Initial Project Information Document (PID)

Report No: AB662

Project Name	ARAB REPUBLIC OF EGYPT - 2G-SOLAR THERMAL (GEF)
Region	Middle East and North Africa Region
Sector	Renewable energy (50%); Power (50%)
Theme	Other environment and natural resources management (P); Access to urban services for the poor (P); Infrastructure services for private sector development (S)
Project	P050567
Borrower(s)	GOVT. OF EGYPT
Implementing Agency(ies)	NREA - NEW AND RENEWABLE ENERGY AUTHORITY Note: The GEF Grant would be disbursed as an up-front payment to contribute to the financing of the project. Address: Mohamed Abou El-Naga Str. - Hay El Zohor - Nasr City Contact Person: Eng. Hosni Hassan El-Kholy, Executive Chairman Tel: (20-2) 272-5895 Fax: (20-2) 271-7172 Email: nre2@idsc.net.eg
Environment Category	B (Partial Assessment)
Date PID Prepared	February 4, 2004
Auth Appr/Negs Date	May 2, 2005
Bank Approval Date	November 1, 2005

1. Country and Sector Background

Egypt has a rapidly expanding economy that is based on the availability of reliable and low cost electric power. The rate of growth of electricity demand in Egypt has exceeded 6.5 percent per year over the past 10 years and is expected to remain in the 6-7 percent range over the next 10 years.

In line with the Egyptian structural adjustment policy, the power sector, operating under the direction of the Ministry of Electricity and Energy (MEE), was unbundled and reorganized in 2001. Power operations are organized under the Egyptian Electricity Holding Company (EEHC) and include five generation companies, seven regional distribution companies and a single transmission company which retains responsibility for the 500, 220 and 132kV transmission backbone; dispatching, planning for new power and transmission projects; and for the purchase of power produced by IPPs. A regulatory board has been established, chaired by the Minister of Electricity and with representatives from EEHC, other ministries and consumers.

In 2002, about 95 percent of the population was served by the electricity grid in Egypt. Of a total demand of 83 TWh on the interconnected system, 78 percent was met by thermal plants, of which 90 percent was supplied from natural gas and 10 percent heavy oil, 19 percent was met by large hydro (principally the High Dam and Aswan 1&2), and electricity from IPPs, including wind accounted for 3 percent.

The Government of Egypt has a target of meeting 3% of its primary energy needs from renewable energy by the year 2010. The New and Renewable Energy Authority (NREA), which was established under the MEE in 1986, has responsibility for implementing the government's strategy to develop the renewable resource in Egypt. Most of NREA's activities have been in the research and development field but since 2001, when the first wind farm was installed with NREA as executing agency, its activities have increasingly turned to the production of green energy. In 2003, about 80% of its revenues were attributable to electricity sales from 63 MW of installed wind capacity at Zafarana through a PPA with EEHC.

The proposed Project addresses GEF Operational Program 7 (OP7): reducing the long-term cost of low greenhouse gas-emitting technologies. The project is one of four projects planned by GEF as part of the benchmarking phase of the solar thermal area of the program.

OP7 aims to accelerate market penetration of several large-scale backstop technologies, such as solar thermal power, that are constrained by high capital costs and high commercial risks. The strategy is to identify projects that address national priorities, and then finance the incremental costs of investments, capacity building and other activities that reduce market barriers. For solar thermal power, it is generally agreed that significant cost reductions and eventual commercial acceptance can only begin to occur with the implementation of several demonstration projects in carefully selected countries and sites.

Egypt is a particularly good candidate to host a solar thermal project with GEF support for three reasons. First, the Government of Egypt is serious about materializing its renewable energy potential and has set a target of 3 percent of installed capacity to be from renewable energy sources by 2010 (about 600MW-800MW). Second, all the necessary resources are present, namely: high insolation; gas for co-firing; electricity network to interconnect to; adequate cooling water supplies; and vacant land for which there is little alternative use. Third, the Egyptian power system offers ample opportunity for replication of the project in Egypt and nearby countries, since it is rapidly expanding and is interconnected with neighboring countries.

2. Objectives

National Development Objective. The national development objective of the project is to support the further development of clean energy in Egypt, in this case solar, as a way to lower CO2 emissions in energy generation. Furthermore, the project will add much needed capacity to the power grid which currently operates with a very low capacity reserve margin.

Global Environment Objective. The global environment objective is to contribute to improving the economic attractiveness of solar thermal technology globally. The project will create global learning effects that will contribute to a reduction in costs for the technology over the long-term.

The objectives will be achieved by demonstrating the technical and commercial viability and environmental benefits of a solar thermal hybrid plant selling power through a Power Purchase Agreement (PPA) to the national power utility, the Egyptian Electricity Holding Company (EEHC).

3. Rationale for Bank's Involvement

Because of its current direct involvement in investment and advisory services across many sectors in Egypt, its experience in the power sector in the past combined with knowledge of renewables investment, including solar thermal power, the Bank, with the assistance of GEF, has a comparative advantage. The proposed project involves the development of a proven but unusual technology through an EPC arrangement which will be followed by a 5-year O&M contract to ensure proper operation and maintenance and maximum output by the solar field. The project will be among the first of its kind in the world.

Bank involvement will help attract strong bidders through the use of transparent and competitive procurement processes. Bank and GEF staff have acquired valuable experience in the past years in developing projects for the commercial exploitation of large-scale grid-connected renewable energy technologies, such as the wind farm projects in India and China. Furthermore, the Bank's experience in developing similar solar thermal power projects in India, Mexico and Morocco will facilitate preparation and implementation of this project. GEF financial commitment to the project is essential. Solar thermal power plants are not yet competitive because of high capital costs and incomplete learning resulting from the low level of deployment globally. Hence GEF support through the proposed grant will avoid Egypt having to bear the incremental costs of the project and help bring down the long-term costs of the

technology.

4. Description

The proposed project will finance the construction of an Integrated Solar Combined Cycle (ISCC) power plant to be located in Kureimat, about 95 km south of Cairo, on the eastern side of the river Nile. According to the baseline technical design parameters, the gross capacity of the Integrated Solar Combined Cycle (ISCC) plant is about 151 MWe and will comprise of two gas turbines, one steam turbine, and one parabolic trough solar field with a capacity of about 200 GWh/a (thermal) of solar heat plus all associated balance of plant equipment. The share of generation attributed to solar measured by energy delivered (solar share) is expected to be about 6.6 percent. The solar proportion – the generating capacity of the solar field as a proportion of the total plant size – is expected to be about 20 percent.

Technical assistance and capacity building will be provided to NREA and EEHC; the activities will include:

- Training of NREA/EEHC and regulatory staff in solar thermal power plant operations, with particular respect to dispatching and integration into the power system;
- Survey/assistance to local equipment suppliers/contractors to establish what components may be provided locally and to inform such suppliers of the opportunity future projects present;
- Monitoring/evaluation and dissemination of performance results from the project both domestically and internationally. The purpose of this activity is to support future replication.
- Consulting services for Project Management and support to NREA's PIU.

5. Financing

Source (Total (US$m))

BORROWER/RECIPIENT ($25.00)
GLOBAL ENVIRONMENT FACILITY ($50.00)
FOREIGN SOURCES (UNIDENTIFIED) ($72.00)
Total Project Cost: $147.00

6. Implementation

The project is to be implemented under an EPC (engineering, procurement, construction) arrangement with a 5-year O&M (operation and maintenance) contract. The contractor/supplier will be chosen by international competitive bidding. Bidders will be given the maximum freedom of choice to meet the plant specifications from the technological and financial points of view. The solar field will be of the proven parabolic trough type, where 2 types of design are available (Euro-trough and LS-3). Plant configuration will be optimized during the bidding and will only become definite when the winning bidder is selected. The bid documents will be flexible and allow a range of power output in order to have sufficient competition.

7. Sustainability

The higher capital cost of the hybrid plant will be offset by the proposed GEF incremental cost grant and no increase in tariffs will be required for cost recovery. The integration of the solar field with a CCGT ensures that the hybrid will provide the required electricity contribution to the system regardless of solar radiation conditions. For these reasons, the hybrid power plant is expected to operate sustainably as an integral part of the Egyptian power system. The incentive structure for the EPC cum O&M will ensure optimal design for integration of the solar thermal with the gas-fired plant and maximize solar output from the plant when in operation. Dissemination of information about this demonstration project will contribute to future replication in other countries and to refining the GEF strategy regarding this technology.

8. Lessons learned from past operations in the country/sector

NREA has gained significant experience in designing and implementing wind energy projects with international loan and grant financing. Important lessons drawn from that experience include the importance of a transparent and well-managed competitive bidding process. Another important lesson from the development of the wind projects is that they have attracted the major international suppliers of wind technology, demonstrating the interest and comfort of major suppliers with business transactions in Egypt.

Furthermore, through the development of these projects, NREA has operated under PPAs with the national utility and has gained significant experience in structuring and negotiating such agreements. This experience will be very useful in the competitive bidding approach adopted for the solar thermal project, in which a power purchase agreement will need to be put in place as well as a gas purchase agreements.

9. Environment Aspects (including any public consultation)

Issues : The environmental impact of the plant, both at the local and regional/global levels, will be minimal as the plant will utilize solar and natural gas. The use of solar power does not produce any pollutants. The combustion of natural gas leads to the lowest level of CO2 emissions of any fossil fuel. In addition, the combustion of natural gas does not entail SOx emissions and has significantly lower emissions of NOx than other fuels. The heat transfer oil might leak and contaminate the soil. However, appropriate treatment of contaminated soil has been included in the design of the project. No other adverse environmental impacts, including on groundwater, are foreseen. Equally, no resettlement is foreseen and no adverse social impacts are expected. The project may, on the contrary, impact poverty positively by adding to the power capacity of Egypt. This is needed given the very low reserve margin that the system is currently operating on. The GEF component will ensure that the poor are not adversely affected, as the project will not impact on the current tariff levels in place.

10. List of factual technical documents:

1. Lahmeyer Feasibility Study (2000)
2. Fichtner Solar Technical Design Study (Draft - January 2004)

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.