For a Japanese ODA Loan

Ex-Ante Evaluation

1. Name of the Project

Country: The Arab Republic of Egypt
Project: Gulf of El Zayt Wind Power Plant Project
Loan Agreement: March 30, 2010
Loan Amount: 38,864 million yen
Borrower: New and Renewable Energy Authority (hereinafter called to as NREA)

2. Background and Necessity of the Project

(1) Current State and Issues of the Energy Sector in Egypt

In Egypt, the energy demand has been growing 7.1% per year average since 1996, based on the rapid economic growth. The Government of Egypt plans to construct power generation facilities of 8,547MW in total, in order to expand 9.1% of power generation capacity annually in the Sixth Five-Year Plan (2007/2008-2011/2012).

Egypt has been depending on petroleum or natural gas generated in their own country for power generation. However, in case the power demand continues to grow, import of energy sources are predicted to increase, and is a concern that it may affect energy security, external balance, and public finance, etc., in the future.

Moreover in the recent years, due to the heightening awareness to the global warming, the Government of Egypt established the Supreme Council of Energy headed by the Prime Minister, in order to reduce the dependence on oil and to develop new and renewable energy, etc. It is planned to cover 20% of the total capacity of the power generation facilities by new and renewable energy (assuming 12% from wind energy and 8% hydropower) by 2020.

In accordance with such power development policy and wind power generation plan of Egypt, this project aims to increase electric power supply and save fossil fuel consumption by the construction of 220MW wind power plant in the Gulf of El Zayt region along the Red Sea coast. In addition to fulfill demand for electricity, this project will contribute to the alleviation of global warming by mitigating greenhouse gas emission, and to economic and social development in Egypt.

(2) Development Policies for the Energy Sector in Egypt and the Priority of the Project

The “Hatoyama Initiative” of the Government of Japan calls for the “Energy saving and clean energy promotion”, which this project is based on. In the Country Assistance Program for Egypt, the “New and renewable energy development” is considered to be one of the pillar of the development issues of “Improvement of investment and business environments” based on the “Realization of sustainable growth and employment creation”, which is one of the three major priority areas.

Based on the Country Assistance Program for Egypt by the Government of Japan, JICA positions the “Realization of sustainable growth and employment creation”, “Poverty reduction and improvement of living standard”, and “Promotion of regional stabilization” as the three pillars of the assistance policy, aiming for “transition to a competitive and stable economic society”. Of these, the Energy Sector is considered to be the priority sector, and

JICA has been approaching from the perspective of ‘‘improvement of electricity supply’’, “new and renewable energy development”, and “energy efficiency promotion” until now. JICA has provided ODA Yen Loan for other project to develop new and renewable energy in Egypt including the *Zafarana Wind Power Plant Project* in December 2003, and the *Kuraymat Integrated Solar Combined Cycle Power Plant Project* in January 2006 and December 2008.

JICA continues to support the power development utilizing new and renewable energy, in order to contribute to the stability of the power supply, diversification of energy, and greenhouse gas emission reduction.

(3) Other Donor's Activity

- Construction of Ain Sokhna Power Plant funded by the World Bank
- Construction of the National Energy Control Center by the assistance of USAID
- Improvement of Zafarana Wind Power Plant by the assistance of Germany, Denmark, and Spain
- Improvement of Gulf of El Zayt Wind Power Plant funded by Germany, European Investment Bank, and EC

(4) Necessity of the Project

This project contributes to the climate change measures which is a significant international commitment of Japan, and also matches the assistance policy. Therefore, the necessity and adequacy of JICA’s assistance is high.

3. Project Description

(1) Project Objectives

The objective of this project is to increase electric power supply and save fossil fuel consumption by the construction of 220MW wind power plant, etc., in the Gulf of El Zayt, thereby contributing to fulfillment of demand for electricity, to mitigation of climate change through the reduction of greenhouse gas emission, and to economic and social development in Egypt.

(2) Project Site/Target Area

Gulf of El Zayt (coast of Red Sea)

(3) Project Components

Newly build a 220MW wind power plant, expansion of substation and transmission lines, and consulting services (detailed design, assistance for bidding, construction management, etc.)

(4) Estimated Project Cost (Loan Amount)

66,059 million yen (Loan amount: 38,864 million yen)

(5) Schedule

The planned implementation schedule of the project is from March 2010 to June 2018 (100 months in total). The use of the facilities will start in June 2015, which is regarded as the completion date of the project.

(6) Project Implementation Structure

1) Borrower: NREA

2) Guarantor: The Government of the Arab Republic of Egypt

3) Executing Agency: NREA and Egyptian Electricity Transmission Company (hereinafter referred to as EETC)

4) Operation and Maintenance System: Same as 3)

(7) Environmental and Social Consideration/Poverty Reduction/Social Development

1) Environmental and Social Consideration

a Category: A

b Reason for Categorization: This project is categorized into Classification Category A, because it corresponds to the vulnerable area to the impacts as listed in “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (established April 2002)

c Environmental Permit: An Environmental Impact Assessment (EIA) report as related to this project was already approved by the Egyptian Environmental Affairs Agency in the Egyptian Ministry of State For Environmental Affairs on April, 2009.

d Anti-Pollution Measures: Particular negative effects cannot be predicted since the main work is installation of equipments.

e Natural Environment: Based on the research by NREA, the proposed site of this project is included in the flyway of some birds including rare species. However, the possibility of negative effects to occur are low in this area, hence development projects are approved by the Egyptian Environmental Affairs Agency. Additionally, monitoring results of during and after the construction are to be reflected to the mitigation measures for improvement and strengthening, as well as implementing the following measures (statement of possibility of transfer/operation termination of some wind turbines are described in EIA) - a) Painting of the wind turbine blades considering visibility, b) Height limitation of wind turbines (110m or lower), c) Secure wide corridors for migratory birds, d) limitation of spec of navigation lights, etc.

f Social Environment: There is no land acquisition, nor involuntary resettlement in the project.

g Other/Monitoring: The executing agency shall monitor the sound/vibration during the construction, as well as the birds striking into the wind power facilities during and after the construction.

2) Promotion of Poverty Reduction: None.

3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases including HIV/AIDS, Participatory Development, Considerations for Persons with Disabilities, etc.): None.

4) Climate Change: This project is an assistance based on the “Hatoyama Initiative” which was announced as a contribution activity aiming for the realization of the “balance of environment and economy”, and the transition to the “low-carbon society” at a global level, and corresponds to the *5. Alternative Energy (new and renewable energy)*, and is a part of the greenhouse gas emission reduction. Therefore, the terms and conditions of ‘Climate Change ODA Loan’ are applied.

(8) Collaboration with Other Donors: None.

(9) Other Important Issues: None.

4. Targeted Outcomes

(1) Performance Indicators (Operation and Effect Indicator)

Indicator	Baseline	Target (2017) 【Expected value 2 years after project completion】
Capacity Factor (%)	-	45
Outage Duration Hours (hr/year) (due to Mechanical Breakdown)	-	18,250
Outage Duration Hours (hr/year) (due to Natural Disaster)	-	0
Planned Outage Duration (hr/year)	-	2,920
Plant Availability (%)	-	95
Net Electrical Energy Production (GWh/year)	-	867
Net Reduction of GHG (CO_2) (tCO_2/year)	-	494,000

(2) Internal Rate of Return

Based on the conditions indicated below, the Economic Internal Rate of Return (EIRR) of this project is 13.89%, and the Financial Internal Rate of Return (FIRR) of this project is 7.19%.

【EIRR】

Cost: Construction cost, operation and maintenance cost (excluding tax)

Benefit: Cost reduction for the construction cost, fuel cost, operation/maintenance cost of the alternative power generation facility (thermal power plant), and income of sellout of CER

Project Life: 20 years

【FIRR】

Cost: Construction cost, operation and maintenance cost

Benefit: Revenue of energy sales, fuel incentive, and income of sellout of CER

Project Life: 20 years

(3) Qualitative effect

- Activation of economical activities due to stable and efficient power supply, and contribution to the improvement of civilian activities.
- Contribution to the development and promotion of utilization of new and renewable energy

5. External Factors and Risk Control

Occurrence of outage of turbines due to unusual weather (change of wind conditions).

6. Lessons Learned from Past Projects

From the Ex-post evaluations of the past power plant projects, we have learned that

appropriate operation/maintenance after the completion is essential in order to maintain the sustainability of the project. NREA and EETC which are the operation/maintenance organizations of this project shall accept dispatch of engineers from the Egyptian Electricity Holding Company (EEHC) which is their superior organization in the power sector. In addition, operation/maintenance technology shall be transferred to the contractor, as well as technical cooperation to be carried out by JICA if needed.

Furthermore, environmental consideration shall be measured by the executing agency in principle, however, in order to realize the measures, it is also suggested that it is significant for JICA to urge the executing agency if necessary. Considering such past lessons learned, this project shall provide assistance through consulting services regarding the strengthening of environmental monitoring.

7. Plan for Future Evaluation

(1) Indicators to be Used

1) Capacity Factor (%)
2) Outage Duration Hours (hr/year) (due to Mechanical Breakdown)
3) Outage Duration Hours (hr/year) (due to Natural Disaster)
4) Planned Outage Duration (hr/year) Plant Availability (%)
5) Plant Availability (%)
6) Net Electrical Energy Production (GWh/year)
7) Net Reduction of GHG (CO_2) (tCO_2/year)
8) Economic Internal Rate of Return (EIRR) (%)
9) Financial Internal Rate of Return (FIRR) (%)

(2) Timing

Two years after project completion