

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: The Republic of the Union of Myanmar

Project: Power Distribution System Improvement Project in Major Cities

Loan Agreement: March 1, 2017

Loan Amount: 4,856 million yen

Borrower: The Government of the Republic of the Union of Myanmar

2. Background and Necessity of the Project

(1) Current State and Issues of the Development of the Electric Power Sector in Myanmar

The Republic of the Union of Myanmar (“Myanmar”) has seen rapid growth in power demand due to recent advances in development and investment. The country’s maximum power demand, which was about 2,072 MW in 2015, is expected to increase to 4,531 MW in 2020 (according to the 2014 Preparatory Study for the Electric Power Development Program). The country plans to reinforce its power supply capacity to meet this increasing demand.

Meanwhile, transmission and distribution losses nationwide are as high as 16 percent (FY 2014). In particular, regional cities tend to have high transmission and distribution losses; more than a few regional cities have a loss rate exceeding 20 percent due to delayed facility improvements and upgrades. Since distribution network transformers are very busy, overloading of power generation facilities is prevented by means of planned outages, emergency load shedding, and other efforts. Even if power sources are developed to meet the increasing power demand, such distribution losses and suspended operation of transformers may still give rise to power supply instability. For this reason, Myanmar must urgently improve and upgrade its distribution facilities.

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

Myanmar’s National Energy Policy (2014) gives priority to increasing power generation, transmission, and distribution capacities to achieve sustainable economic development and reduce poverty. The economic policy announced by the new administration led by the National League for Democracy (July 2016), which aims to “achieve equal economic development between states/regions” as a policy target, also prioritizes the “swift development of basic economic infrastructures, such as power supply, roads, and ports.” Myanmar’s government considers the development of power supply infrastructures to be an important challenge.

The Power Distribution System Improvement Project in Major Cities, which aims to improve and upgrade the distribution networks in major cities of Myanmar (hereinafter, “the Project”), thus supports these policies of Myanmar’s government.

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

Japan's economic cooperation policy for Myanmar, which was established in April 2012, places importance on "assisting in the development of infrastructures and systems necessary for sustainable economic growth." JICA's assistance in the realm of power supply includes the Project for Rehabilitation of Baluchaung No. 2 Hydropower Plant (grant aid) and the National Power Transmission Network Development Project Phase I (loan aid). The Project supports these policies because it contributes to Myanmar's sustainable economic growth by improving power supply in major regional cities.

(4) Other Donors' Activities

The Asian Development Bank (ADB) has helped Myanmar formulate the Myanmar Energy Master Plan (officially announced in January 2016) and carried out the Power Distribution Network Improvement Project in Yangon, Mandalay, Sagaing, and other regions since 2014 (ADB signed a 60 million dollar loan agreement in January 2014). The World Bank (WB) has helped the country formulate the National Electrification Plan (which has yet to be officially announced by the Myanmar government) and carried out the National Electrification Project nationwide (WB signed a loan agreement to loan 400 million dollars out of the total project cost of 567 million dollars in November 2015).

(5) Necessity of the Project

The Project, which improves and upgrades distribution networks in major cities of Myanmar, is consistent with the country's development challenges and policies as well as Japan's aid policies and will help the country to provide better access to electric power. Since the Project is considered to help achieve Sustainable Development Goal 7—to ensure access to affordable, reliable, sustainable, and modern energy for all—JICA's assistance is highly necessary.

3. Project Description

(1) Project Objective(s)

The objective of the Project is to improve the reliability of power supply by repairing and reinforcing the existing distribution facilities in major cities in Myanmar, thereby contributing to economic development of Myanmar.

(2) Project Site/Target Area

11 major local cities (Patheingyi, Bago, Pyaw, Bhamo, Loikaw, Magway, Mandalay, Mawlamyaing, Monywa, Taunggyi, and Dawei)

(3) Project Components

- 1) Construction and upgrading of 33/11 kV and 66/11 kV substations
- 2) Installation, augmentation, and improvement of 33 kV and 66 kV distribution lines
- 3) Procurement and installation of reliability improvement equipment
- 4) Procurement of utility vehicles
- 5) Provision of consulting services (including detailed design, bidding assistance, and construction supervision)

(4) Estimated Project Cost (Loan Amount)

5,364 million yen (including an ODA loan of 4,865 million yen)

(5) Schedule

From March 2017 to March 2021 (49 months). The Project will be deemed complete once the substations are put into service (March 2020).

(6) Project Implementation Structure

- 1) Borrower: The Government of the Republic of the Union of Myanmar
- 2) Guarantor: N/A
- 3) Executing Agencies: Electricity Supply Enterprise, Ministry of Electricity and Energy (ESE) and the Mandalay Electricity Supply Corporation (MESOC)
- 4) Operation and Maintenance System: Electricity Supply Enterprise, Ministry of Electricity and Energy (ESE) and the Mandalay Electricity Supply Corporation (MESOC)

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

1) Environmental and Social Considerations

- ① Category: B
- ② Reason for Categorization: The Project is not considered to have significant adverse impacts on the environment because it is not a large-scale power transmission and distribution line project as described in the JICA Guidelines for Environmental and Social Considerations (effective as of April 2010). Also, this Project is not associated with sensitive characteristics or areas as described in the Guidelines.
- ③ Environmental Permit: Myanmar's laws do not require the preparation of an environmental impact assessment (EIA) report concerning the Project.
- ④ Anti-Pollution Measures: Although the Project is expected to have adverse environmental impacts (e.g., waste, air, and water pollution) and other problems during construction work in addition to noise and other problems after the start of service, such adverse environmental impacts will be minimized by taking appropriate measures: during construction work, reuse and recycling of polyethylene containers and signboards, water sprinkling, and leachate treatment; after the start of service, proper maintenance of noise reduction equipment.
- ⑤ Natural Environment: Since the project sites are not in or near sensitive areas, such as national parks, the Project is considered to have minimal adverse impacts on the natural environment.
- ⑥ Social Environment: The Project does not involve land acquisition or resident resettlement because it only improves and upgrades existing facilities.
- ⑦ Other/Monitoring: During construction work, the builders will monitor air and water quality, waste generation, and other problems. After the start of service, the executing agencies will monitor noise and other problems.

2) Promotion of Poverty Reduction: N/A

3) Promotion of Social Development: Since more female technical staff members are

expected to be hired to work at the new substations constructed in the Project, environmental arrangements necessary for hiring female staff members (installation of women's lavatories) will be made at the new substations.

(8) Collaboration with Other Donors

In some cities targeted by the Project, ADB is also carrying out the Power Distribution Network Improvement Project. JICA and ADB have already made arrangements to avoid overlapping assistance sites according to the project list for the Five-year Distribution System Development Plan, which JICA helped Myanmar formulate in the 2015 Preparatory Study for the Power Distribution System Improvement Project in Major Cities.

(9) Other Important Issues: Since the Project will reduce power losses and eliminate the need for additional power generation to compensate for such power losses by improving distribution systems, the Project will help reduce greenhouse gas emissions; it is expected to reduce greenhouse gas emissions by about 23,747 tons of carbon dioxide equivalent per year.

4. Target Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

Indicator	Baseline (Recorded in 2014)	Target (2022) (2 years after completion)
Transformer capacity (MVA)*1	653	1,418
Transformer operating rate (%)*2	69	76
Amount of power sold (GWh/yr.)	1,160	2,103
SAIFI*3 (No. of interruptions/yr./customer)	N/A	0
SAIDI*4 (length of interruptions (min.)/yr./customer)	N/A	0
Rate of distribution losses (%)	13.7	13.4

*1: The total of the capacity of all transformers to be introduced in the cities targeted by the Project and the capacity of all transformers to be introduced with Myanmar's government funds

*2: Calculated based on the estimated power demand for the cities targeted by the Project and the projected transformer capacity*1

*3: System Average Interruption Frequency Index (the annual average number of interruptions experienced by each customer) (the number of customers used for the

denominator is the number of residents in the cities targeted by the Project)

*4: System Average Interruption Duration Index (the annual average duration of interruptions experienced by each customer) (the number of customers used for the denominator is the number of residents in the cities targeted by the Project)

(2) Qualitative Effects

Stable domestic power supply and promotion of economic and social development

(3) Internal Rate of Return

Based on the conditions indicated below, the Economic Internal Rate of Return (EIRR) is 30.2%, while the Financial Internal Rate of Return (FIRR) is 8.9%.

【EIRR】

Cost: Project costs (excluding tax) and operating, administrative, and maintenance costs

Benefit: Increased power supply

Project life: 30 years

【FIRR】

Cost: Project costs and operating, administrative and maintenance costs

Benefit: Revenue from sales of electric power

Project life: 30 years

5. External Factors and Risk Control

N/A

6. Lessons Learned from Past Projects and Application of Lessons Learned to the Project
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(1) Lessons Learned from Past Projects

The ex-post evaluation of the Distribution System Reliability Improvement Project for Thailand (evaluated in 2009) indicated that project delays were partially attributable to a delay in obtaining permission from other government agencies; this was caused by burying power lines, which interfered with road construction and preservation of historical structures. The project taught JICA the lesson that it is necessary to draw up project schedules based on the progress of past projects and to discuss how to prevent project delays.

(2) Application of Lessons Learned to the Project

The Project involves installing transformers and utility poles along roads, which may require prior negotiations with local authorities who administer roadside trees and roads. Based on the aforementioned lesson, JICA has already decided to secure the time necessary for the executing agencies to have negotiations with the relevant authorities so that the process of obtaining the necessary permissions will not delay the Project.

7. Plan for Future Evaluation

(1) Indicators to Be Used

- 1) Transformer capacity (MVA)
- 2) Transformer operating rate (%)
- 3) Amount of power sold (GWh/year)
- 4) SAIFI (No. of interruptions/yr./customer)
- 5) SAIDI (length of interruptions (min.)/yr./customer)
- 6) Rate of distribution losses (%)
- 7) EIRR (%)
- 8) FIRR (%)

(2) Timing of the Next Evaluation

Two years after the completion of the Project