

**PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE**

Report No.: AB5530

Project Name	Egypt - Wind Power Development Project
Region	MIDDLE EAST AND NORTH AFRICA
Sector	Renewable energy (100%)
Project ID	P113416
Borrower(s)	GOVERNMENT OF EGYPT
Implementing Agency	Egyptian Electricity Transmission Company
Environment Category	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined)
Date PID Prepared	April 21, 2010
Date of Appraisal Authorization	April 26, 2010
Date of Board Approval	June 15, 2010

1. Country and Sector Background

Country context

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. 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.

3. In response to the crisis the Government of Egypt (**GoE**) implemented a response plan featuring fiscal, monetary and direct support measures. 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. 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.

4. 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% 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 CO₂ emissions from energy uses have increased by over 7 % per year since 2000, reaching about 168 Mt in 2007.

Sector Context:

5. **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% 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 barrels¹ 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% 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. 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 million tons (Mt)⁴.

6. 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 translates to several thousand MWs of installed capacity⁵. 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 Nile⁶.

7. **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.

8. **Energy Efficiency.** The GoE has prepared a National Energy Conservation plan and has set up an interministerial 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.

9. **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% 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.

10. 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

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.

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..

11. **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 programs⁷ 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.

12. 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.

13. **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% 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.

14. 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.

15. 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 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.

16. 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.

2. Objectives

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

18. 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.

3. Rationale for Bank Involvement

19. 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, 2006⁸. 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

⁸ The project is a 700 MW power generation project, with US\$259 million of Bank financing.

the 1200 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.

20. 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.

4. Description

21. 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 Elzait 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).

5. Financing

Source:	(\$m.)
Borrower	54.8
International Bank for Reconstruction and Development	70
Clean Technology Fund	150
BOO	450
Other Financing	71.2
Total	796

6. Implementation

22. 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 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.

23. **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 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. The PIU will also coordinate project preparation activities with other the International Financing Institutions (IFIs) to ensue an early start to project implementation.

7. Sustainability

24. The GOE is strongly committed to renewable energy development as evidenced by the 20% target set by the Supreme council on energy (including 12% 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 windpower 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 windpower 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% 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.

25. 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.

26. 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.

8. Lessons Learned from Past Operations in the Country/Sector

27. 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.

28. 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 GOE intends to purchase the energy at the high voltage side of the wind farm substation covering the capital and operating cost of the transmission lines from its own budget.

9. Safeguard Policies (including public consultation)

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]

10. List of Factual Technical Documents

- 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)

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

- c. EETC Drat Feasibility Study (electronic form)
- d. Egypt: Clean Technology Fund Investment Plan (2009)
- e. Wind Energy Development Plan for Egypt (2008)

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