People's Republic of Bangladesh

FY2017 Ex-Post Evaluation of Japanese ODA Loan

"Central Zone Power Distribution Project"

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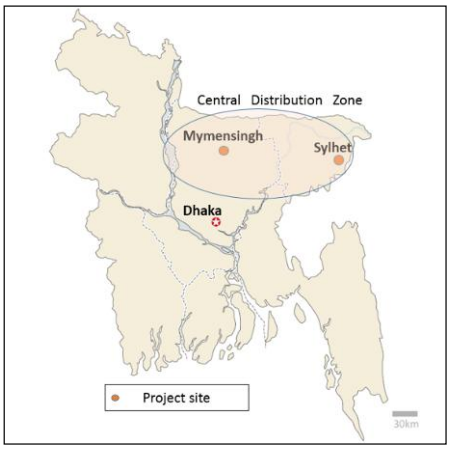
0. Summary

This project was implemented with the aim of ensuring a stable power supply through improvement of the power distribution network in the central zone of Bangladesh and support for strengthening the institutional capacity of the executing agency which planned to be unbundled as a part of the power sector reform. Its objective was consistent with the development policy of Bangladesh, which aims for stable and reliable power supply, Bangladesh's development needs including development of a power distribution network that could withstand the ever-increasing demand accompanying economic growth, and Japan's ODA policy. As such, its relevance is high. While project cost was within the plan, project period exceeded the plan due to the increase of outputs and the delays in tendering and each step of facility development. Therefore, the efficiency of this project is judged as fair. Through the implementation of this project, the maximum demand served in the target area increased, the frequency and duration of system interruptions and distribution loss rate decreased, and the reliability of power supply improved. This means that the project goal, providing a stable power supply, has achieved. These effects have a positive impact on stimulating the regional economy, local residents' daily lives. Since the planned unbundling of the executing agency did not materialize, support for strengthening its institutional capacity was not implemented. However, there was confirmed improvement in commercial indicators such as sales, number of customers and billing collection rate through the increase of the power supply. Therefore, the effectiveness and impact of this project are high. Although the state of maintenance of the facilities developed in this project is largely good and there are no issues with financial conditions, some minor concerns with the O&M system and technical capacity of the executing agency have been confirmed. Therefore sustainability of the project effects is fair.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Locations

Rehabilitated Substation (Tangail, Sylhet)

1.1 Background

At the time of appraisal, power demand was growing in Bangladesh along with steady economic growth of 5-6% annually. Meanwhile, power facilities could not keep up with demand growth – there was a supply-demand gap as of 2006 in which peak power demand was about 4,700 MW while the actual available capacity of power supply facilities was only about 3,800 MW. Maximum output of the power plants was significantly lower than the maximum demand served due to aging and other factors and the plans for new power plants were not carried out as planned because of delays in plant investment. In addition, there were concerns about the supply-demand gap widening since power plants in operation were planned to be shut down due to aging. Moreover, electrification rate in the country was low at 42% and the per capita electricity consumption of 140 kWh/year was one of the lowest in the world[1].

Furthermore, inefficiency was identified as an issue throughout the entire power sector. Electricity tariffs was set lower than cost recovery level due to political considerations. In addition, there were accumulated unpaid electricity bills from the government to distribution companies and outstanding debt of distribution companies to the government, impairing the financial soundness of the entire sector. Particularly, the power plants where Bangladesh Power Development Board (hereinafter referred to as "BPDB"), the executing agency of this project, performed maintenance and management achieved only 60% of the original power supply capacity due to inadequate maintenance and fuel supply caused by a lack of personnel and funds, aging of facilities and other factors, despite the power supply shortage.

These circumstances made development of power supply facilities to address the demand expansion an urgent issue, requiring capital investment as well as sector reform at each segment of power generation, transmission and distribution.

[1] document provided by JICA

In light of the situation discussed above, towards the provision of a stable power supply, this project was conducted to support developing power distribution facilities for the central zone as well as establishing the institutional setting of the new distribution company to be separated from the executing agency.

1.2 Project Outline

The objective of this project is to provide stable power supply in the target areas by developing/rehabilitating power distribution network facilities, and by strengthening the institutional capacity of new distribution company to be established, thereby contributing to stimulate regional economic activities and improvement of living standard, in the Central Zone.

Loan Approved Amount/ Disbursed Amount	9,715 million yen / 9,709 million yen	
Exchange of Notes Date/ Loan Agreement Signing Date	February 2009 / March 2009	
Terms and Conditions	Interest Rate	0.01 %
	Repayment Period	40 years
	(Grace Period	10 years)
	Conditions for Procurement	General untied
Borrower / Executing Agency	The Government of the People's Republic of Bangladesh (GOB) / Bangladesh Power Development Board (BPDB)	
Project Completion	May 2016	
Main Contractor(s) (Over 1 billion yen)	Siemens ltd.(India)	
Main Consultant(s) (Over 100 million yen)	-	
Related Studies (Feasibility Studies, etc.)	・Basic data management survey on distribution related facilities in central zone(2007) ・Special assistance for project formulation for Bangladesh Central Zone Power Distribution Project (2008)	
Related Projects	【Technical Cooperation Projects】 ・Power Sector Advisor (Dispatch experts) (2013-2014), (2014-2016) ・Strengthening Management and Performance Standards in Power Sector of Bangladesh through Promotion of TQM (2006-2009) 【ODA Loan Projects】 ・National Power Transmission Network Development Project (February 2013) 【Asian Development Bank】 ・Power Sector Development Program I (2003), II (2004) 【World Bank】 ・Power Sector Financial Restructuring and Recovery Plan (2006) ・Power Sector Development Technical Assistance Project (2004)	

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Hideyuki Takagi, Ernst & Young ShinNihon LLC

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: November, 2017 – January, 2019

Third-country meeting: February 18 – 21 and May 6 – 9, 2018

2.3 Constraints during the Evaluation Study

Based on instructions from the JICA Evaluation Department, the evaluator did not enter Bangladesh for security reasons and a local consultant carried out the entire process of the field study. The evaluator and the local consultant had a preliminary meeting in the third country (Thailand) before the field study to share information on the evaluation policy of the project and the method of the field study. In the meeting, in order for the local consultant to accurately understand and be able to collect information necessary for the 5 evaluation and analysis items, materials prepared by the evaluator such as a questionnaire to the executing agency and an information collection checklist to be used in the site survey were used, so as to ensure the completeness of the collection of information and the quality of information collection used in analysis.

3. Results of the Evaluation (Overall Rating: B[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Consistency with the Development Plan of Bangladesh

At the time of appraisal of the project, the basic document of development strategy, *Unlocking: National Strategy for Accelerated Poverty Reduction*(2005), which was equivalent to the country's *Poverty Reduction Strategic Papers* (hereinafter referred to as "PRSP"), positioned the power sector as important infrastructure for economic growth leading to poverty reduction while addressing the need for power sector reform. The basic direction was also followed in the New PRSP formulated in 2008[4]. At that time, *Power Statement on Power Sector Reforms* (2000), which indicated the direction of the power sector, laid out a long-term vision through three points as follows: securing power supply capacity enabling all people to use electricity by 2020, provision of a high-quality and reliable power supply, and provision of a power supply with reasonable tariffs. Furthermore, sector reform to unbundle the vertically

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③: High, ②: Fair, ①: Low

[4] Source: document provided by JICA

integrated BPDB into generation, transmission and distribution segments was promoted and the *Power Sector Road Map* formulated with the support of ADB planned to sequentially unbundle the generation segment and then distribution segment of BPDB. This Road Map also defined the action plan and schedule to change BPDB itself to a holding company[5].

7th Five Year Plan 2016-2020 (2015), as of the ex-post evaluation, indicates that an efficient and inexpensive power infrastructure is necessary in order to maintain the development of the country's international competitiveness. It also aims to reduce transmission and distribution losses and increase electrification rate in rural areas with the increase of the efficiency of power transmission and distribution[6]. *The Power System Master Plan 2016* formulated in 2016 also aims for Bangladesh to be a high-income country by 2041, and discusses the establishment of a high-quality electricity network to support its long-term economic development.

Meanwhile, in accordance with the power sector reforms planned at the time of appraisal, part of the plan to unbundle segments to each area has been implemented by the time of ex-post evaluation. However, it was pointed out that the effect of unbundling BPDB could not be sufficiently confirmed and progress stalled following discussion by management. At the time of ex-post evaluation, the plan to proceed on BPDB reform as a holding company is summarized anew as a report in December 2017[7], and there has been no major change in the direction of reform.

As stated above, the development plans of Bangladesh have positioned the infrastructure development of the power sector as an important area which contributes to economic growth since the time of appraisal through the time of ex-post evaluation. Moreover, they have aimed to promote a continuously highly reliable power supply, which is consistent with this project's aim of providing a stable power supply by developing power distribution facilities. Although progress of unbundling BPBD as a part of the power sector reform was stalled during the project implementation as its meaning was called into the questioned, future roadmap are being newly discussed at the time of ex-post evaluation, and it was also confirmed that there are no changes to its objective.

3.1.2 Consistency with the Development Needs of Bangladesh

In Bangladesh at the time of appraisal, peak power demand was increasing at about 8% per year along with steady economic growth, and was expected to increase to about 6,600 MW in 2010. Due to the supply-demand gap, power supply was already being restricted out of necessity mainly around the peak time in each area and 1,400 hours of planned power outages

[5] Source: documents provided by JICA
[6] Source: Website of *7th Five Year Plan 2015-2020* (http://www.plancomm.gov.bd/wp-content/uploads/2015/10/7th_FYP_18_02_2016.pdf), accessed on August 2, 2018.
[7] Source: documents provided by executing agency

were implemented in 2005. Accordingly, approximately 4,200 MW by 2012 and 11,400 MW by 2020 of new power source development and the associated power transmission facilities were required. However, the capital investment for the aforementioned forecast demand was delayed due to the delay in financing. Even in the distribution segment, the average distribution loss rate nationwide was high at 19.3%[8] due to deterioration of facilities, poor meter reading, power stealing, etc., thus it was a challenge to improve those problems. Furthermore, the distribution loss rate of BPDB (20%) and of Dhaka Power Supply Agency[9] (30%) were higher than the one of converted public companies such as Dhaka Power Supply Company (16.6%) and the Western Power Distribution Company (18.9%). As a result, the necessity of sector reform to improve efficiency through conversion to a public companies has been pointed out[10].

Table 1 shows the capacity of power supply and peak demand of Bangladesh and the target area, namely Mymensingh and Sylhet, after 2014. Both total power supply capacity and peak power demand are in an increasing trend, and it is expected that peak power demand will continue to increase with the country's economic growth in the future. The distribution loss rate has improved year by year (see Table 2), and efficiency seems to have been improved, however, the distribution loss rate of BPDB is still higher than other distribution companies. As such, even at the time of ex-post evaluation, development of the distribution network towards stable power supply in the target areas is still needed.

Table 1 Capacity of power supply and peak demand in Bangladesh

	2014	2015	2016	2017
Capacity of power supply (MW)				
Bangladesh	10,416	11,532	12,365	13,846
Mymensingh	376	441	706	706
Sylhet	175	260	385	405
Peak Demand (MW)				
Bangladesh	8,488	8,124	9,286	9,507
Mymensingh	N.A.	394	441	499
Sylhet	N.A.	156	204	231

Source: prepared based on questionnaire

Table 2 Average distribution loss rate

	2014	2015	2016	2017
BPDB	11.9%	11.2%	10.7%	9.0%
Dhaka Power Distribution Company Limited	9.0%	9.5%	9.2%	8.4%
Dhaka Electric Supply Co. Ltd	8.4%	8.3%	8.0%	7.2%
North-west Power Generation Company Ltd	11.0%	10.3%	10.0%	9.6%

Source: prepared based on questionnaire

[8] Transmission and distribution loss rate in South East and South Asian countries were as follows; 11.3% in Indonesia (2004), 13.1% in Philippine in 2005, 12.1% in Vietnam (2004), 8.2％ in Thailand (2004), 31% in India (2004). Source: document provided by JICA

[9] Dhaka Power Supply Agency was renamed to Dhaka Power Distribution Company Limited in October 2005 following the reorganization.

[10] Source: document provided by JICA, data shows the figures as of 2005.

3.1.3 Consistency with Japan’s ODA Policy

In Japan's *Bangladesh Country Assistance Program* (2006), in addition to the lack of capital investment in the power sector, issues such as inefficient management by government agencies, improper electricity tariff levels, and unpaid electricity charges were pointed out. In response to those issues, the program focused on areas including "support for policies, management, operating, financial improvement of the entire power sector", "support for expansion of power generation facilities to reduce the supply-demand gap" and "support of efforts to reform the power transmission and distribution sector". JICA also positioned the power sector as a priority area for "development of economic infrastructure" raised as a development issue under "economic growth", one of the priority objectives for assistance in Bangladesh. This project aimed at providing the stable power supply through the improvement of power distribution network, thus it is consistent with the priority items of Japan’s support to Bangladesh.

3.1.4 Appropriateness of the Project Plan and Approach

Considering the project effect of a stable power supply in the target area, output increased dramatically in this project (see “efficiency” for details). The increased cost caused with this increase of the output was covered by utilizing the remaining unused amount of the loan and was borne by the Bangladesh side. Moreover, while the project period exceeded the plan, the increased output was implemented as an additional portion of this project rather than being planned as a new project from scratch, preventing a loss of the time and manifesting the effects of this project. Therefore, this change in the scope was a result of due consideration of the appropriateness of the project plan and approach, and it does not affect the sub-rating of the Relevance.

As stated above, this project has been highly relevant to the Bangladesh’s development plan and development needs, as well as Japan’s ODA policy. Therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

As the main outputs of this project, development of power distribution facilities and consulting service for strengthening institutional capacity were planned. The planned and actual outputs are shown in Table 3. Concerning the development of power distribution facilities, the scope of renovation/construction of distribution feeders and transformers, the number of substations and the number of transformers installed increased significantly. Conversion of 33kV lines which as not included in the plan was added. Consulting services for

strengthening institutional capacity was cancelled because BPDB was not spun off.

Table 3 The plan and actual outputs
(New construction and rehabilitation of core distribution facilities)

Item		Unit	Plan	Actual
Rehabilitation/construction facilities				
Distribution feeder				
33kV Line	Renovation	km	308	377
	Construction	km	98	386
11kV Line	Renovation	km	227	730
	Construction	km	183	565
11kV/0.4kV Line	Renovation	km	281	700
	Construction	km	244	752
0.4kV Line	Renovation	km	616	1,618
	Construction	km	525	1,024
33kV Line（Underground cable）	Construction	km	3	32
Conversion of 11 to 33kV Lines			―	46
Sub station				
33/11kV substation	Renovation	No.	16	26
33/11kV substation	Construction	No.	6	14
2 × 5MVA substation	Renovation	No.	―	12
Transformer (Renovation and construction)				
250kVA transformer	Renovation	No.	393	465
	Construction	No.	451	1,166
100kVA transformer	Renovation	No.	564	640
	Construction	No.	419	1,226
Condenser (Construction)				
3x100kVA, Auto SW		No.	122	As planned
3x 50kVA, Auto SW		No.	65	As planned
3x100kVA, Auto Fix		No.	115	As planned
3x 50kVA, Auto Fix		No.	7	As planned
Equipment and vehicle for maintenance works, others			No detail information	Equipment for maintenance work 100 Note 1, Vehicle 115 Note 2, Function building 2,069m^2

Source: documents provided by JICA and questionnaire
Note 1: 60 Hot stick tools, 40 feeder meters.
Note 2: Six Bucket cars, 83 Motorcycles, Three Jeeps, 23 Pickups.

Reasons for the changes and the details for measures are described as follows.

【Changes of Output from the Original Plan】

Increase of each power distribution facility by expansion of the target areas（12[11]⇒40 units）

Reason: Though the project cost at the time of appraisal was 8,868 million yen, the actual contract amount was only 5,055 million yen due to the effect of competitive bidding

[11] Units formally means Electric Supply Unit. It shows the power distribution areas and Mymensingh and Sylhet are comprised of 40 units in total.

and fluctuation of foreign exchange rate. Prior to the appraisal of this project, a plan was proposed by the executing agency for all 40 units covering Mymensingh and Sylhet. On the other hand, only 12 units with high priority were planned to be included in this project based on criteria such as urgency and investment efficiency as a result of the Special Assistance for Project Formation Survey. Even in the initial plan, the effect to satisfy the project purpose of this project was expected to be generated, however, in addition to the occurrence of unused loan during the project, demand further increased with the passage of time, thus the expansion of the number of units of facilities was considered in order to generate further effects. As a result, Bangladesh submitted a request to add 28 units which were out of scope of the original plan of the project. The amount required due to this increase was estimated to be 6,241 million yen, and the amount exceeding 4,373 million[12] yen of the unused loan was covered by the Bangladesh side with the consent of JICA, leading to the change.

Effects and appropriateness of the change: As stated above, covering all 40 units was proposed for stable power supply and reliability improvement in the target area, however only 12 units with high priority were targeted in this project. By changing the output, the power distribution network for all 40 units was developed, leading to the achievement of the expected effect as explained as below, and the change is therefore considered to have been appropriate.

Table 4 Planned and actual outputs
（Consulting services for strengthening institutional capacity）

Plan	Actual
Support for strengthening institutional capacity to Newly establish Central Zone Power Distribution Company ・Development of institution framework for each area: human resources, finance/accounting and legal/regulatory ・Formulate systems necessary for beginning institutional management ・Development of business plan ・Conduct baseline survey and assist implementation for development of universal service provision	Cancelled

Source: documents provided by JICA and questionnaire

【Changes of Output from the Original Plan】

Cancellation of consulting service for strengthening the institutional capacity

Reason: At the time of appraisal, as part of Bangladesh's power sector reform, unbundling the central region from BPDP was examined and the implementation of consulting services for new distribution companies to be newly established was planned. However, after the start of this project, the opinion that the effect of unbundling was not as great as

[12] This amount was the sum of contingency (449 million yen) that was recorded at the time of planning and the difference (3,924 million yen) between the project cost (8,868 million yen) at the time of appraisal and the contract amount (5,055 million yen).

expected was raised in the executing agency, and unbundling was temporarily suspended. In addition, following the reconsideration of the effects of unbundling by management and the labour union's approaches, efforts towards unbundling during the project discontinued. Following this, implementation of the consulting services was also cancelled.

Effects and appropriateness of the change: Given that efforts towards unbundling were stopped, implementation of this component is virtually impossible, thus this cancellation is judged to be appropriate. According to the executing agency, there is no effect on the project objectives, such as the provision of a stable power supply, or the project period, etc., due to this change. Part of the funds scheduled to be allocated to consulting services was reallocated to the construction and rehabilitation work of the 33 kV·11 kV line. This was arranged to proceed with the construction work caused by the increase in output without delay, thus it can be said that it was a reasonable change based on its necessity.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was 17,559 million yen, exceeding the initial planned amount (12,737 million yen) (138% compared to the plan) (See table 5). The main reason for the increase was due to the increase in output. However, if the increased planned amount (6,241 million yen) due to the increase in output was added to the planned amount at appraisal, the planned amount after the change of output would be 18,978 million yen[13]. Therefore, the ratio of the planned amount including the increased output and the actual result was 92%, and it was within the plan. Incidentally, within the increased amount, the portion in excess of the unused balance of the ODA loan was borne by the Bangladesh side. As compared with the case where the construction of additional units is implemented as a new project, including additional units into the current project scope by utilizing the unused loan amount was judged to be more efficient in terms of time and cost, and moreover further project effect was expected. As stated above, this change was made by taking into consideration of not only the power situation of the specific area where this project provided the facilities, but also the power situation of the target area as a whole and the subsequent effects, therefore it can be said that there is no problem in its appropriateness.

[13] At the time of appraisal, the ODA Loan amount was 9,715 million yen, of which the equipment and construction cost was 8,979 million yen. On the other hand, the actual contract amount was 5,505 million yen due to competitive bidding price of tendering and fluctuation of the exchange rate. Hence, 3,924 million yen（planned equipment and construction cost (8,979 million yen) minus actual contract amount (5,505 million yen)) was unused. 4,373 million yen, the sum of 449 million yen (the planned contingency cost at the time of appraisal) and 3,924 million yen, was confirmed as unused loan. Among the amount (6,241 million yen) required for the increase in output, the amount exceeding the unused loan amount (4,373 million yen) was borne by Bangladeshi side (1,870 million yen).

Table 5 Planned and actual project cost

(unit: million yen)

	Plan			Actual		
	Foreign Currency portion	Local Currency portion	Total	Foreign Currency portion	Local Currency portion	Total
Material and construction	6,587	2,039	8,626	6,790	6,246	13,036
Consulting services	230	57	287	0	146	146
Price escalation	354	0	354	0	0	0
Interest during construction	2	0	2	0	1,095[Note1]	1,095
Contingency	347	102	449	0	1	1
Land acquisition	0	59	59	0	79	79
Administration cost	0	486	486	0	197	197
Duties and taxies	0	2,475	2,475	0	3,005	3,005
Total	7,520	5,217	12,737	6,790	10,769	17,559

Source: documents provided by JICA, questionnaire

Note 1: Interest during construction significantly exceeded the plan even when compared with other items. This is because the amount at the time of appraisal assumed the interest payment amount to JICA, while the actual result is the amount including the interest related to additional cost born by Bangladesh side. The amount paid (actual result) to JICA was 1.09 million yen, which was 55% of the plan.

Note 2: Exchange rate 1 Bangladesh Taka (BDT) = 1.56 yen (as of plan), 1 BDT = 1.26 yen (Actual) based on the IFC annual average rate of project implementation period

3.2.2.2 Project Period

The project period[14] of this project was planned to be 37 months, however, in fact it took 87 months from March 2009 to May 2016, which was significantly longer than the plan (235% of the originally planned project period). The table below shows the planned and actual schedule of this project (Table 6) and the increase in output of each facility and the resulting extended project period (Table 7).

The expansion of 33kV line and 11kV line as well as the number of substations (actual output) that were subject to increase and expansion exceeded the plan by more than 200%. Furthermore, installation of equipment and conversion of 33kV line, which were not included in the plan, were also performed. Considering this increase, it is thought that the implementation period of 235% of the plan was an extension according to the increase of output. The executing agency also explained that the increase of output was necessary to generate the effect in the target area, thus it is was a reasonable period of extension in line with this increase. Meanwhile, as shown in Table 6, the project had already been delayed before the detailed design of the additional component was started, and the construction period of the initial scope also took 34 months (189% of the planned time of 18 months). Hence, the delay has been confirmed, and it can be judged that the project period significantly exceeded the plan.

[14] Project period is defined as the period from loan agreement signing date to the completion month of construction works.

Table 6 Implementing period of this project (Planned and actual)

	Planned	Actual
Loan Agreement	June 2008	March 2009
Detailed design	May - December 2008 (8 months)	January - June 2010 (6 months)
Tendering	September 2008 - December 2009 (16 months)	June 2010 - March 2012 (22 months)
Civil works	January 2010 - June 2011 (18 months)	March 2012 - December 2014 (34 months)
Additional component		
Detailed design	—	June 2012 - February 2013 (9 months)
Tendering	—	January 2013 - February 2014 (14 months)
Civil works	—	December 2014 - May 2016 (18 months)

Source: responses to questionnaire

Table 7 Increase rate of each facility output and extension of project period

	Actual to plan	Extended period caused by increase of output
Extension of distribution feeder	Approximately 200%	20 months
Increase of the number of target substations	22 ⇒ 52 (236%)	24 months
Increase of feeder meter, etc.	Not planned ⇒ 40	12 months
Laying underground cable	Not planned ⇒ 30km	15 months

Source: responses to questionnaire

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

The result of recalculating the internal rate of return was significantly higher than that at appraisal. The reason for the difference between the calculations at the time of appraisal and the recalculation is mainly due to the considerable increase in output as mentioned in "Efficiency", namely that the number of outputs of this project was increased from 12 to 40 units[15]. The calculation at the time of appraisal was reviewed and amended as follows for recalculation:

ŸTo change the starting point of project life from the project completion to the start of the project

ŸTo include the Bangladesh side cost in the total project cost, which was not included in the original calculation

ŸTo change the basis of the calculation of operation and maintenance (O&M) cost from total project cost to construction cost

[15] Therefore, in recalculation, the baseline of benefits has also changed from 12 at the time of appraisal to 40 units.

Table 8 Elements for the recalculation of internal rate of return

Item	Explanation
Number of units	Increased due to the change of plan at implementation
Cost:	
Project cost	Construction cost and expenditures
O&M cost	3% of the construction cost per year
Transmission cost	Transmission cost based on the volume of distribution (cost of distributing electricity increased by new construction plus cost continued after renovation)
Benefit:	
Revenue from sales of electric power	Enhancement of distribution capacity by new construction
	Continued volume of electricity distribution by renewal
Reduction of loss on distribution of electricity	Increased volume of electricity distribution by the reduction of distribution loss
	Avoided cost for the new construction of generation plant (only EIRR)

Source: Prepared by the evaluator based on documents provided by JICA and the executing agency.

(1) Financial Internal Rate of Return (FIRR)

The result of recalculation at the time of ex-post evaluation has risen to 2.5% compared to -0.3% in the result of calculation at the time of appraisal (after correction), however both calculation results are relatively low. This is affected by the policy of the Bangladesh government of keeping electricity usage fees low, which, as described in “financial aspect of sustainability”, is related to a prolonged deficit in BPDB’s financial results.

Table 9 Results of recalculation for FIRR

	At appraisal (corrected)	At ex-post evaluation
FIRR	- 0.3%	2.5%

Source: documents provided by JICA and recalculation by the evaluator

(2) Economic Internal Rate of Return (EIRR)

The result of calculation at the time of appraisal (after correction) was 13.9% and the result of recalculation at the time of ex-post evaluation was 18.1%, both of which are relatively high levels. Based on the calculations, it was confirmed that the project has consistently been cost-effective before and after the project.

Table 10 Results of recalculation for FIRR

	At appraisal (corrected)	At ex-post evaluation
EIRR	13.9%	18.1%

Source: documents provided by JICA and recalculation by the evaluator

Based on the above, although the project cost was within the plan when analysing the planned cost reflecting the increased output, the project period exceeded the plan. Therefore, efficiency of this project is fair.

3.3 Effectiveness and Impacts[16] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

(1) Maximum demand served, system interruption frequency/duration, distribution system loss rate

Baseline before the project implementation, target to be achieved after two years of project completion set at the time of appraisal and actual data after the project completion for each indicator are shown in the table 11.

Table 11 Maximum demand served, system interruption frequency/duration, distribution system loss rate

		Baseline	Target	Actual	
		2007	2 Years After Completion	2016 Completion Year	2017 1 Year After Completion
Maximum demand served (MW)[Note1]	Mymensingh	69	123 (174) [Note2]	441	449
	Sylhet	94	176 (154) [Note2]	204	231
Average system interruption more than 30 minutes (times/year)	Mymensingh	63	11	4	2
	Sylhet	120	50	4	4
Average system interruption more than 30 minutes (minutes/year)	Mymensingh	2,037	400	125	40
	Sylhet	11,481	700	44	47
Distribution system loss (%)	Mymensingh	20.7	11.6	13.1	13.2
	Sylhet	16.4	10.0	12.3	11.6

Source: documents provided by JICA, questionnaire

Note 1: Targets of maximum demand served were calculated based on the collected data in 2007 as the baseline data, with the assumption of power demand increase rate for 2007 to 2012 was 8.6%, and that for after 2013 was 7.8%.

Note 2: In this project, it was confirmed that the target value set at appraisal and the target value (indicated in parentheses) answered by the executing agency through questionnaire during this evaluation are different. However, in the ex-post evaluation, if such change is not confirmed through officially agreed-upon documents, the effectiveness is analysed based on the target value at the time of appraisal in principle. Therefore, analysis in this evaluation was performed based on the target value set at appraisal.

【Maximum demand served】

The maximum demand served in the target area, Mymensingh and Sylhet, has greatly increased and achieved the target value (see Table 11). However, when analysing the achievement status of the target value, it is necessary to consider two points as follows: 1) the output of the power distribution network facility increased to more than 200% of the

[16] Sub-rating for Effectiveness is to be put with consideration of Impacts.

plan, and 2) two years from the project completion (set as the timeframe to confirm the target value) have not yet elapsed at the time of the ex-post evaluation due to the delay.

Upon confirmation with the executing agency about the increase of output, the target value was not re-examined when the project scope was increased, and it was accordingly not possible to perform an accurate analysis. Meanwhile, as described in "3.2.1 Output", the scope of distribution network facilities increased by approximately 200%. If the increase in the output is prorated to the target maximum demand served[17], the target value can be assumed to be about 325 MW for Mymensingh and 239 MW for Sylhet. As a result, it can be said that about 138% in Mymensingh and about 97% of the Sylhet of the target value were achieved one year after the completion of the project. Also, the target value was initially set to be confirmed two years after completion of the project, and one year has passed at the time of ex-post evaluation. Hence, while it cannot be concluded that the figure will necessarily increase for 2018, which is two years after the completion of the project, it can be judged that the target value has been largely achieved at the time of ex-post evaluation.

【System interruption (frequency / duration)】

Both the frequency and duration of system interruption in Mymensingh and Sylhet have decreased and achieved the target value. This can be a result of improving the reliability of the power supply of the system by newly constructing and extending the power distribution system, which was seriously aged and overloaded. Prior to this project, there was only one distribution system in each section, and when trouble occurred in one place, it led to immediate blackouts. However, backup facilities were additionally installed in each unit through the expansion of the distribution networks, enabling the provision of a stable power supply.

【Distribution system loss rate】

Both areas have improved compared with the baseline and reached 80% or more of the target value although they have not reached the target value. According to the executing agency, the entire power distribution network is not covered by this project alone, and additional facility investment is required to improve the distribution loss rate further. However, the effect of the distribution loss rate through this project is confirmed as shown in Table 11.

[17] The output increased by 28 units, of which 23 units are in Mymensingh and 5 units are included in Sylhet. Therefore, calculation was performed assuming that 82% of the output increased by 200% was allocated to Mymensingh and 18% to Sylhet.

(2) Improvement of commercial indicators

Improvement of commercial indicators was expected as an effect of consulting services for strengthening institutional capacity of the new company planned to be established by unbundling of BPDB. In actuality, however, the planned unbundling was not implemented and consulting services for strengthening institutional capacity was not carried out either. As such, the planned and actual commercial indicators are shown in table 12 for reference.

The average monthly billing collection rate is slightly worse than the baseline in Mymensingh, however it exceeds 90% and has been maintained at a high level. In Sylhet, as a result of appropriate handling, the average monthly billing collection rate has become the level not exceeding 100%. This rate used to exceed 100% because of collecting the uncollected portion of the previous year in the following year. According to the executing agency, the spread of electrification to rural areas and difficulties in collecting tariffs from poor areas are factors as to why both areas show lower rates than the target value. Meanwhile, average monthly billing, number of customers per employee, and sales per employee have improved both at the project completion year and at the ex-post evaluation. In this project, consulting services for strengthening institutional capacity were not implemented, however, improvement of commercial indicators has been confirmed due to increased sales following an improved electrification rate by expanding the power supply capacity.

Table 12 Commercial indicators (Only for reference)

		Baseline	Target	Actual	
		2007	2013	2016	2017
			2 Years After Completion	Completion Year	1 Year After Completion
Average monthly billing collection rate (%)	Mymensingh	97.5	100.0	87.4	90.8
	Sylhet	111.6[Note]	100.0	91.8	96.8
Average monthly billing (million BDT)	Mymensingh	134.0	248.0	734	800
	Sylhet	114.5	211.9	420	439
Customer/employee (no. of people)	Mymensingh	223	425	651	718
	Sylhet	295	550	689	752
Sales/employee (million BDT)	Mymensingh	1.64	3.1	7.0	8.0
	Sylhet	0.30	0.6	8.9	9.9

Source: document provided by JICA, questionnaire

Note: The baseline of Sylhet is 111.6% because it was calculated including the collection of the uncollected portion of the previous year in addition to the collection of the current year. It was expected to be no more than 100% when carrying out appropriate treatment (recovery or amortization of uncollectible amount) for uncollected cases in previous years.

(3) Increase in number of electrified households

As shown in table 13, the number of electrified households has significantly increased after implementation of this project. Since the target area expanded from the initial 12 units of the scope to 40 units covering all areas of Mymensingh and Sylhet, target values were

corrected to 2.9 times for Mymensingh and 1.5 times for Sylhet during project implementation from the target values set at the time of appraisal. Accordingly, the actual numbers at the time of ex-post evaluation achieved the target values, which were 1.6 times (Mymensingh) and 1.4 times (Sylhet) the target values respectively.

Table 13 Number of electrified households in the target area

		Baseline	Target	Revised target	Actual	
		2007	2013	2 Years After Completion	2016	2017
			2 Years After Completion		Completion Year	1 Year After Completion
Number of electrified households	Mymensingh	93,184	159,701	462,012	673,906	759,186
	Sylhet	97,833	167,669	245,799	314,114	339,438

Source: documents provided by JICA, questionnaire

3.3.1.2 Qualitative Effects (Other Effects)

(1) Improvement of stability and reliability of power supply

As mentioned above, it is quantitatively shown that the frequency and duration of system interruptions have decreased after implementation of this project, hence it was confirmed that power is supplied stably through the improvement of the power distribution network. With regard to these effects, power consumers of Mymensingh and Sylhet were interviewed for the purpose of gathering information to complement the above existing data, confirming the status of improvement of stable power supply through the number (frequency) of system interruptions, etc.[18].

The results of interview surveys reported reduction of the frequency and duration of system interruptions similarly as shown by the quantitative data. The information from the respondents was almost the same in each area. Answers obtained stated that before the project was implemented, system interruptions occurred on average four to five times per day in Mymensingh and five to seven times per day in Sylhet, while no planned or unplanned power failures occurred except for planned outages required for maintenance at the time of ex-post evaluation. Even if system interruptions occurred, time to restoration decreased to about 15 to 30 minutes at the time of ex-post evaluation, which used to take 1.5 to 2 hours in both areas before the project. Respondents explained that the stable supply of electricity and reliability[19] are synonymous, and all respondents said that reliability for

[18] Field surveys were conducted at two sites (units) in Mymensingh (S&D Div 2, DD Tangail) and two sites in Sylhet (S&D-1,DD Moulvibazar). Interviews were conducted for a total of 25 customers in 6 to 7 places at each site. The target customers were as follows. Mymensingh: three universities, two hospitals, one high school, two colleges, one mat factory, one flour mill factory, one chamber of commerce and two hotels. Sylhet: Two universities, two high schools, one hospital, one tea factory, one chamber of commerce, one rice mill factory, one food factory, two hotels and one supermarket.

[19] According to the respondents, reliability to power supply indicates, for example, to ease the anxiety or

power supply improved owing to stable supply of electric power. Moreover, according to staff at each substation where local consultant visited for the field surveys, complaints for system interruptions to substations/power plants, etc. have decreased, and the satisfaction of users is increasing in recent years.

3.3.2 Impacts

3.3.2.1 Intended Impacts

(1) Stimulation of the regional economy

Contributing to stimulation of the regional economy was expected as an impact of this project through establishing power distribution network facilities in the target area by constructing and rehabilitating the distribution network facilities of this project. An attempt was made to obtain economic statistics such as GDP data, manufacturing production and household income of the target area through the executing agency, however, data for each area could not be obtained. On the other hand, according to the executing agency, as a result of the improvement of the power distribution network, power has been supplied stably in the target area, leading to contribution to stimulation of the regional economy through promotion of industry in the target area and energization of agricultural activities. Specific effects of the reduction of the frequency and duration of system interruptions (i.e., the provision of a stable power supply) as stated during interviews with consumers in the target area included the following: “We are now able to provide operation, sales and services continuously and conduct business stably. Accordingly, sales and service have improved”, (factory and supermarket managers) “The number of customers has increased due to service improvements and employees are able to perform their work more efficiently due to the reduction in system interruptions” (hotel manager). Furthermore, almost all respondents answered that the number of times of generators use and the usage time decreased, which has made possible to increase the investment amount with the saved amount.

(2) Improvement of living standard of local residents

Many areas in rural areas of Mymensingh and Sylhet were not electrified before the project. The spread of electrification to households in rural areas can be said to have significantly improved the living environment in those areas. Specific examples of the impact of a stable supply of electricity mentioned in interviews at high schools and colleges in both target areas included increased at-home study time for students and being able to conduct classes using multimedia, thus deepening students’ understanding. The following effect was mentioned at a hospital in the target area: “Service has improved due to the reduction of equipment malfunctions through stabilized voltage and reduced time restrictions

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dissatisfaction occurred by unplanned or sudden system interruptions.

on conducting clinical consultation, medical treatment and surgeries thanks to a stable supply of electricity." According to the executing agency, although there is no data showing its impact, implementing this project has expanded home industries and irrigation areas through electrification in rural areas, resulting in the creation of jobs for the people in those areas. Therefore, it can be said that electrification indirectly contributes to improving living standards by providing convenience for people in rural areas as well as increasing employment opportunities.

Class using digital equipment (Public high school in Sylhet)

Reception at Hotel (Sylhet)

Milling factory where electricity is indispensable (Sylhet)

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

Environmental Impact Assessment Report of this project was approved by Department of Environment in the Ministry of Environment and Forest in July 2008. Based on the environment on *Guidelines for JBIC for Confirmation of Environmental and Social Considerations* (April 2002), it was considered that the undesirable impact on the environment of the project is not likely to be serious and the project was categorized as B. According to the executing agency, no undesired impacts on the natural environment accompanying the implementation of this project were confirmed. The executing agency also mentioned that since implementation of power distribution projects in general do not cause serious negative impact on the natural environment, monitoring was not carried out but no report has been made on negative impact including air pollution due to dust and so on, waste, noise, soil contamination, etc. during and after this project. In addition, during the interviews to users conducted at the site visit, they also explained that there was no negative environmental impact from implementing this project.

(2) Resettlement and Land Acquisition

At the time of appraisal, resettlement and land acquisition along with implementation of this project were not planned. However, land was acquired in each area when the scope was changed, although it was only 2.2 hectares in Mymensingh and 0.6 hectares in Sylhet. Land

acquisition was not made in the area affecting the commercial activities and people's living and was conducted in accordance with the regulations and plans of the administration in districts of each area, and it was confirmed with the executing agency that no particular problems occurred. There was no resettlement caused by the implementation of this project.

(3) Unintended Positive/Negative Impacts

・Promoting access to power by low-income people

Although data could not be obtained, the number of electrified households in the target area increased as a result of implementation of this project as described above in effectiveness. In particular, electrification has been extensive in rural areas because they were included in the target area of this project. According to the executing agency, since many low-income people live in rural areas, implementing this project has contributed to the promotion of access to the electricity by low-income people.

・ Creation of employment at target electric power stations

At the time of appraisal, it was assumed that employment opportunities for women would continue to be secured as an effect of this project, as 90% of all staff at the billing centre for electricity charges in the project area were women. At that time, the bill was prepared manually, and 80% of the workers were women. However, the executing agency explained that the work was computerized after the project completion, and employment opportunities and the number of employees for women decreased. Meanwhile, it was confirmed in an interview with the executing agency that new employment for workers, guards, etc. has been created due to the establishment and expansion of distribution stations and the change of unmanned power distribution stations to manned stations.

As mentioned above, the maximum demand served and duration/frequency of system interruptions in the target area have achieved the target, and a certain effect has also been confirmed in the power distribution loss rate through implementation of this project. Accordingly, stability and reliability of power supply are improved, thus it can be said that the expected effects have been generated. In addition, the stable power supply has promoted the stimulation of regional economies, and the increase in the number of electrified households, especially in rural areas, has also had a positive impact on the lives of local residents.

In light of the above, this project has largely achieved its objectives. Therefore effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

At the time of appraisal, Central Distribution Company, which was to be unbundled from the executing agency, was planning to maintain and manage the facilities. However, unbundling was not actually implemented, hence BPDB, the executing agency, is responsible for the Operation and Maintenance (O&M) of the facility, and each regional office of BPDB distribution divisions is in charge of the operation and maintenance activities at the time of ex-post evaluation. Therefore, there is no change in the O&M system prior to the project implementation, and there is no effect on the system, but the shortage of the number of personnel continues to be mentioned as a problem. The following table shows the actual and prescribed number of staff of the executing agency and regional office. The number of allocated staff is about 70% of prescribed number of staff in Mymensingh, and less than 50% in Sylhet. According to the executing agency, the shortage of the number of personnel is a problem occurring throughout the government sector. In BPDB, due to the personnel shortage, the work burden of several people falls upon one person, and it is necessary to outsource some work such as meter reading to the private sector.

Table 14 Prescribed and actual number of personnel in executing agency and regional offices

	Prescribed number of staff	Actual number of staff
Maintenance staff in BPDB	1,628	1,191
Mymensingh	1,705	1,258
Sylhet	1,032	504

Source: questionnaire

3.4.2 Technical Aspect of Operation and Maintenance

The executing agency is an institution which has been in charge of O&M for power distribution facilities up to now, thus there are basically no issues with technical aspects. During the site survey, it was also confirmed that O&M for the facilities and equipment are conducted in line with the instruction manuals and operation guides provided by this project. The executing agency reported the improvement of quality control and management capacity as well through a technical cooperation project for comprehensive quality management improvement. However, it has been confirmed that the partially damaged equipment at the distribution stations in Mymensingh and Sylhet has not been addressed sufficiently due to lack of technical capacity or knowledge. Thus, it can be said that the improvement of technical capacity to deal with equipment, especially in case of equipment failure, is an issue to be addressed.

3.4.3 Financial Aspect of Operation and Maintenance

(1) Financial condition of the distribution department of BPDB

The Bangladesh Government has adopted a policy to keep electricity rates low, while the government simultaneously subsidizes the negative balance of BPDB[20]. The results of business operations based on this national power policy are shown in the financial statements of BPDB. The concerns about financial situation remains unchanged since appraisal[21]. Table 15 shows the annual changes in the revenue and expenditure and deficit of the distribution department of BPDB.

Table 15 Annual changes in the revenue and expenditure and deficit of the distribution department of BPDB

(Unit: Million BDT)

Item	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
Sales (Power distribution)	44,121	51,373	59,412	73,204	68,326
% of change from previous year	*38%*	*16%*	*16%*	*23%*	*-7%*
Cost of revenue (Power distribution costs)	50,016	56,715	61,834	73,669	68,513
% of change from previous year	*41%*	*13%*	*9%*	*19%*	*-7%*
(Repair and maintenance cost)	*1,064*	*1,247*	*1,290*	*1,189*	*977*
Loss from revenue	-5,895	-5,343	-2,422	-465	-188
General & admin. expenses	705	599	742	957	987
Operating loss	-6,600	-5,941	-3,164	-1,422	-1,174
Net loss	-6,774	-6,509	-3,770	-2,026	-2,191
Deficit	-17,672	-24,166	-27,678	-29,772	-31,693

Source: Annual reports of BPDB (fiscal year is from July to the end of June in the next year)

At the time of appraisal, financial indicators were set as quantitative effect indicators. (Boldfaces in Table 16). The following table shows the analyzed trends of financial sustainability by complementing the originally set indicators. Due to the national policy to keep the electricity rate low as mentioned above, the sales profit margin has been at nearly 0%, which is a major source of the financial difficulties.

[20] Source: Energy Regulatory Commission (ERC) *BPDB Bulk Electricity Price Rate Order, 23 November 2017*

[21] At the time of appraisal, the donors including the World Bank and ADB were implementing support for financial reform and reconstruction. Technical support for financial improvement was scheduled for this project as well. The Government has been considering the separation of the distribution business of Mymensingh and Sylhet area.

Table 16 Annual changes in the financial ratios of the distribution department of BPDB

Financial ratio	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
Debt-servicing capability					
1. Current ratio	**No data**	**No data**	**0.86**	**0.83**	**0.61**
2. Debt equity ratio	No data	No data	1.04	1.01	0.97
3. Debt service coverage ratio [Note 1]	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Financial sustainability					
4. Equity ratio	No data	No data	0.27	0.26	0.29
Profitability					
5. Sales profit ratio (%)	-13.4	-10.4	-4.1	-0.6	-0.3
6. Operating profit ratio (%)	**-15.0**	**-11.6**	**-5.3**	**-1.9**	**-1.7**
7. Rate of return on assets (ROA) (%)	**No data**	**No data**	**-3.0**	**-1.5**	**-1.7**
8. Rate of return on equity (ROE) (%)	No data	No data	-11.3	-5.7	-5.7
Other					
9. Receivables turnover period (days)	No data	No data	131	123	100

Source: Calculated by the evaluator based on the figures in BPDB's annual reports

Note 1: DSCR (debt service coverage ratio) was not calculated (N/A) as the operating results were negative and operating cash flows were assumed to be negative.

As mentioned above, financial conditions so far have been harsh. However, efforts to improve the financial condition planned at the time of appraisal are underway: government subsidies currently treated as long-term debt are to be capitalized in the future. The debt related to the subsidies for the gap between selling and purchase price of power accounts for 396 billion BDT (69% of total long-term debt (as of 2017)). Excessive liabilities will be eliminated as a result of capitalization.

(2) Operation and maintenance costs of the project area

Table 17 shows operation and maintenance costs for both Mymensingh and Sylhet distribution areas over the past three years and the budget over the next two years. The 2017/2018 budget for personnel expenses and O&M costs is greater than the past year's. According to the breakdown of the budget, the main reasons for the change are that more overtime and severance payments are posted for personnel expenses, and more repair costs and stored items such as parts are posted for operation and maintenance expenses. The 2018/2019 budget for O&M costs is comparatively smaller than that in the past years, likely because the budget in 2017/2018 was larger and the amount accordingly needed to be adjusted. Although the answer to the questionnaire by BPDB mentions that the budget allocations for the O&M costs of both distribution areas are assumed to be insufficient, there seems to be no substantial reduction from that in the past years. Therefore, there is no particular problem in the budget allocation for O&M costs.

Table 17 Annual changes in personnel expenses and O&M costs in Mymensingh and Sylhet

(Unit: Million BDT)

Item / Distribution area	Actual			Budget	
	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Personnel expenses:					
Mymensingh	301	440	609	692	618
Sylhet	231	269	386	473	410
O&M costs:					
Mymensingh	70	69	91	197	62
Sylhet	52	55	91	145	46
Total	654	833	1,177	1,507	1,136

Source: Calculated by the evaluator based on the budget documents of BPDB

Based on the understanding that government subsidies are inseparable from the national policy, it is assumed that the subsidies will be secured as long as the policy continues. In addition, it is expected that the financial condition of BPDB will be improved by the capitalization of long-term debt related to the subsidies. Based on these observations, there is no concern regarding the financial sustainability of the project effects.

3.4.4 Status of Operation and Maintenance

Through questionnaire and site survey conducted by a local consultant, it was confirmed that O&M of the facilities is generally good. Cases in which the breaker at the substation was not operating due to the low gas pressure and the switch to cut 11kV breaker was not functioning correctly were observed during the site survey, however, it was reported that these defects posed no serious concern to fulfilment of their function as distribution stations. Lack of expertise and understanding of countermeasures were mentioned as reasons why these defects have not been repaired. This reveals trouble shooting method and process when failure and trouble occurs have not established and this would partly be an issue related to institutional aspect of the maintenance and management.

As stated above, some minor problems have been observed in terms of the institutional aspect, technical aspect and current status. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented with the aim of ensuring a stable power supply through improvement of the power distribution network in the central zone of Bangladesh and support for strengthening the institutional capacity of the executing agency which planned to be unbundled as a part of the power sector reform. Its objective was consistent with the development policy of Bangladesh, which aims for stable and reliable power supply,

Bangladesh's development needs including development of a power distribution network that could withstand the ever-increasing demand accompanying economic growth, and Japan's ODA policy. As such, its relevance is high. While project cost was within the plan, project period exceeded the plan due to the increase of outputs and the delays in tendering and each step of facility development. Therefore, the efficiency of this project is judged as fair. Through the implementation of this project, the maximum demand served in the target area increased, the frequency and duration of system interruptions and distribution loss rate decreased, and the reliability of power supply improved. This means that the project goal, providing a stable power supply, has achieved. These effects have a positive impact on stimulating the regional economy, local residents' daily lives. Since the planned unbundling of the executing agency did not materialize, support for strengthening its institutional capacity was not implemented. However, there was confirmed improvement in commercial indicators such as sales, number of customers and billing collection rate through the increase of the power supply. Therefore, the effectiveness and impact of this project are high. Although the state of maintenance of the facilities developed in this project is largely good and there are no issues with financial conditions, some minor concerns with the O&M system and technical capacity of the executing agency have been confirmed. Therefore sustainability of the project effects is fair.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- The executing agency reported a shortage of O&M staff. At the time of ex-post evaluation, the workload of each staff member increased, and some necessary O&M activities are accordingly performed by outsourced private companies. In the government sector of Bangladesh, staff shortage has been regarded as a common problem. Since excessive workload can hinder the implementation of appropriate O&M activities in the future, it is necessary for the executing agency to endeavour to increase the number of persons deployed as many as possible while considering the O&M workload required in each region.
- It has been confirmed that there are no staff at the regional distribution stations with the technical capacity to respond when problems arise with equipment. There is also a lack of understanding of not only the technical aspects, but also how to respond (who should deal with it or where to report it). The executing agency should clarify the process of how the distribution stations should respond when a problem occurs in the facility, notify each distribution station, and provide technical backup if needed.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Flexible response during implementing projects to realize effects

In this project, output was drastically increased by utilizing the remaining unused loan during project implementation. The occurrence of unused loan due to currency fluctuations and price competition cannot be predicted during appraisal. However, after confirming the occurrence of unused loans in this project, the scope of the project was reconsidered in terms of effectiveness and efficiency and significantly expanded from 12 unit as of the planning to 40 unit including 28 which was excluded in the course of formulating the plan based on the priority. Accordingly, though both project cost and period exceeded the plan and affected efficiency, it became possible to supply stable power to a wider area throughout the whole region. The use of unused loan can be examined only when the added scope is inseparable from the initial ODA loan project, necessity arises due to circumstances that cannot be predicted initially, and it is necessary to implement construction and procure service urgently. However, in cases when unused loan arise due to currency fluctuation or the reduced contract price during project implementation and when additional scope consistent with the purpose of use of unused loan is envisioned, the recipient government and Japanese stakeholder can respond promptly and flexibly to deal with the use of unused loan, thereby making it possible to further enhance the project effect.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
Rehabilitation/construction facilities		
Distribution feeder		
33kV Line Rehabilitation	308 km	377 km
Construction	98 km	386 km
11kV Line Rehabilitation	227 km	730 km
Construction	183 km	565 km
11kV/0.4kV Line Rehabilitation	281 km	700 km
Construction	244 km	752 km
0.4kV Line Rehabilitation	616 km	1,618 km
Construction	525 km	1,024 km
33kV Line（Underground cable）		
Construction	3 km	32km
Conversion of 11 to 33kV Lines	-	46 km
Sub station		
33/11kV substation Renovation	16 no.	26 no.
33/11kV substation Construction	6 no.	14 no.
2 × 5MVA substation Renovation	-	12 no.
Transformer (Renovation and construction)		
250kVA transformer Renovation	393 no.	465 no.
Construction	451 no.	1,166 no.
100kVA transformer Renovation	564 no.	640 no.
Construction	419 no.	1,226 no.
Condenser (Construction)		
3x100kVA, Auto SW	122 no.	As planned
3x 50kVA, Auto SW	65 no.	As planned
3x100kVA, Auto Fix	115 no.	As planned
3x 50kVA, Auto Fix	7 no.	As planned
Equipment and vehicle for maintenance works, others	No detail information	Equipment for maintenance work 100 no., Vehicle 115 no., Function building 2,069m^2
Support for strengthening institutional capacity to newly establish Central Zone Power Distribution Company	・Development of institution framework for human resource, finance/accounting and legal/ regulatory ・Formulate systems necessary for beginning institutional management ・Development of business plan ・Conduct study and assist its implementation for development of universal service provision	Cancelled
2. Project Period	June 2008 – June 2011 (37 months)	March 2009 – May 2016 (87 months)
3. Project Cost		
Amount Paid in Foreign Currency	7,520 million yen	6,790 million yen
Amount Paid in Local Currency	5,217 million yen (3,344 million BDT)	10,769 million yen (8,549 million BDT)
Total	12,737 million yen	17,559 million yen
ODA Loan Portion	9,715 million yen	9,709 million yen
Exchange Rate	1 BDT = 1.56 yen (As of March 2008)	1 BDT = 1.26 yen (Average between March 2009 and March 2015)
4. Final Disbursement	March 2015	