Japanese ODA Loan

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: The Republic of Iraq
Project: Hartha Thermal Power Station Rehabilitation Project
Loan Agreement: February 23, 2015
Loan Amount: 20,224 million Yen
Borrower: The Government of the Republic of Iraq

2. Background and Necessity of the Project

(1) Current State and Issues of the Electricity Sector in Iraq

Three wars and years of economic sanctions since the 1980s have left the electric power infrastructure in the Republic of Iraq, including power plants and transmission and distribution networks, aging and decayed. Since the end of the Iraq War in 2003, the infrastructure of the power sector has been gradually rehabilitated, but as of 2013, Iraq's capacity to supply electricity was only approximately 12,000 megawatts against a total national demand of around 16,000 to 18,000 megawatts. It was not unusual for electricity outages to last for more than 10 hours a day. This insufficient and unstable electrical power supply not only contributes to public disturbances and other forms of social unrest, but also provides a serious hindrance to the development of industry and social sectors such as healthcare and municipal water/sewage services.

(2) Development Policies for the Electricity Sector in Iraq and the Priority of the Project

Among the electricity sector goals in the Iraqi government's National Development Plan 2013–2017 include (1) increasing the electrical system's production capacity to cover the full increasing demand for power, (2) increasing the Iraqi per capita share of electrical power to 3700 kWh in 2017, and (3) improving the performance efficiency of the electrical system and keeping it from deteriorating. When it comes to the electricity supply in particular, the government is working to construct power stations in order to ensure supply. This project rehabilitates the Hartha Thermal Power Station in Basra Governorate with the aim of stabilizing electric power supply, and will thus contribute to the achievement of Iraq's development goals.

(3) Japan and JICA's Policy and Operations in the Electricity Sector

Japan's Country Assistance Policy for Iraq (June 2012) stipulates "strengthening economic infrastructure" as a priority area, making electricity reconstruction consistent with these policy goals. The Rolling Plan also makes "strengthening economic infrastructure" a priority area, defining this as infrastructure development in electricity and other areas underlying the vitalization of the private sector. Japan has been providing support for Iraq's electricity sector in the form of grant aid (FY2005–FY2006) and five ODA loan projects between FY2007 and FY2009. In addition, JICA held training sessions on the electricity sector (operations and maintenance of power stations, establishment of transmission and distribution networks, and others) for 30 percent of all Iraqi trainees (1,582 people) between FY2003 and FY2013.

(4) Other Donors' Activities
Multiple donors, including the US, UNDP, and the World Bank, offered emergency reconstruction support for electricity transmission and distribution networks after the end of the Iraq War in 2003.

(5) Necessity of the Project
As indicated above, the Project is in line with the development policies of the Iraqi government as well as the policy of the government of Japan and JICA. Therefore, JICA's assistance with the Project is highly necessary and relevant.

3. Project Description

(1) Project Objective(s)
The objective of the Project is to improve electricity supply in the Republic of Iraq, by rehabilitating the Unit No. 4 (rated capacity 200 megawatts) at Hartha Power Station, one of the largest power stations in Basra Governorate and one that is suffering from deteriorating output and operating ratio due to degradation over time, thereby contributing to the economic and social reconstruction of Iraq.

(2) Project Site/Target Area
Hartha, Basra Governorate

(3) Project Component(s)
1) Rehabilitation of the Unit No. 4 (rated capacity 200 megawatts) at Hartha Power Station (repairs of boilers, turbines, control system, generators and insulation, and technology transfer training, etc.)
2) Consulting services (construction supervision assistance, preparation of operation and maintenance manuals, technical assistance, etc.)

(4) Estimated Project Cost (Loan Amount)
20,463 million Yen (Loan Amount: 20,224 million Yen)

(5) Schedule
From February 2015 to September 2019 (total of 55 months). Project completion is defined as the end of construction (October 2018).

(6) Project Implementation Structure
1) Borrower: The Government of the Republic of Iraq
2) Guarantor: None
3) Executing Agency: Ministry of Electricity (MOE)
4) Operation and Maintenance System: MOE

(7) Environmental and Social Consideration/Poverty Reduction/Social Development
1) Environmental and Social Consideration
   ① Category: B
   ② Reason for Categorization: The project is not considered to be a large-scale thermal power generation project, is not located in a sensitive area, and has none of the sensitive characteristics under the JICA Guidelines for Environmental and Social Considerations (April, 2010), and is not likely to have significant adverse impact on the environment.

③ Environmental Permit: Preparation of an Environmental Impact Assessment (EIA) report for this project is not required under Iraqi law.

④ Anti-Pollution Measures: During construction, contaminants will be stored in a temporary tank and separated for treatment to prevent impact on water quality, while low-noise, low-vibration equipment will be used to address these impacts. Once the facilities are in use, atmospheric pollution will be addressed by replacing burners and regulating fuel, measures which are expected to lower pollution from current levels. As a result, no major negative environmental impacts are expected.

⑤ Natural Environment: The project site is not located in or near sensitive areas such as national parks, and adverse impact on the natural environment is assumed to be minimal.

⑥ Social Environment: The improvement project will take place on the existing power station site, and will thus require no new site acquisition or resettlement.

⑦ Other/Monitoring: During construction, MOE will monitor air quality, water quality, noise/vibration, waste treatment, and other environmental factors. Once the facilities are in use, it will monitor air water, and river water quality as well as underground water, waste treatment, and the like.

2) Promotion of Poverty Reduction: N/A

3) Promotion of Social Development (e.g. Gender Perspectives, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for Persons with Disability, etc.): N/A

(8) Collaboration with Other Schemes or Donors

Synergy is expected between the Project and electricity sector training on power station operations and maintenance.

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicators)

Indicator		Baseline (actual value in 2013)	Target (2020) Expected value two years after project completion
Maximum Output (MW)		140	200
Plant Load Factor		70.1	85
Gross Thermal Efficiency (%)		32.9	35
Outage Hours by factor (hours/year)	Mechanical Errors	315.3	0
	Human Errors	0	0
	Periodical Inspection	1,910	1,296
Annual Amount of Net Generation Output (MWh/year)		859,706.4	1,489,200.0

(2) Qualitative Effects

Expected to promote socioeconomic development and mitigate atmospheric pollution.

(3) Internal Rate of Return

Based on the conditions indicated below, the Economic Internal Rate of Return (EIRR) of this project was calculated as 23.1%, while the Financial Internal Rate of Return (FIRR) was 3.6%.

【EIRR】

Costs: Rehabilitation work costs, fuel costs, operation and maintenance expenses (excluding taxes)
Benefits: Difference in economic value between diesel internal combustion engines and petroleum-based power generation
Project Life: 10 years

【FIRR】

Costs: Rehabilitation work costs, fuel costs, operation and maintenance expenses (including taxes)
Benefits: Collected revenue from electricity fees
Project Life: 10 years

5. External Factors and Risk Control

Worsening public security.

6. Lessons Learned from Past Projects

(1) Lessons learned from evaluating similar projects

A lesson cited in the ex-post evaluation for the Mombasa Diesel Generating Power Plant Project in Kenya, for example, was that independent efforts on the part of the executing agency of the project and effective support from the supplier side should be enhanced. A lesson cited in the ex-post evaluation for the Rades Combined Cycle Power Plant Construction Project in Tunisia was that securing operation and maintenance personnel at the executing agency and considering the manner of training must be thoroughly considered. Another lesson comes from the rehabilitation of the No. 2 and No. 3 facilities at the Hartha Thermal Power Station, currently being implemented with support from the World Bank. In this project, the boiler prepared by the contractor (a Russian company) was not compatible with the main unit led to delays in the project, as did a lack of advisors at the worksite.

(2) Lessons for this project

The MOE is the agency in charge of operations and maintenance for this project, and though they have been operating, maintaining, and managing the power station facilities during the period of economic sanctions and on either side of national conflicts, there is a need to further strengthen operation, maintenance, and management systems in order to update engineer knowledge and skills for the current rehabilitation work. Training from the manufacturer is thus included as part of the project. In selecting contractors as well, it is important not only that appropriate machinery, equipment, and materials are secured according to instructions, but also that the contractor’s implementation system is thoroughly confirmed as well.

7. Plans for Future Evaluation

(1) Indicators to be Used

1) Maximum Output (MW)
2) Plant Load Factor (%)
3) Gross Thermal Efficiency (%)
4) Outage Hours by factor (mechanical error, human error, planned outage hours by periodical inspection) (hours/year)
5) Annual Amount of Net Generation Output (MWh/year)
6) Economic Internal Rate of Return (EIRR)

7) Financial Internal Rate of Return (FIRR)

(2) Timing
Two years after the completion of the Project