

**Initial Project Information Document (PID)****Report No: AB350**

<b>Project Name</b>	MOROCCO - MA-SOLAR BASED POWER
<b>Region</b>	Middle East and North Africa Region
<b>Sector</b>	Renewable energy (70%); Power (20%); Central government administration (10%)
<b>Theme</b>	Pollution management and environmental health (P); Rural services and infrastructure (P); Access to urban services for the poor (S)
<b>Project</b>	P041396
<b>Borrower(s)</b>	GOVERNMENT OF MOROCCO
<b>Implementing Agency(ies)</b>	OFFICE NATIONAL DE L'ELECTRICITE (ONE) Address: 65 rue Othman Ben Affan, 21000 Casablanca, Morocco Contact Person: Mr. Ahmed Nakkouch, Directeur Général Tel: 212 22 295079 Fax: 212 22 205698 Email:
<b>Environment Category</b>	B (Partial Assessment)
<b>Date PID Prepared</b>	September 25, 2003
<b>Auth Appr/Negs Date</b>	September 3, 2004
<b>Bank Approval Date</b>	June 15, 2005

**1. Country and Sector Background**

Since 1996, the Government of Morocco (GOM) has made significant efforts in improving the role of the private sector in the electric power sector. Through the concessions for Jorf Lasfar thermal power plant and Koudia Blanco wind farm power plant, and power distribution (concessions in Casablanca, Agadir and Rabat), the private sector now owns and operates about 40 percent of the total installed power generating capacity and about 60 to 70 percent of the distribution market. In this regard, private IPP (Independent Power Producers) initiatives are under preparation such as the Tahardart Thermal Plant (470 MW), the Wind farms (200 MW) at Tangiers and Tarfaya, and the Solar Based Thermal Plant (200 MW) at Ain Beni Mathar.

The Government's policy is to create a competitive environment to increase efficiency and to reduce costs to consumers through increased private sector participation. To this end, the Government and ONE (Office National de l'Electricite), the Moroccan power utility have approved in 2001 the sector liberalization plan. The plan calls for a reorganization of ONE and a progressive liberalization of the sector based on the following principles: (a) unbundling of ONE and creation of specialized subsidiaries in generation, transmission and distribution; (b) defining which eligible clients e.g., beginning with large industrial users, will be allowed to purchase electricity from ONE, from private generators or from abroad; and (c) opening the grid to (private) independent power producers, which would operate without a power purchase agreement (PPA) with ONE ("Non-PPA Generators").

The "Centre de Developpement des Energies Renouvelables" (CDER) is a public establishment created in 1982 under the tutelage of the Ministry of Energy and Mines. Its main responsibilities are to implement GoM's strategy to develop national renewable resources and to carry out studies and research promoting and developing mini-hydro, solar, and wind technologies. At the same time, it has an important role in the improvement of efficiency in energy usage and in reduction of gas emissions.

Morocco is working towards some of the important targets included in its policy of developing renewable energies, utilizing cleaner fuels, and improving efficiency in energy usage. Examples include: the 50 MW wind farm at Koudia al Baida; the existing IPP at Jorf Lasfar which has substantially enhanced supply-side efficiency; and the first phase of the IPP at Tahadart, which is to be operational by 2003 and which will further contribute to supply side efficiency.

A study financed by the European Commission considered the transferability of the solar thermal parabolic trough technology to the Mediterranean countries. It was followed up by a pre-feasibility study for a solar thermal plant in the northern part of the country. Partially based on the experience in California, this study was restricted to assessing the potential of existing parabolic trough technology in a variety of configurations while considering the matching with local electricity demand patterns. The proposed World Bank/Global Environment Facility (GEF) project entails further deepening the analyses and conclusions of the existing study, to prepare the necessary documentation, and to support the implementation of a solar based power scheme in northern Morocco.

## **2. Objectives**

The project development objectives are to increase the use of renewable energy sources in Morocco and to help reduce the long-term costs of low greenhouse gas emitting energy technologies in accordance with OP7 of the GEF. As a country that is well endowed with both solar and wind resources, this project will allow Morocco to develop this comparative advantage and become a leader in the application of solar thermal technologies. The project aims furthermore at enabling Morocco to embark on a path of sustainable development in accordance with its commitments under the 2002 Johannesburg World Summit for Sustainable Development and the 1997 Kyoto Protocol to the Climate Change Convention. In addition, the project addresses Morocco's power shortage in the electricity sector. The goal for the gas-fired part of the plant is to exhibit increased levels of power plant efficiency and availability when compared with existing plant.

## **3. Rationale for Bank's Involvement**

The project is consistent with GEF's operational strategy on climate change in support of long-term mitigation measures. In particular, the project will help reduce the costs of proven parabolic trough solar technology so as to enhance its commercial viability. The proposed project is expected to be the first in a multi-country series of investments which together would recommercialize the technology. Similar projects in Mexico, India, Egypt, and the United States are in advanced stages of preparation. Other countries in the high insolation regions of North Africa have also shown interest (i.e, Algeria). While not all of these projects are expected to materialize in the near term, up to four projects including the initiative in Morocco, are anticipated to be developed within the next five years. The combined effects of these projects will be to accelerate the process of cost reduction, demonstrate the technical performance of the technology in a wider range of climate and market conditions, and create a sustainable market for parabolic trough solar thermal technology.

The capital cost of solar thermal power generation technologies is significantly higher than fossil-based conventional power. Nevertheless, costs have been falling sharply from \$5,000 per kW for the first solar thermal Luz plant, to \$2,900 for the latest Luz plant in California. Recent estimates for proposed integrated solar combined cycle plants are estimated to be in the region of \$2,000 per kW. The pre-feasibility study financed by the European Community provided the economic analysis for the 11 alternatives studied at Jerada and Ain Benimathar sites. The alternative ABM-3 at Ain Benimathar site, which provided the lowest levelled tariff and the highest rate of return, was selected.

Regarding the final design, the choice of technology is relatively open since the final power plant configuration and sizing will be chosen by the potential project sponsors after open competitive bidding. This process will ensure that costs and plant efficiency are optimal. This open approach will help ensure that best technology at least cost is employed which is in line with ONE's power generation expansion plan. Furthermore, GOM's policy is to continue with the privatization process.

#### **4. Description**

The project includes the integration of a solar trough collector field producing a minimum energy output with a natural gas-based power generating unit. The proposed project will be implemented in two phases. The first phase entails the engagement of specialized consultants to prepare a feasibility study, bidding documents, draft contracts, and to advise ONE during the evaluation of proposals. The following phase involves the construction and operation of a solar/fossil fuel hybrid power station of about 200 MW with an expected annual net production of 1,590 GWh per year. The solar output is estimated at 3.5% of the annual production representing 55.2 GWh per year. It is expected that the solar thermal power plant may be put in service in the beginning of 2008.

Following an unsatisfactory response to competitive bidding of an IPP, Morocco's public power utility has decided to finance the solar thermal plant itself through an EPC (Engineering, Production, Construction) cum O&M (Operation and Maintenance) contract. ONE will thus be the owner of the plant. The O&M contract will last 5 years, and is put in place in order to ensure appropriate incentives for the operation of the plant, including to the full capacity of the solar field. The power plant capacity is indicative and is based on the results of the feasibility study.

A GEF PDF Block C grant is financing the preparation of the project. The feasibility and environment and social studies have been completed. Prequalification and EPC cum O & M documentation are being prepared.

Timeline up until construction:

1. Pre-qualification (month 1-4)
2. Preparation of bid documents (month 1-4)
3. Preparation and submissions of offers (months 5-11)
4. Technical and commercial evaluation of offers (month 12-18)
5. Contract negotiations (month 19-23)

#### **5. Financing**

##### **Source (Total ( US\$m))**

BORROWER/RECIPIENT (\$20.00)

GLOBAL ENVIRONMENT FACILITY (\$50.00)

FOREIGN SOURCES (UNIDENTIFIED) (\$120.00)

**Total Project Cost: \$190.00**

#### **6. Implementation**

The proposed project would be implemented in two phases. The first phase would entail the engagement of specialized consultants to prepare a feasibility study, bidding documents, and draft contracts (among others Power Purchase, Fuel Supply, Engineering, Procurement and Construction (EPC), Operation and Maintenance (O & M) Agreements); and to advise ONE during the evaluation of proposals and negotiations of the contract. The following phase would involve the construction and operation of the

plant.

The project would be implemented over four years. The feasibility and environmental and social studies have been completed and prequalification and bid preparation phase is expected to start in October 2003 and is expected to be completed by April 2004. Following bidding and award, the plant is expected to be commissioned by 2008.

The Executing Agency will be ONE, with support from CDER.

## **7. Sustainability**

The project will be implemented in the context of on-going reforms in Morocco's power sector which calls for commercializing the sector and attracting private sector investments and management skills into all new generation facilities. ONE is committed to have this plant in operation by 2008 and it is part of ONE's expansion plan to meet the growing demand. At a plant level, the sustainability of the project is conditioned to a large degree in maintaining power output from the solar-based power plant component throughout the project life. The public/private operator may be biased towards maximizing output from the conventional component because its lower operation and maintenance costs (excluding fuel cost). To prevent this occurrence, the contractual documentation would include appropriate legal clauses to require the public/private operator to maintain a specified solar-based production output. To further assure maximum solar output, the GEF grant would be disbursed in two tranches.

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

The project design reflects worldwide and regional experience that institutional development by way of privatization ensures efficiency gains in a short period of time, and that sustainable development requires improved institutional frameworks and optimum use of available resources. The main relevant lessons in past operations include the lack of commitment by GoM on financial and institutional matters. Some of the critical issues were the high level of subsidy provided by GoM to ONE's investment program to compensate for tardy tariff increases and for high levels of arrears due to ONE. The lack of autonomy of ONE was also significant. GoM has now shifted its policy resulting in substantially improved financial and institutional performance of the sector and ONE in particular.

The private operator at Jorf Lasfar power plant is progressing extremely well. The improvements in the operation of the two existing units and the progress achieved in the construction of the new ones are quite remarkable. The important lesson is that there is a good investment climate in Morocco in which the private sector is willing to invest; this is further borne out by the development of the wind farm at Koudia Al Baida and the CCGT at Tahadart. Significantly, there does not seem to be private sector reluctance in developing newer technologies.

## **9. Environment Aspects (including any public consultation)**

**Issues** : In accordance with World Bank Operational Policy 4.01 (Environmental Assessment), the project has been assigned as Category B (Partial Assessment). The proposed project would contribute to improving the environment, primarily through reduced greenhouse gas emissions and by permitting older, less efficient plant to be retired. The project implementation will not result in involuntary resettlement and will only require limited land acquisition. Provision for implementing an environment management and monitoring plan, as well as environment mitigation measures will form part of the bidding documents.

**10. List of factual technical documents:**

- (1) Rapport final – Méthodologie et Critère d'évaluation et modèle financier (mission 2) – Projet de Centrale Thermo-Solaire d'Ain Beni Mathar en Production Concessionnelle pour l'Office National de l'Electricité, Casablanca, Maroc, Fichtner Solar GmbH, Stuttgart ( February 25, 2002).
- (2) Rapport final – Spécifications Techniques (Mission 1), Projet de Centrale Thermo-Solaire d'Ain Beni Mathar en Production Concessionnelle pour l'Office National de l'Electricité, Casablanca, Maroc, Fichtner Solar GmbH, Stuttgart (April 2, 2002).
- (3) Spécification Techniques (mission 1) & Méthodologie d'évaluation et modèle financier (mission 2), Projet Centrale Thermo-Solaire d'Ain Beni Mathar en Production Concessionnelle pour l'Office National de l'Electricité, Casablanca, Maroc, Fichtner Solar GmbH, Stuttgart (November 18, 2001).

**11. Contact Point:****Task Team Leader**

Rene Mendonca

**The World Bank**

1818 H Street, NW

**Washington D.C. 20433****Telephone:** 202-473-2989**Fax:** 202-477-1998

12. For information on other project related documents contact:

The InfoShop

The World Bank

1818 H Street, NW

Washington, D.C. 20433

Telephone: (202) 458-5454

Fax: (202) 522-1500

Web: [http:// www.worldbank.org/infoshop](http://www.worldbank.org/infoshop)

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