

## Ex-Ante Evaluation (for Japanese ODA Loan)

### 1. Name of the Project

Country: The People's Republic of Bangladesh

Project: Renewable Energy Development Project

Loan Agreement: March 10, 2013

Loan Amount: 11,335 million Yen

Borrower: The Government of the People's Republic of Bangladesh

### 2. Background and Necessity of the Project

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

Bangladesh's electricity demand has been increasing in accordance with the recent economic growth, whereas the country's per capita electricity consumption is 252 kWh in 2009 remaining at the lowest level in the world. Electricity supply in Bangladesh is not sufficient with the demand increase, and the supply capacity remains 80% of the demand (5,271MW of installed capacity for electricity supply compared to 6,454MW of electricity demand in peak time). Moreover, all gas-fired generation plants accounting for 80% of the whole installed capacity of power generation rely on natural gas produced in the country, and diversification of energy resources is therefore needed. The household electrification rate in Bangladesh is 50 percent (2012), making the country the second in South Asia after India in terms of its non-electrified population at approximately 95 million people. Looking at the electrification rate in Bangladesh by region, rural areas are merely at 35 percent, compared to 90 percent in urban areas, making the need for electrification particularly high in rural areas. Moreover, the existing customers have frequently experienced voltage fluctuation and sudden power outage in off-peak time due to the lack of transmission and distribution capacity and failure in electric equipment, etc. Based on above, the challenge in the power sector is to facilitate increase of power supply capacity through development of new power sources and efficient operation of existing equipment, in addition to promote diversification of energy resources including introduction of renewable energy and local electrification at the same time.

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

In the "Sixth Five Year Plan" (FY 2011 – 2015), as a measure for the worldwide depletion of fossil fuels and for consideration of the environment, the Government of Bangladesh has set a goal of increasing the amount of renewable energy to 5% of all its electrical power by 2015. In addition, in the "Policy Statement on Power Sector Reform (2000)", the following three goals are set as a long-term vision of the power sector: (a) securing of the supply capacity so that all citizens can use electricity by 2020; (b) reliable electricity supply; and (c) electricity supply at appropriate prices.

The Government of Bangladesh put a high priority on the Project as it is in accordance with these goals..

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

The Japanese Government has intended to play a leading role to solve challenges in energy policies and transformation to green economy, etc. corresponding to the global warming, and put its interim goal until FY 2015 to provide assistance of 3 billion dollars for the area of climate change including renewable energy. In addition, "stable electricity supply" is a priority issue according to JICA Country Analytical Work for Bangladesh (in February 2012) and acceleration of economic growth is one of the priority areas expressed in the Country Assistance Policy for Bangladesh (in June 2012) and JICA Rolling Plan for Bangladesh, deciding its assistance for dissemination of renewable energy in order to respond to the gap between power demand and supply and contributing to increase of electrification ratio. Hence, the Project is in line with these analysis and policy. Major assistance projects conducted in the power sector are as listed below:

- Loans: Grid Substations and Associated Transmission Lines Project (2006), New Haripur Power Plant Development Project (Phase-I) and (Phase-II) (2007 and 2009), Central Zone Power Development Project (2009), Rural Electrification Upgradation Project (2010)
- Technical Cooperation: Project for Strengthening Management and Performance Standards in Power Sector of Bangladesh through promoting of TQM (2006-2009), Master Plan Study on Coal Power Development in Bangladesh (2009 – 2010)

### (4) Other Donors' Activity

The World Bank, Asian Development Bank (ADB), the Islamic Development Bank, Kreditanstalt fuer Wiederaufbau (KfW), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and other donors have provided loans, grant aid, and technical assistance to the Infrastructure Development Company Limited (IDCOL) for the Solar Home System (SHS). With regard to other renewable energy technologies, the World Bank, KfW, the GIZ, etc. implement loans, grant aids, and technical assistance projects for solar irrigation systems, biomass-based power generation, and solar mini-grids in remote areas, etc.

### (5) Necessity of the Project

The IDCOL is working in collaboration with local NGOs and private sectors (sponsor agencies) to spread the SHS in rural areas since 2003, and has installed 1,709,714 systems (cumulative from 2003) as of September 2012, smoothly expanding the program size. In order to address significant needs for power supply expansion in off-grids regions, the IDCOL aims to install 3 million SHS systems in total by December 2015, and estimates 788 million dollars necessary for further dissemination of the SHS from 2013 to 2015. Moreover, the IDCOL is expanding its target of solar irrigation systems, etc., based on its experience in above-mentioned program.

Besides financial assistance, the IDCOL requires assistance for establishing mechanism for technical specifications, etc. The Project aims to promote diversification of power supply sources and increase of power supply through installing renewable energy equipment including the SHS program specifically by providing two-step loan to the IDCOL. As above, the Project meets Bangladesh's challenges and development policy and assistance policy of Japan and JICA, Therefore, its necessity and relevance is high.

### **3. Project Description**

#### (1) Project Objective(s)

The objective of the Project is to promote the increase of power supply and the diversification of energy source, by financing the installation of solar PV power generation and biomass power generation mainly in the rural area of Bangladesh, thereby contributing to sustainable economic development, improvement of the people's living conditions and mitigation of climate change.

#### (2) Project Site/Target Area: Throughout Bangladesh

#### (3) Project Components (Including the Procurement Method)

- 1) In order to implement sub-projects for renewable energy, fund is provided to sponsor agencies in charge of sales and maintenance and management of equipment (the type of ODA loan: two-step loan)
- 2) Consulting services: monitoring, sub-project screening support, technical assistance, etc. (a short list method)

#### (4) Estimated Project Cost (Loan Amount): 26,669 million Yen (11,335 million Yen)

#### (5) Schedule

The Project is planned to be implemented from March 2013 to December 2016 (46 months in total). The Project will be completed upon completion of disbursement (December 2016)

#### (6) Project Implementation Structure

- 1) Borrower: The Government of the People's Republic of Bangladesh
- 2) Executing Agency: Infrastructure Development Company Limited (IDCOL)
- 3) Operation and Maintenance System: Sponsor agencies (IDCOL implements monitoring)

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

##### 1) Environmental and Social Consideration

- ① Category: FI
- ② Reason for Categorization: The Project is designed to provide financing to financial intermediaries. Sub-projects cannot be specified prior to JICA's approval for funding, and they may have environmental impacts under the JICA guidelines for environmental and social considerations. (April 2010)
- ③ Other / Monitoring: In the Project, along with the Bangladesh's domestic law

and the guidelines as described above, the implementation agency classified each sub-project and take measures necessary to each category. Those sub-projects classified as Category A are not expected to be implemented.

- 2) Promotion of Poverty Reduction: the Project contributes to poverty reduction through installation of the SHS targeting the poor as the main beneficiary.
- 3) Promotion of Social Development (e.g. Gender Perspective, Measure for Infectious Diseases Including HIV/AIDS, Participatory Development, Consideration for the Handicapped etc.): Giving priority for funding the capacity development of female technicians in charge of installation and maintenance of the SHS and sponsor agencies making their efforts on disseminating the SHS to schools and hospitals etc., the Project contributes to promotion of social development. .

(8) Collaboration with Other Schemes and Donors

KfW and the GIZ, etc. provide grants to where not covered by the ODA loan. The World Bank and ADB, etc. also provide assistance to the IDCOL.

(9) Other Important Issues

Considering the importance of ensuring appropriate technical specifications and screening capacity, an ODA loan expert is dispatched and provides assistance for establishing a mechanism for technical specifications and a screening manual, etc.

**4. Targeted Outcomes**

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicator)

Indicator (unit)	Baseline	Target (2018) 【Expected value 2 years after project completion】
Yearly Power Generation Volume (MWh/year)	0	63,162
Installed Generation Capacity (MW)	0	46.632
Effect of the Reduction of CO2 (CO2 conversion tons/year)	0	40,422

2) Internal Rate of Return

No rate for the Project in whole is calculated as the target sub-projects cannot be selected before the Project implementation. On the other hand, sub-projects with their EIRR over 12% are to issue loans with regard to the project components other than the SHS. EIRR of each sub-project is not calculated in the SHS program. However, a result of a trial calculation based on a sample shows approximately 45 %.

(2) Qualitative Effects

Sustainable economic development, livelihood improvement, and climate change mitigation.

## **5. External Factors and Risk Control**

n/a

## **6. Evaluation Results and Lessons Learned from Past Projects**

### (1) Evaluation Results of similar projects

When several implementation agencies (financial institutions) intervene in a case of two-step loan, it is effective to address demand for fund and size according to sponsor agencies targeted by each agency in a flexible manner, not standardizing the size of project and sub-loan condition. The lessons have been learned from the result of Ex-post evaluation of “Small & Medium Industries Development Corporation” in Malaysia, etc.

### (2) Lessons for the Project

Based on the lessons as described above, the Project brings flexibility to the loan condition by each sponsor agency according to their cumulative amount of loans in the SHS program.

## **7. Plan for Future Evaluation**

### (1) Indicators to be Used

- 1) Yearly Power Generation Volume (MWh/year)
- 2) Installed Generation Capacity (MW)
- 3) Effect of the Reduction of CO<sub>2</sub> (CO<sub>2</sub> conversion tons/year)

### (2) Timing of Next Evaluation: 2 years after project completion

END