Japanese ODA Loan

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: India
Project: Andhra Pradesh Rural High Voltage Distribution System Project
Loan Agreement: June 16, 2011
Loan Amount: 18,590 million yen
Borrower: The President of India

2. Background and Necessity of the Project

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

With its recent fast-paced annual economic growth of more than 8%, energy consumption in India has been increasing, which has made the country become the fifth largest energy consumer in the world. However, energy supply has not caught up with energy demand (FY2010: April 2010 - March 2011): serious shortage of electricity supply, 10.6% in the total requirement, 12.1% in the peak demand). In addition, a high rate of power transmission loss (FY2010: 25.5% on average for entire India) and frequent power cuts have become serious problems with respect to power supply.

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

Under the Eleventh Five-Year Plan (April 2007 to March 2012), the Government of India plans on developing new power sources of 78,600 MW, establishing power transmission facilities, and reducing transmission loss (reducing to 15%). In addition, during the Tenth Five-Year Plan, in order to improve the High Voltage Distribution System, the Government of India also launched the "Accelerated Power Development and Reform Programme" (APDRP) and continued to improve the High Voltage Distribution System (HVDS) in the rural area under the "Restructured Accelerated Power Development and Reform Programme" (R-APDRP). As the "Andhra Pradesh Rural High Voltage Distribution System Project" (hereinafter referred to as "the Project") aims to improve distribution systems, the Project therefore supports the aforementioned reform programs.

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

In Japan's Country Assistance Programs for India, "Promotion of Economic Growth" has been identified as one of the priority areas. Accordingly, JICA has set the "Promotion of Sustainable Growth through the Development Assistance to the Infrastructure" as a prioritized area. In order to deliver stable and efficient supply of electric power, strengthening power supply capacity as well as power transmission capacity is necessary. JICA's primary assistance includes establishing highly efficient power supply facilities (power stations and transmission/distribution systems), improving efficiency of the existing old power facilities, and reducing power transmission losses, which are all consistent with the Project's objective. As for the past Japanese ODA loan projects to India in the energy sector, there were 69 projects totaling 966.6 billion yen (31% of the total loan amount). With regard to the State of Andhra Pradesh (AP State), the "Transmission System Modernization and Strengthening Project in the Hyderabad Metropolitan Area" assists in establishing transmission lines and substations. As for technical cooperation, JICA conducted development study titled the "AP State Power Distribution Improvement Planning Study" and the "Thermal Power Generation Management Improvement Planning Study."

(4) Other Donors' Activities

The World Bank and the Asian Development Bank (ADB) have been supporting not only the power sector reform in each state, but also projects related to the establishment of transmission and distribution systems, strengthening of the capacity of state electric power corporations, development of hydroelectric power generation, and energy efficiency improvement.

(5) Necessity of the Project

In recent years, AP State, primarily the state capital Hyderabad, has become the center for IT and bio-medical industries. This trend led to an increase in the number of office buildings, factories and population, causing a sharp rise in the demand for electric power in urban areas. As AP State is located in the Deccan Plateau, agriculture has traditionally been prospering, and an increase in the demand for electric power in rural areas is prominent due to the development of electric irrigation pumps throughout the State. In order to narrow the huge gap between electric power supply and demand, it is necessary not only to increase the electric-generating capacity, but also to establish efficient distribution systems.

As AP State is one of the most agricultural states in India, power supply to agriculture accounts for approximately one-third of the total power supply, which is mainly used for approximately 2.7 million irrigation pumps. Since electric power is supplied to the irrigation pumps using low-voltage lines through large-capacity transformers, electricity is likely to be stolen and the lines are more likely to cause distribution losses compared to high-voltage distribution lines. In addition, considerable voltage fluctuations cause damages to the irrigation pumps, which hinders farm work and puts burden on farmers to spend money on pump repair fees. As a result, in order to stabilize power supply and agricultural production for the entire state of AP, it is necessary to urgently promote an efficient way of supplying electric power for agriculture.

In this environment, JICA's assistance for the Project is considered necessary and appropriate as the Project aims to reduce distribution losses in electric power supply to agriculture and to provide stable electric power supply in AP State by establishing high-voltage distribution systems in rural areas.

3. Project Description

(1) Project Objective

The objective of the Project is to facilitate the reliability and quality of power supply to agricultural services and the reduction of distribution losses by converting Low Voltage Distribution System (LVDS) to HVDS in rural areas of AP State, thereby contributing to securing the stable energy supply in the State and improving the efficiency of agricultural production as well as living standard of the rural population.

(2) Project Site/Target Area

16 districts in the rural areas, State of Andhra Pradesh

(3) Project Components

Out of all the rural areas in AP State subject to the High Voltage Distribution Systems Improvement Plan (including installation of approximately 69,000 km High Voltage Distribution Lines and approximately 195,000 units transformers), the Project focuses on the areas that will highly benefit from the Project and primarily focuses on works that improve HVDS by converting LVDS to HVDS.

1) Procurement of equipment (high voltage distribution lines, small-capacity transformers, supporters, low voltage lines)
2) Civil works that accompany the installation
3) Consulting services (assistance for monitoring of implementation)

(4) Estimated Project Cost (Loan Amount)

27,480 million yen (Loan Amount: 18,590 million yen)

(5) Schedule

June 2011 – December 2016 (67 months); Project completion is scheduled in January 2016, which is the expected time for commencement of commercial operation.

(6) Project Implementation Structure

1) Borrower: The President of India
2) Executing Agencies: Central Power Distribution Company of Andhra Pradesh Limited; Northern Power Distribution Company of Andhra Pradesh Limited; Southern Power Distribution Company of Andhra Pradesh Limited
3) Operation and Maintenance System: same as 2) above

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

1) Environmental and Social Consideration
   (1) Category: C
   (2) Reason for the Categorization: The Project has a potential minimal negative impact on the environment as per the JBIC Guidelines for Confirmation of Environmental and Social Consideration (issued April 2002).
2) Promotion of Poverty Reduction
   Reduction in the cost of irrigation pump maintenance fees
3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for the Person with Disability, etc.)
   None

(8) Collaboration with Other Donors

None

(9) Other Important Issues

The Project aims to improve energy efficiency by reducing distribution loss, and therefore it will contribute in controlling Greenhouse Gas (GHG) emissions and further in mitigating climate change. The Executing Agency is proactively considering registering the Project for the Clean Development Mechanism (CDM).

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicator)

Indicator	Distribution Company	Baseline (2010)	Target (2017) (2 Years after Project Completion)
Distribution Loss (%)	Central	13.5	8.3
	North	13.0	8.0
	South	13.0	7.5
Reduction in Failure of Distribution Transformers (%)	Central	9.00	1.0
	North	9.11	1.0
	South	7.12	1.0
Unauthorized Number of pump-sets (%)	Central	20.0	0.0
	North	15.0	0.0
	South	15.0	0.0
Improvement in Voltage Profile (% reduction in tail-end voltage drop)	Central	12.0	6.0
	North	14.0	7.0
	South	10.0	6.0
Improvement in Efficiency of End Use Equipment (rated efficiency)	Central	80	95
	North	80	95
	South	80	95

2) Internal Rates of Return

Based on the conditions indicated below, the Economic Internal Rate of Return (EIRR) for the Project is 18.73%.

EIRR
Costs: Project cost (excluding taxes), operation and maintenance costs
Benefit: Effect of reduction of distribution losses
Project life: 30 years

(2) Qualitative Effects

Improvement of living conditions in the rural areas; local economic growth; improvement of power supply and demand in AP State through the improvement of distribution efficiency in the rural areas; mitigation of climate change

5. External Factors and Risk Control

Deterioration of political and economic climate and natural disasters in India and the areas near the Project

6. Lessons Learned from Past Projects

From the ex-post evaluation of previous transmission and distribution projects, for projects to be fully effective, continuous augmentation of facilities as well as optimization of the equipment is necessary after the project completion. Along with the HVDS improvement, the Project also requires optimization of the entire distribution system by resolving overloaded lines and equalizing the load, and therefore monitoring the investment climate related to the improvement of power distribution facilities has been planned.

7. Plan for Future Evaluation

(1) Indicators to Be Used

1) Distribution loss rate (%)
2) Reduction in Failure of Distribution Transformers (%)
3) Unauthorized Number of Pump-Sets (%)
4) Improvement in Voltage Profile (% reduction in tail-end voltage drop)
5) Improvement in Efficiency of End Use Equipment (rated efficiency)
6) Economic Internal Rate of Return (EIRR) (%)

(2) Timing

Two years after project completion