

United Republic of Tanzania

FY2015 Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for Reinforcement of Power Distribution in Zanzibar Island”

External Evaluator: Sawa Hasegawa, OPMAC Corporation

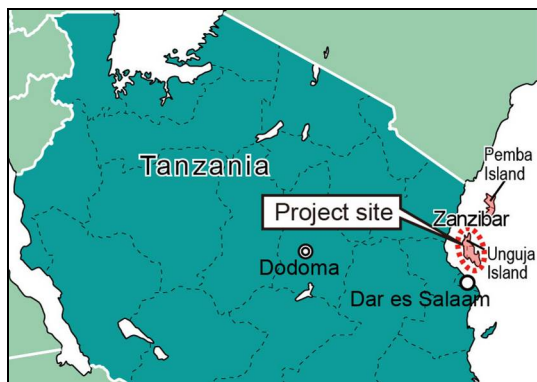
## **0. Summary**

The objective of this project is to provide more stable power supply to local residents on Unguja Island in Zanzibar by expanding an existing substation, installing new substations, and newly installing and replacing distribution lines on the island. With the achievement of this objective, the project aimed to contribute to enhancing economic and social activities in Zanzibar.

This project was consistent with the development plan and development needs of Zanzibar, both at the time of planning and ex-post evaluations, as well as Japan’s ODA policy at the time of planning. Therefore, the project relevance is high. As for the project effects, it was confirmed by local residents that the project brought about some positive effects such as decreases in frequency and length of blackout as well as improvements in stability of electricity voltage, achieved by the increased capacity of electricity supply facilities and reductions in voltage drops, power outages caused by accidents and power losses. Through these positive effects, it is considered that power supply on Unguja Island has become more stable. In addition, economic activities in Zanzibar increased after the project completion, while the living environment of local residents improved. The project was found to have contributed to these improvements, and thus, its effectiveness and impacts are high. The efficiency of the project is also high since both the project cost and project period were as planned, and project outputs were produced in accordance with the plan. The sustainability of project effects is fair since some problems were observed in the financial soundness of the implementing agency, although no problem has been identified in the operation and maintenance of the installed or replaced substations and distribution lines after the project completion as well as in the institutional and technical aspects of the implementing agency.

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

## 1. Project Description



Project location



The main transformer of Welezo Substation (33/11kV) newly installed by the project

### 1.1 Background

Zanzibar is located to the east of mainland Tanzania, off the east coast of Africa on the Indian Ocean. Zanzibar consists of two main islands, Unguja and Pemba, as well as a number of small islands surrounding them. Although Zanzibar is a part of the United Republic of Tanzania, it is governed by the highly autonomous Revolutionary Government of Zanzibar (hereinafter called the Government of Zanzibar). With its rich tourism resources such as Stone Town on Unguja Island, which is registered as a World Heritage site, and a number of marine resorts, Zanzibar is a popular tourist destination among foreigners and tourism is one of its main industries.

Zanzibar lacks its own power generation facilities<sup>1</sup>, and electricity is supplied from mainland Tanzania by the 132kV undersea cable<sup>2</sup>. The electricity supplied through the 132kV undersea cable is transmitted to Mtoni Substation, located near Zanzibar City, the city center of Unguja Island, and was stepped down to 33kV and 11kV in voltage, before distributed to the entire island. However, the 132kV transformation unit and 33kV distribution lines that were used to supply electricity to these facilities have never been replaced since their installations in the 1970-80s, and therefore, have deteriorated considerably. Moreover, at the time of project planning, the peak power demand in Zanzibar had reached approximately 40MW as against the undersea cable's maximum transmission capacity of about 45MW, and with existing substations already overloading, power outages and voltage drops occurred frequently.

Under these circumstances, the Government of Zanzibar requested the international

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<sup>1</sup> On the island of Unguja, electric power supply is supplemented by the use of diesel power generators. On the island of Pemba, supply is supplemented by the power provided from mainland Tanzania through a 33kV undersea cable and that generated on the island using diesel fuels.

<sup>2</sup> In mainland Tanzania, Tanzania Electric Supply Company Ltd. (hereinafter called TANESCO) oversees the generation, transmission and distribution of electricity. TANESCO's source of power generation has a relatively high rate of hydroelectric generation and the total electricity supply in the whole Tanzania including Zanzibar was approximately 1,000MW in 2015. Because hydroelectric generation uses water resources, load shedding is implemented in the mainland during dry seasons.

community for cooperation, which resulted in a project to improve the 132kV transmission line between mainland Tanzania and Unguja Island starting in 2010, financed by the Millennium Challenge Corporation (hereinafter called MCC)<sup>3</sup> of the USA. The understanding at that time was that the project's implementing agency, Millennium Challenge Account Tanzania Project (hereinafter called MCA-T), was to improve the 132kV transmission facility and the 132/33kV transformation unit in the existing Mtoni Substation, and the Zanzibar Electricity Corporation (hereinafter called ZECO) was to take responsibility for improving the 33kV distribution lines.

ZECO was capable of handling the operation and maintenance of the existing transmission/distribution facilities. However, improving Unguja's transmission/distribution lines required ZECO to install additional distribution lines consistent with power demand, replace a transformation unit and expand cables in order to enhance distribution capacity. These requirements were beyond what ZECO could meet with their technical capacity and budget situations at that time. As a result, the Government of Zanzibar requested the Japanese government to assist in the above-mentioned constructions, leading to the project under this evaluation.

## 1.2 Project Outline

The objective of this project is to provide more stable power supply to local residents on Unguja Island in Zanzibar by expanding an existing substation, installing new substations, and newly installing and replacing distribution lines on the island, thereby contributing to enhancing economic and social activities in Zanzibar.

### <Grant Aid Project>

E/N Grant Limit or G/A Grant Amount / Actual Grant Amount	3,000 million yen / 3,000 million yen
Exchange of Notes Date (/Grant Agreement Date)	March 2011
Implementing Agency	Zanzibar Electricity Corporation (ZECO)
Project Completion Date	March 2013
Main Contractors	Takaoka Engineering Co., Ltd. Mitsubishi Corporation
Main Consultant	Yachiyo Engineering Co., Ltd.

<sup>3</sup> MCC was established in 2003, separate from the United States Agency for International Development (USAID), to administer the Millennium Challenge Account, a special account of the USA. MCC's policy is to prioritize development assistance to countries that have shown strong commitments to good governance, investments in their citizens and economic freedom.

Basic Design	March 2011
Detailed Design	June 2011
Related Projects	<u>Technical Cooperation</u> - Project for Capacity Development of Efficient Distribution and Transmission Systems (2009 – 2016) - Project for Formulation of Power System Master Plan in Dar es Salaam and Review of the Power System Master Plan (2012) (2014 – 2016) (Technical Cooperation for Development Planning) <u>Other International Agencies and Donors</u> MCA-T Project, Millennium Challenge Corporation - Zanzibar Second Interconnector (2010 – 2013) <sup>4</sup>

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Sawa Hasegawa, OPMAC Corporation

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted as follows:

Duration of the Study: December 2015 – January 2017

Duration of the Field Study: April 3, 2016 – April 16, 2016, and June 23, 2016 – July 1, 2016

### 2.3 Constraints during the Evaluation Study

As mentioned in “1.1 Background” above, the MCA-T project aimed to improve the undersea cable and transmission line between mainland Tanzania and Unguja Island, while this project aimed to enhance the power receiving facilities on Unguja Island. Therefore, these two projects are complementary. In measuring effects, quantitative effects of this project were captured by operation and effect indicators, but qualitative effects and impacts of this project and the MCA-T project were intertwined and difficult to separate. Therefore, although no special explanation is given in the later sections, qualitative effects and impacts confirmed by this evaluation study were achieved jointly by this project and the MCA-T project.

<sup>4</sup> The project which laid a 132kV submarine cable from the mainland to Zanzibar as well as construction of transmission lines.

### 3. Results of the Evaluation (Overall Rating: A<sup>5</sup>)

#### 3.1 Relevance (Rating: ③<sup>6</sup>)

##### 3.1.1 Relevance to the Development Plan of Zanzibar

The Government of Zanzibar, in its development and poverty reduction plan, “the Mpango wa Kukuza Uchumi na kuondoa Umasikini Zanzibar” (known as MKUZA) (formulated in 2007), stated that the electricity sector is an important sector that serves as the foundation for the improvement of all public infrastructures. The following “MKUZA II” (2010 – 2015) highlighted the need to secure adequate electricity in order to enable active public investments/ development in such areas as airports, port facilities, roads, the environment and water resources. Moreover, “the Zanzibar Energy Policy” (formulated in 2009) mentions the needs to actively promote the use of renewable energy that has less negative impacts on the environment and to stabilize electric power supply.

At the time of ex-post evaluation, MKUZA II’s next 5-year plan (2016 – 2020) was still in the process of finalization. However, it is understood that the next plan, as was the case of MKUZA II, will continue to pursue the policy of securing sufficient electricity in order to enable public investments and development. Zanzibar’s sector policy, the Zanzibar Energy Policy, was still in effect at the time of ex-post evaluation.

Therefore, it is concluded that the project was consistent with the development plan and energy policy of Zanzibar, both at the time of project planning and ex-post evaluation.

##### 3.1.2 Relevance to the Development Needs of Zanzibar

As mentioned in “1.1 Background,” increasingly unreliable electric power supply, due to the deterioration of transmission and distribution facilities and frequent blackouts and voltage drops caused by overloading, was a problem in Zanzibar. Based on the view that an independent business entity which can provide stable and efficient electricity power supply was indispensable for the development of the tourism industry, a driving force of country’s economic growth, the Government of Zanzibar established ZECO in 2006 as part of the electricity sector reform. With assistance from Norway, Sweden, etc., ZECO has been striving to improve financial management and replace existing facilities. However, for the reinforcement of distribution facilities, which is central to the improvement of transmission/distribution networks, ZECO was required, but was unable, to adequately fund the investments from its limited budgets.

As seen in Table 1 and Figure 1 below, both Zanzibar’s population and foreign tourists visiting Zanzibar have been increasing year by year, driving up the demand for electricity (see Figure 2). On the other hand, as mentioned in “1.1 Background,” the transmission

<sup>5</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

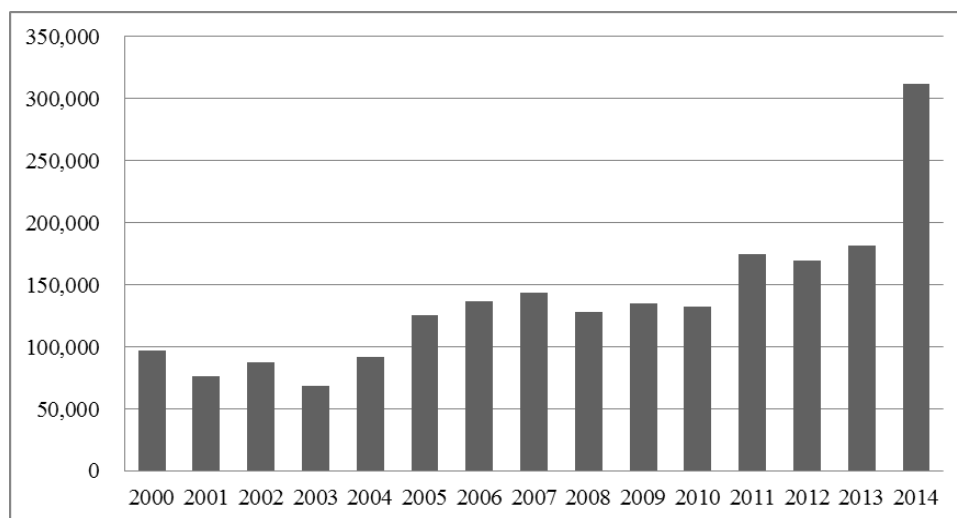
<sup>6</sup> ③: High, ②: Fair, ①: Low

capacity of the undersea cable at the time of project planning was approximately 45MW, and electricity demand was not fully met due to the limited supply capacity. In particular, damages in power receiving ends resulted in prolonged blackouts in 2008 and 2009 (a blackout lasted as long as 3 months in 2009). In addition, water shortage at the hydroelectric power plant dam in mainland Tanzania has caused a serious power shortage in 2011. Zanzibar, which largely depends on electric power supply from the mainland, experienced frequent power restrictions and outages. Under such circumstances, increasing and stabilizing electric power supply was an urgent task in Zanzibar.

Table 1: Population Trend in Zanzibar (Year 1988, 2002 and 2012)

	1988	2002	2012
Total population	640,685	984,625	1,303,569
Number of households	-	-	250,212

Source: National Bureau of Statistics “Population and Housing Census 1988, 2002 and 2012”  
(The number of households is not available for 1988 and 2002)

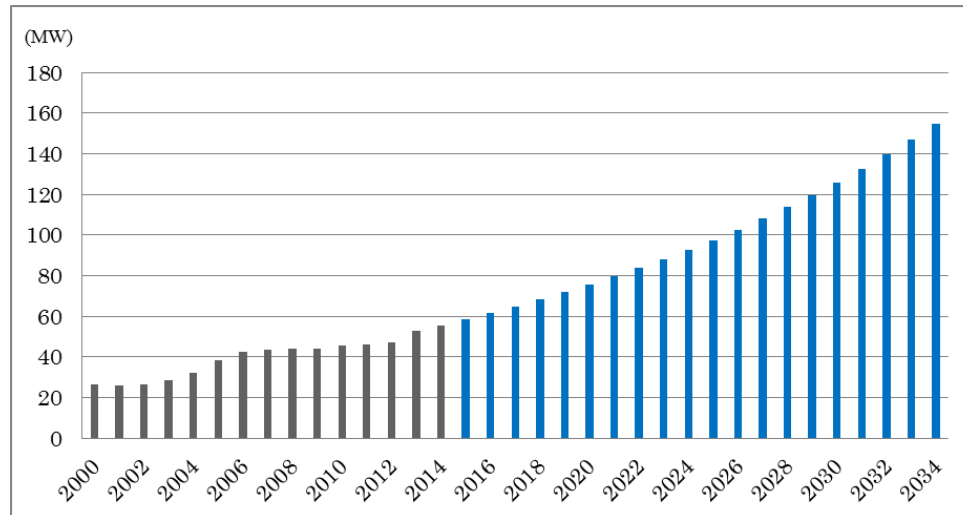


Source: Documents provided by the Zanzibar Commission for Tourism

Figure 1: International Tourists Arrivals in Zanzibar (Year 2000 – 2014)

After the completion of both this and MCA-T projects, the capacity of electricity supply facilities in Zanzibar increased markedly from 45MW to 100MW. At the time of ex-post evaluation (2016), electricity demand was approximately 60MW, well within the current facility’s supply capacity. However, electricity demand has been increasing annually, and according to ZECO’s estimate, demand will likely exceed 100MW in or around 2025 (Figure 2). Hence, the need to improve power supply capacity in Zanzibar remains strong at the time of ex-post evaluation. If the power demand exceeds supply again in the future, it will likely be necessary to increase power supply by using diesel generators as in the past. ZECO, however, envisages to enhance the share of renewable energy in power supply in

consideration of the high costs of diesel fuels, and was conducting a feasibility study, with assistance from EU, for the introduction of solar and wind power generations at the time of ex-post evaluation.



Source: Documents provided by ZECO

Figure 2: Power Supply in Zanzibar  
(Year 2000 – 2034, predicted figures of power demand from Year 2015)

Based on the above, the project was consistent with the development needs of Zanzibar both at the time of project planning and ex-post evaluation.

### 3.1.3 Relevance to Japan’s ODA Policy

The “Country Assistance Program for Tanzania” (June 2008) regards infrastructure development (transport and traffic such as roads, energy, water supply and water resource management), which contributes to economic growth and poverty reduction, as one of the priority agenda. The project is aimed at supporting infrastructure development in the country’s energy sector, by replacing and newly installing equipment and materials at the substations and distribution facilities. Therefore, the project was also consistent with Japan’s ODA policy towards Tanzania at the time of project planning.

In light of the above, this project has been highly relevant to Zanzibar’s development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

## 3.2 Efficiency (Rating: ③)

### 3.2.1 Project Outputs

The planned outputs of the project were the i) construction of 33kV facilities for Mtoni Substation, 33/11kV Mwanyanya Substation and 33/11kV Welezo Substation, ii)

procurement and installation of equipment and materials for these three substations, and iii) procurement and installation of equipment and materials for three distribution lines of the North route, South route and Fumba route (all are 33kV distribution lines). All outputs were produced as planned. The summary of produced outputs of the project is provided in Table 2.

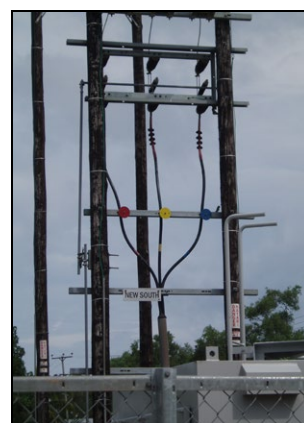
Table 2: Summary of Produced Outputs

Procurement and installation of equipment and materials	
1)	Expansion of 33kV facilities for Mtoni Substation (Site area: 546 square meters)
2)	Installation of 33/11kV Mwanyanya Substation (Site area: 840 square meters)
3)	Installation of 33/11kV Welezo Substation (Site area: 840 square meters)
4)	Installation of 33kV distribution lines for the North route (20.3 km between Mtoni Substation and Mahonda)
5)	Installation of 33kV distribution lines for the South route (22.0 km between Mtoni Substation and Tunguu)
6)	Replacement of 33kV distribution lines for the Fumba route (38.5 km between Mtoni Substation and Fumba)
Procurement of equipment and materials	
1)	Equipment and materials for distribution lines
2)	Test devices and maintenance tools
3)	Replacement parts
4)	Emergency backup supply
5)	Consumable goods

Source: Preparatory Survey Report, internal documents provided by JICA



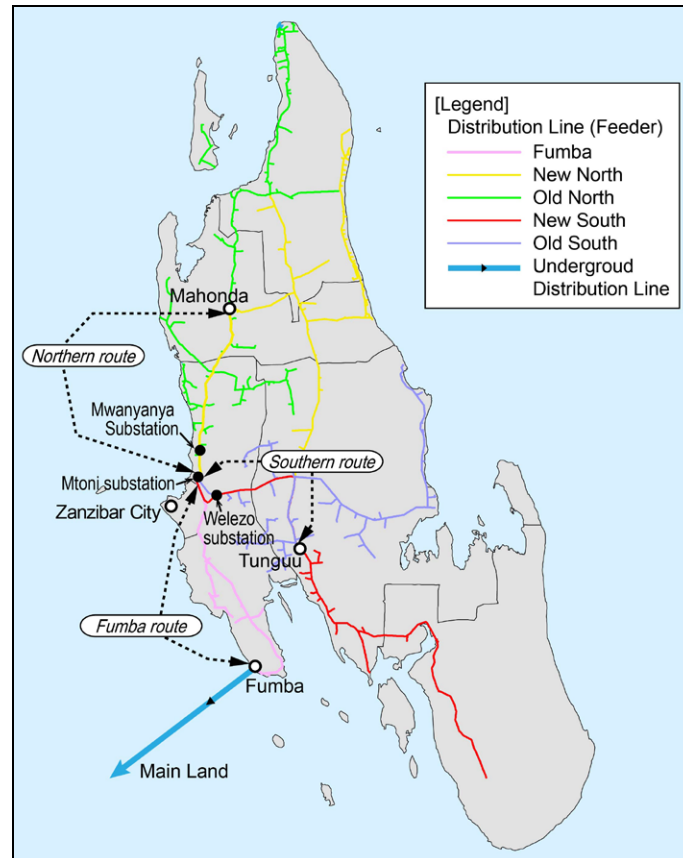
Mtoni Substation expanded by the project (33kV)  
(adjacent to the 132/33kV Substation that was  
constructed by the MCA-T Project)



Terminal pole of Mtoni Substation  
(for the South route distribution line)

Figure 3 shows the distribution feeders on Unguja Island, including the substations and distribution lines constructed under the project.





Source: Modified from the figure provided by ZECO

Figure 3: Distribution Feeders on Unguja Island with Substations and Distribution lines constructed under the Project

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The planned project cost to be borne by the Japanese side was 3,000 million yen and the cost to be borne by the Tanzanian side was 26 million yen<sup>7</sup>. The actual project cost borne by the Japanese side was 3,000 million yen as planned. As for the cost to be borne by the Tanzanian side, the exact amount of actual cost was not available because a separate record of expenditures for the project was not made. According to ZECO, however, the actual cost was roughly as planned. In addition, the amount borne by the Tanzanian side was small compared to that of the Japanese side. Given the circumstances, the evaluation on the project cost was made only with the comparison between planned and actual project costs borne by the Japanese side. Therefore, the project cost was also as planned (100%).

<sup>7</sup> The compensation cost for land acquisition and resettlement is not included. The planned and actual compensation costs are described in “3.4 Impact.”

### 3.2.2.2 Project Period

The planned project period was 24 months from April 2011 to March 2013, including the basic design and bid tender, and the actual period was also 24 months from March 29, 2011 to March 8, 2013. Thus, the project period was as planned (100%).

Both the project cost and project period were as planned. Therefore, efficiency of the project is high.

## 3.3 Effectiveness<sup>8</sup> (Rating: ③)

### 3.3.1 Quantitative Effects (Operation and Effect Indicators)

As the Operation and Effect Indicators to measure the quantitative effects of this project, capacity of power supply facility, voltage drops on the consumer side, length of power outages caused by accidents, and power losses were selected at the time of project formulation. Furthermore, for the purpose of ex-post evaluation, additional indicators, including the frequency of power outages, length of supply restrictions and distribution loss rate, were examined in order to better understand the situations related to power outages caused by accidents and power losses. The results are provided in Table 3 below.

Table 3: Results of Indicators on Project's Quantitative Effects

Indicators	Baseline	Target	Actual		
	2010	2016	2013	2014	2015
	Baseline Year	3 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion
<Operation and Effect Indicators> <sup>Note 1</sup>					
Capacity of power supply facility (MW) <sup>Note 2</sup>	40	78	100	100	100
Voltage drop on consumer side (%)	10-20	Less than 10	±6	±6	±6
Power outage caused by accidents (hours per month)	10	1	0	0	0
Power losses (MW) <sup>Note 3</sup>	7	Less than 5	Approx. 5	Approx. 5	Approx. 5
<Additional Indicators> <sup>Note 4</sup>					
Frequency of power outage (times per year)	-	N.A.	-	625	431
Supply restriction (hours per day)	3.5	N.A.	0	0	0
Distribution loss rate (%)	30	N.A.	-	23.9	-

Source: Internal documents provided by JICA, Documents provided by ZECO

Note 1: The actual figures of the 4 operation and effect indicators between 2013 and 2015 are the same because ZECO does not collect relevant data annually and its staff responded that the figures remained roughly the same during 2013-2015.

Note 2: While the actual baseline data on capacity of power supply facility was 45MW, it was set as 40MW since ZECO had restricted power supply to 40MW after the major breakdown of the undersea cable. In addition, the actual capacity of power supply facility exceeded the target because the MCA-T project incorporated increases in the transmission capacity in light of the continuing rise in power demand expected in the future.

Note 3: ZECO did not provide accurate records on the power losses. However, the staff stated that power losses decreased after the project implementation to approximately 5MW.

Note 4: '-' indicates that the data is not available. The targets for additional indicators were not set originally. The data on additional indicators cover the entire Unguja Island.

<sup>8</sup> Sub-rating for Effectiveness is also provided in consideration of Impact.

As seen in Table 3, the capacity of power supply facilities have increased to 100MW as against the project target of 78MW, while the actual power supply in 2015 was approximately 60MW (Figure 2). The three distribution lines installed or replaced under this project have not encountered any power outage after project completion (0 hour), and voltage drop on the consumer sides of the three distribution lines has decreased to around 6% on average as against the target of less than 10%. The power losses also decreased after the project completion. Although the figures of additional indicators account for the entire Unguja Island, the distribution loss rate also decreased compared to before the project, and no power restriction has been conducted since the completion of the project. Thus, the project is considered to have contributed to the stabilization of power supply on Unguja Island.

### 3.3.2 Qualitative Effects (Other effects)

As a qualitative effect of this project, it was expected that the consumer confidence in electricity services will improve as power supply on Unguja Island becomes more stable after the project. In order to evaluate the achievement of this effect, a beneficiary survey was conducted among power users as part of ex-post evaluation<sup>9</sup>.

The characteristics of the respondents under this survey is provided in Tables 4 to 9.

Table 4: Number of General Households Surveyed by Distribution Feeders

Distribution feeder	Region	No. of responses
North route	Kinyasini Kipandoni Upinja	14
South route	Makunduchi Bwejuu Jambiani	28
Fumba route	Fumba Nyamanzi Bweleo Kombeni Urban Centre	38

Source: Beneficiary survey (effective number of responses: 80)

<sup>9</sup> This survey was conducted by asking power users who receive electricity through the North, South or Fumba route distribution feeders, some questions regarding the changes in stability and reliability of electric power supply before and after the project. The structured interviews were conducted individually with power users. The number of total valid samples were 100, comprising 80 general households, 10 public facilities (school, hospital, public offices, etc.), and 10 commercial facilities (hotel, factory, retail shops, etc.). The sample general households were selected among those serviced by the three distribution feeders, with the number of samples for each route determined according to the user population. The interviewers visited the area and conducted interviews to the allocated number of people (The gender was not considered in the selection of respondents, and as a result, the ratio of male and female respondents was 6:4). Public and commercial facilities were selected by i) ensuring that the surveyed entity has been operating on the same premise since before the project; and ii) excluding small enterprises whose electricity consumption was similar to that of general households.

Table 5: Summary of General Households Surveyed

Category	Distribution	No. of responses	%
Age	20 – 29	8	10.0
	30 – 39	17	21.3
	40 – 49	24	30.0
	50 – 59	20	25.0
	60 and above	11	13.8
Sex	Male	50	62.5
	Female	30	37.5
Ownership of house	Own	71	88.8
	Rent	2	2.5
	Others	7	8.8
Number of members living together	2 – 4	17	21.3
	5 – 7	49	61.3
	8 – 10	12	15.0
	11 and above	2	2.5
Length of residence (years)	4 – 8	7	8.8
	9 – 13	14	17.5
	14 – 18	12	15.0
	19 – 23	20	25.0
	24 and above	27	33.8
Length of connection to electricity (years)	4 – 8	26	32.5
	9 – 13	23	28.8
	14 – 18	22	27.5
	19 and above	9	11.3
Average monthly electricity bill (TZS) <sup>10</sup>	9,999 and below	3	3.8
	10,000 – 19,999	19	23.8
	20,000 – 29,999	18	22.5
	30,000 – 39,999	16	20.0
	40,000 – 49,999	12	15.0
	50,000 and above	12	15.0

Source: Beneficiary survey (effective number of responses: 80)

Table 6: Public Facilities Surveyed

Type of facilities (Number of respondents)	Respondents	Distribution feeder
Hospital (1)	Alrahma Hospital	Fumba route
School (3)	Lumumba High School	Fumba route
	Zanzibar Commercial School Mahad Istiqama	Fumba route South route
University/Institute (2)	SUMAIT University	Fumba route
	Zanzibar Institute of Tourist Development	Fumba route
Government office (4)	Zanzibar Water Authority	Fumba route
	Zanzibar Social Security Fund	Fumba route
	Zanzibar Airport Authority	Fumba route
	Zanzibar Revenue Board	Fumba route

Source: Beneficiary survey (effective number of responses: 10)

<sup>10</sup> 1 Tanzanian Shilling (TZS) = Approximately 0.05 yen (Exchange rate as of July 2016)

Table 7: Commercial Facilities Surveyed

Type of facilities (Number of respondents)	Respondents	Distribution feeder
Factory (3)	Zainab Bottlers Drop of Zanzibar Dunga Block factory	Fumba route North route North route
Hotel (4)	Fumba Beach Lodge Melia The Zanzibar Residence Serena inn	Fumba route South route South route Fumba route
Retail shop (2)	Abdul-razak shop Rashid shop	Fumba route Fumba route
Radio station (1)	Coconut FM Radio	Fumba route

Source: Beneficiary survey (effective number of responses: 10)

Table 8: Summary of Public Facilities

Category	Distribution	No. of responses
Length of residence (years)	4 – 8	4
	9 – 13	1
	14 – 18	2
	19 and above	3
Average monthly electricity bill (TZS)	Below 5 million	4
	5 million – 14.99 million	3
	15 million – 24.99 million	1
	25 million and above	2
Private generator	Owned	9
	Not owned	1

Source: Beneficiary survey  
(effective number of responses: 10)

Table 9: Summary of Commercial Facilities

Category	Distribution	No. of responses
Length of residence (years)	4 – 8	3
	9 – 13	5
	14 – 18	0
	19 and above	2
Number of employees	Below 50	4
	50 – 99	2
	100 – 149	1
	150 – 199	2
	200 and above	1
Average monthly electricity bill (TZS)	Below 5 million	3
	5 million – 14.99 million	2
	15 million – 24.99 million	2
	25 million and above	3
Private generator	Owned	8
	Not owned	2

Source: Beneficiary survey  
(effective number of responses: 10)

The results of the beneficiary survey are shown in Table 10.

Table 10: Results of Beneficiary Survey on Project's Qualitative Effects

Q1: Awareness of the project				
Knew		Did not know		
47		53		

Q2: Current stability of electricity voltage				
Very stable	Stable	Unstable	Very bad	Do not know
28	64	7	0	1

Q3: Change in stability of electricity voltage before and after the project			
Improved	Same	Worsened	Do not know
83	16	1	0

Q4: Current average frequency of blackout (times per month)			
1 – 2	3 – 4	5 – 6	7 and above
33	47	10	10

Q5: Change in frequency of blackout before and after the project			
Decreased	Same	Increased	Do not know
92	6	2	0

Q6: Current average length of blackout (minutes)			
5 – 24	25 – 44	45 – 64	65 and above
30	22	20	28

Q7: Change in length of blackout before and after the project			
Decreased	Same	Increased	Do not know
91	7	0	2

Q8: Incident of electrical accidents/faults	
Yes	No
27	73

Q9: Change in frequency of electrical accidents/faults before and after the project			
Decreased	Same	Increased	Do not know
67	24	2	7

Q10: Type of electrical accidents/faults if answered 'Yes' in Q8			
Electrical leak	Short circuit	Flashover	Others
2	8	11	6

Q11: View on current electricity tariff				
Too expensive	Expensive	Reasonable	Cheap	Do not know
38	35	22	0	5

Q12: Satisfaction level of ZECO's services				
Very satisfied	Satisfied	Not really satisfied	Dissatisfied	Do not know
22	56	19	1	2

Source: Beneficiary survey (effective number of responses: 100)

Note: Possible reasons for the few responses of 'Worsened' or 'Increased' to the questions on change in stability of electricity voltage (Q3), frequency of blackout (Q5) and frequency of electrical accidents/faults (Q9) are that the respondents were receiving electricity through old distribution lines with some defects, or that there are some problems in the leading wires from the distribution lines to their buildings.

As seen in Table 10, according to the results of the beneficiary survey collected from the total of 100 power users, including general households, public facilities and commercial facilities, more than 80% of beneficiaries responded that electricity voltage has stabilized (Q3), more than 90% responded that both the frequency and the duration of blackouts have decreased (Q5 and Q7), and approximately 70% responded that electrical accidents and faults have decreased (Q9).

When asked about ZECO's electricity tariffs, more than 70% of beneficiaries responded "expensive" or "too expensive" (Q11). Such responses may be because beneficiaries are now consuming more electricity with improved power supply, and as a result, their electricity bills have increased. It should also be noted that, in Zanzibar, water tariffs are not only very low (4,000 TZS or about 200 Japanese Yen monthly, regardless of the consumption volume)

but also often uncollected. Therefore, many beneficiaries feel electricity bills that are collected based on the consumption data managed by meters are high. When asked about ZECO's services, nearly 80% of the beneficiaries responded "very satisfied" or "satisfied" (Q12), indicating high satisfaction levels. The remaining 20% of beneficiaries who responded "Not really satisfied" or "dissatisfied" list such reasons as high electricity tariffs, delays in repairs of broken meters, inconveniences related to the concentration of payment centers in the Zanzibar city center, and slow responses to troubles.

Overall, the beneficiary survey confirmed the positive qualitative effects related to the stability and reliability of power supply, as seen in significant reductions in the frequency and duration of power outages, and improvements in voltage stability, among others.

### 3.4 Impacts

#### 3.4.1 Intended Impacts

The project aimed to contribute to enhancing economic and social activities in Zanzibar by providing more stable power supply to local residents on Unguja Island. To confirm the impacts that were brought about by the project, such aspects as revitalization of the local economy in Zanzibar, improvement in living environment of local residents, stable operation of public facilities and improvement in productivity of commercial facilities were reviewed, mainly using the feedback from the beneficiary survey.

##### (1) Impact on local economy in Zanzibar

According to the feedback given by the Ministry of Lands, Housing, Water and Energy of Zanzibar and ZECO to the questionnaire and interview, there have been a number of new large investment projects and development plans in Zanzibar in recent years, showing the signs of increased economic activities. Examples include the construction of a new airport terminal (expected to be operative towards the end of 2016), a major hotel development by foreign capital, a large-scale factory manufacturing dairy products and drinks, and a new urban development accompanied by a shopping mall in the Fumba district located in the southwest of Zanzibar. Improved electric power supply and the availability of more stable and reliable electricity made possible by the project are considered to have promoted investments and served to enhance economic activities in Zanzibar.

##### (2) Improvement in living standards and environment

When conducting the beneficiary survey (100 valid responses) to evaluate project's qualitative effects as discussed above, impacts of this project were also examined.

The findings related to changes in living environment of general households are provided in Table 11 below.

Table 11: Project Impacts on General Households

Q1: Change in utilization of electric appliances before and after the project				Q2: Change in frequency of breakdowns of electric appliances before and after the project			
Increased	Same	Decreased	Do not know	Decreased	Same	Increased	Do not know
26	46	7	1	34	34	0	12

Q3: Change in time spent on housework before and after the project				Q4: Change in activities at night before and after the project			
Decreased	Same	Increased	Do not know	Increased	Same	Decreased	Do not know
22	45	7	6	19	32	27	2

Source: Beneficiary survey (effective number of responses: 80, of which 50 males and 30 females)

As shown in Table 11, when asked about the impact of the project, approximately 30% of beneficiaries responded that the utilization of electric appliances has increased (Q1), and about 40% responded that the frequency of breakdowns of electric appliances has decreased (Q2). Although most beneficiaries responded that there was no change in the length of time spent on housework or night-time activities, nearly 30% of beneficiaries mentioned that, by starting to use laundry machines and electric cooking appliances, the time spent on housework has decreased (Q3 and Q4).

As an example of the way in which the stability of power supply has contributed to their life, some respondents mentioned that using more electric appliances for a longer period of time has improved the quality of life, and watching television has made them pay more attention to the events and news in the society.

### (3) Stable operation of public facilities

The changes related to the operation of public facilities are summarized in Table 12.

Table 12: Project Impacts on Public Facilities

Q1: Change in utilization of electric appliances before and after the project				Q2: Change in frequency of breakdowns of electric appliances before and after the project			
Increased	Same	Decreased	Do not know	Decreased	Same	Increased	Do not know
5	4	1	0	7	1	2	0

Q3: Change in use of generator before and after the project (effective number of responses: 9)		Q4: Change in operation capacity and service quality etc. before and after the project	
Decreased	Same	Improved	Worsened
8	1	9	0

Source: Beneficiary survey (effective number of responses: 10)

As shown in Table 12, project's impacts on public facilities include increased utilization of electric appliances, lower incidence of breakdowns of electric appliances and reduced use of in-house power generators. Also, 9 out of 10 beneficiaries responded that the operation



rate of their facility and the quality of services, such as education and medical services, have improved after the project (Q4).

Examples of benefits brought about by stable electricity include improvements in computer use and student learning at schools as well as better utilization of medical appliances due to fewer breakdowns at a hospital. Among public institutions, the Zanzibar Water Authority responded that their water supply services improved due to the higher operation rate of water pumps as well as reductions in fuel costs as a result of less frequent use of in-house power generators.

#### (4) Improvement in productivity of commercial facilities

The changes in production outputs and sales among commercial facilities are summarized as follows.

Table 13: Project Impacts on Commercial Facilities

<b>Q1: Change in business hours before and after the project</b>				<b>Q2: Change in sales before and after the project</b>			
Increased	Same	Decreased	Do not know	Increased	Same	Decreased	Do not know
4	4	2	0	5	5	0	0

<b>Q3: Change in use of generator before and after the project (effective number of responses: 8)</b>		<b>Q4: Change in production outputs, productivity, service quality, etc. before and after the project</b>			
Decreased	Same	Improved	Same	Worsened	Do not know
6	2	7	1	0	2

Source: Beneficiary survey (effective number of responses: 10)

As shown in Table 13, about half of the beneficiaries responded that their business hours and sales have increased (Q1 and Q2), and 7 out of 10 beneficiaries responded that production outputs, productivity and service quality have improved (Q4).

The examples of benefits brought about by stable power supply include improved quality of merchandise, such as fresh produce and frozen food items, at retail stores, constructions of new factories, and reduction in fuel expenses due to less frequent use of in-house power generators.

### 3.4.2 Other Positive/Negative Impacts

#### (1) Benefits to the residents living in the project area and its adjacent areas

In addition to the impacts confirmed in the above-mentioned beneficiary survey, a few more examples were confirmed during the interviews with the relevant parties.

The evaluator interviewed the Children Officer and the Women Officer of the Department of Women and Children at the Ministry of Empowerment, Social Welfare, Youth, Women and Children on benefits for women derived from more stable power supply by the project.

During the interview, it was mentioned that because of the stable power voltage and fewer blackouts, more households are now able to use electric appliances such as laundry machines, and consequently, hours spent by women on housework have reduced. Some women have made use of the spare time to start their own small businesses, such as making fruit juice and cakes for sale.

Moreover, some women who were already engaged in businesses, such as horticulture or raising chickens, have also started using electric appliances, including refrigerators and warmers, and increased production of these cash crops and income.

## (2) Land Acquisition and Resettlement

The implementation of the project resulted in land acquisition and resettlement in the project areas. During the basic design study of the project, the installation of new substations and additional distribution lines were expected to require the involuntary resettlement in the scope of 138 houses 74 households and 509 people, and also affect the farmland of 707 households. It was planned that the compensations for the buildings and farmland to be affected by the resettlement be provided based on the Resident Resettlement Plan, formulated upon consultations with the affected people, and in accordance with the relevant laws and regulations as well as land system in Zanzibar.

As a result of the project implementation, 164 households were eventually resettled and the farmland of 913 households was affected. ZECO implemented the relocation in accordance with the Resident Resettlement Plan, and made compensations to all affected people accordingly. The entire cost of compensation was borne by the Government of Zanzibar. For the expected amount of compensation 2,372,508,125TZS (approximately 144.25 million Japanese Yen), the Government of Zanzibar allocated 2,431,928,625TZS, and the actual compensation paid by ZECO, in 11 installments to the affected people from December 2011 to July 2013, was 2,415,770,168TZS in total.

During the interviews held with four affected residents for the purpose of ex-post evaluation, some interviewees have voiced dissatisfaction with the amount of compensation despite the fact that compensations were properly paid following the Resident Resettlement Plan. Also, according to these four residents as well as local leaders in the affected areas, most of the affected residents have resettled in the areas close to their original residence, means of livelihood and fluctuations in income remained unchanged, and means of livelihood were secured after the relocation.

In light of the above, land acquisition and resettlement caused by the project were appropriately handled by ZECO in accordance with the related laws and land systems of the Government of Zanzibar as well as the Resident Resettlement Plan. The compensations for all the affected residents were also paid based on the assessed values. Therefore, it is

concluded that the process of land acquisition and resettlement under the project were properly handled.

### (3) Impacts on the Natural Environment

At the time of basic design study, the environmental impact assessment was conducted to understand the project's impacts on the environment, but neither adverse impacts on the environment nor pollutions were anticipated. Nevertheless, some measures were proposed in the environment management plan to relieve the impacts of noises and wastes anticipated during the course of project implementation. These measures were duly taken and no adverse impact on the environment was observed during project implementation or ex-post evaluation.

On the other hand, due to the decreased incidence of power outages, operation hours of diesel power generators were reduced, driving down the use of diesel fuels and the amount of exhaust gas emitted. Hence, the project made some contributions to reducing negative burdens on the environment. It should be noted that, when the power supply through the undersea cable ceased for 3 months and Zanzibar faced prolonged blackouts, the Government of Zanzibar installed emergency power generators throughout Unguja Island, leading to rapid increases in the consumption of diesel fuels used for power generation.

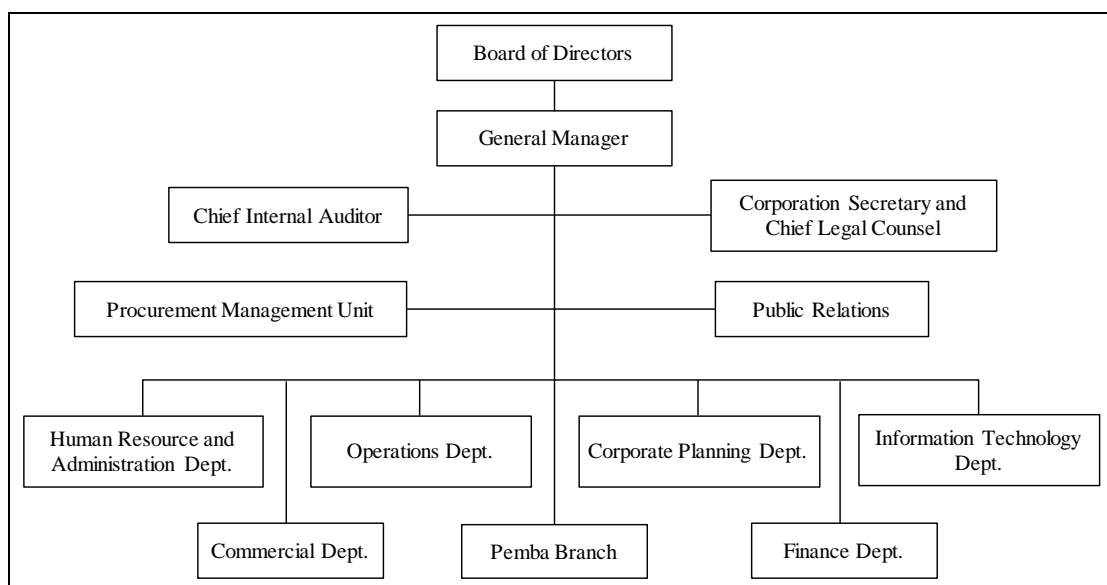
To summarize, more stable power supply achieved under this project has made such impacts as enhanced economic activities in Zanzibar, improved living environment of the residents, higher operation rates and better quality of services given by public facilities, improvements in production outputs, productivity and quality of services by commercial facilities, and more active participation by women in social and economic activities. Thus, it is concluded that the project has made contribution to stimulating economic and social activities in Zanzibar.

This project has mostly achieved its objectives. Therefore, effectiveness and impact of the project are high.

## 3.5 Sustainability (Rating: ②)

### 3.5.1 Institutional Aspects of Operation and Maintenance

The implementing agency responsible for the operation and maintenance of the facilities financed under the project is ZECO. ZECO underwent an organizational reform in July 2015, and the current structure is given in Figure 4. ZECO has 722 staff in total (as of July 2015), and is constituted by 7 departments, each with clearly-defined responsibilities.



Source: Documents provided by ZECO

Figure 4: Organization Chart of ZECO

Within ZECO, the Operations Department is responsible for the operation of the substations and the maintenance of the distribution lines financed by the project. The Operations Department which houses a total of 202 staff (as of April 2016) consists of three units, namely the ‘Power Generation Unit’ that oversees power generation, ‘System Control, Plant, Transmission Unit’ that oversees power transmission, and ‘Power Distribution Section’ that oversees power distribution. The staff in the Operations Department are ranked according to their qualification levels: Engineers (principal engineers, college graduates, there were 14 Engineers as of April 2016), Technicians (engineers, with a certificate or diploma, 21 Technicians) and Artisans (workers, no qualification, 162 Artisans). According to the result of a questionnaire and an interview given to the Operations Manager, the current number of staff and department structure are adequate for the operation and maintenance of subsections and distribution lines.

Regarding the operational system of the expanded or newly installed Mtoni Substation, Mwanyanya Substation and Welezo Substation, it was mentioned that 4 operators station in rotation for 24 hour-monitoring at each substation. In order to have some margins in the rotation system, the department intends to increase two more operators for each substation in the future. However, due to budgetary constraints, it will be difficult to hire new staff, and the plan is to transfer existing staff from the Commercial Department.

As for the maintenance of distribution lines, 9 teams (7 staff per team) attend to the regular inspections and such work as cutting tree branches off the distribution lines. The North route, South route, and Fumba route have approximately 30, 30, and 20 staff, respectively.

Based on the above, no problem was observed related to the operation of substations and the maintenance of distribution lines, and ZECO's organization structure, operation and maintenance structure, and staffing arrangements are in order.

### 3.5.2 Technical Aspects of Operation and Maintenance

From October 2012 to February 2013 of the project implementation period, project members (main contractors) conducted an on-the job training (hereinafter called OJT) for 11 staff of ZECO's Operations Department (1 project coordinator, 3 substation staff, and 7 distribution line staff), on how to operate and maintain the procured equipment and materials. According to the feedback from Operations Manager, the staff who participated in the OJT continues to be engaged in the same tasks in the Department and no technical problem has occurred in the regular operation and maintenance of the substations and distribution lines. The manuals that were provided during the procurement of equipment and materials were utilized where appropriate.

On the other hand, operators stationing at each substation are mainly in charge of managing records and data (taken every 30 minutes by hand). When there is a problem in an area controlled by a substation, operators will contact a technical staff so that the latter can go to the substation and deal with the problem. Although the three substations that were constructed under the project have yet to encounter problems, troubles have occurred at older substations. It has been pointed out that troubles can be tackled more swiftly if the operators themselves can deal with some problems.



Recording by an operator at Welezo Substation

Recorded data

In Tanzania, JICA implemented a technical cooperation project “The Project for Capacity Development of Efficient Distribution and Transmission Systems” (August 2009 – March 2016), to support the TANESCO Training School (hereinafter referred to TTS)<sup>11</sup>, and 73 ZECO staff (all Artisans) have so far participated in their training courses such as the “operation and maintenance of distribution lines.” Because the training at the TTS allows participants to learn practical skills on how to conduct regular inspections and trouble-shooting, and it is the only such training opportunity available for ZECO staff, the satisfaction level among ZECO participants is high, and the knowledge obtained has been put to use in the actual operations. According to Operations Manager, wrong approaches to maintenance work have been corrected as a result of the training. ZECO hopes to have more staff attend the training – not only Artisans, but also the newly-graduated Engineers, relatively inexperienced Technicians and staff outside of the Operations Department. However, the number of staff which ZECO can afford to send to TTS training is limited as TTS collects fees and ZECO’s budget is tight.

In sum, while no particular technical problem has been observed in terms of ZECO’s regular operation and maintenance, ZECO wishes to further improve skills of its staff.

### 3.5.3 Financial Aspects of Operation and Maintenance

ZECO is a financially independent company. Its income and expenditure accounts since its establishment in fiscal year 2006/07 (a fiscal year in Tanzania starts in July and ends in June of the following year) till fiscal year 2013/14 are summarized in Table 14, while the number of its customers since fiscal year 2010/11 is provided in Table 15.

Table 14: Income and Expenditure of ZECO

Unit: TZS

	FY2006/07	FY2007/08	FY2008/09	FY2009/10
Operating income	18,001,362,000	17,127,869,019	25,108,092,151	35,619,530,000
Non-operating income	20,880,209,000	21,089,935,798	1,948,692,063	2,233,426,000
<b>Income in total</b>	<b>38,881,571,000</b>	<b>38,217,804,817</b>	<b>27,056,784,214</b>	<b>37,852,956,000</b>
Cost of electricity	6,256,471,000	24,137,957,710	29,371,109,167	22,081,722,000
Other expenses (Of which maintenance)	5,169,587,000	5,869,475,547	7,481,151,268	12,511,855,158 1,466,362,500
<b>Expenditure in total</b>	<b>11,426,058,000</b>	<b>30,007,433,257</b>	<b>36,852,260,435</b>	<b>34,593,577,158</b>
<b>Balance</b>	<b>27,455,513,000</b>	<b>8,210,371,560</b>	<b>-9,795,476,221</b>	<b>3,259,378,842</b>

<sup>11</sup> TTS was established as an internal training institution for TANESCO’s technical staff. JICA has assisted in the 1) development of training curriculum, syllabus and teaching materials for electrical engineers, technical staff and engineers, 2) installation of a training facility and equipment as well as procurement of training tools and expendables, 3) execution of training of trainers, and 4) development of a training certification system.

	<b>FY2010/11</b>	<b>FY2011/12</b>	<b>FY2012/13</b>	<b>FY2013/14</b>
Operating income	28,321,080,807	32,483,344,167	46,571,577,193	56,968,070,013
Non-operating income	2,127,554,864	2,492,806,440	3,604,178,799	3,980,112,809
<b>Income in total</b>	<b>30,448,635,671</b>	<b>34,976,150,607</b>	<b>50,175,755,992</b>	<b>60,948,182,822</b>
Cost of electricity	28,939,500,717	31,315,005,686	34,210,751,044	41,875,542,460
Other expenses	15,597,332,502	16,875,666,819	18,217,899,280	20,418,048,180
(Of which maintenance)	637,103,906	453,045,952	352,007,009	316,636,940
<b>Expenditure in total</b>	<b>44,536,833,219</b>	<b>48,190,672,505</b>	<b>52,428,650,324</b>	<b>62,293,590,640</b>
<b>Balance</b>	<b>-14,088,197,548</b>	<b>-13,214,521,898</b>	<b>-2,252,894,332</b>	<b>-1,345,407,818</b>

Source: Financial Reports of ZECO (FY2010/11, FY2011/12, FY2012/13, FY2013/14), Preparatory Survey Report  
Note 1: The breakdown of specific expense items such as the maintenance and repair expense has been added from the Financial Report for FY2009/10.

Note 2: The Financial Reports for FY2014/15 and FY2015/16 have not been officially approved.

Note 3: Other expenses include carry-forward of a previous year's operating loss.

Table 15: Number of Customers of ZECO

Unit: Customer

<b>FY2010/11</b>	<b>FY2011/12</b>	<b>FY2012/13</b>	<b>FY2013/14</b>	<b>FY2014/15</b>	<b>FY2015/16</b>
105,294	111,261	118,208	127,553	140,577	145,330

Source: Documents provided by ZECO

According to ZECO's Finance Manager, negative balances in the income and expenditure accounts of fiscal years 2008/09, 2010/11 and 2011/12 depend to a large extent on the significant shortages of power supply due to the damages of undersea cable in 2008 and 2009 as well as the water shortage in mainland Tanzania in 2011 as mentioned in "3.1.2 Relevance to the Development Needs of Zanzibar," which necessitated the continuous use of diesel power generators on Unguja Island, resulting in substantial fuel costs. Although both customer numbers and operating income have been increasing since then, costs of electricity (e.g. cost of power purchase from TANESCO on mainland Tanzania, cost of diesel fuels used to supply power on Pemba Island, etc.) have also increased, resulting in operating losses on a single-year basis. According to Finance Manager, although the financial reports for fiscal years 2014/15 and 2015/16 have not been officially approved, operating losses have been on the decrease since fiscal year 2010/11, and the financial conditions of ZECO are improving.

The electricity tariff of ZECO was revised in November 2013, and the current tariff structure is provided in Table 16 below. Finance Manager mentioned that ZECO itself has been considering further tariff increases in order to improve its financial standing. However, tariff increases will require the approval from the Government of Zanzibar, and cannot be decided solely by ZECO. At the same time, there is no budgetary supplement from the Government of Zanzibar to compensate for the operating losses, and the only government subsidy available is dedicated to the electrification projects in the countryside, accounting only a small portion of ZECO's income.

Table 16: Electricity Tariff of ZECO (since November 2013)

Unit: TZS

	Type of tariff	Utility rates for units (kWh)	Unit price	Service charge per month	Price per kVA demand
1	Lifeline	1 to 50 units	66	2,100	-
		Consumption in excess of 50 units	240		
2	General service	1 to 1,500 units	222	2,100	-
		Consumption in excess of 1,500 units	240		
3	Small industries	1 to 5,000 units	172	16,500	15,000
		Consumption in excess of 5,000 units	213		
4	Large industries	1 to 10,000 units	169	240,000	15,000
		Consumption in excess of 10,000 units	141		
5	Street light	1 unit to infinity	222	240,000	15,000

Source: Documents provided by ZECO

Aside from tariff increases, ZECO has been promoting tariff collections through the prepaid method since around 2000, so as to decrease non-payments of electricity charges by power users, and thereby, improve its financial conditions. ZECO's Commercial Manager mentioned that approximately 70% of the power users are currently using the pre-paid method. Accordingly, the incidence of non-payments is on the decrease, but ZECO aims to further improve the collection rate of electricity charges in the future.

It is also noted that maintenance-related expenditure has been decreasing annually. According to Operations Manager, while the necessary maintenance and operation cost is secured, the installation of substations and the use of durable ABC cables and insulation cables for distribution lines under this project as well as the MCA-T project contributed to the decrease in the incidence of troubles and breakdowns, and therefore, reduced repair expenses and led to the decrease in the whole maintenance expenses of ZECO.

As seen above, although ZECO's financial situations are improving, the company has been running operating losses for the past 5 years. In the future, there will also be a need to secure funds for maintenance and repair expenditures, which will likely increase as the facilities, equipment and materials become degraded and deteriorated with age.

### 3.5.4 Current Status of Operation and Maintenance

Based on the feedback given by ZECO's Operations Manager on the questionnaire and interview, Mtoni Substation, Mwanyanya Substation and Welezo Substation that were newly installed or expanded under the project have been operating without troubles and no repair work has been necessary. In addition, distribution lines that were additionally installed or replaced under the project (North Route, South Route and Fumba Route) have been regularly inspected, and no power outage has been caused by accidents. No problem has been observed on all concerned substations and distribution lines with visual checks during ex-post evaluation. In addition, Operations Manager mentioned that they still have spare parts procured during project implementation in stock and no problem is expected to locally



procure spare parts of all the equipment in the future.

In sum, no problem was observed in the current status of operation and maintenance since the substations and the distribution lines have been operating normally and maintenance and inspection work has been conducted regularly.

In light of the above, and considering the problems observed in the financial aspect of ZECO, the sustainability of the project effects is evaluated to be fair.

## **4. Conclusion, Lessons Learned and Recommendations**

### **4.1 Conclusion**

The objective of this project is to provide more stable power supply to local residents on Unguja Island in Zanzibar by expanding an existing substation, installing new substations, and newly installing and replacing distribution lines on the island. With the achievement of this objective, the project aimed to contribute to enhancing economic and social activities in Zanzibar.

This project was consistent with the development plan and development needs of Zanzibar, both at the time of planning and ex-post evaluations, as well as Japan's ODA policy at the time of planning. Therefore, the project relevance is high. As for the project effects, it was confirmed by local residents that the project brought about some positive effects such as decreases in frequency and length of blackout as well as improvements in stability of electricity voltage, achieved by the increased capacity of electricity supply facilities and reductions in voltage drops, power outages caused by accidents and power losses. Through these positive effects, it is considered that power supply on Unguja Island has become more stable. In addition, economic activities in Zanzibar increased after the project completion, while the living environment of local residents improved. The project was found to have contributed to these improvements, and thus, its effectiveness and impacts are high. The efficiency of the project is also high since both the project cost and project period were as planned, and project outputs were produced in accordance with the plan. The sustainability of project effects is fair since some problems were observed in the financial soundness of ZECO, although no problem has been identified in the operation and maintenance of the installed or replaced substations and distribution lines after the project completion as well as in the institutional and technical aspects of ZECO.

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

### **4.2 Recommendations**

#### **4.2.1 Recommendations to the Implementing Agency**

As mentioned in "3.5.2 Technical Aspects of Operation and Maintenance," ZECO has sent its staff, mainly its Artisan, to the TTS training courses in mainland Tanzania. They are of

the opinion that the training was highly useful and wish to send more staff - not only Artisans, but also those Technicians who lack field experience and newly-graduated Engineers. While the number and skill levels of ZECO staff who handles the regular maintenance works, including the operation of substations and inspection of distribution lines, are adequate, experienced engineers are too busy with daily operations to take time to train the newly-graduated young technicians and inexperienced staff. ZECO wishes to have these technicians and workers take part in the TTS training, thereby allowing them to acquire necessary skills and knowledge. However, due to budgetary constraints, the number of staff that ZECO can afford to send to the fee-based TTS training courses each year is limited.

ZECO has sent a total of 73 Artisans to the TTS training to date. In order to strengthen the ability of ZECO staff more efficiently, ZECO may consider selecting some past TTS trainees and training them to be lecturers (or trainers), who can provide in-house training to the newly-recruited staff in the future. Although it will be difficult for ZECO to introduce a comprehensive facility like TTS, it is proposed that ZECO start introducing training which can be provided without large equipment, train staff – especially past TTS trainees – to become lecturers (or trainers), thereby gradually increasing the number of in-house training offerings.

#### 4.2.2 Recommendations to JICA

Under its technical cooperation project “The Project for Capacity Development of Efficient Distribution and Transmission Systems,” JICA provided TANESCO with technical assistance related to the implementation of training at TTS. JICA is also planning to continue similar assistance to TANESCO under the phase 2 of the above technical cooperation expected to commence this year.

In order to support ZECO establish its in-house training program as mentioned above, it is recommended that considerations be given to include ZECO staff in such opportunities as the training of trainers and/or counterpart training under the phase 2. Such opportunities will provide ZECO with the similar expertise provided to TANESCO in developing training curriculum, syllabus and teaching materials as well as training of lecturers and establishment of a certification system. Such assistance is expected to further strengthen the linkage and synergy between this project in Zanzibar and the above-mentioned technical cooperation in mainland Tanzania.

#### 4.3 Lessons Learned

None