will be mitigated by implementing action outlined in the EMP (Environmental Management Plan). Inside the desert area access roads will be built as compacted gravel roads to allow transport as needed.

13. **Access Road:** The main transport infrastructure linking the Samallout zone to the Suez Gulf/ Gabel El-Zaitt area and also both of them to the country main ports facilities is principally based on road network. The site of end points (substations) and along the entire route of the transmission line is accessible through the major Regional Road from El-Sheikh Fadl to Ras Ghareb. This road directly passes in parallel to the route along its pathway from Samallout to Gabal El-Zait. Actually no major access roads are envisaged to be constructed particularly for the transmission line project and the end point structures associated to it.

Impacts during Construction

14. **Impacts on Flora and Fauna:** Construction will be phased utilizing very limited areas for the placement of footings of the T.L. towers, thus leaving huge areas untouched and much room for resting or retreat of the little common fauna expected in the area. The EA indicated that the common breeding birds of the Nile Valley include 66 species (Goodman *et al.* 1989). At least 14 of these are not known to breed outside that habitat . Characteristic species include *Egretta ibis, Elanus caeruleus, Milvus migrans, Falco tinnunculus, Gallinula chloropus, Hoplopterus spinosus, Rostratula benghalensis, Streptopelia senegalensis, Centropus senegalensis, Tyto alba, Merops orientalis, Galerida cristata, Hirundo rustica, Motacilla flava, Prina gracilis, Corvus cowrie, Passer domesticus,* and others. The ESA does indicate that some part of the anticipated 500 KV transmission line route between Samallout and Suez Gulf, particularly at Gabel El-Zait may fall under the known migratory route of birds with potential to impact migratory birds if project results in removal and destruction of surrounding vegetation near tower footings or sub stations. These impacts will be mitigated by avoiding removal or clearance of vegetation in the Gabel El-Zait area, where strain towers will provide additional roosting and nesting platform for large raptors such as vultures and Eagles. The EA indicate that the impact of potential collision of birds with T- line is, however, unlikely. The EA indicates that no significant environmental impacts are expected during the construction, as the construction planning is expected to be based on avoidance, minimization followed by mitigation for residual impacts.

Impacts during Operation

15. **Waste Quantities and Disposal:** Waste from the Transmission Line and Substation would consist of used consumables regularly to be exchanged, when servicing the machines, and smaller defective parts. These are non hazardous materials, most of them valuables and fit for recycling. Hazardous used oil will be collected once per year or once in two years and send for recycling. The practice in other Egyptian Substations show that this works without problems. The volume of used oils will depend on the type of transformer selected and on the service intervals requested by the selected contractor.

16. Domestic waste will be generated at the service facilities of EETC. The other T.L.s& substations experience shows that the domestic waste is small in quantities and mainly composed of biodegradable or burnable waste. The estimated volume not compacted is less than 10 persons x 2 to 3 l/d: 15 l/d. The standard method as applied at remote housing facilities in the desert in Egypt would be that waste will be collected in bags and in bins, and disposed of on an environmentally safe waste disposal site. Considering the small amounts of domestic waste, this simple method is considered to be acceptable.

17. **Workers Health and Safety and other Risks**: Potential occupational health and safety hazards during the construction of transmission line and substation projects include risks from:

- Earth works and foundation constructions (minor nature),
- Working at heights (major risks),
- Working on electrical systems.
- Working or living or practicing activities close to the Transmission Lines, i.e. exposure to electromagnetic fields.

18. The risks can be limited to acceptable standards if works are strictly carried out as to the stipulations defined in WB/IFC Environmental, Health and Safety Guidelines, and according to internationally acceptable Electrical Workers Safe-Work Regulations. A safety observer shall be kept in case of heavy mobile equipment, which may be hazardous, by its movement. The observer shall ensure that people are kept away of mobile equipment.

- Equipment that could present a hazard to personnel, if accidentally activated during the performance of installation, repair, alteration, cleaning or inspection, work shall be made inoperative prior to state of work. Such equipment shall include compressors, conveyors, elevators, machine tools, pumps, valves and similar equipments.

- Equipment which is subject to unexpected external physical movement such as rotating, turning, dropping, sliding etc., mechanical and/or structural constraint shall be applied to prevent such movement.

- All equipment which are locked or taken out of service, because of potentially hazardous condition shall be appropriately tagged indicating the reason it has been taken out of service.

Excavation and Trenching

- All excavations shall be made in accordance with the approved drawings.

- The sides of all excavations, which might expose personnel or facilities to danger resulting from shifting earth shall be protected by providing slope to the appropriate angle of repose or benching in the sides and ends of the excavation or ladders must be used and secured, enough to withstand at least 1 meter above the top of the excavation.

- All excavation deeper than 1.2 meters must have barriers and toe boards around the outside to-prevent persons and material failing into the excavation. Barriers must be of a strength that is capable of withstanding the weight of a person falling against the barrier. Barriers shall be readily visible by day or night.

- An inspection must be conducted at the end of the works to ensure that the excavation has been left in a safe manner. Heavy loads shall not be put on the edge of the excavation.

- All persons in excavation must wear safety helmets, safety boots and dress as defined by the site rules.

- Vehicles and construction plant must not be allowed to come within 2 meters of an excavation unless working in connection with the excavation.

19. **Implementation Arrangements:** The Environmental and Social Management Plant (ESMP) including mitigation measures and design of monitoring programs will be overall responsibility of implementation of the Environmental and Social management plan. The Egyptian Electricity Holding Company (EEHC) has strong institutional capacity with respect to Bank's safeguard policies having two Bank-financed large Category A and Category B project under supervision. In addition, Egyptian environmental regulations on ESIAs, requires formal approval by the Egyptian Environmental Affairs Agency (EEAA), including supervision. The Project Management Unit will have the overall responsibility for implementation of Environment and Social management plan and the RPF. The PMU will designate a Safeguards Coordinator and hire environmental and social management specialists who will work closely with contractors and sub-contractors to ensure that all environment and social impact mitigation measures including occupation, health and safety guidelines are mainstreamed into the project design; monitored and supervised. Safeguards Coordinator will have direct responsibility for implementation of the Environment, Health and Safety measures as well as the RPF for the site during construction and operation. Relevant staff will be trained in identification of key environment and social issues as well as in implementation of management, mitigation and monitoring measures, including occupational health and safety; and contingency plans and emergency procedures. The mitigation measures are summarized in the tables below.

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)/PIU*	EEHC management EETC management EETC Project Manager in collaboration with the Consultant Site Manager.	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/ PIU 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.

* PIU = Project Implementation Unit.

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. Loss of land use and population relocation due to placement of towers and substations. Chemical contamination from chemical maintenance techniques.	• 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. • Select ROW to avoid important social, agricultural, and cultural resources. • Utilize alternative tower designs, if possible, 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 and EIB procedures. • 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.	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)/PIU	EEHC management EETC management EETC Project Manager in collaboration with the Consultant Site Manager.	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/ PIU 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				
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. • Select appropriate support structure design, materials, and finishes.	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)/PIU	EEHC management EETC management EETC Project Manager in collaboration with the Consultant Site Manager.	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/ PIU 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				
Indirect Induced secondary development during construction in the surrounding area. Increased access to sensitive lands.	• Provide comprehensive plans for handling induced development. • Construct facilities to reduce demand. • Provide technical assistance in land use planning and control to local governments. • Route ROW away from sensitive lands. • Provide access control.	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)/PIU	EEHC management EETC management EETC Project Manager in collaboration with the Consultant Site Manager.	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/ PIU 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.

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.	1. All activities related to the construction of the new transmission line will take place within the areas allocated to EETC, i.e. there will be no off-site activities or associated resettlement during const-ruction. 2. Land acquisition is limited to small pieces of land of around 20x20 m^2 each for the towers' footings, at a separated distances, against fair land and crop compensation. 3. The entire labor force will camp temporarily, for short periods, all along the route during continuing movement with the TL development, thus no worker housing or associated facilities will be permanently erected on sites during construction. 4. Public Relations will be maximized through open dialogue between EETC and local authorities and public representatives.	During construction.	Record local employment provided by the project.	EETC Project Manager	EETC & EEHC top Management.	Workers satisfaction as measured by staff interviews and complaints submitted.	Editing a special report	Responsibility of EETC.	Responsibility of EETC.

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 AND SAFETY, ***Risks and Hazards*** Standard international practice on EHS issues shall be employed on sites. 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 construction companies and staff; • management, supervision, monitoring and record-keeping as set out in operational manual; • pre-construction and operation assessment of the EHS risks and hazards; • implementation of Fire Safety plan; • provision of appropriate training on EHS issues for all workers;	During construction.	Daily inspection 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 contractors on site under supervision of the PIU and the Project Manager.	EETC top Management in collaboration with Site Engineer.	Management procedures in place. Workers health and safety as measured by no. of incidents.	Daily inspection Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, EIB, etc.), if required.	EETC/PIU to ensure contractors 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. Contractors are responsible for ensuring that a Fire Safety Plan is prepared and implemented under supervision of PIU and the Plant Manager.	Mitigation measures will require management time plus costs for implementation of EHS 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				
	• 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. 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. • Development of site emergency response plans.								

Resettlement Policy Framework (RPF)

The project and the role of the RPF

1. The Samallout / Suez Gulf / Gabel El-Zait 500 kV Electrical Interconnection Project is an integral part of the Egyptian Electricity Sector's on-going program to enhance transmission capacity for meeting the ever increasing demand for electricity generation. The project includes evacuation of the wind-based generated electricity to the National Unified Power Grid (NUPG) via interconnecting Overhead Transmission Lines (OTL). These interconnecting transmission lines will connect the electricity users and consumers to the National Electricity Network. (Figures- 1).

2. Since some of the sub-components of the project (electricity transmission, access roads, substation areas) may result in land acquisition, World Bank OP 4.12 on involuntary Resettlement has been triggered and a Resettlement Policy Framework (RPF) has been prepared. An RPF is the instrument used because the nature and extent of land acquisition resulting from the above infrastructure are not known at appraisal. The purpose of the RPF is to establish resettlement objectives, organizational arrangements and funding mechanisms for any resettlement operation that may be necessary. When during implementation the exact extent of land acquisition becomes known, a Resettlement Action Plan (RAP) or abbreviated RAP- depending on the scale and severity of impacts - will be prepared. The various steps in preparing a RAP have been outlined in the RPF. It should also be emphasized that the resettlement process should be completed prior to the start of physical works.

3. The current status with regard to transmission lines, substations and access roads is as follows:

Transmission Lines

4. In order to evacuate the electrical energy generated at the Gulf of Suez into the 500 kV backbone network, EETC is planning to interconnect the Wind Farms in the Suez Gulf / Gabel El-Zait to Samallout substation at the Nile valley, via installing 500 kV parallel lines of 280 km length, approximately.

5. There are three proposed routes in the green area at Samallout route segment, where one of them may pass near some housing blocks and the second is not preferred as it passes through mining area located at the eastern side of the Nile River and constitutes a source of pollution, which may adversely affect the line insulators. The third one, i.e. the preferable and chosen route, succeeds in avoiding all housing blocks and passes far from the mining area.

6. The line Route starts at Samallout 500 kV S/ST on a desert land, then s through agricultural area until the Nile river. When it crosses the Nile it s through desert lands till Suez Gulf, including Gabel El-Zait area.

7. When the transmission line crosses the Nile, it goes close to an asphalt road through the desert lands till Suez Gulf, including Gabel El-Zait area. The desert segment of the transmission line route is approximately 89 percent of the total length of the line, while the remaining 11 percent lies on cultivated lands at Samallout area.

8. No land acquisition is associated with around 89% of the route as it passes through uninhabited, uncultivated, State-owned desert land.

9. Only in the cultivated area of Markaz Samallout, along the remaining 11% of the route, small pieces (of area around 20x20 m each) of the agricultural land will be occupied by TL towers' footings. For these footings, compensation for fair land acquisition and, if necessary crop compensation, will be applied.

Substations

10. At Samallout, 500/220/132/66/33 substation is located at the desert edge, west of the Nile river. This substation will be expanded to accommodate the new equipment associated with the construction and operation of the new transmission line. No land take or resettlement is associated with this site of Samallout substation.

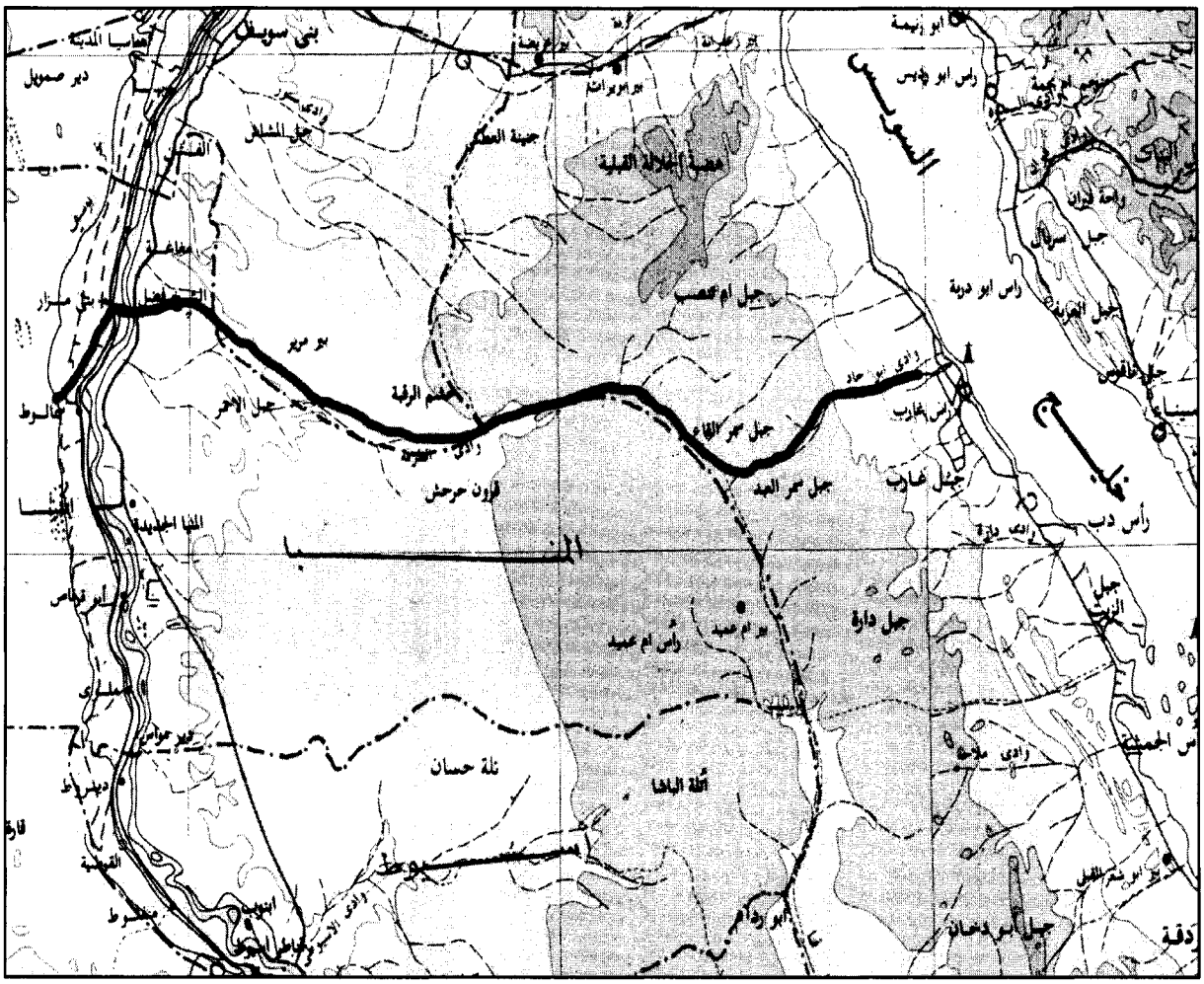
11. At Suez Gulf and Gabel El-Zait, substation areas are allocated to the project by local concerned authorities in the Red Sea Governorate according to a Contract signed by the EETC and the concerned authorities.

12. The land areas of substations are uninhabited, uncultivated desert lands. No land acquisition or resettlement is associated also with these pieces of land.

Access Roads

13. The main transport infrastructure linking the Samallout zone to the Suez Gulf / Gabal El-Zait area and also both of them to the country main ports facilities is principally based on road network. The site of end points (substations) and along the entire route of the transmission line is accessible through the major Regional Road from El-Sheikh Fadl to Ras Ghareb. This road directly passes in parallel to the route along its pathway from Samallout to Gabel El-Zait. Actually no major access roads are envisaged to be constructed particularly for the transmission line project and the end point structures associated to it.

Proposed Routing Pathway of
the Samallout / Suez Gulf / Gabel El-Zait Interconnection Project
500 kV Transmission Lines



14. **Local livelihoods**: Some individual Fellahs (Farmers) own the cultivated lands, where the transmission line will go through along its pathway routing in the Samallout area. Based upon experience from many similar transmission lines, particularly the main 500kV arterial transmission line: Aswan Dam S/ST-Cairo 500 S/ST, which passes the Samallout 500 kV S/ST and crosses the same cultivated lands, Fellahs at the Samallout area are quite familiar with such transmission line projects.

15. They are fully aware of the type of land acquisition as well as land and crop compensations associated with the construction of transmission line towers, with footings occupying around 20x20 m pieces of cultivable land.

16. Dialogues with many of the Fellahs in the Samallout area indicated that they fully recognize that the transmission line projects are "national projects", and they should support them for the welfare of the country, thus they accept that the lines may cross their lands.

17. Speaking to them about compensation rates and fees, they assured they are convinced that as long as there will be a fair application to the set rules, their rights for fair compensation are guaranteed.

18. Many of them expressed their hopes that compensation should take into consideration not only the loss of land, but the loss of crops as well.

Project Affected Persons

19. According to the Samallout / Gabal El-Zayt 500 kV Overhead Transmission Line (OHTL) primary route and the Line Details received from EETC, upto 70towers will be located on the Samallout agricultural area along 32.183km, represent a part of the total route. This means that a maximum of 50 Farmers would be affected. The effect will include occupation of small pieces of agricultural land (of areas around 20x20 m each) by the tower footings. The overall sum of the occupied areas along that part of the OHTL will not exceed 10,000 m^2, i.e. 2.38 Feddans. Market price of such an agricultural area will range between 750,000 and 2,380,000 Egyptian Pounds.

20. Crop compensation fee will also be identified by the concerned authority (Egyptian Public Authority for Drainage Projects, EPADP) (It should be mentioned that even though it is a public authority for drainage projects, EPADP is designated by the Egyptian Law to be responsible of crop compensation). EPADP has developed a well established system for providing affected farmers with crop compensations for land areas put out production.

Objective of the RPF Framework

21. The objectives of this framework correspond to those of the World Bank's policy on Involuntary Resettlement, namely:

- To avoid or minimize (whenever possible) involuntary resettlement and land acquisition through design efforts.

- If involuntary resettlement and land acquisition is unavoidable, to execute resettlement and compensation activities as sustainable development programs, whereby sufficient investment resources are provided to give the Project Affected Persons an opportunity to share in project benefits. Displaced and compensated persons shall be meaningfully consulted and given opportunities to participate in planning and implementation of Resettlement Action Plans (RAPs).

- To assist Project Affected Persons in their efforts to improve their livelihoods and standard of living or at least to restore them to pre-displacement levels, or to levels prevailing prior to the beginning of project implementation, whichever is higher.

RPF PREPARATION

22. The RPF preparation process has been implemented in consultation with various institutions involved in involuntary resettlement issues in Egypt (particularly concerned Ministries and EPADP), potentially affected persons and neighboring communities. Discussion with all parties included information about the Egyptian Laws, views on the application methods and timing of execution. All stakeholders have been informed about the translated Executive Summary of the RPF which can be accessed on the EETC web site.

LEGISLATIVE FRAMEWORK FOR RESETTLEMENT IN EGYPT

23. Property expropriation and compensation in Egypt is initiated and executed at central, local and, stakeholders levels. At the central level, the governmental agency in charge of the implementation of the expropriation acts issued for public interest is the Egyptian General Authority for Land Survey ("ESA"), except for projects handled by other entities pursuant to a law to be issued in this respect. As mentioned above, ESA is charged with the formation of the expropriation and compensation committees.

24. Usually the executing body will be the concerned Ministry or Governorate. Accordingly, the executing agency would be responsible for paying the compensation to affected groups through ESA or under its supervision, and implementing the resettlement project.

25. The Egyptian Constitution recognizes three main types of ownership. Article 29 of the 1971 Constitution provides that "Ownership shall be under the supervision of the people and the protection of the State. There are three kinds of ownership: public ownership, co-operative ownership and private ownership".

26. In accordance with Article 34 of the Constitution: "Private ownership shall be safeguarded and may not be placed under sequestration except in the cases defined by law and in accordance with a judicial decision. It may not be expropriated except for the general good and against a fair compensation as defined by law. The right of inheritance shall be guaranteed in it." According to this article, it is understood that procedures for private property expropriation are

considered to be exceptional. The competent jurisdiction shall be entitled to take cognizance of the lawsuits raised by individuals against the administration for appropriate compensations.

27. Within the framework of the Constitution, ***the Civil Code, in articles 802-805 concerning private property***, has recognized the private ownership right. Article 802 has stated that the owner, pursuant to the law, has the sole right of using and/or disposing his property. In Article 803, land ownership has been defined as land with all things above and below it and pursuant to the law, the property of the surface may be separated from the property of what is above or below it.

28. Then, Article 805 provides that "No one may be deprived of his property except in cases prescribed by law and this would take place with an equitable compensation."

29. Law No. 3, 1982 for Physical Planning, in its Sixth chapter concerning District Renewal (this also applies for slums' redevelopment or resettlement projects) has obliged the concerned local body entitled to renewal to first plan and prepare the proposed relocation sites where the occupants of the original area under renewal or redevelopment, would be resettled. The concerned local body should first prepare these relocation sites to be suitable for housing and proceeding different activities of the relocates prior to their transfer to the new site.

30. Article 40 of this law stated that it is not allowed to commence with the resettlement before at least one month from officially notifying the PAPs with their new destination. Any occupant, who would be subjected to the resettlement and receives a new housing unit, has the right to complain of its unsuitability within 15 days of receiving the notification to a specialized committee formulated by the concerned governor. The committee should reach its decision concerning the complaint within a maximum one month period. However, the right to complaint does not include the location of the new resettlement site, rather it is only limited to the unit itself.

31. Law 3/1982 allows compensation by: (i) taking the value of the property; or (ii) postponing the taking of such value in full or in part until all or part of the area in question is sold.

32. Article 47 of Law 3, 1982 authorized the concerned Governor to formulate compensation committee.

In addition:

- Law 3 of 1982: added to the foregoing list acts aiming at the establishment of green areas and public parking.
- Prime Ministerial Decree No. 160 of 1991 : added to the list the establishment of governmental educational buildings
- Prime Ministerial Decree No. 2166 of 1994: added fishery farms established by ministries, governmental departments, local government units, and public authorities.
- Law 557/54, which was later amended by Law 252/60 and Law 13/62, lays down the provisions pertaining to the expropriation of real estate property for public benefit and improvement.

- Law No. 27 of 1956, which stipulates the provisions for expropriation of districts for re-planning, upgrading, and improvement, and the amended and comprehensive Law No.10 of 1990 on the expropriation of real estate for public interest.

Expropriation of Ownership for Public Interest (Law 10/1990)

33. Although, the constitution prohibits the expropriation of private property except for public interest against compensation determined pursuant to the law, Law 10 of 1990 concerning the Expropriation of Ownership for Public Interest was issued to reflect this constitutional mandate. In addition, expropriation of property is further regulated by Law 59 of 1979 concerning the Establishment of New Urban Communities and Law 3 of 1982 concerning Urban Planning.

34. The term **"public interest"** in the context of expropriation has been defined in Article 2 of Law 10/1990. The Article specifies the acts that are considered for public interest.

35. The procedures taken to the transfer of ownership and compensation are administrative, with no judicial interference except in the assessment of the compensation amount.

36. Disputes over compensation assessment: These disputes are subject to legal jurisdiction as follows: The authority in charge of the expropriation procedures shall refer the disputes over the compensation assessment submitted to court. The court shall examine the complaint quickly and its judgment shall be conclusive.

37. The right of the public authority to expropriate needed real estate property also includes the right to temporarily occupy / take over this privately owned property. Law No. 577 of 1954, Law No. 27 of 1956, and the new Law No. 10 of 1990 pertaining to property expropriation, include provisions regarding temporarily occupying property.

Expropriation Procedures

38. According to the Law 10, 1990 the expropriation procedures involves (i) declaration of public interest pursuant to a Presidential Decree accompanied with a memorandum on the required project and a complete plan for the project and its buildings *(Law 59/1979 and Law 3/1982 provide that the Prime Minister issues the decree)* and, (ii) the decree and the accompanying memorandum must be published in the Official Gazette. A copy for the public is placed in the main offices of the concerned local government unit. Many operational steps should be followed based on these procedures.

Valuation and Compensation Methods

39. Determination of the valuation methods and compensation to be given to PAPs is made at two separate levels:

- The first is made by the Expropriating Entity in order to meet the requirement that the estimated compensation amount is deposited with ESA prior to proceeding with the remaining formalities as described in the preceding section.

- The second level is a review of that estimated compensation by the Compensation Estimation Committee within ESA.

Grievance & Redress Procedures

40. The current Egyptian laws and regulation[23] stated that the concerned owners and holders of rights have the right, within 30 days from the date of posting and publishing the lists and information of the expropriated properties, to object to the information contained in such lists. The objection is made to the main offices of the Expropriating Entity or the administration to which it is attached within the governorate in which the property is located. In order to limit the number of time consuming court cases, a project level grievance redress mechanism will be established. The EETC will address grievances as they arise during the land acquisition process. The EETC representative within the Compensation Committee will liaise with the EETC Chairman as well as with the EETC Legal department on a timely basis in an effort to solve problems amicably. It is important to ensure that the opinions of the concerned PAPs are given fair treatment and this process should be carefully documented. To further strengthen PAP participation, an informal committee where both project officials and PAPs are represented should be established to allow problems to be discussed before they reach the Compensation Committee

Crop Compensations in Egypt

41. The Egyptian Electricity Transmission Company (EETC) will use the same procedures for crop compensation developed for drainage projects if transmission lines pass on active agricultural land.

42. Egypt's agricultural drainage network is a vast one, with a long-standing history of implementing subsurface drainage projects. During the implementation of these systems on active agricultural lands, farmers are subject to losing crops on part of their land and thus losing income. Consequently, the concerned authority (Egyptian Public Authority for Drainage Projects, EPADP) has developed a well established system for providing affected farmers with crop compensations for land areas temporarily put out of production due to the execution of subsurface drainage systems.

43. The procedures for crop compensation are regulated by a series of Ministerial Decrees issued by the Minister of Water Resources and Irrigation. The most recent decree is no. 358 for the year 2008 and is dated 31 July 2008. This decree specifies the procedures to be followed for administering the process as well as the crop compensation unit rates on which the calculations are based (the decree includes a comprehensive list including numerous varieties of summer crops winter crops, vegetables, medical plants, decorative plants, palm trees, fruit trees, forestry and flowers).

[23] Hassouna & Abu Ali Law Firm, " Land Development Zones: Analysing Law No. 10/1990 for Expropriating Land for Public Welfare", Participatory Urban Management Programme Working Paper, GTZ and MOP, Cairo 2000.

World Bank Safeguard Policies

44. The WB's policy on involuntary resettlement and the compensation of Project Affected Persons is clearly spelled out under the Bank's operational safeguard policy (OP) # 4.12.

Resettlement Instruments

- Resettlement Action Plan
- Resettlement Policy Framework
- Process Framework

45. In projects triggering OP 4.12 the task team must decide which of the above three instruments are appropriate for the project in question, and the necessary documentation must be prepared by appraisal.

Policy Objective and Principles

46. The principle policy objectives of WB-OP 4.12 are:

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.
- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

Scope and Coverage of RPF

47. A Policy Framework covers direct economic and social impacts that both result from, and are caused by project:

(a) The involuntary taking of land resulting in: (i) relocation or loss of shelter, (ii) lost of assets or access to assets and, (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location.
(b) The involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.
(c) Project activities resulting in involuntary resettlement that in the judgment of the Bank, are (i) directly and significantly related to the project, (ii) necessary to achieve project objectives as set forth in the project documents and, (iii) carried out, or planned to be carried out, contemporaneously with the project.

Valuation of Assets

48. In compliance with paragraph 6 of the OP 4.12, a Resettlement Action Plan (RAP) or a resettlement policy framework should apply to impacts covered under paragraph 3 (a) of Bank's resettlement policy.

Implementation Procedures

49. Each eligible PAP will sign a compensation certificate together with the authorized project representative.

50. Compensation will be paid prior to the PAP vacating the land. Actual vacation will be monitored by project in cooperation with local authorities.

Grievance Redress Mechanisms

51. In such compensation and resettlement operations, it often appears that many grievances originates from misunderstandings of the Project policy, or result from neighbor conflicts, which can usually be solved through adequate mediation using customary rules. Most grievances can be settled with additional explanation efforts and some mediation. This is why a first instance of dispute handling will be set up with the aim of settling disputes amicably. It is important that the established grievance redress mechanism ensures that affected farmers are represented and that the opinions of the concerned PAPs are given fair treatment as discussed in paragraph 40 above. This process should be carefully documented.

Documentation and tracing

52. A template form for claims should be developed. It is advised that these forms be collated on a quarterly basis into a database held at project level.

Budget and Funding

53. Based on the preliminary quantitative estimate of affected assets and affected people presented, the budget for resettlement activities associated with the First Year should be prepared and a summary of implementation Plan presented.

Disclosure Requirements for Bank Resettlement Documents

54. The Bank insists on both the participation of PAPs and public disclosure of relevant resettlement documents. PAPs should be meaningfully consulted and should be given the opportunity to participate in both planning and implementation of resettlement programs.

Consultation & Implementation Process

55. Consultation on the RPF was held and will continue to be organized by the appropriate government agency through the project implementation. Information and consultation are proposed to be implemented in the course of the preparation of RAPs and ARPs.

Monitoring and Evaluation

56. Monitoring and Evaluation (M&E) are key components of the RPF/RAP. They have the following general objectives:

- Monitoring of specific situations or difficulties arising from the implementation, and of the compliance of the implementation with objectives and methods as set out in the RPF/RAP.

- Evaluation of the mid- and long-term impacts of the resettlement process on affected households' livelihood, environment, local capacities and economic development.

  Monitoring aims to track project implementation will address the following aspects:

  i) Social and economic monitoring.
  ii) Technical monitoring.
  iii) Grievances and grievance management system.
  iv) RPF progress reports will be included as part of overall project monitoring.

While ensuring the evaluation process, the project will utilize:

- This RPF as its guiding instrument,
- The Egyptian laws and regulations as described above in Section 2 and as they stand as of the approval of this RPF.
- The applicable World Bank Safeguard Policies as spelt out in OP 4.12 on Involuntary Resettlement.

57. Evaluation of resettlement activities will be part of general assessment and review activities undertaken for the Project as a whole.

Legal and Regulatory Gaps

58. Certain legal and regulatory gaps which will need to be addressed exist between the Egyptian law and Bank policy with regard to land acquisition and resettlement. These – which are spelt out in more detail in the Resettlement Policy Framework – include *among others* the right of squatters, how vulnerable groups should be treated in case of involuntary resettlement and the payment of full replacement costs to Project Affected Persons.

Brief summary of key RPF elements

- When planning project and resettlement strategies, the affected group should be informed about the displacement and participate in defining resettlement options from the earliest stage of the process, that is even before issuing the decree for public interest.

- A cut-off date should be clearly spelled out to assure the right of affected groups and yet avoid subsequent problems,
- Conduct a detailed economic study evaluating expected properties to be expropriated and this exercise should be carried out by a professional body (private or public) able to define the real-market value,
- Consider establishing a specialized unit within the management of the project to address grievances at the early stages of the project and the inception of the Resettlement Action Plan (RAP). The unit should include representation from local governmental executive bodies in addition to representatives from the local affected community,
- Undertake a socio-economic study focusing on the affordability of the probable impacts on assets and livelihoods of affected people with particular attention to vulnerable subsets,
- The process governing the implementation of Resettlement Action Plan (RAPs) should have full transparency and project affected people must have their voice heard and incorporated into the overall program via an established project unit,
- It is important to enlist high profile government officials as champions at an early stage of the process. Their role is vital in implementing and solving urgent conflict issues and this is crucial for building the trust within local communities to assure the project's success,
- Develop and implement a fair, quick and transparent grievance redress mechanism,
- Ensure the active involvement of traditional leaders within the local community is also a cornerstone for the success of the project,

Public Consultation and Participation

59. During preparation of the ESA and ESMP, based on detailed field work for the preferred route, baseline studies and consultations with Project affected people, local and national government agencies and other organizations, it is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures in the ESMP for the Project such that the overall benefits from the Project will greatly outweigh the adverse impacts.

60. The RPF was prepared in consultation with various institutions involved in involuntary resettlement issues in Egypt (particularly concerned Ministries and EPADP), potentially affected persons and neighboring communities. Discussion with all parties included information about the Egyptian Laws, views on the application methods and timing of execution. All stakeholders were informed about the translated Executive Summary of the RPF that would be accessed on the EETC web site on the due time.

EETC has disclosed the ESIA/ESMP and the RPF in Egypt on March 28, 2010. These reports are publicly available on the EEHC/ETC premises and on the EETC's website.

Annex 11: Project Preparation and Supervision

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

	Planned	Actual
PCN review	08/05/2009	08/05/2009
Initial PID to PIC		09/22/2009
Initial ISDS to PIC		03/04/2010
Appraisal	04/20/2010	04/20/2010
Negotiations		05/12/2010
Board/RVP approval	06/15/2010	
Planned date of effectiveness		
Planned date of mid-term review		
Planned closing date	12/31/2015	

Key institutions responsible for preparation of the project:

Egyptian Electricity Transmission Company

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Mr. Chandrasekar Govindarajalu	Senior Energy Specialist and TTL	MNSEG
Mr. Vladislav Vucetic	Lead Energy Specialist & Program Leader	MNSEG
Mr. Soren Krohn	Senior Energy Specialist	Consultant
Mr. Armando Araujo	Procurement Advisor	Consultant
Ms. Margaret Wilson	Energy Economist & Financial Analysis,	Consultant
Mr. Rome Chavapricha	Financial Management Specialist	MNSEG
Mr. Akram El-Shorbagi	Senior Environmental Specialist	MNAFM
Mr. Sanjay Srivastava	Regional Safeguards Advisor	SARDE
Mr. Knut Opsal	Senior Social Development Specialist	MNSSO
Mr. Waleed Al Suraih	Energy Specialist	MNSEG
Mr. Mohab Hallouda	Senior Energy Specialist	MNSEG
Mr. T. Mpoy-Kamulayi	Lead Counsel	LEGEM
Mr. John Irving	Power Engineer	Consultant
Mr. Luis Prada	Senior Procurement Spec	MNAPR
Mr. Ferhat Esen	Young Professional	MNSSD
Ms. Fowzia Hassan	Operations Analyst	MNSEG
Ms. Sydnella Kpundeh	Program Assistant	MNSSD
Ms. Laila Kotb	Team Assistant	MNC03

Bank funds expended to date on project preparation:

I. Bank resources:	$400,925
II. Trust funds:	$0
III. Total:	$400,925

Estimated Approval and Supervision costs:

1. Remaining costs to approval: $15,000
2. Estimated annual supervision cost: $80,000

Annex 12: Documents in the Project File

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

a. CESI-Tractabel – Study for the Development of Egypt Transmission Network Master Plan 2008-2030 (for EEPT August 2009 Executive Summary plus 42 Adobe files 60MB)

b. **Decon-Fichtner - Feasibility of a Large Wind Farm at Gulf of El Zayt** (for NREA Sept 2008 Executive Summary, Annexes III and IV 3 files 20MB)

c. EETC Draft Feasibility Study (electronic form)

d. Egypt: Clean Technology Fund Investment Plan (2009)

e. Wind Energy Development Plan for Egypt (2008)

Annex 13: Clean Technology Fund (CTF)

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Introduction

1. Egypt ranks among the 11 countries in the world showing fastest growing GHG emission. The analysis undertaken as part of the National Strategy Studies (NSS) in 2002 indicates that by 2017 emissions could reach more than three times the 1990 levels. The overall energy sector (including transport) is expected to remain by far the largest source, with the growth rate of 4.9%. The actual growth of emissions, based on IEA/OECD database, has been slower compared to the NSS projections (in large part due to a lower GDP growth) but still shows well over 30% increase from the 1990 levels.

2. The growth of the GHG emissions in Egypt is primarily linked to the strong economic growth and associated increases in energy demand, especially through higher demand for electricity and transport services. Electricity demand is growing at 7-8% per year, which implies adding about 1,500-2000 MW per year over the next several years (current installed capacity is close to 22,000 MW). The increase in energy demand has been met primarily by increased use of fossil fuels (Figure 1), leading to the high carbon intensity of the economy.

Figure 1: Share of Fossil Fuels in Total Primary Energy Consum ıtion

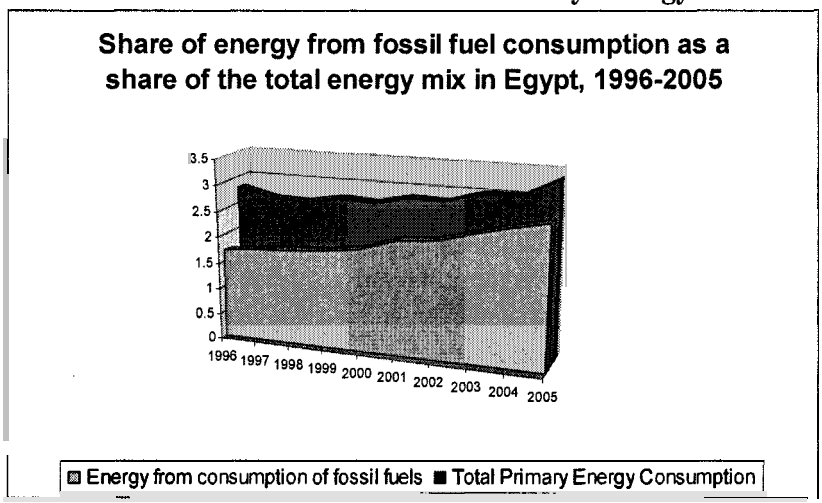
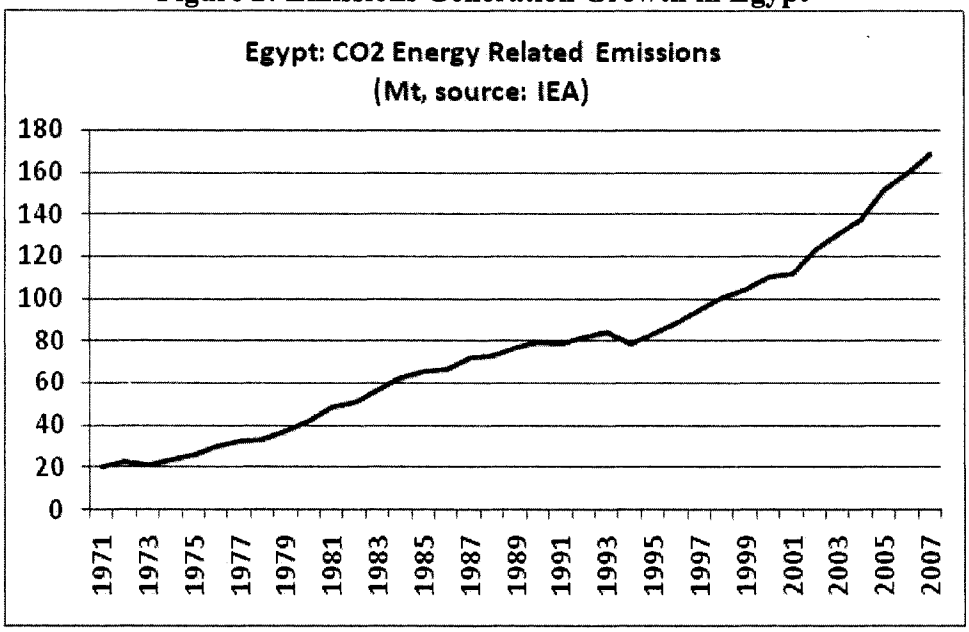


Figure 2: Emissions Generation Growth in Egypt



3. As a result, the CO_2 emissions from energy uses have increased by over 7 % per year since 2000, reaching about 168 Mt in 2007 (see figure above). In view of the characteristics of GHG emissions, the main priorities for achieving GHG reductions lie in the *electricity and transport* sectors which, combined, contribute to over 70 percent of the GHG emission in Egypt. Assessments of a range of 31 mitigation options were considered as part of the National Strategy Study in 2002 and the following priority areas were identified

   a. Co-generation in textile, chemicals, food and beverage, metals, buildings, and hotel sectors;
   b. Energy efficiency in textile, chemicals, food and beverage, metals, buildings, and hotel sectors;
   c. Fuel switching to natural gas in industry and transportation;
   d. Wind energy development;
   e. Organic waste management and municipal solid waste methane utilization;
   f. Aforestation projects;
   g. Concentrating Solar Power options such as integrated solar-fossil fuel combined cycle power station and solar pumps;
   h. Extension and electrification of railways and underground lines; and
   i. Support mass transit system for transport modal shift and extension of waterways transportation infrastructure.

4. In the electricity sector, the Government recognizes that the power system in Egypt needs to grow in tandem with the economy with the early lower cost transmission investments providing an important enabling function for competitive investments in generation. Even with somewhat lower electricity consumption growth rate in comparison with the GDP growth -- to

allow for energy efficiency improvement -- the needs for new investments in the power generation, transmission, and distribution are very significant. The MoEE, with endorsement of the Cabinet, adopted the following strategy: (i) increased use of efficient fossil-fuel generation technologies (CCGT and supercritical steam boilers); (ii) large scale development of Egypt's renewable resources with the goal of having 20% of its installed generation capacity in the form of renewable by 2020 (including the existing hydropower); and (iii) stepping up efforts for more efficient consumption of electricity. Of the 20% of generation targeted for renewable resources, approximately 12% or 7,200 MW is intended to be provided by wind resources.

Proposed Transformation

5. The project will help scale-up wind energy generation from the existing approximately 460 MW to over 3,000 MW as part of achieving Egypt's 7,200 MW target for wind energy (12% of installed generation capacity) by 2020.

6. In particular, this project enables the deployment of wind power at transformational scale in the Gulf of Suez and Gab El-Zait by providing critical transmission infrastructure necessary for private sector investments in generation. Without this project, wind power development in this region will be dependent largely on donor financed public sector projects and sub-optimal transmission infrastructure – lack of transmission infrastructure has constrained wind power development all over the world, including in large markets like the U.S.

7. Upfront transmission investments of about US$ 350 million, including US$ 150 million from the CTF, comprise a small percentage (~ 2.75%) of total investments of about US$ 5.5 billion in new wind power infrastructure with an installed capacity of 2,500 MW commissioned in the area.

8. In order to accelerate the wind program to be able to achieve the ambitious target, the Government is pursuing a wind commercialization program that will focus on engaging the private sector. The different public and private business models being pursued and planned for wind scale-up are discussed in Annex 4 (Detailed Project Description). These include private Build, Own, Operate, (BOO)[24] projects, feed-in-tariffs for small projects, public projects, autogeneration and joint ventures. One of the key models is the competitive bidding approach where the EETC will issue tenders requesting supply of power from large scale renewable energy resources for specific pre-determined sites on a Build, Own, Operate (BOO) basis. It is expected that the competitive bidding approach will result in additional capacity of about 2,500 MW of private sector capacity. The programme targets to achieve competitive electricity tariffs through an international tender and stimulate private investment from international and local investors into Egypt's power sector. Transmission infrastructure to evacuate the additional capacity is an essential prerequisite to private sector participation in the wind commercialization program.

[24] Includes transmission and generation costs

Potential for GHG Emissions Savings

9. *Emission reduction potential of investment*: The current approach for developing wind resources relies largely on donor financed public projects implemented by the New and Renewable Energy Agency (NREA). Absent any further development of wind resources, GHG emissions from power generation are expected to increase from an estimated 63 million tons/yr in 2007 to an estimated 282 million tons by 2020 – an increase of 219 million tons. Based on a grid emission factor of 0.55 that was utilized for the registered CDM project in Zafarana and an estimated capacity factor of 0.5, the annual emission reductions for the 2,500 MW of new wind capacity additions would be approximately 7 million tons of CO_2.

10. *Technology development:* Currently the majority of wind turbines in Egypt at Zafarana are Gamesa 850 kW turbines in addition to Vestas 660 kW and Nordex 600 kW turbines. All these turbines are very reliable and proven designs. It is expected that the current state of the art wind turbine technology of the 2 to 2.5 MW class will become a standard also for Egypt with this program. These turbines have a track record of several thousands of turbines and a number of manufacturers have already gained experience with high temperature versions which are able to operate at conditions up to 45°C ambient temperature. These turbines have a rotor diameter of 80 to 93 m for the high wind versions which are approved for IEC Class 1. As the wind conditions exceed IEC Class 1 for the average wind speeds but without gusts, the manufacturers have to apply for a special type certification for these projects. Currently most of the suppliers also offer low wind versions with rotor diameters extended by up to 10 m in the range of 90 to 100 m. The hub height may be 80 m or 100 m for the Nile region. New developments in the 3 – 3.6 MW class, which will be ready for serial production by 2010 have rotor diameters of 107 – 116 m with respective hub heights up to 100 – 140 m.

Cost-effectiveness

11. The projected emissions savings of 7 million tons of CO_2 would translate to a cost estimate of about $21.40 of CTF investment per ton of CO_2. This abatement costs compare well with the global marginal abatement costs curve estimates for wind technology which is in the same range (Mckinsey:Enkvist, Naucler, Rosander, 2007).

12. As wind power development gains momentum in Egypt, it is expected that there will be more local manufacturing of components that will help bring down costs. Starting from the first wind projects, Egypt has already had a history of encouraging local production of wind turbine components. Electrical components (cables, transformers) and wind turbine towers have been mostly produced by local companies, at significant cost savings relative to imported materials. As local markets for turbines and components grow, it is expected that local manufacture will increase to take advantage of lower labour and transportation costs. As early adopters of wind technology in the region, Egyptian manufacturers are likely to enjoy a competitive advantage in regional markets, which will allow them to further reduce costs through economies of scale.

Demonstration Potential at Scale

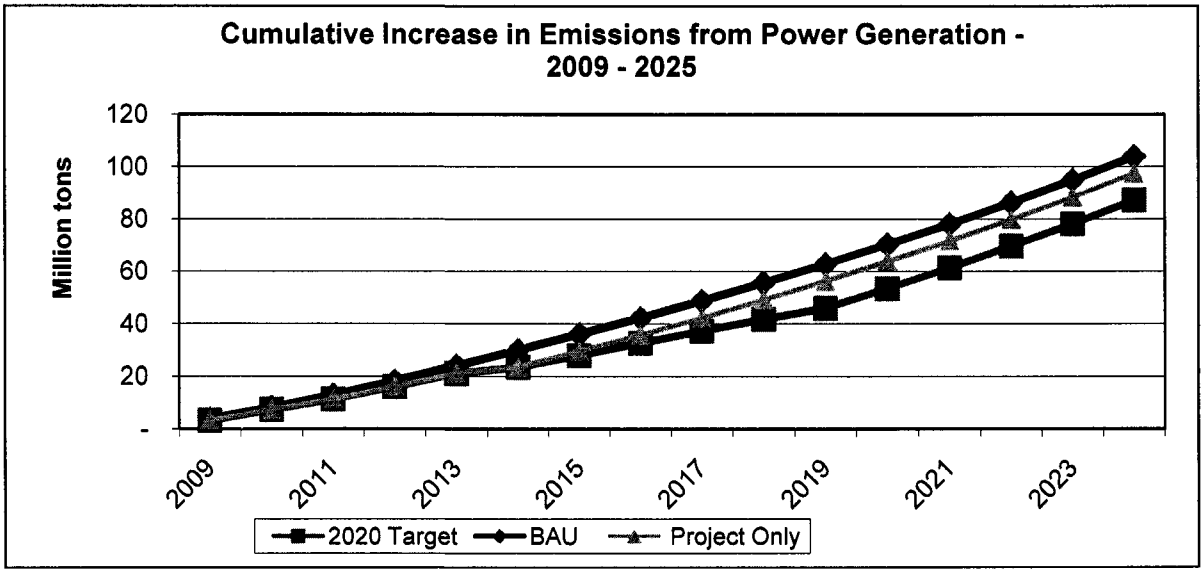
13. Para 10 above discussed the impact of the project on GHG emissions and also the impact of the government's current program for wind energy development (via installation of 7,200 MW

of wind capacity by 2020). This, however, is only a fraction of the wind potential within Egypt and within the region as a whole. The wind atlas for Egypt, which was completed in 2005, shows that most of the land area adjacent to the Suez Gulf as well as large areas east and west of the Upper Nile, an area near Kharga in South-Eastern Egypt and parts of the Sinai have average annual wind speeds in excess of 7 m/s. The wind potential of the Suez Gulf region alone has been estimated at 20,000 MW. All of these areas are lightly populated, which increases their attractiveness as sites for further development of wind generation. If the costs of wind generation fall, and the private sector proves willing to play a significant role in supplying power to Egypt, wind energy could become an economically as well as an environmentally attractive alternative to gas generation, and could ultimately exceed the 12% share of total generation targeted for 2020.

14. The CTF-funded project supports development of the first large scale private sector competitively bid project for renewable energy in Egypt. With 2,500 MW of planned installed capacity, and an estimated investment cost of $5 billion, the wind commercialization program has already attracted the attention of international developers and fostered an interest in the development of local capacity in manufacturing and support services. It is also of a sufficient scale to justify necessary adaptation of equipment designs in order to achieve optimum performance under Egyptian conditions.

15. The CTF supported investments would under-pin development of a further 2,500 MW of new wind capacity in the Egyptian power system which would result in additional annual emission reductions of about 7.0 million tons of CO_2. Assuming that the government's target of 12% of total generation being supplied by wind resources is realized by 2020, it is expected that over 7,200 MW of wind capacity will be installed and over 17 million tons of CO_2 emissions will be avoided annually. Figure 2 below shows the cumulative increase in carbon emissions associated with the growth in electricity generation from 2009 to 2025 under three scenarios – business as usual which is limited to minimal wind generation, project-related wind generation (2,500 MW by 2015) and wind generation at the government target level (7,200 MW by 2020).

Figure 2: Impact of Large Scale Wind Development on Emissions



16. Through implementation of the project, the government will gain experience in negotiating and contracting with private sector generation companies, while private companies will have an opportunity to observe the relative ease or difficulty of doing business with the Egyptian government. This learning experience will help both parties to adjust their negotiating positions and facilitate the completion of future contracts. The Egyptian experience, being the most extensive in the region, will also be applicable for many of the other MENA countries and several countries such as Jordan, Syria and Yemen are already beginning to look closely at the BOO approach to wind development. In all these respects, the project has the potential to be transformational to the development of wind resources in the region and the consequent reduction in GHG emissions associated with power generation.

17. The project has several elements that will support replication as well as further development of other renewable resources: (a) The experience in preparation of bid documents, development of grid code, and legal agreements will all be helpful for future renewable energy projects, including solar projects: (b) The joint wind resource measurement program will provide valuable experience for future wind projects, and, (c) The policies being introduced by the GoE in the course of development of the first BOO project such as land use, customs duties, bank guarantees, foreign exchange denominated PPAs, and permitting are likely to help future development, including development of solar projects.

Development Impact

18. The development of wind energy would have significant benefits in terms of the quality and reliability of power supply to local consumers, which is a high development priority for the Government of Egypt. Tapping into the wind resources would help to reduce the carbon intensity of power generation (wind investments related to the project itself would reduce CO_2 emissions by almost 7 million tons per year). In terms of reliability, further diversification of generation sources would reduce vulnerabilities associated with any power system which has a

large hydro component and is hence subject to the short and long term variations in hydrology. Diversity will also strengthen the resilience of the power sector to future shocks such as peaks in fuel costs, interruptions in fuel supply, or impacts of climate variability on hydro power.

19. While the project itself is intended primarily to evacuate wind power from the Suez Gulf region, over the longer term it is expected to be an integral component of a least-cost transmission expansion plan for Egypt. At present, the HV transmission network, as well as most of the power generation plants, is concentrated in a north-south corridor parallel to the Nile River. While this is a suitable arrangement for the existing combination of generation facilities and load centers, it limits the flexibility of the network in terms of serving future export markets such as Saudi Arabia and Jordan. It also increases the risk that a single major incident could interrupt power supply to a large part of the country. The new line between the Nile and the Suez Gulf which is being funded by the current project could easily be looped along the Suez coast and linked to an east-west line from Cairo and/or routed under the Suez Gulf to provide a direct link to export markets and an alternate link between upstream hydro resources and the major load centers around Cairo.

20. With respect to environmental co-benefits, the wind generation supported by the project is expected to replace gas fired single-cycle and CCGT plants which have typically been located close to load centers. While gas fired plants are typically free of toxic and particulate emissions, the presence of large scale gas combustion plants and the routing of major gas pipelines close to urban centers presents an undesirable risk to local population.

21. Large scale wind power development would support Egypt in building up industrial infrastructure for future development. The government also wishes to ensure local manufacturing capacity to be strengthened as part of the wind commercialization program. The development of the wind sub-sector in Egypt would further strengthen Egypt's role as a leader in renewable energy development in the region and could help it become regional supplier for the wind industry. Due to the current international market situation manufacturers have other even better and more attractive markets which require local production. They can only be convinced to establish local production facilities in Egypt if they can expect a continuous market share in the medium to long-term. The much needed customization of the equipment for achieving optimum performance under Egyptian conditions would also be possible only through a large program. Any decision by manufacturers to establish local production facilities is made in relation to the size of the local market which means Egypt has to compete with other regional markets which have already proven their stability.

Implementation Potential

Public policies and institutions:

22. The GoE is strongly committed to the wind energy development program, both to reduce dependence on natural gas as a source of power generation and to provide a cleaner and healthier environment for the population. Since 1986, the New and Renewable Energy Agency (NREA), which was established under the Ministry of Electricity and Energy, has worked with lenders and donors to introduce and develop renewable energy technologies in Egypt on a commercial scale and to deepen the local capabilities to use, produce and develop its equipment in different

applied fields. To date NREA has been responsible for the development of approximately 460 MW of wind power plants, and are continuing to actively pursue opportunities for additional projects to be developed with a combination of public and donor funding. The GoE also established a "Petroleum Fund" that provides economic incentives to producers of non-fossil fuel based energy although the incentive of 2 Pt/kWh is insufficient to mobilize significant investment.

23. More recently, the Supreme Energy Council established the 20% renewable energy target for 2020 which is expected to be met largely by scaling-up of wind and solar energy as the hydro potential is largely utilized. The council has also approved key policy steps related to wind power scale-up in the country. These include: (a) Approval of the need to cover additional costs for renewable energy projects through tariffs; (b) Finalization of the land use policy for wind power developers; (c) Approval of zero customs duty on wind equipment (d) Acceptance of foreign currency denominated PPAs and confirmation of central bank guarantees for all BOO projects and (e) Permitting support for developers with respect to environmental, social and defense clearances. These provisions are also included in the draft Electricity Law; however, pending adoption of the Law by Parliament, they are being implemented through regulations issued by the Supreme Energy Council.

24. With respect to implementation arrangements, the construction of the transmission line will be implemented by the state-owned grid operating company, EETC. As the single buyer of power in the Egyptian system, it will also contract with private developers for the purchase of power from new wind generation plants. The program for development of a pipeline of wind generation projects is being led by a cross-departmental Steering Committee under the Ministry of Electricity which is comprised of top officials and experts from the EEHC, EETC, NREA, the Energy Regulator, and the Ministry of Electricity. A Wind Tender Steering Committee oversees the work of the Gulf of Suez Wind Project task force of the EETC with technical assistance from NREA. Staff and consultants with extensive experience from the previous three thermal BOO projects are also working on this task force.

25. Policies and institutional arrangements ensure that development of renewable energy resources and the associated reduction in GHG emissions is a central focus of all power sector institutions and is supported by extensive technical and administrative expertise. This will facilitate technology transfer within the country, while Egypt's growing reputation as a center for renewable energy development will facilitate transfers within the broader region. Sustainability, however, will require continued focus on sector finances. In the short term, it is extremely unlikely that wind energy will be financially viable when compared with the cost of gas-fired generation. The marginal electricity production cost in Egypt is about US cents 3.75/kWh (based on a gas price of $3/mmbtu), whereas the cost of wind power cost is estimated to be in the range of 7-11 US cents/kWh, depending on site conditions. Over time it is likely that the gap between gas fired and wind generation will narrow as tariffs increase. In view of the fact that wind resources in Egypt are of unusually high quality, long-term costs are likely to be highly competitive. In the interim, support from concessionary financing sources to develop the transmission infrastructure and thereby offset some of the cost and risk premiums associated with private development of wind generation, is critical to support the scale-up effort.

26. Much of the new generation will be privately financed and operated which removes it from one level of dependence on the budget. A second level of budget dependence, government subsidies to cover the differential between the cost of wind power and the retail power tariff, is being addressed as part of the ongoing tariff reform in the medium term whereby the government has committed itself to an average annual increase in electricity tariffs of about 7.5%. These increases will ultimately cover the increased share of (relatively) higher cost wind energy in the generation mix.[25] In the interim, the Supreme Council on Energy has announced that additional costs linked to renewable energy will be covered either by direct Government transfers to the EETC or through a Renewable Energy Fund (REF), to be created under the new Electricity law. As discussed in a previous section, the GoE is also undertaking efforts in the area of energy efficiency that will help the transition to cost-reflective pricing (by keeping consumer electricity expenditures close to existing levels).

27. In addition, the World Bank is engaged with the government to enhance the overall sector policy framework and advance reforms aimed at improving sector commercial environment and financial sustainability. The government recognizes that EEHC operates under tight financial constraints and has demonstrated its willingness to gradually increase tariffs toward cost covering levels and provide budget and other support in the meantime. Measures to improve the sector's financial performance are discussed in detail under Section IV Appraisal Summary.

Leverage: In this project alone CTF financing of US$ 150 million is leveraging in addition to financing of US$ 70 million from IBRD loan, US$ 70 million from EIB, kfW, NIF, AfD loan an Government financing of about US$ 54 million for the transmission infrastructure. ; (b) approximately US$ 450 million in private sector financing for the first 250 MW BOO project; and (c) over the project life, a total of US$5 billion in wind investments for another about 2250 MW (public and private).

Additional Costs/Risk Premium

28. The project provides upfront financing for transmission infrastructure and mitigates the power evacuation risk faced by project developers. Although transmission infrastructure comprises a small percentage (2.3%) of the overall financing needs of a transformative wind program, it allows project developers to make considered long-term decisions as this critical infrastructure is often not available for wind projects.

29. The development of the wind resource in Egypt carries both a cost premium and a risk premium in terms of the delivered price of electricity, especially when compared to the cost of public-sector fossil fuel plants located closer to load centers. The wind resource is remote from the main grid, necessitating substantial investments in transmission infrastructure, while the lack of a successful track record in terms of tendering for privately developed wind generation raises the likelihood that tariffs for wind power will contain a significant risk premium.

[25] The tariff increase was not implemented in 2009 due to the economic crisis. However, until the wind energy scale-up is completed, wind power will represent only a small part of generation and hence will have little impact on the weighted average cost of supply.

30. This risk premium will have an adverse impact on the project economic returns, making it difficult for the GOE to achieve an EIRR that matches or exceeds its opportunity cost of capital (generally 10% for government investments. Table 2 below summarizes the highlights of the economic analysis. The first column shows the EIRR and NPV of the project including only the WTP benefits of increased power supply. The subsequent columns show the project returns at different assumed levels of carbon prices. Net Present Value is shown at the standard discount rates of 10% and also at a reduced opportunity cost of capital of 5.7% which reflects the inclusion of $150 million of CTF funding. Table 2 also shows the project's benefit-cost (BC) ratios based on discount rates of 10% and the CTF weighted OCC. BC ratios are not generally used as a criterion for economic viability in Egypt; however, they are often applied for public and public/private sector projects elsewhere (e.g., the Mid-west ISO in the U.S uses a 1.25 BC ratio for transmission projects)

Table 2 - Highlights of Economic Analysis

Carbon Price	0		$5		$13		$20		$30		$50	
E	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4
EIRR (%)	9.2	2.6	9.9	3.3	11.2	4.4	12.5	5.5	14.6	7.3	21.1	11.9
NPV at 10% (without CTF)	(279)	(2,199)	(22)	(1,942)	389	(1,531)	748	(1,171)	1,262	(658)	2,289	370
NPV at OCC (CTF case)	2,764	(1,987)	3,233	(1,518)	3,983	(767)	4,640	(110)	5,579	828	7,455	2,704
BC at 10% (without CTF)	0.97	0.72	1.00	0.76	1.05	0.81	1.09	0.85	1.16	0.92	1.29	1.05
BC at OCC (CTF case)	1.20	0.86	1.23	0.89	1.29	0.94	1.33	0.99	1.40	1.06	1.54	1.19

31. If the economic analysis of the project only compares the energy benefits with the incremental capital and operating costs, the EIRR of the project falls short of the 10% opportunity cost of capital generally applied to government investments in Egypt. The value of GHG emission reductions (at current CDM prices) raises the EIRR to 11.2%, comfortably above the threshold required for viability. However, this is only under base case assumptions for the analysis. The sensitivity analysis found that, while the EIRR findings were robust under a range of assumptions regarding lower demand growth and higher capital cost, they were quite sensitive to the assumed price elasticity of electricity demand, which in itself is a highly uncertain variable. Increasing price elasticity from the base case assumption of -0.30 to -0.40 reduced the EIRR of the project (excluding GHG benefits) by almost 7 percentage points from 9.2% to 2.6%. In this scenario, the project only became viable when the assumed value of avoided CO_2 emission approached $50 per ton.

32. The analysis demonstrates that the investment faces risks to its viability as a result of potential changes in the price of carbon and price elasticity of demand. The break-even NPV, without CTF financing, will require a carbon price between $5 and 13 per ton, if price elasticity is -0.30; however, the carbon price would have to be more than $30 per ton for the NPV to be positive if price elasticity is -0.40. Therefore, the CTF concessional loan plays a critical role in mitigating risks of reduced carbon prices and increased price elasticity of demand, by lowering the opportunity cost of capital and thereby improving prospects of attaining economic viability of the investment(i.e. where EIRR met or exceeded this rate and NPV breaks even).

33. The question of project financial rate of return (FIRR) was an important issue in the project appraisal as it provided a basis for determining whether the proposed CTF financing was

both necessary and sufficient to ensure the project's financial viability. The assessment was complicated, however, by the fact that the finances of the implementing agency, EETC, reflect only part of the true cost of the services provided. The GoE, through a system of non-cash subsidies, actually bears a large part of the cost of supply, including a significant proportion of the costs of power generation. EETC is assured a positive margin on the purchase-resale of electricity, and is insulated from increases in the average cost of generation. To assess the financial impacts of the project solely from the perspective of EETC would fail to capture the effect that the relatively high purchase price of wind energy will have on the weighted average cost of supply. In order to capture all of the financial impacts of the project, it was decided to examine the project's financial returns from the perspective of the GOE which is not only the primary borrower and ultimate owner of the consolidated sector but also the entity which will, either directly or indirectly, receive the incremental revenues and bear the full burden of incremental costs.

34. The financial analysis used the same assumptions as the EIRR analysis with respect incremental power and the system average costs of transmission and distribution. Rather than using customer willingness to pay to measure benefits, however, the financial analysis used the incremental revenue from retail sales of the power. Since Egypt is in the process of adjusting its retail selling tariffs, average tariffs were assumed to increase at an annual rate of 2.5 percent in real terms (i.e. in addition to inflation), a rate which is consistent with, albeit slightly higher than recent and proposed tariff adjustments.

35. The financial NPV of the project was calculated at two discount rates – one representing the real Weighted Average Cost of Capital (WACC) associated with the proposed project financing plan, and a second which assumed that the CTF financing was replaced with additional funds from IBRD[26]. In both cases, nominal borrowing rates were converted to real rates assuming a long term international inflation rate of 1.5 percent. As with the EIRR, the financial analysis also looked at different values for carbon credits associated with the project. The table below summarizes the results. CTF funding is included in WACC-1, but excluded in WACC-2.

Carbon Price	$0	$5	$13	$20	$30	$50
FIRR	-1.2%	-0.4%	0.9%	2.0%	3.8%	8.0%
NPV@WACC-1 (without CTF)	($3,013)	($1,789)	$169	$1,883	$4,330	$9,226
NPV@WACC-2 (CTF case)	($3,868)	($3,044)	($1,725)	($571)	$1,078	$4,375

36. The table shows that with CTF funding at the proposed level of US$150 million (WACC-1), the project is financially viable from the GOE perspective as long as the value of carbon credits approaches or exceeds $13/t. Without the CTF funding (WACC-2), the project only becomes financially viable when the carbon price exceeds $20/t. If there are no carbon credits, or if their value falls below $13/t, the proposed level of CTF financing is insufficient to make the project financially viable from the perspective of the GOE. The above analysis is subject to a number of uncertainties. It does, however, indicate that under a reasonable set of assumptions, the proposed CTF financing increases the likelihood that the project will yield a positive financial return to the GOE.

[26] The financial cost of GoE financing was assumed to be 6.95 percent, which is the yield on a recent issue of GoE 30 year dollar bonds.

Annex 14: International Energy Agency Comments and Responses (Quality Enhancement Review Stage)

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Q. Environmental impacts of the wind farm development itself should be outlined in more detail, as the transmission system is essential to wind power development.

A. All wind farm development at the Gulf of Suez is located in a coastal desert, in which the neighboring areas are currently being used for oil exploration. The environmental impacts of all wind farms are being analyzed jointly in an EIA financed by the KfW. The scope of this EIA includes ornithological studies and covers an area of 200 Sq km or roughly 1000 MW of installed capacity

Q. What about reinforcement of the existing transmission lines in the Nile Valley? Is it sufficient already to accommodate 3000 MW of new capacity?

A. The proposals are based on the findings of a 2009 Master Plan of the entire 500/220/66kV transmission system taking into account planned wind, thermal and nuclear powered expansion projects to the year 2030. The proposed 500kV OHTL will interconnect the wind farms in Gulf of Suez &Elzait to the main national grid through Samallout. This project is part of a very comprehensive transmission networks expansion plan with investment costs of over $ 1 billion until 2015.

The proposals are based on the findings of a 2009 study by Tractabel of the entire 500/220/66kV transmission system taking into account planned wind, thermal and nuclear powered expansion projects to the year 2030. The Samallout substation, where the 500kV transmission line will be connected to evacuate most of the wind generation capacity is part of the backbone for the 500kV Egyptian power system.

The East and West Nile area which are estimated to generate 7350MW of wind power development until 2030 but are not the subject of this project.

Q. What is the risk that the wind regime has been overestimated, especially since a comprehensive multi-year wind monitoring program at the site is still underway?

A. The Gulf of Suez area is covered by two modern state of the art wind atlases prepared by Riso National Laboratory on the basis of satellite data plus some 13 years of ground-based wind measurements in the area. There is a nearby wind mast at Ras Ghareb erected by Riso with some ten years of reference wind measurements, plus additional shorter data series from other masts on adjacent wind farm sites (for the KfW, Italgen projects), which can be used for verification of the planned 12-month wind measurement program on the site for the 250 MW IPP/BOO project. The specific characteristics of the local wind climate between the sea and the coastal mountain range are well known from Zafarana. The uncertainty of the wind measurements for the IPP/BOO project will be quantified under the joint measurement campaign.

Q. Is the seasonal and diurnal variability well known enough to include the effect of the wind power additions on the power development plan, including the need for peaking vs. base load capacity? Does the wind have any capacity value or only energy?

A. The seasonal and diurnal wind patterns are known from more than ten years of wind measurements with more than a dozen meteorology masts in the area (cf. the previous answer), plus a multi-annual analysis of this issue done for NREA at the Zafarana wind farms by a Danish consultant team, including EMD. According to 2008 study on the El Zait wind resources there is very little variability in wind speed. Consequently the Load factors of the wind farms along the Gulf of Suez are expected to be quite high possibly in excess of 60%. This implies the available capacity of the farms is fairly dependable - particularly during peak periods. It is likely that these farms can contribute a reasonable proportion of their capacity to the overall capacity planning. More information will be available after the completion of the joint measurement campaign.

Q. Under Technical Issues, suggest including a brief discussion of any system stability impacts for the Egyptian grid as a result of adding over 3000 MW of intermittent wind power. Wind power will grow from less than 1% to more than 10% of installed capacity on the Egyptian grid. Will addition of so much wind power require additional operating reserves or peaking power plants? If so, have these extra costs been included in the economic analysis?

The answer is at least partly addressed by a study on variable power generation sources:

"IEA analysis suggests that penetration of 10 to 20% wind energy in power systems is quite feasible without recourse to dedicated back-up. Existing margins, assuming the generation portfolio is flexible enough can be expected to be sufficient for balancing. However, most system models, and likewise most real world experience with intermittent renewables, are within the OECD area, where power systems are likely to be better configured, better understood and may be better operated than in less developed countries."

A. Studies by Fichtner of power system behavior taking into account 3000MW in EL Zait region indicate there are no significant power system stability problems although more work will need to be done to study the impact of further wind capacity being added to the grid along the Nile. The Egyptian power system is well endowed with thermal peaking capacity strategically located near major load centers and due to the high capacity factors of wind generation in Elzait, it is unlikely that additional thermal capacity will be needed to counter the fairly low variability of wind resources. The project design has been modified to include technical assistance for appropriate integration of wind resources in the Egyptian power system.

Q. The PAD identifies certain institutional arrangements for successful commercial development of wind power via IPPs. They include: (a) Approval by the supreme energy council of the need to cover additional costs for renewable energy projects through tariffs; (b) Finalization of the land use policy for wind power developers; (c) Approval of zero customs duty on wind equipment (d) Acceptance of foreign currency denominated PPAs and confirmation of central bank guarantees for all BOO projects and (e) Permitting support for developers with respect to environmental, social and defense clearances. What are the risks that these institutional

arrangements may be delayed or not introduced at all? What is being done to reduce this risk other than ongoing sector dialogue?

A. These arrangements are already being implemented so the risk of delay of their completion is modest. The environmental assessment for a 200 Sq m area (roughly 1000 MW) is already underway with support from the kfW.

Q. The highly-concessional CTF does not seem to be leveraging very much other lending. I understood a target of 4:1 minimum was the goal, with some CTF projects leveraging even more. Does the co-financing involvement of EIB, KfW, and AfD contribute to greater leveraging? If so this might be described; otherwise, it seems the leveraging is not even 2:1.

A. The co-financing from private sector and other donors has been described suitably and the CTF resources leverage 5:1 at the project level. At the program level, CTF resources of US$ 150 million enable total investments of US$ 5.5 billion considering investments for the additional 2500 MW of capacity and the transmission infrastructure.

Q. Economic analysis is very unappealing. 8.5 cents/kWh net of carbon benefits is quite high, especially with average industrial rates at the 5-6 cents/kWh level. What will be the effect of the project on overall subsidies to the electric power sector? Is this additional fiscal drain included in the economic analysis?

A. Economic and financial analyses has been updated since the receipt of these comments and are available in the appraisal summary as well as the CTF Annex.

Q. Economic analysis includes carbon benefits. How will these be realized? What is the effect of the recent volatility in carbon prices on the economic analysis?

A. According to the pre-qualification document for the BOO/IPP wind farm carbon credit arrangements will be managed by the Government of Egypt. Ultimately this may be part of the contract negotiations, but the value of the benefits would serve either to reduce the tariff to EETC or to reduce the net fiscal impact of the project. The economic analysis includes sensitivity analysis based on different carbon prices given the market uncertainties.

Q. Considering that the wind power resources are being added to accommodate a 7-8% demand growth, was the alternative of energy efficiency focused on reducing demand growth considered as an alternative to the project? This seems especially germane given that the levelized costs of an energy efficiency alternative would be much less than 11.3 cents/kWh of the EG-WPDP.

A. This has been elaborated in the document. Energy efficiency is an important area of focus for the Government for managing demand and the Bank has an ongoing dialogue on this issue. Energy efficiency activities are complementary to this project not necessarily considered as an alternative to this project.

Q. If a successful wind IPP regime is established through tendering why is it necessary to switch to a feed-in tariff regime in Year 5? Usually the feed-in tariff is established to reduce risk borne

by the developer in the early stages of renewable energy development before a viable industry is established and where competition on price is difficult. After five years of tendering one or two 250 MW wind farms per year the industry should be quite well established and the delivered cost of wind energy well established. Introducing feed-in tariffs at that point might reduce the transparency of the marginal production costs of new wind energy projects that are otherwise revealed through competitive tendering.

A. The PAD provides clarification on the different approaches being considered by the Government. The feed-in-tariff approach is only being considered by the Government for development of small scale wind projects. See Annex on Detailed Project Description for more details.

Q. In this same vein, it seems a worthwhile PDO would be to establish a competitive wind energy industry in Egypt as opposed to just increasing the share of wind energy in total generation. An additional outcome indicator would then be delivered cost of wind energy as well as the amount of wind energy. This would encourage movement towards newer, larger, more efficient wind technologies, which reduce the fixed costs of incremental wind energy plus additional reductions in variable costs of production achievable through competition.

A. The delivered cost of wind energy would indeed be a worthwhile indicator. However, setting targets on the delivered cost of energy would be difficult. The team will report on the cost of delivered wind energy at the mid-term review and at project completion.

Q. Although modern wind turbines provide support to the grid (fault ride through, voltage support) – meaning the impact of short-term fluctuations (seconds to minutes) on grid stability is unlikely to be very significant – balancing requirements (hours, days), as well and adequacy requirements (years) will need to be assessed.

A. This is an issue which is recognized at the level of EETC and technical assistance has been included in the project (component B2) to support EETC on this issue.

Q. The intermittent renewables penetrations mentioned above are of wind power alone (less analyses exist for PV). The Egypt PAD looks at wind and solar combined. These resources may show complementarity, a smoothing of aggregated output, and thus reduced requirement for balancing reserves than each technology assessed individually, then summed. Has this complementarity been studied in the resource assessment?

A. No such study has been done to date, but it has been discussed at the level of the MENA region and a study is being launched for the Maghreb region on this issue.

Q. Would a control centre which has the ability to curtail all intermittent plants (and dispatch, if wind plants are kept below maximum output) a necessary addition to system operation? The CECRE in Spain (run by the TSO Red Electrica) for example is a highly efficient example, which has done much to dispel variability fears, and more concretely provides a real-time, system wide view of output.

A. We agree that EETC has to integrate wind/solar forecasting and curtailment options in its planning and procedures. In the preparation of the 2,500 MW IPP/BOO pipeline of wind projects, it is envisaged to do both a wind turbine grid code and a wind farm grid code. The latter document will precisely address the issue of ensuring that wind farm output can be curtailed by 0-100% in grid emergency situations. It will also make it mandatory to provide real time data for wind power forecasting in the EETC, an issue which has also been dealt with in both the prequalification document and in the site wind measurement agreement by the EETC. Completing both in the form of regulations or PPA requirements are in the ToRs for the consultants dealing with the RFP documents for the IPP/BOO tender.

Q. Probabilistic output forecasting techniques, integrated in system operation by EETC should be considered prerequisite.

A. [see the answer above]

Q. Paragraph 7 describes a government owned, vertically integrated power sector. Though a major barrier to IPPs – and therefore ultimately to be unbundled – a vertically integrated system may have advantages from the point of view of early stage intermittent renewables deployment, as the system operator can plan and dispatch his portfolio that much more easily if he controls all of it.

A. We agree with the latter part of this assessment, that either a single buyer or a single ownership of power plants may facilitate operational optimization. Whether this type of institutional setup is really a barrier to IPPs is debatable. In several Canadian provinces e.g. Québec, Ontario and Manitoba the single buyer system has not prevented the development of more than 6,000 MW of wind IIPs currently contracted and being built in these three provinces alone, though a number of large tenders of blocks of 500-2,000 MW of wind power. This seemingly disproves the barrier argument.

Q. The flexibility of the existing generation portfolio is likely to be high in Egypt: lots of gas, hydro. They are likely to constitute a significant ability to ramp up and down quickly in response to deficit / surfeit of intermittent output. Is the usage of these constrained (e.g. by gas technology type, fish ecology)?

A. In the case of hydro, the major asset is the Assuan project, which is a multi-purpose project, which includes irrigation. We agree that this consideration of having readily available balancing power should be an important consideration in overall planning of the power generation portfolio in Egypt. It should also be seen in the context of wind and solar dispatch forecasting discussed previously.

Q. The flexibility resource of the system needs to be identified. This is made up of dispatchable generation, storage (pumped hydro), demand response and trade, and will be constrained by how the system is operated. Once the constraints are identified, the amount of ramp (up or down) on the intermittent resource (combined with fluctuation in demand) that can be reliably tolerated by the system can be identified.

A. We agree, see the previous answer.

Annex 15: Statement of Loans and Credits

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Project ID	FY	Purpose	Original Amount in US$ Millions				Cancel.	Undisb.	Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF			Orig.	Frm. Rev'd
P116011	2010	EG-Enhancing Access to Finance for SMEs	300.00	0.00	0.00	0.00	0.00	300.00	0.00	0.00
P112346	2010	EG-Affordable Mortgage Finance DPL	300.00	0.00	0.00	0.00	0.00	300.00	0.00	0.00
P080228	2010	EG-Health Insurance Systems Development	75.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00
P101201	2010	EG-Cairo Airport Development Project-TB2	280.00	0.00	0.00	0.00	0.00	280.00	0.00	0.00
P101103	2009	EGYPT-Railways Restructuring	270.00	0.00	0.00	0.00	0.00	270.00	0.00	0.00
P100047	2009	EG-Ain Sokhna Power	600.00	0.00	0.00	0.00	0.00	600.00	0.00	0.00
P095392	2008	EG-NATURAL GAS CONNECTIONS	75.00	0.00	0.00	0.00	0.00	30.86	-29.77	0.00
P094311	2008	EG INTEGRATED SANITATION & SEWERAGE INFR	120.00	0.00	0.00	0.00	0.00	112.70	14.19	0.00
P093470	2007	EG-MORTGAGE FINANCE	37.10	0.00	0.00	0.00	0.00	7.54	0.30	0.00
P087970	2007	West Delta Water Conserv. & Irrig. Rehab	145.00	0.00	0.00	0.00	0.00	145.00	133.33	66.67
P091945	2006	EG-EL TEBBIN POWER	259.60	0.00	0.00	0.00	0.00	76.47	25.54	0.00
P090073	2006	EG-Second Pollution Abatement	20.00	0.00	0.00	0.00	0.00	15.96	13.79	13.79
P082952	2005	EG-Early Childhood Education Enhancement	20.00	0.00	0.00	0.00	0.00	12.65	11.54	0.00
P073977	2005	EG-INTEGRATED IRRIGATION IMPR. & MGT	120.00	0.00	0.00	0.00	0.00	103.67	53.67	0.00
P045499	2000	EG-NATIONAL DRAINAGE II	80.00	0.00	0.00	0.00	0.00	30.35	0.35	0.00
P050484	1999	EG Secondary Education Enhancement Proj	0.00	50.00	0.00	0.00	0.00	13.58	9.74	0.00
		Total:	2,701.70	50.00	0.00	0.00	0.00	2,373.78	232.68	80.46

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.
1996	ANSDK	1.33	0.00	0.00	0.00	0.56	0.00	0.00	0.00
2004	Alexandria Fiber	8.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00
2001	Amreya	4.69	0.00	0.00	0.00	4.69	0.00	0.00	0.00
2006	CIB LLC	0.00	0.72	0.00	0.00	0.00	0.48	0.00	0.00
1999	CIL	0.00	0.74	0.00	0.00	0.00	0.74	0.00	0.00
2004	CIL	0.00	0.15	0.00	0.00	0.00	0.15	0.00	0.00
1992	Carbon Black-EGT	0.00	1.48	0.00	0.00	0.00	1.48	0.00	0.00
1997	Carbon Black-EGT	0.00	1.48	0.00	0.00	0.00	1.48	0.00	0.00
1998	Carbon Black-EGT	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00
2000	Carbon Black-EGT	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Ceramica Al-Amir	3.33	0.00	0.00	0.00	3.33	0.00	0.00	0.00
2006	Cmrcl Intl Bank	0.00	23.28	0.00	0.00	0.00	23.03	0.00	0.00
2006	EFG Hermes	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	EHF	0.00	1.70	0.00	0.00	0.00	1.70	0.00	0.00
2005	Egypt Factors	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Gippsland	0.00	4.61	0.00	0.00	0.00	2.03	0.00	0.00
2001	IT Worx	0.00	2.00	0.00	0.00	0.00	2.00	0.00	0.00
2004	Lecico Egypt	8.94	0.00	0.00	0.00	8.94	0.00	0.00	0.00
1986	Meleiha Oil	0.00	8.62	0.00	0.00	0.00	0.00	0.00	0.00
1988	Meleiha Oil	0.00	9.20	0.00	0.00	0.00	0.00	0.00	0.00
1992	Meleiha Oil	0.00	13.00	0.00	0.00	0.00	0.94	0.00	0.00
2005	Merlon Egypt	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Metro	10.50	0.00	0.00	0.00	10.50	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
	Orix Leasing EGT	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	Orix Leasing EGT	0.00	0.53	0.00	0.00	0.00	0.53	0.00	0.00
2001	Orix Leasing EGT	1.09	0.00	0.00	0.00	1.09	0.00	0.00	0.00
2001	Port Said	41.07	0.00	0.00	132.53	41.07	0.00	0.00	132.53
2002	SEKEM	4.18	0.00	0.00	0.00	4.18	0.00	0.00	0.00
2006	SONUT	10.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00
2004	SPDC	18.40	0.00	0.00	0.00	18.40	0.00	0.00	0.00
2001	SUEZ GULF	40.40	0.00	0.00	129.07	40.40	0.00	0.00	129.07
1997	UNI	2.05	0.00	0.00	0.00	2.05	0.00	0.00	0.00
2001	UNI	2.06	0.00	0.00	0.00	2.06	0.00	0.00	0.00
2005	Wadi Group	15.00	0.00	0.00	0.00	7.50	0.00	0.00	0.00
	Total portfolio:	214.74	70.51	4.00	261.60	165.47	34.56	0.00	261.60

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2004	ACB Acrylic	0.00	0.00	0.00	0.00
2004	Merlon Egypt	0.00	0.00	0.00	0.02
2000	ACB Expansn III	0.00	0.00	0.00	0.00
2006	Rally Energy	0.01	0.00	0.00	0.00
	Total pending commitment:	0.01	0.00	0.00	0.02

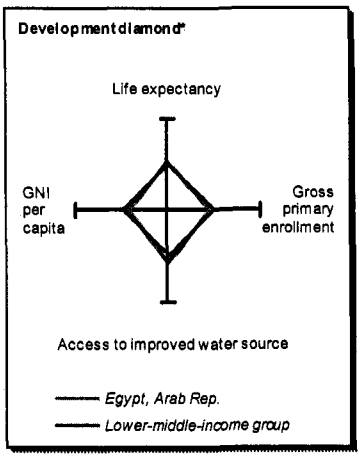
Annex 16: Country at a Glance

EGYPT, ARAB REPUBLIC OF: Wind Power Development Project

Egypt, Arab Rep. at a glance

12/9/09

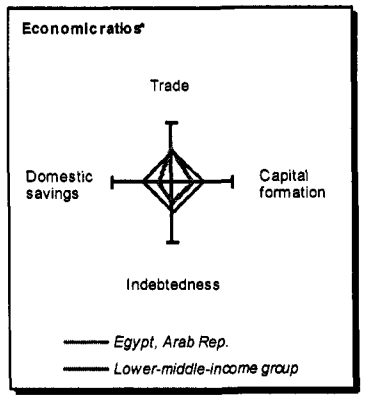
POVERTY and SOCIAL	Egypt	M. East & North Africa	Lower-middle-income
2008			
Population, mid-year *(millions)*	81.5	325	3,702
GNI per capita *(Atlas method, US$)*	1,800	3,242	2,078
GNI *(Atlas method, US$ billions)*	146.8	1,053	7,692
Average annual growth, 2002-08			
Population *(%)*	1.9	1.9	1.2
Labor force *(%)*	3.0	3.0	1.6
Most recent estimate (latest year available, 2002-08)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	43	57	41
Life expectancy at birth *(years)*	70	70	68
Infant mortality *(per 1,000 live births)*	20	32	46
Child malnutrition *(% of children under 5)*	7	..	26
Access to an improved water source *(% of population)*	98	88	86
Literacy *(% of population age 15+)*	66	73	83
Gross primary enrollment *(% of school-age population)*	100	106	109
Male	102	109	112
Female	97	104	106



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

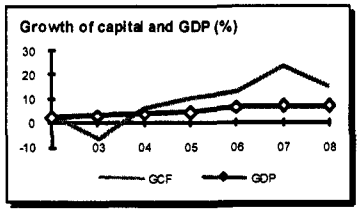
	1988	1998	2007	2008
GDP *(US$ billions)*	35.0	84.8	130.5	162.3
Gross capital formation/GDP	34.9	21.5	20.9	22.5
Exports of goods and services/GDP	17.3	16.2	30.3	33.2
Gross domestic savings/GDP	17.1	12.0	16.3	16.9
Gross national savings/GDP	28.1	18.6	22.6	23.4
Current account balance/GDP	-1.6	-2.9	1.7	0.5
Interest payments/GDP	3.5	1.1	0.7	0.6
Total debt/GDP	131.6	38.1	25.2	20.1
Total debt service/exports	22.1	9.9	5.6	4.3
Present value of debt/GDP	..	..	20.9	16.7
Present value of debt/exports	..	..	56.0	37.0

	1988-98	1998-08	2007	2008	2008-12
(average annual growth)					
GDP	4.1	4.6	7.1	7.2	5.3
GDP per capita	2.0	2.7	5.1	5.2	3.1
Exports of goods and services	4.8	14.9	23.3	28.8	2.9

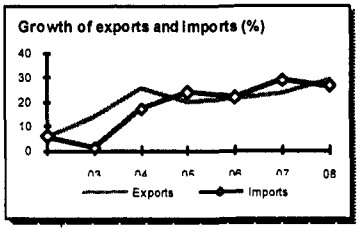


STRUCTURE of the ECONOMY

	1988	1998	2007	2008
(% of GDP)				
Agriculture	19.0	17.1	14.1	13.2
Industry	28.8	30.9	36.3	37.5
Manufacturing	17.7	18.3	15.7	15.7
Services	52.2	52.0	49.6	49.2
Household final consumption expenditure	69.0	76.7	72.4	72.2
General gov't final consumption expenditure	13.9	11.3	11.3	10.9
Imports of goods and services	35.2	25.7	34.8	38.8



	1988-98	1998-08	2007	2008
(average annual growth)				
Agriculture	2.9	3.4	3.7	3.3
Industry	6.0	4.9	7.9	10.3
Manufacturing	5.5	4.8	7.6	7.9
Services	3.0	5.1	7.4	8.6
Household final consumption expenditure	4.4	3.1	5.1	2.5
General gov't final consumption expenditure	3.2	2.8	0.2	1.1
Gross capital formation	0.9	5.3	23.8	15.5
Imports of goods and services	2.8	11.4	28.8	26.3



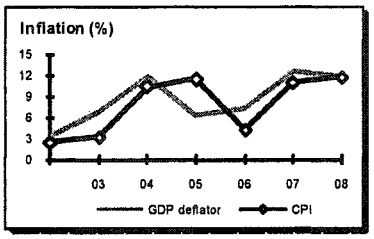
Note: 2008 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

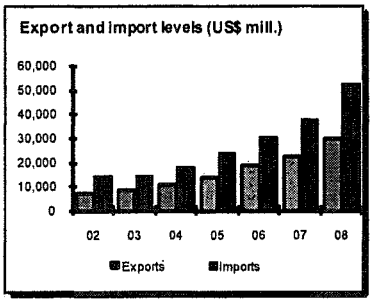
PRICES and GOVERNMENT FINANCE

	1988	1998	2007	2008
Domestic prices				
(% change)				
Consumer prices	18.6	5.7	11.0	11.7
Implicit GDP deflator	13.7	3.9	12.6	11.8
Government finance				
(% of GDP, includes current grants)				
Current revenue	20.1	22.2	23.2	23.4
Current budget balance	-5.5	2.9	-3.2	-4.4
Overall surplus/deficit	-17.6	-1.0	-7.3	-6.8



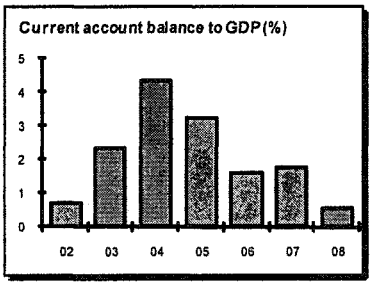
TRADE

	1988	1998	2007	2008
(US$ millions)				
Total exports (fob)	3,274	5,128	22,018	29,356
Cotton	480	1,728	110	194
Other agriculture	354	103	10,223	14,628
Manufactures	961	1,685	7,519	10,932
Total imports (cif)	8,858	16,899	38,308	52,771
Food	1,254	3,193	2,671	3,927
Fuel and energy	2,148	2,188	4,336	10,001
Capital goods	2,188	4,801	9,845	11,871
Export price index *(2000=100)*	98	96	157	183
Import price index *(2000=100)*	11	104	140	170
Terms of trade *(2000=100)*	928	92	112	107



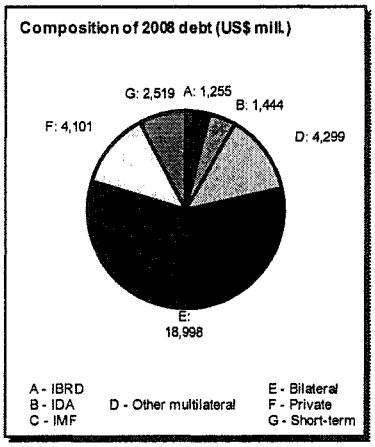
BALANCE of PAYMENTS

	1988	1998	2007	2008
(US$ millions)				
Exports of goods and services	7,225	13,502	39,428	53,277
Imports of goods and services	11,689	21,795	45,398	63,086
Resource balance	-4,465	-8,292	-5,969	-9,809
Net income	-161	1,213	1,177	1,360
Net current transfers	4,081	4,600	7,061	9,338
Current account balance	-545	-2,479	2,269	888
Financing items (net)	1,001	2,344	3,013	4,532
Changes in net reserves	-456	135	-5,282	-5,420
Memo:				
Reserves including gold *(US$ millions)*	..	..	30,320	39,516
Conversion rate *(DEC, local/US$)*	1.8	3.4	5.7	5.5



EXTERNAL DEBT and RESOURCE FLOWS

	1988	1998	2007	2008
(US$ millions)				
Total debt outstanding and disbursed	46,122	32,289	32,830	32,616
IBRD	1,515	846	1,181	1,255
IDA	900	1,268	1,490	1,444
Total debt service	2,487	1,897	2,740	3,131
IBRD	291	170	144	136
IDA	10	26	58	62
Composition of net resource flows				
Official grants	444	1,374	1,246	1,303
Official creditors	909	-249	646	-860
Private creditors	676	34	572	-235
Foreign direct investment (net inflows)	1,190	1,076	11,578	9,495
Portfolio equity (net inflows)	0	-160	-3,199	-674
World Bank program				
Commitments	70	285	0	1,075
Disbursements	131	104	737	154
Principal repayments	142	132	144	127
Net flows	-11	-28	593	26
Interest payments	159	65	58	70
Net transfers	-170	-92	535	-44



Note: This table was produced from the Development Economics LDB database. 12/9/09

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
13 GIZA

Mediterranean Sea
WEST BANK AND GAZA
ISRAEL
JORDAN
NORTHERN SINAI
SOUTHERN SINAI
Gulf of Suez
Gulf of Aqaba
SAUDI ARABIA
Red Sea
MARSA MATRUH
6TH OF OCTOBER
EL FAYOUM
BENI SUEF
AL MINYA
ASSIUT
SOHAG
QENA
AL WADI AL JADID
AL BAHR AL AHMAR
ASWAN
SUDAN
Lake Nasser
Nile River
ARAB REPUBLIC OF EGYPT

Alexandria, Damietta, Port Said, El'Arish, Kafr el Sheikh, El Mansura, Damanhur, Tanta, Shibin el Kom, Benha, Zagazig, Ismailia, Suez, CAIRO, Giza, 6th of October, Helwan, El Fayoum, Beni Suef, Abu Zenima, Ras Gharib, El Tur, Taba, Nuweiba, Al Minya, Assiut, Sohag, Qena, Luxor, Aswan, Kom Ombo, Al Ghurdaqah, Quseir, Marsa 'Alam, Bir Seyala, Mût, El-Kharga, Aswan Dam, Lake Nasser, Shalaten

500kV double-circuit overhead transmission line (OHTL)

Project extension of 500kV/220kV GIS substation

Planned 500kV substation

ARAB REPUBLIC OF EGYPT
WIND POWER DEVELOPMENT PROJECT

PROJECT:

- 500kV DOUBLE-CIRCUIT OVERHEAD TRANSMISSION LINE (OHTL)
- PLANNED 500kV SUBSTATION
- 250MW GULF OF SUEZ WIND FARM

FUNDED BY EUROPEAN INVESTMENT BANK:

- PROJECT EXTENSION OF 500kV/220kV GIS SUBSTATION AT SAMALLOUT

Submarine Cable / Planned / Existing

ELECTRIC TRANMISSION LINES:

- 500 kV
- 300 to 400 kV
- 225 kV
- 110 to 150 kV
- POWER PLANTS
- SUBSTATIONS
- INTERCONNECTION
- INTERCONNECTION, FUTURE STUDIES
- SELECTED CITIES AND TOWNS
- GOVERNORATE CAPITALS
- NATIONAL CAPITAL
- GOVERNORATE BOUNDARIES
- INTERNATIONAL BOUNDARIES

0 40 80 Kilometers
0 40 80 Miles

Area of Map

MAY 2010

IBRD 37829