

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: The Republic of Indonesia

Project: Geothermal Development Acceleration Program (Tulefu Geothermal Power Plant Project (E/S))

Loan Agreement: March 28, 2013

Loan Amount: 5,104 million yen

Borrower: The Republic of Indonesia

2. Background and Necessity of the Project

(1) Current State and Issues of the Power Sector in Indonesia

According to PT. PLN (Persero) (hereinafter referred to as "PLN"), the peak demand for power in Indonesia nationwide in 2011 was 26,664MW, while the installed capacity is 32,898MW and the reserve margin is 23%, far short of PLN's target of 35%. PLN's Long Term Electricity Development Plan (RUPTL) (2011-2020) (hereinafter referred to as "RUPTL") estimates that electricity demand of the country will reach 55,053MW in 2020, annually increasing approximately 8% on average. Thus alleviation of stringency in power demand is an urgent issue.

Maluku Province, the target area of the Project, is one of the poorest areas in Indonesia, and the electrification rate is 70.80%, which is below the national average (72.95%). Moreover, further expansion of electricity consumption is expected due to economic growth and industrial development under the stable security. In the Ambon system, which covers Ambon City, the capital of Maluku Province, the peak demand for power in 2011 was 43.3MW, accounting for approximately 56% of the total power demand of the province, and it is expected to reach 72.9MW in 2016. On the other hand, installed capacity remains 56.2MW. Thus, the construction of new power plants is urgently required.

(2) Development Policies for the Power Sector in Indonesia and the Priority of the Project

To meet the increasing power demand and to mitigate climate change, the Indonesian government is promoting energy diversification policy, including the promotion of renewable energy development. Presidential Regulation No.05/2006 targets the energy mix of new and renewable energy from 4.6% in 2003 to 17% by 2025 (including 5% (9,500MW of geothermal energy)). Indonesia has one of the highest potential of geothermal resources in the world, and the second "Crash Program" established in January 2010, plans approximately 10,000MW of power plant development, including 4,757MW from geothermal, with the aim of increasing power supply, diversifying power sources and introducing renewable energy.

The Geothermal Development Acceleration Program (Tulefu Geothermal Power

Plant Project (E/S)) (hereinafter referred to as “the Project”) is mentioned in the said second “Crash Program”, and will supply power to Maluku Province, one of the poorest provinces in Indonesia, in order to stabilize the electricity supply. Promoting the renewable energy development, the Project is consistent with the energy mix policies.

(3) Japan and JICA’s Policy and Operations in the Power Sector

The Government of Japan considers “support for disparity reduction and building of a safe society” as one of the priority areas in the “Country Assistance Policy for Indonesia” (April 2012), it emphasizes “disparity alleviation and connectivity development” as one of the development issues. It specifically prioritizes “the program for rural development and development of hub urban district” as one of the cooperation programs. JICA Country Analytical Work for the Republic of Indonesia also analyzes “stable electricity supply, improvement of reliability” and “reduction of impacts on the global environment” as key development issues. Therefore, the Project is consistent with such policies and analyses. In the power sector of Indonesia, JICA has provided 116 loans (total commitment of 908,792 million yen). Concerning technical cooperation, assistance has been provided for geothermal development and energy-saving policies have been provided. Related to the Project, “Capacity Building for Enhancement of the Geothermal Development” (2010-2013) is being implemented in order to support data collection and its analysis of geothermal resources.

(4) Other Donors’ Activity

The World Bank expresses the necessity of power plant capacity to meet the increasing power demand in the “Country Partnership Strategy (2009-2012)”, and recently strengthened assistance for geothermal power development by considering the assistance on geothermal fields in Uluberu (Sumatra Island) and Lahendong (Sulawesi Island), to which JICA previously provided ODA loans to the existing plants. Asian Development Bank aims at promoting renewable energies and improving the efficiency of power transmission based on “Country Operations Business Plan (2012-2014)”, and has considered the assistance to geothermal fields in Sungai Penuh (Sumatra Island) and Mataloko (Flores Island) since 2011.

(5) Necessity of the Project

As mentioned above, the Project is consistent with the country’s issues and development policies, as well as the assistance policies of Japan and JICA. Therefore it is highly necessary and relevant for JICA to provide assistance through the Project.

<h2>3. Project Description</h2>

(1) Project Objective

The objective of the project is to improve the stability of power supply and ease the stringency of power demand in the Ambon and other systems, by constructing the

Tulehu Geothermal Power Plant and by supporting drilling works at potential development sites, thereby contributing to the betterment of the living standards as well as economic growth of the regions by improving the investment climate and to the mitigation measures against climate change through the development of a renewable energy source and reduction of greenhouse gas emissions and air pollution.

This loan covers Engineering Services of the Project, including detailed design, and accelerates the smooth implementation of the Project

(2) Project Site/Target Area: Ambon Island, Maluku District, Maluku Province

(3) Project components

- 1) Consulting Services (project management, geothermal resource analysis, review of detailed design, tender assistance, supervision, environmental monitoring, technology transfer)
- 2) Exploratory well drilling for the Project (4 wells)
- 3) Exploratory well drilling in the future development site (3 wells)
- 4) Well drilling
- 5) Power plant with Facilities for Collecting and Reducing Steam (FCRS), and other related facilities

This loan will be provided for above 1), 2) and 3) above as the engineering services (E/S) loan for the Project.

(4) Estimated Project Cost (Loan Amount)

6,703 million Yen (Loan Amount: 5,104 million Yen)

(5) Schedule

March 2013 – November 2018 (69 months in total)

The Project will be deemed completed when the disbursement is completed (November 2018).

(6) Project Implementation Structure

- 1) Borrower: Republic of Indonesia
- 2) Executing Agency: PT. PLN (Persero)
- 3) Operation and Maintenance System: Ditto

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

1) Environmental and Social Consideration

- ① Category: B
- ② Reason for Categorization: This Loan is for Engineering Services, and it does not fall under Category C, according to “the JBIC Guidelines for Confirmation of Environmental and Social Considerations (established in April, 2002).
- ③ Environmental Permit: The environmental management plan (UKL) and environmental monitoring plan (UPL) were already approved by the Environment Protection Department of Central Maluku District in March 2010.
- ④ Anti-Pollution Measures: Environmental impact assessment and mitigation measure of hydrogen sulfide (H₂S) will be considered in this engineering services.

- ⑤ Natural Environment: The project area is not located in and around any sensitive areas such as national parks, and it is likely to have a minimal adverse impact on the natural environment.
 - ⑥ Social Environment: The Project involves land acquisition of approximately 7ha maximum, and the steps will be taken in accordance with Indonesia's domestic law. No resettlement is expected.
 - ⑦ Other/Monitoring: In the Project, PLN will monitor the environmental impact including air, water quality, or noise level, during construction and operation.
- 2) Promotion of Poverty Reduction (e.g. Gender Perspective, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for the Person with Disability, etc.): To be confirmed at the appraisal of the construction loan
 - 3) Promotion of Social Development (gender consideration, prevention measures of HIV and other infectious diseases , participatory development, consideration for disabilities, etc.): The necessity of HIV prevention measures for construction workers will be confirmed during the construction by considering scale of the Project.
- (8) Collaboration with Other Donors: None in particular
- (9) Other Important Issues: The Project enhances the reduction of GHG emission, thus contributing to mitigation of climate change.

4. Targeted Outcomes

(1) Quantitative Effects

- 1) Performance Indicators (Operation and Effect Indicator): To be finalized by loan for construction
- 2) Internal Rate of Return: To be finalized by loan for construction

(2) Qualitative Effects

Betterment of the living standards by stable power supply, improvement of the investment climate, reduction of impacts on the global environment

5. External Factors and Risk Control

None in particular

6. Lessons Learned from Past Projects

(1) Lessons from similar projects

According to the ex-post evaluation of Philippine's "Tiwi Geothermal Power Plant Complex Rehabilitation Project", it is lessoned that it is important to have adequate development and rehabilitation plan which keep the balance of geothermal reservoirs and to ensure country's strong commitment for the implementation of the Project.

(2) Lessons applicable to the Project

The Project will ensure the sustainability of the Project through accurate evaluation of geothermal resources through geothermal reservoir simulation for long-term geothermal development. In addition, the commitment of the country is confirmed as the Project is listed in the second "Crash Program".

7. Plan for Future Evaluation

(1) Indicators to be Used

To be finalized by loan for construction

(2) Timing

To be finalized by loan for construction