

1. Name of the Project

Country: Republic of India

Project: Transmission System Strengthening Works in Madhya Pradesh

Loan Agreement: March 31, 2016

Loan Amount: 15,457 million yen

Borrower: The President of India

2. Background and Necessity of the Project

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

India's energy consumption has been increasing driven by its rapid economic growth in recent years, and the country has become the fourth largest power consumer in the world (2012). Meanwhile, power infrastructure development has not kept pace with the growing demand. The electricity supply increased to 995,157GWh yet fell short of the demand of 1,048,672GWh by 5.1%, and the electricity generation capacity of 144,788MW also 2.0% fell short of the peak demand, which hit 147,815MW (all figures presented as of FY 2014, Central Electricity Authority (CEA) of India).

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

Under the Twelfth Five Year Plan (from April 2012 to March 2017), the Government of India has continued its efforts from the Eleventh Five Year Plan to promote the power sector reform based on the new Electricity Act; develop power generation capacity, especially through the supercritical-pressure coal-fired power generation system; strengthen power transmission and distribution systems; and facilitate rural electrification. This Project is in line with these policies as it aims to strengthen the wide-area transmission network in Madhya Pradesh State, where the power demand is expected to increase significantly not only in urban areas but also in rural areas due to its rapid industrialization in recent years.

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

Japan's Country Assistance Program for India (May 2006) identifies the "Promotion of Economic Growth" as a priority target. Moreover, JICA's Country Analysis Paper for India (March 2012) also identifies "Support for Sustainable Economic Growth through Economic Infrastructure Development" as a priority issue. In order to increase generation, transmission, and distribution capacity to ensure the stable supply of energy, the paper has three pillars of assistance: developing high-efficiency power supply systems (power plants and transmission and distribution networks); improving the efficiency of existing old facilities; and reducing transmission and distribution losses. This Project is in line with these policies and analysis results. As of the end of September 2015, 84 ODA loan projects, worth 1,319.8 billion yen in total, have been approved for the power sector in India.

(4) Other Donors' Activity

The World Bank and the Asian Development Bank (hereinafter referred to as the "ADB") have been supporting power sector reforms in some states as well as the development of transmission and distribution networks, the capacity building of state electricity companies, the development of hydropower generation, and the improvement of energy efficiency, among others. In Madhya Pradesh, the ADB provided loans to the implementation agency of this Project, Madhya Pradesh Power Transmission Company Limited (MPPTCL), as well as offered technical assistance and program loans to support the state's power sector reform.

(5) Necessity of the Project

This Project is highly urgent as it aims to strengthen the wide-area transmission network in Madhya Pradesh State, where the power demand is expected to increase significantly not only in urban areas but also in rural areas due to its rapid industrialization in recent years. Moreover, this Project is consistent with the development issues and policies of the Government of India and the assistance policies of Japan and JICA. Therefore, JICA's assistance to the Project is necessary..

3. Project Description

(1) Project Objective

By developing and expanding new and existing power transmission lines and substations across Madhya Pradesh State, this Project aims to ensure the stable operation of the transmission system and realize the reliable transmission of power increased as a result of the development of power generation capacity in the state, thereby contributing to the improvement of the power supply-demand balance in the state.

(2) Project Site/Target Area

The entire state of Madhya Pradesh

(3) Project Components

- 1) Construction of power transmission lines with a total length of approximately 940km (400kV, 220kV, and 132kV), including low-loss conductors
- 2) Construction and expansion of 30 new and existing substations, including the outdoor type gas insulated switchgear (GIS) substations

(4) Project Cost

20,393 million yen (Loan amount: 15,457 million yen)

(5) Project Implementation Schedule

March 2016 - May 2020 (51 months). The project is scheduled to be completed in May 2020 for commencement of commercial operation.

(6) Project Implementation Structure

- 1) Borrower: The President of India
- 2) Executing Agency: Madhya Pradesh Power Transmission Company Limited (MPPTCL)

3) Operation and Maintenance System:

The facilities to be constructed will be transferred in ownership to three regional offices (Indore, Bhopal, and Jabalpur) under the management of the maintenance department of MPPTCL and maintained by their respective areas. MPPTCL inspects and maintains transmission lines at the time of each failure and on a regular basis (every half or one year), depending on the failure and operational condition. MPPTCL also inspects substations on a regular basis.

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

1) Environmental and Social Considerations

- ① Category: B
- ② Reason for Categorization: This project is classified as Category B because it is not in a sector nor does it have characteristics likely to exert impact, nor is it in a sensitive region, and so no significant adverse impact on the environment is considered likely, under JICA guidelines for environmental and social considerations (April 2010).
- ③ Environmental Permit: The Environmental Impact Assessment (EIA) report is not required for this Project under the Indian laws. The forest clearance required for the forest area (approx. 66.4ha) within the project boundaries (covering a total area of approx. 87.5ha) is expected to be obtained by December 2016.
- ④ Anti-Pollution Measures: During the construction period, the negative environmental impact of air, noise, and vibration pollution is to be mitigated by such measures as covering loads on trucks to prevent dust emissions and limiting the speed of construction vehicles. Moreover, during the construction and after the commencement of operations, the impact of land erosion and water pollution is to be reduced by such measures as planting vegetation to protect slopes and avoiding the construction of transmission towers on the steep slopes.
- ⑤ Natural Environment: Although there are national parks and reserves designated by the State Government of Madhya Pradesh in the vicinity of the Project sites, the route of the transmission lines as well as the location of the construction sites will be selected outside these protected areas. Moreover, the lands to be cleared will be reforested in accordance with the forest clearance conditions. These measures are expected to minimize the adverse impact of this Project on the natural environment.
- ⑥ Social Environment: The Project sites, with a total area of approximately 87.5ha, will be transferred from the State Government to MPPTCL. Therefore, this Project will not involve land acquisition or involuntary resettlement. The loss of trees, crops, and other sources of livelihood of residents due to the construction activities of this Project shall be compensated in accordance with India's laws and regulations as well as the JICA guidelines. Although some ethnic minorities designated under India's laws are living in and around the Project sites, no specific impacts on these designated ethnic

minorities were identified in the discussions held with residents in the Project sites. The impact of this Project on these designated ethnic minorities is likely to be minimal since their residential areas and cultural assets are not located on the route of the power transmission lines or within the construction areas. Moreover, no objection has been raised against this Project in the discussions with residents.

⑦ Other/Monitoring: During the construction, the contractors will monitor the quality of air, water, and soil as well as the level of noise and vibration. Meanwhile, MPPTCL will monitor the compensation process for the loss of means of livelihood before and during the construction period.

2) Promotion of Poverty Reduction: None

3) Promotion of Social Development (e.g. Gender Perspective, Measures to Prevent Infectious Diseases Including AIDS, Participatory Development, Consideration for Handicapped, etc.): None

(8) Collaboration with Other Donors

This Project will provide technical assistance to MPPTCL, such as support for the introduction of new technologies (e.g., low loss conductors and outdoor type GIS substations), in order to ensure its smooth implementation and maximize its effects.

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicator)

Indicators		Baseline (actual value in 2014)	Target (2022) [2 years after project completion]
Installed transformer capacity (MVA)	400/220kV	6,720	14,705
	220/132kV	18,470	29,270
	132/33kV	20,246	27,289
Average availability factor (%)	400/220kV substation	99	98
	220/132kV substation	99	98
	132/33kV substation	99	98
Power supplied at sending end (GWh)		56,916	115,180
Power transmission loss rate (%)		2.82	Less than 3.00

(2) Qualitative Effects

Stable operation of the transmission system, reliable transmission of power increased as

a result of the development of power generation capacity, and improvement in the power supply-demand balance in the state by increasing transmission efficiency

(3) Internal Rate of Return

Based on the conditions indicated below, the Economic Internal Rate of Return (EIRR) for the Project is 15.63% and the Financial Internal Rate of Return (FIRR) is 9.86%.

【EIRR】

Cost: Project cost (excluding tax and duties), operation and maintenance expenses

Benefit: Increase in transmission tariff revenue by the enhanced transmission system,
Energy saving due to decreased transmission losses

Project Life: 30 years

【FIRR】

Cost: Project cost , operation and maintenance expenses

Benefit: Increase in transmission tariff revenue by the enhanced transmission system

Project Life: 30 years

5. External Factors and Risk Control

Political and economic instability and natural disasters in India and areas surrounding the Project sites

6. Evaluation Results and Lessons Learned from Past Projects

(1) Results Similar Past Projects

The ex-post evaluation of Anpara Power Transmission System Project (1) and (2) in India extracted a lesson that when new technologies, such as super-high voltage transmission lines, are introduced, a realistic implementation plan should be developed based on a sufficient examination of procedures and standards, such as tender screening criteria, forest clearance procedures, and standards for permission required by the aviation law, since administrative and legal difficulties and obstacles may newly arise in relation to these matters due to the lack of established procedures and standards.

(2) Lessons for the Project

This Project will introduce technologies new to MPPTCL, such as outdoor GIS substations and low-loss conductors; therefore, the Project is planned to support the bidding process (e.g., basic designing and procurement) of these technologies, while ensuring competitive bidding, so that MPPTCL can select appropriate companies which can provide high-quality products and proper construction services. In terms of approval procedures, JICA will monitor the progress of the application of MPPTCL for forest clearance in order to ensure the timely completion of the process.

7. Plan for Future Evaluation

(1) Indicators for Future Evaluation

- 1) Installed transformer capacity (MVA)
- 2) Average availability factor (%)
- 3) Power supplied at sending end (GWh)
- 4) Power transmission loss rate (%)
- 5) Economic internal rate of return (EIRR)
- 6) Financial internal rate of return (FIRR)

(2) Timing

Two years after project completion