

Republic of Ghana

Ex-Post Evaluation of Japanese ODA Grant Aid Project

The Project for Rural Electrification

External Evaluator: Jun Totsukawa, Sano Planning Co., Ltd,

0. Summary

This project aimed to improve basic living standards in areas without electricity such as the Upper Denkyira District in the Central Region, and the West Akim District in the Eastern Region through the provision of a stable power supply to residents of rural communities by enhancing the electrical grid. This aim is highly relevant as it was consistent with the policies and needs at the time of project planning and at the time of the ex-post evaluation. The procurement and installation of equipment and materials related to improving the electrical grid were implemented largely according to schedule, but while the project costs were within the initial plan, the project period was extended by around five months, and therefore the efficiency of the project is fair. However, the Japanese side procured and installed the 33/11 kV power distribution equipment for this project, and the Ghanaian side installed and connected meters to the final consumers. From the data collected in the present study, the electrification rate of the towns and villages and the household electrification rate within the area set at the time of planning exceeded the target, and positive impacts were seen such as a strengthened regional economy and improved health and hygiene services. In light of the above, it can be said that the project's effectiveness and impact are high. Similarly, there were no major items of concern in the organizational system and technical capabilities related to the maintenance of the Electricity Company of Ghana, and it can be evaluated that it will be possible to ensure a certain level of sustainability in future.

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

1. Project Description



Project Location

(Yellow section to the west: Upper Denkyira District in the Central Region,
Yellow section to the east: West Akim District in the Eastern Region)



Upper Denkyira District Facility Installation

1.1 Background

In the Republic of Ghana during the 1990s, there was a large population outflow from rural communities to urban areas, and with the expansion of urban slums poverty and economic disparity became increasingly severe. In response, the Ghanaian government aimed for sustainable economic growth and to reduce poverty, and in 1995 drew up a long-term development program of the "Vision 2020," as well as the 2003 "Ghana Poverty Reduction Strategy" Within these, the rural electrification scheme was a priority issue as an essential project to improve living standards and to reduce poverty in rural communities.

As a practical approach, the government formulated the National Electrification Scheme (NES) to promote rural electrification with the aim of supplying power to all settlements with a population of over 500 by 2020. It was decided that the electrification scheme would be advanced in six phases. Under Phases 1 & 2 (1991-1995 and 1996-2000 respectively), donors including Japan collaborated under the initiatives of the World Bank, and electrification was implemented in district capitals and key municipalities in rural areas, and the electrification in all district capitals (110 locations) was completed according to the plan. From Phase 3, it was intended to further strengthen approaches at domestic rural electrification such as by advancing the Self-Help Electrification Project¹ (SHEP) to parallel the electrification of key municipalities in rural areas.

However, the financial deficit of the electric power sector has become a serious problem due to the increased cost of electricity resulting from a fall in the Cedi (Ghana's currency), a surge in crude oil prices, and electricity tariff arrears, and this has impacted negatively on progress made by the NES. As a result, the electrification rate in rural communities has only risen gradually by an average of 20% (around 60% in the region of the national capital), and disparity between urban and rural areas has reemerged as a pressing issue. Amidst such circumstances, as part of the NES, the Ghanaian government planned to electrify two districts in the central-southern region of Ghana where electrification had been particularly delayed (the West Akim District in the Eastern Region and the Upper Denkyira District in the Central Region), and requested grant aid from Japan for the funding required to improve its power distribution network.

1.2 Project Outline

The objective of this project is to improve basic living standards through providing a stable power supply to residents of rural areas by enhancing the electrical grid in areas such as the West Akim District in the Eastern Region and the Upper Denkyira District in the Central Region.

¹ The SHEP was the form the project took in areas of remote, dispersed settlements not subject to the NES, and it aimed to promote electrification through local resident funding. The SHEP is designed to electrify municipalities that satisfy certain conditions, for example, i. it should be within 20km of preexisting power lines, ii. the local residents should bear the cost of low-voltage power distribution masts (wooden poles), and iii. over a third of residents should own a domestic wiring system and desire electrification.

Grant Limit/Actual Grant Amount		Phase 1: 678 million yen, Phase 2: 410 million yen/ Phase 1: 677 million yen, Phase 2: 408 million yen
Exchange of Notes Date		Phase 1: August 2006, Phase 2: August 2007
Implementing Agency		Ministry of Energy, Electricity Company of Ghana (ECG)
Project Completion Date		December 2008
Parties Involved with the Project	Main Contractor	(Materials & Equipment Procurement) Mitsubishi Corporation, Nishizawa Ltd., Inc.
	Main Consultant	Yachiyo Engineering Co., Ltd.
Basic Design		March 2006 - August 2006
Related Projects (if any)		<ul style="list-style-type: none"> • Phase 1 "The Project for Rural Electrification" (E/N 1989, 826 million yen) • Phase 2 "The Project for Volta Downstream Area Electrification" (E/N 1993, 1.068 billion yen, E/N 1994, 808 million yen) • Phase 3 "The Project for Asesewa Yeji Area Electrification" (E/N 1996, 507 million yen, E/N 1997, 605 million yen) • Phase 4 "The Project for Rural Electrification" (E/N 2002, 755 million yen, E/N 2003, 306 million yen)

2. Outline of the Evaluation Study

2.1 External Evaluator

Jun Totsukawa, (Sano Planning Co., Ltd)

2.2 Duration of Evaluation Study

The study was implemented as follows:

Duration of the study: November 2011 to August 2012

Duration of the field study: November 30, 2011 - December 22, 2011; May 06, 2012 - May 21, 2012

2.3 Constraints during the Evaluation Study

None in particular.

3. Results of the Evaluation (Rating: A²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance with the Development Plan of Ghana

(At project planning)

The Republic of Ghana formulated the "Vision 2020" as its national long-term program of general development with the goal of becoming a middle-income country by 2020, and therein, the rural electrification project is an issue of the utmost priority. The Plan's ultimate goal is to supply power to all citizens based on an economic and efficient power supply system, which can assist socio-economic development. Likewise, in one of the state's basic policies, the Ghana Poverty Reduction Strategy (GRPS I and GRPS II⁴), the rural electrification project is deemed an essential approach in improving the living standards of the residents of rural communities and eradicating poverty.

Furthermore, in terms of energy sector policy, further promoting rural electrification was set out in the "Strategic National Energy Plan (2006-2020)" drawn up in 2005.

(At the ex-post evaluation)

The Republic of Ghana's long-term program of general development, the "Vision 2020," is still a primary policy indicating the state's basic direction at the time of the post-project evaluation, and consistency was maintained with this policy. Similarly, as for the Ghana Poverty Reduction Strategy, the GSGDA⁵ (2010-2013) was formulated after the GRPSII, and therein one crucial issue put forward among seven areas was "improving infrastructure, energy, and living environments." Within which, it is clearly stated that an electricity supply conducive to the industrial growth of rural communities and improvement of the living environment of local residents is crucial. On this point, the project's contents can be confirmed consistent with policy. Furthermore, the Strategic National Energy Plan has been unchanged, and kept the actions for promoting rural electrification as a crucial issue.

From the above, not only was the project consistent with the Republic of Ghana's development policy at the project planning time, but it is still in line with the crucial policies at the post-project evaluation.

3.1.2 Relevance with the Development Needs of Ghana

(1) Development needs at the time of project planning

Under Phases 1 & 2 of the NES (1991-1995 and 1996-2000 respectively), donors including Japan collaborated under the initiative of the World Bank, and electrification was implemented in district

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

³ ③: High, ②: Fair, ①: Low

⁴ GPRS: Growth and Poverty Reduction Strategy

⁵ GSGDA: Ghana Shared Growth and Development Agenda

capitals and key municipalities in rural areas, and first of all, the electrification of all district capitals (110 locations) was completed in 2000.

When this project was planned in 2006, electrification of the remaining key municipalities in rural areas was progressing, and rural electrification approaches were also gaining strength, such as the simultaneously expanding SHEP which incorporated the concept of user charges. However, regardless of such government efforts, the electrification rate in rural areas where approximately 70% of the population reside is only around 20%, (the national electrification rate average is 43%), and it was recognized that further promotion of rural electrification is an important and pressing issue in order to improve living standards and the quality of public services such as medical and educational facilities in areas without electricity.

The electrification rate in the project sites of the West Akim District in the Eastern Region and the Upper Denkyira District in the Central Region were 6% and 7% respectively, which was remarkably low against the national average of 43%, and therefore the need of local residents for electrification was very high.

From the above, it can be said that this project is consistent with both the development needs of the Republic of Ghana and the project sites.

(2) Development needs at the time of the post-project evaluation

The Republic of Ghana has promoted rural electrification as one of the government's prioritized issues. The electrification rate on the basis of the municipalities is rising rapidly due to the recent donor assistance, with 66% of municipalities electrified according to the latest official statistics in 2009.⁶

This project is playing a part in this rapid improvement in the electrification rate, and can be said to be consistent with the Republic of Ghana's development needs.

As seen above, though the electrification scheme is basically showing sound progress, it is still only partway to achieving its objective of the total electrification of all towns and villages throughout the country by 2020. In light of this it can be said that support in the area of electrification is still consistent with the government's development needs.

3.1.3 Relevance with Japan's ODA Policy

Country Assistance Program for the Republic of Ghana (2006) in Japan, the basic development objective for support to Ghana was stipulated as, "continuing to improve the basic environment including human development and socio-economic foundations for independent economic growth." The plan proclaims "invigorating rural areas and communities" as a key development issue, and indicates assistance for "improving foundational living environments within poverty-stricken areas." Furthermore, from the viewpoint of "industrial growth," the plan indicates that assisting economic

⁶ The estimated level as of 2011 was 72% (data from Ministry of Energy, the Republic of Ghana).

infrastructural improvements such as the energy sector is one element of encouraging "private sector development."

In light of the above points, this project to promote electrification in Ghana was consistent with the direction and content of Japan's ODA policy.

From the above, this project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁷ (Rating: ③)

3.2.1 Quantitative Effects

The quantitative effects that were the aim of this project were achieved as per the table below:

Table 1: Electrification Rate of Towns & Villages

	Figure at planning period (2005)	Target figure (2008/09)	Current figure (2011)
Eastern Region, West Akim District	16 towns & villages, 6%	47 towns & villages, 17% *Amount of net increase due to this project (31 towns & villages) + existing towns & villages	106 towns & villages, 40% *This project + other support
Central Region, Upper Denkyira District	15 towns & villages, 7%	31 towns & villages, 13% *Amount of net increase due to this project (16 towns & villages) + existing towns & villages	47 towns & villages, 22% *This project + other support

Source: Basic Design Study & ECG Materials

(Notes on the quantitative effects)

- * The number of towns & villages electrified which was the target figure (2008/2009) for the quantitative effect cites the net increase in the number of towns & villages due to implementing this project (in sum 31/16 towns & villages respectively). On the other hand, the current number of towns & villages electrified includes the net increase performance of this project in addition to the number of towns & villages electrified with the assistance of other donors (China and the World Bank - as will be discussed later).

The electrification rate in towns & villages already greatly exceeds the target. This results from the effects of this project in addition to the electrification projects conducted by China and the World Bank. With assistance from China, 57 towns and villages in the West Akim District of the Eastern

⁷ Sub-rating for Effectiveness is to be put with consideration of Impact.

Region were electrified from 2007-2008, and similarly the World Bank's assistance project (2009-2011) supported the electrification of two towns and villages in the area. Similarly, with assistance from China, 16 towns and villages in the Upper Denkyira District (2008-2011) have been electrified. Hence, electrification in the project site progressed more rapidly than initially expected.

On the other hand, the rate of electrification of households has also reached the target⁸. However, regarding the household electrification rate, since China's assistance projects focused on towns and villages in areas of low population, the effect to increase the figures is somewhat limited compared with the increase in the electrification rate of towns and villages.

Table 2: Rate of Electrification of Households

	Figure at planning period (2005)	Target figure (2008/09)	Current figure (2011)
Eastern Region, West Akim District	15%	35%	42%
Central Region, Upper Denkyira District	22%	44%	46%

Source: Basic Design Study & ECG Materials

Table 3: Increase in the Number of Electrified Towns & Villages and Households by Project (2006-2011)

	This project		China assistance project		World Bank assistance project	
	Number of towns & villages	Number of households	Number of towns & villages	Number of households	Number of towns & villages	Number of households
Eastern Region, West Akim District	31	8,171	57	3,025	2	105
Central Region, Upper Denkyira District	16	5,870	16	1,621	0	0

Source: ECG Materials

3.2.2 Qualitative Effects

Under this project, the effects of electrification on the local society were arranged as indirect rather than qualitative effects, and the circumstances through which these emerged are noted under the following items.

From the above, the effects of implementing this project emerged largely according to plan, and therefore its effectiveness is high.

⁸ The total number of households in the region was not publicized by the Ghana National Census (conducted in 2010) at the time of the field survey, so the basic design study used a population estimate. Similarly, the rate of electrification of households is calculated based on the number of meters.

3.3 Impact

3.3.1 Intended Impacts

Implementing this project had the following impacts. Note that, when confirming the circumstances of these impacts, a beneficiaries survey⁹ was conducted within the ex-post evaluation.

(1) Improvements in Health & Hygiene Services due to Electrification

In the targeted areas of this project, the introduction of electric medical equipment and fridges for pharmaceutical products became possible, and this was welcomed by local residents and clinic staff alike.

Table 4: Local Residents' Awareness of Improvements in the Medical Services Provided by Clinics (number of responses)

	Improved	Almost the same	Deteriorated	Uncertain	Total
West Akim	23	20	0	7	50
Upper Denkyira	20	19	0	11	50
Total	43	39	0	18	100

Source: Beneficiaries survey Results

Local residents particularly welcomed the fact that local clinics became able to handle vaccination campaigns, and that medical examinations could be conducted at night.

Similarly, the clinic staff themselves also referred to impacts coinciding with electrification such as an improved vaccine storage system, and the potential to improve the patient waiting room environment by purchasing electric fans and televisions.

(2) Invigorating the Local Economy

1) Increase in retail stores and extended business hours

While there were already small-scale economic activities in the project sites such as retail, catering, and beautification, after electrification, economic vitalization was seen whereby business hours were extended due to the use of electricity and electrical products, and the number and variety of retail stores increased.

The table below shows the local residents' awareness of the increase in the number of retail stores in the regions and opening hours.

⁹ The recipient survey was conducted as a face-to-face questionnaire survey focusing on, i. general local people in the regions (50 in each region x2 = 100), ii. owners of retail stores in the regions (5 x2 = 10), and iii. clinics (5 - all clinics in the area).

Table 5: Local Residents' Awareness of the Change in the Number of Retail Stores in the Region

	Increased significantly	Increased	Almost the same	Decreased	Uncertain	Total
West Akim	15	21	11	1	2	50
Upper Denkyira	15	26	9	0	0	50
Total	30	47	20	1	2	100

Source: Beneficiaries survey Results

Table 6: Local residents' awareness of the change in opening hours of retail stores in the region (number of responses)

	Increased significantly	Increased	Almost the same	Decreased	Uncertain	Total
West Akim	21	18	9	0	2	50
Upper Denkyira	14	29	7	0	0	50
Total	35	47	16	0	2	100

Source: Beneficiaries survey Results

2) Decrease in Milling Costs

Before implementing this project, a high-priced diesel engine was used for grinding the staple food of corn, which put an economic burden on local residents. For this reason, though a reduction in the price of milling was expected due to electrification under this project, the impact are somewhat short of satisfying expectations, and in actual fact there were even some responses that milling prices had increased. It can be inferred that this not only relates to the price of milling, but reflects the general impression local residents have on commodity prices, which have been on the increase over the last several years.

Table 7: Local residents' Awareness of Milling Costs (number of responses)

	Major Decrease	Decreased	Almost the same	Increased	Uncertain	Total
West Akim	2	5	8	22	13	50
Upper Denkyira	4	12	4	3	27	50
Total	6	17	12	25	40	100

Source: Beneficiaries survey Results

(3) Effect of the reduced harmful influence of kerosene lamps

It was expected that with electrification kerosene lamp use would cease, and the ill effects on health caused by lamp smoke would reduce. However, in the Beneficiaries survey a relatively low number of local residents were aware of the effect of reduced smoke. The background of this result is conceivably that only a small number of local residents had paid attention or keenly aware of the harm to health by kerosene lamp smoke.

Table 8: Awareness of Change to Health (irritation of the eyes and throat) due to discontinuing the use of Kerosene Lamps (number of responses)

	Improved a great deal (eased)	Somewhat improved	Almost the same	Deteriorated	Uncertain	Total
West Akim	3	7	35	0	5	50
Upper Denkyira	1	2	23	0	24	50
Total	4	9	58	0	29	100

Source: Beneficiaries survey Results

(4) Others

It was expected in the basic design study that reducing the burden of fetching water from wells on local residents and women in particular would reduce labor. However, the majority of local residents still use the community well manually, and almost no electric pumps have been introduced.

3.3.2 Other Impacts

(1) Impacts on the natural environment

No positive or negative impacts on the natural environment were seen.

(2) Land Acquisition and Resettlement

No residents were resettled and no land was acquired.

(3) Others

1) Impact on the lifestyle of local residents

In addition to the above, this project had the following impacts on the lifestyle of local residents, and it is thought the positive impacts of this were major.

Table 9: Other Positive Effects due to Electrification (number of responses - multiple responses from 100 residents)

	Number of hours spent with the family increased	Children's study time increased	Robbers and thieves decreased	Information transmitted via television increased	Shopping became easier (because neighboring shops increased)	Young people became able to stay in their own towns*.
West Akim	38	32	11	34	28	24
Upper Denkyira	35	45	10	31	28	14
Total	73	77	21	65	56	38

Note: *In the past, leaving the town/village at night to go to nearby electrified towns was common

Source: Beneficiaries survey Results

Similarly, in addition to the responses in the table, it was noted that refrigerator usage became possible and it became safe to go out at night (dangers such as street-crime and snakes could be avoided)

On the other hand, the negative impacts are shown in the table below. In particular, homes experienced a major one-off financial strain due to the system of invoicing collectively for several months' electricity tariffs. Likewise, negative impacts were seen such as children spending more time in front of the television and less time helping in the home.

Table 10: Other Effects due to Electrification (number of responses - multiple responses from 100 respondents)

	The community became noisier (e.g. due to music and advertising)	Greater financial burdens	Young people started staying longer in shops (and the time helping at home reduced)
West Akim	22	16	14
Upper Denkyira	14	29	9
Total	36	45	23

Source: Beneficiaries survey Results

2) Overlap and relevance of other projects

There was no inefficient overlap between this project and that of China or the World Bank.

However, with the increase in consumers throughout the districts, occasional voltage drop was seen in some of the project sites (particularly in West Akim). The ECG is also aware of the voltage drop situation in the project area, and is considering either an 11 kV upgrade of the existing facility or constructing a new substation, though no specific conclusion has been reached.

The local residents' awareness of the voltage drop situation of this project is as per the table below:

Table 11: Local Resident Awareness of Voltage Drop (number of responses)

	Stable	Fairly stable	Fairly unstable	Unstable	Uncertain	Total
West Akim	24	13	10	3	0	50
Upper Denkyira	33	16	1	0	0	50
Total	57	29	11	3	0	100

Source: Beneficiaries survey Results

From the above, the project has had positive effects such as improving the everyday living environment, strengthening the local economy and improving health and hygiene services.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

Under this project, the following materials and equipment were procured and installed in the target areas of the West Akim District in the Eastern Region and the Upper Denkyira District in the Central Region. All equipment and materials were procured and installed according to plan except for the emergency equipment targeted for Phases 1/2 in the West Akim District in the Eastern Region.

Table 12: Equipment & Materials Procured and Installed by this Project

No.	Item	Unit	Eastern Region, West Akim District	Central Region, Upper Denkyira District	Total
A.	Procurement and installation of equipment and materials for the 33 kV and 11 kV distribution lines				
(1)	33 kV distribution line				
	1) 33 kV/433-250 V transformers				
	a) 50 kVA	Unit	-	2	2
	b) 100 kVA	Unit	-	7	7
	2) Auto reclosers	Unit	-	1	1
	3) Load isolators	Unit	-	5	5
	4) Lightning arrestors	Unit	-	16	16
	5) Cutout switches with fuses	Unit	-	9	9
	6) Electrical wire: AAC 120 mm ²	Km	-	28.9	28.9
	7) Steel poles (11 m)	pole	-	275	275
(2)	11 kV distribution line				
	1) 11 kV/433-250 V transformers				
	a) 50 kVA	Unit	22	3	25
	b) 100 kVA	Unit	16	8	24
	c) 200 kVA	Unit	4	0	4
	2) Auto reclosers	Unit	1	0	1
	3) Load isolators	Unit	9	2	11
	4) Lightning arrestors	Unit	53	13	66
	5) Cutout switches with fuses	Unit	42	11	53
	6) Electrical wire: AAC 120 mm ²	Km	98.6	21.3	119.9
	7) Steel poles (11 m)	pole	1,108	233	1,341
(3)	Main distribution board (MDB)	set	42	20	
Procurement of equipment and materials for low voltage distribution lines					
(1)	Low voltage trunk distribution lines	Km	455.8	183.4	639.2
(2)	Pole fitting materials for distribution lines (such as insulators and terminals)	set	1	1	2
(3)	Procurement of maintenance tools and emergency spare equipment	set	1	1	2

Source: Basic Design Study

Difference between the Plan and Performance

The emergency distribution transformers (11 kV/433-250 V, 50kVA, 100kVA, and 3 units of 200kVA) planned to be procured for West Akim in the Eastern Region were not made. This was

because a write-down of approximately ¥5,065,000 was required as the foreign exchange rate saw the Yen weaken and Euro strengthen more than anticipated (4.7% stronger Euro). However, the Ghanaian side has already procured emergency spare equipment which has been deployed to the local branches.

Equipment Usage Situation

All the facilities and equipment were being utilized effectively except for the auto reclosers in the Upper Denkyira District of the Central Region.

The auto reclosers are not currently used by the project office because the Upper Denkyira District is susceptible to power blackouts due to interference from trees, wildlife and wind-borne debris. Auto reclosers are devices that function to automatically restart once debris causing the power blackout has been automatically removed (such as the wind causing objects attached to power lines to fall). However, it was judged that the devices would not be used in this region as there are frequent cases where interfering debris is not automatically removed. However, the West Akim District has comparatively less vegetation than the Upper Denkyira District, and the devices are being utilized without such issues.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project's planned expenses and performance are as per the table below, and the project costs were lower than planned.

Table 13: The Project's Planned Expenses and Performance

Scheduled	Japanese side:			Ghanaian side:	Project Total: Japan/Ghana Share
	Phase 1	Phase 2	Total		
	678 million yen	410 million yen	1.088 billion yen	344 million yen	1.432 billion yen
Performance	677 million yen	408 million yen	1.085 billion yen (Comparison with the plan 99.7%)	227 million yen (Comparison with the plan 65.9%)	1.312 billion yen (Comparison with the plan 91.6%)

Source: JICA materials & ECG materials

Note that the Japanese side was responsible for the procurement and installation of the 33/11 kV distribution facility in the regions subject to electrification, and also for the procurement of the low voltage trunk distribution equipment and materials. On the other hand, the Ghanaian side was responsible for, a) logging of trees along the route of the distribution line installation, b) procurement and installation of low voltage distribution equipment, c) procurement of power consumption meters

and connection to consumers, and the procurement and installation of circuit breakers, d) securing operating and maintenance staff, and e) operating and maintaining procured equipment.

Difference between Scheduled Project Expenses and Performance

Regarding Phases 1/2, as a result of adjusting the procurement of emergency spares described above, the project costs of the Japanese side were kept within the planned costs.

On the other hand, the items the Ghanaian side was responsible for, such as logging and the procurement of low voltage distribution equipment, were also kept within the initially planned project costs. The discrepancy between the share amount at the time of planning and actual performance resulted primarily from the fact that the cost of logging in the West Akim Region was lower than planned.

3.4.2.2 Project Period

The scheduled period and performance of this project are as per the table below, and slightly longer than planned.

Table 14: Scheduled Project Period and Performance

	Phase 1		Phase 2		Total	
	Scheduled	Performance	Scheduled	Performance	Scheduled	Performance
Japanese side:	11 months	14 months: Comparison with the plan: 127% (Feb 2007 - Mar 2008)	10 months	12 months: Comparison with the plan: 109% (Jan 2008 - Dec 2008)	Overall: 21 months	Overall: 26 months: Comparison with the plan: 123%
Ghanaian side:	29 months	32 months: Comparison with the plan: 110% (Feb 2007 - July 2009)	28 months	30 months: Comparison with the plan: 127% (Feb 2007 - April 2010)	Overall: 57 months	Overall: 62 months: Comparison with the plan: 108%
Project Total:	30 months	46 months: Comparison with the plan: 153%	38 months	42 months: Comparison with the plan: 110%	Overall: 78 months	Overall: 88 months: Comparison with the plan: 114%

Source: JICA materials & ECG materials

Difference between the Planned Project Period and Performance

The construction period was extended. This can be attributed to the delay in manufacturing the procured equipment and a delay in transporting the equipment. In Phase 1/2, the equipment and materials arrived around three months later than planned, and similarly around two months later than planned in Phase 2/2. As a result, around five additional months were needed for the construction period the Japanese side required for the project overall. The Japanese side's delays in completion caused the start-date of the Ghanaian side's share of the construction to be delayed, and the

completion date was delayed somewhat as a result. However, the construction period required for the items which were the responsibility of the Ghanaian side went according to plan¹⁰.

From the above, though the project's cost was within the plan, the project period was exceeded, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

It is thought a largely adequate organizational framework has been laid down that will sustain the facilities and equipment installed by this project.

The ECG's has jurisdiction over the project in six districts of southern Ghana, and is comprised of a head office, regional offices, and district offices, and employed 5,390 staff at the end of 2009. This means a 10% personnel increase on the 4,889 staff at the time of planning (2005), and it is clear that this personnel increase parallels an expanded array of activities. Likewise, an organizational shakeup has begun at the head office, and the organizational framework continues to strengthen through such actions as making the ICT section independent and reinforcing the Strategy Division.

On the other hand, it is believed that within district offices which routinely manage and maintain the project's equipment, a sustainable framework has been improved, and personnel have been increased in divisions performing key routine duties.

Table 15: Change in the Number of Engineers in Focus Business Offices

Region	Business Office	Engineers		Meter Reading Staff		Customer Service	
		2008	2011	2008	2011	2008	2011
West Akim	Asamankese	5	8	2	6	1	3
	Nsawam	3	5	4	7	6	8
Upper Denkyira	Dunkwa	3	6	3	4	1	3
	Sefi	3	5	7	13	2	3

Source: ECG Materials

Note that in terms of the system of customer service, changing the collection method from house-to-house collection to a card system was considered. However, there is no plan to introduce this in the near future because constructing a network in rural areas is problematic in terms of cost, and in fact meter-reading staff visits are preferable as they deter surreptitious electricity usage.

¹⁰ The Ghanaian side's responsibilities vis-à-vis this project included connection to consumers, and hence their responsibilities were scheduled for a further 18 months after the Japan side completed its share of the project. Because the project completions of the Japanese side were delayed by three months and two months respectively, as a result the Ghanaian side's share of the work was also delayed by three and two months respectively.

3.5.2 Technical Aspects of Operation and Maintenance

Almost all the equipment installed under this project is similar to that already used by the ECG, and hence its management and maintenance does not require new skills or a particularly high level of technical competence, and therefore technically it is believed to be of largely adequate sustainability.

Note that the ECG's engineers are obliged to undergo training at ECG's Tema Training Center¹¹ before their field assignment. Engineers are as a rule assigned to the field after they have mastered a certain level of skills related to operating the equipment and routine maintenance. The training center also has an established refresher course with a training system set up for intermediate level technicians. In light of the above points, it is believed that the technical capabilities of ECG's engineers are assured at certain level.

3.5.3 Financial Aspects of Operation and Maintenance

The equipment and materials procured by this project are basically maintenance free, though spares must always be readily available to replace expendables and deteriorated parts necessary to operation. As per the table below, the ECG has a fixed budget secured as annual maintenance costs, and even though operations within the region have expanded greatly, maintenance costs per unit are largely maintained at the previous level. On the basis of such performance, it can be assessed that maintaining a largely capable level to perpetuate the effect of this project is possible in terms of financial sustainability.

Table 16: Cost of Maintaining Power Lines

	Region	Eastern Region		Central Region	
	Unit/Year	2004	2010	2004	2010
Existing distribution lines	Km	1,708	4,121	888	2,298
Annual maintenance budget	Million Cedi	2,832	6,985	2,444	5,924
Per Km of distribution lines	Million Cedi/Km	1.66	1.69	2.75	2.58

Source: ECG Materials

Likewise, the ECG has been in the black financially over the last four years, except for 2009.¹²

¹¹ As of May 2012, the center had four full-time instructors, and a further 20 registered instructors are dispatched according to the course details. New trainees are obliged to take a total of a one year course consisting of six-months at the training center and six-months OJT. Intermediate staff also accord with the personnel program, and are obliged to undergo 2-3 weeks refresher training. The training center also accepts third-nation trainees from countries such as the Gambia, Liberia, and Sierra Leone.

¹² There have been financial years to date when the ECG's income and expenditure was in the red (2006 and 2007). The main causes were the national policy that ensures electricity tariffs are kept low, and the tendency of government related organizations to delay payment. Recently, the ECG has been in the black as payments from government

Furthermore, ECG announced at the annual meeting that it will continue to focus management effort on improving the future financial situation. Specific targets were raised, such as, i. reducing distribution losses, ii. introducing a prepaid card system in urban areas, iii. thoroughly collecting tariffs, and iv. utilizing ICT effectively¹³. Until now, distribution losses in recent years have hovered from around 24% to just under 27%, so the ECG is particularly inclined to improve non-technical losses by further enhancing customer service (it is estimated that among the distribution losses, the majority of non-technical losses result from surreptitious electricity usage). On this note, a certain level of income and expenditure improvement can be expected by thoroughly reinforcing meter reading, and it can be said the system is being strengthened by increasing meter reading staff.¹⁴

Table 17: Changes in the ECG's Business Income & Expenditure (Unit: 1,000 Cedi)

		2008	2009	2010	2011
Income	Electricity Tariff Income	598,770	616,079	967,112	1,190,381
Expenditure	Purchasing Electricity and related Costs	495,205	541,332	825,977	1,010,801
	Transmission Costs	15,842	23,369	29,974	41,109
	Personnel Costs	51,970	77,673	81,940	111,887
Other Income and Expenditure	Exchange Profit & Loss	3,483	6,107	17,051	3,653
	Loan Interest	-24,838	-15,717	-4,695	-17,439
	Dividends of Affiliated Companies	163	170	448	-
	Other Income	11,213	10,413	9,344	10,634
Business Income & Expenditure		25,774	-25,321	51,369	23,432

Note: Figures for 2011 are provisional

Source: ECG Annual Report

Table 18: The ECG's Distribution Losses

	2006	2007	2008	2009	2010
Technical Losses	10.9%	10.8%	11.5%	11.7%	12.0%
Non-technical losses	13.3%	13.2%	14.1%	14.3%	14.6%
Total	24.3%	24.0%	25.6%	26.0%	26.6%

Source: ECG Materials

related organizations have been made relatively smoothly.

¹³ Liquidity ratio is said to indicate the short-term financial health of corporate bodies, and at 186% (as of 2008) is well clear of the standard of 150% or higher that is normally judged preferable. Note that 150% is only one benchmark, and apparently the liquidity ratio of heavy industries with major debts often falls below 150% (according to the 2011 Ministry of Economy, Trade and Industry Basic Survey of Industry).

¹⁴ Note that technical losses and non-technical losses cannot be clearly distinguished, so the ECG regards 45% of losses as attributable to technical losses, and the remaining 55% as non-technical losses. Incidentally, it is estimated that the majority of technical losses are accounted for by losses related to primary/distribution power transformers.

3.5.4 Current Status of Operation and Maintenance

The current status of operation and maintenance is good. In the ex-post evaluation survey, the opinions of the engineers of the district offices were that the equipment and materials of this project had not suffered a major breakdown to date and are of very high quality even compared with that of other projects (all four offices gave similar opinions).

Note that replacement equipment that must be purchased is available at local agencies, and no particular problems were seen in acquiring spare parts.

From the above, the materials and equipment of this project can be assessed as possessing a high potential to be used sustainably in future.

From the above, no major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

This project aimed to improve basic living standards through the provision of a stable power supply to residents of rural communities by enhancing the electrical grid in areas without electricity such as the Upper Denkyira District in the Central Region, and the West Akim District in the Eastern Region. This aim is highly relevant as it was consistent with the policies and needs at the time of project planning, and at the time of the ex-post evaluation. The procurement and installation of equipment and materials related to improving the electrical grid were carried out largely according to schedule, but while the project costs were within the initial plan, the project period was extended by around five months, and therefore the efficiency of the project is fair. However, the Japanese side procured and installed the 33/11 kV power distribution equipment for this project, and the Ghanaian side installed and connected meters to the final consumers. From the data collected in the present study, the electrification rate of the towns and villages and the household electrification rate within the area set at the time of planning exceeded the target, and positive impacts were seen such as a strengthened regional economy and improved health and hygiene services. In light of the above, it can be said that the project's effectiveness and impact are high. Similarly, there were no major items of concern in the organizational system and technical capabilities related to the maintenance of the Electricity Company of Ghana, and it can be evaluated that it is possible to ensure a certain level of sustainability in future.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

In order to establish the ECG's financial situation, further effort is required to reduce distribution losses and thoroughly reinforce the collection of tariffs.

Regarding the usage methods of the auto reclosers, the advanced settings inside the device need to be re-verified for effective material and equipment usage. The device settings such as the degree of sensitivity causing the devices to close can be altered in several ways according to various local usage conditions, so effective usage is possible through readjusting the calibrations. Accordingly, personnel in charge need to be trained in the appropriate methods of using these devices.

4.2.2 Recommendations to JICA

None in particular.

4.3 Lessons Learned

The Japan side was responsible for procuring and partially installing the distribution equipment and materials for this project, and the Ghanaian side was responsible for the connection and distribution to the final power consumers. For the government of the recipient country to take responsibility for approaches in the final stage entails a certain level of risk. However, in this case, from looking at the performance from past grant aid projects, an appropriate scope of responsibilities were shared with Japan and Ghana, over scrutinizing implementing capability of the project implementation body, degree of difficulty of the project overall, and ability to cost share.

It can be said that sharing an appropriate level of responsibility between both countries based on the past performance is effective for project planning in terms of project efficiency.