

Ex-Ante Evaluation

Africa Division II, Africa Department
Japan International Cooperation Agency

1. Name of the Project

Country: Republic of Uganda

Project: Kampala Metropolitan Transmission Improvement Project

Loan Agreement: April 26, 2018

2. Background and Necessity of the Project

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

The demand for electricity in the Republic of Uganda (hereinafter referred to as “Uganda”) is increasing at a rate of about 6 to 7 percent per year and reached 500 MW in 2013. This trend is supported by favorable economic growth in recent years, and expected to continue in the future, with demand rising to 1,957 MW by 2030. The Government of Uganda formulated the Hydropower Development Plan and has been advancing the development of power sources centering on the Karuma Hydro Power Station (600 MW) and the Isimba Hydro Power Station (188 MW), with the aim of boosting power generating capacity from the current 815 MW (2014) to 3,905 MW in 2030.¹

Meanwhile, in the Kampala metropolitan area (a population of approximately 3.5 million), which is the main area where electricity is needed, reinforcement of power transmission and transforming facilities has lagged behind, resulting in frequent power outages due to overloading. The Government of Uganda took emergency measures including the JICA’s grant aid “Project for Improvement of Queensway Substation” (Exchange of Notes (E/N) signed in November 2014), and is coping with immediate electricity demand. However, with progress of the above-mentioned development plan and the increased demand for electricity in future, it is anticipated that transmission facilities will again be overloaded in 2020. Responding to the situation, transmission facilities in the Kampala metropolitan area need to be reinforced in the medium term. This is also given the highest priority in the Grid Development Plan 2014-2030, and thus, such initiative through the Kampala Metropolitan Transmission Improvement Project (hereinafter referred to as “this Project”) should be undertaken based on the plan.

¹ The target value (3,905 MW) has been set higher than the estimated power demand (1,957 MW) on the assumption of Uganda’s future selling of electricity to Kenya, Rwanda, South Sudan, etc. and securing of a certain amount of reserve capacity.

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

In Japan's Country Assistance Policy for the Republic of Uganda (June 2012), this Project is placed in the priority area of "infrastructure improvement to achieve economic growth" and is in line with the policy. Additionally, JICA Country Analysis Paper for the Republic of Uganda concludes that promoting reinforcement of the transmission network is needed for stable power supply and remediation of the outage situation. This Project also contributes to the infrastructure development designated by TICAD V as one of the priority areas for boosting economic growth. In addition to the grant aid provided in the 1990s (E/N signed in FY1991 and FY1993) for the construction of distribution substations, including the Queensway substation, in the Kampala metropolitan area, Japan currently implements the above-mentioned "Project for Improvement of Queensway Substation." Japan also supported the Project for Rural Electrification from phase I to phase III (E/N signed in FY1999, FY2008, FY2013) through grant aid. Furthermore, it is expected that this Project will contribute to attaining Goal 7 (sustainable energy) of the SDGs.

(3) Development Partners' Activity

In the power sector, other major development partners are KfW, GIZ, Norway, AFD, AfDB, the World Bank (hereinafter referred to as "WB"), etc. Most of the other partners' activities center on supporting the rural areas (e.g. construction of transmission lines connecting suburban cities and rural electrification, small-hydraulic and solar generation issues). In the Kampala metropolitan area, KfW, WB, etc. provide support in the renovation and new construction of transmission lines. The Export-Import Bank of China also provides financing to construct substations for expansion of the industrial development zones. There are no overlaps between those projects and this Project.

3. Project Description

(1) Project Objectives

This Project seeks to restructure the transmission system of the Kampala metropolitan area through new construction and expansion of substations, extension and replacement of transmission lines, and introduction of mobile substations, thereby contributing to improving the security and reliability of power supply as well as to vitalizing Uganda's economic activities

(2) Project Site/Target Area

The Kampala metropolitan area and suburban areas

(3) Project Components

1) Civil engineering work and equipment:

Substations: New construction of 220/132/33 kV substations, reinforcement of substations (132/33 kV transmission equipment), etc.

Transmission lines: Extension of 220 kV lines (approximately 5 km), extension and relining of 132 kV lines (approximately 42 km)

Mobile substations: On a scale of 132 kV/33 kV, 20 MVA

2) Consulting services:

Detailed engineering, bidding assistance, construction supervision, environmental impact assessment, etc.

(4) Estimated Project Cost (Loan Amount)

15,144 million yen (loan amount: 13,659 million yen)

(5) Schedule

April 2018 to February 2024 (total 70 months). This Project will be deemed complete with the start of facility services (February 2022).

(6) Project Implementation Structure

1) Borrower: The Government of the Republic of Uganda

2) Guarantor: None

3) Execution Agency: Uganda Electricity Transmission Company Limited (UETCL)

4) Operation and Maintenance Agency: UETCL

(7) Collaboration and Division of Roles with Other Projects and Donors

1) Japan's assistance activities: Japan is helping to expand transmission networks in the Kampala metropolitan area and strengthen international interconnection through ODA loans to "Bujagali Interconnection Project" (Loan Agreement (L/A) signed in FY2007) and "Interconnection of Electric Grids of Nile Equatorial Lakes Countries Project" (L/A signed in FY2010 co-financed with the African Development Bank). There is expected to be collaboration between those projects and this Project with the aim of providing stable power supply to the metropolitan area.

2) Other development partners' assistance activities: The Kawanda-Masaka 220 kV transmission lines planned by WB will be connected to the Buloba

Substation that is to be newly constructed by this Project to stabilize power supply to the metropolitan area.

(8) Environmental and Social Consideration/Poverty Reduction/Social Development

1) Environmental and Social Consideration

i) Category B

ii) Reason for Categorization

This Project does not fall into the category of large-scale projects in the power transmission and distribution sector under the “JICA Guidelines for Environmental and Social Considerations” (announced in April 2010; hereinafter referred to as “JICA Guidelines”), is considered not to have a significant adverse impact on the environment, and does not fall into the category of projects having characteristics that are liable to cause adverse environmental impact or are located in or around sensitive areas as specified in the JICA Guidelines.

iii) Environmental Permit

The Environmental Impact Assessment (EIA) report for this Project is scheduled to be approved in March, 2017.

iv) Anti-Pollution Measures

Regarding air quality, water quality, noise, etc., measures are planned to be taken during construction to meet Uganda’s national emission and environmental standards. Measures include sprinkling water and covering the back of sediment transport vehicles to mitigate dust, prohibiting discharge of water used for cleaning concrete and having the cleaning carried out at appropriate facilities, and conducting regular inspection on fuel and oil leaks of vehicles and heavy equipment. After the commencement of services, measures will be taken to cover exposed cross-sections of earth that have been cut and filled with vegetation, etc. to minimize the impact of soil flowage and prevent water pollution

v) Natural Environment

This Project is not located in or around any sensitive areas such as national parks, and is assumed to be the least liable to cause adverse environmental impacts. Permission for deforestation will be obtained from the National Forestry Authority.

vi) Social Environment

This Project will require acquisition of approximately 46.6 ha of land, and steps will be taken in accordance with the JICA Guidelines and

Uganda's national procedures. There has been no confirmation of particular objections against this Project from affected local residents

vii) Other/Monitoring

In this Project, UETCL and independent external institution(s) will monitor land acquisition before construction. During construction, construction companies will monitor air and water quality. After services commence, UETCL will monitor soil conditions, etc.

2) Cross-Cutting Issues: This Project is expected to contribute to the reduction of greenhouse gas (GHG) emissions by reducing transmission losses. It is roughly estimated to have a climate change mitigation effect (approximate calculation of reduction amount of GHG emissions) of approximately 5,000 tons of CO₂ per year.

3) Gender Classification: Not subject

<Activities/reason for classification> This Project will not be subject to gender classification, since there is little possibility of executing concrete activities from a gender perspective.

(9) Other Important Issues: None in particular

4. Targeted Outcomes

(1) Quantitative Effects

1) Performance Indicators (Operation and Effect Indicator)

Indicator	Baseline (Actual Value in 2016)	Target year [Expected value 2 years after project completion]
i) Capacity utilization rate (maximum load) (%)		
220 kV Bujagali Substation transformers	-	48
220 kV New Mukono Substation transformers	-	29
220 kV Buloba Substation transformers	-	28
132 kV Kawaala transformers (132/11 kV)	-	25
132 kV Kawaala transformers (132/33 kV)	-	28
132 kV Buloba transformers	-	39
132 kV transmission lines (Mukono – Namanve South)		44
132 kV transmission lines (Namanve South – Namanve)		7
132 kV transmission lines (Namanve South – Kampala North)		3

132 kV transmission lines (Kampala North – Lugogo)		11
132 kV transmission lines (Kampala North – Kawaala)		4
132 kV transmission lines (Kampala North – Mutundwe)		5
132 kV transmission lines (Kawaala – Mutundwe)		12

ii) (Annual) Transmission end power (GWh)		
220 kV Bujagali Substation transformers	-	781
220 kV New Mukono Substation transformers	-	237
220 kV Buloba Substation transformers	-	233
132 kV Kawaala transformers (132/11 kV)	-	33
132 kV Kawaala transformers (132/33 kV)	-	217
132 kV Buloba transformers	-	204
132 kV transmission lines (Mukono – Namanve South)		694
132 kV transmission lines (Namanve South – Namanve)		103
132 kV transmission lines (Namanve South – Kampala North)		49
132 kV transmission lines (Kampala North – Lugogo)		169
132 kV transmission lines (Kampala North – Kawaala)		64
132 kV transmission lines (Kampala North – Mutundwe)		76
132 kV transmission lines (Kawaala – Mutundwe)		194

iii) (Annual) Unscheduled outage time (132 kV transformers)		
Unscheduled outage time (hours/year) of 132 kV transformers in Uganda's central region	2,674	Below 2,674

Capacity utilization rate (%) = Annual maximum load (MW)/capacity (MW):

Indicator to confirm appropriateness of facility plan and reserve capacity

Transmission end power (MWh): Indicator to confirm effectiveness as power distribution facility

Annual outage time (hour): Indicator to confirm effect of outage reduction by improvement of power system and securing of emergency power supply via mobile substation

(2) Qualitative Effects

Vitalization of economic activities in the Kampala metropolitan area and improvement of residents' living standards

(3) Internal Rate of Return

Based on the conditions indicated below, the economic internal rate of return (EIRR) of this Project is 50.1%. Since this Project is not required to independently maintain and secure financial return, the financial internal rate of return (FIRR) is not calculated.

[EIRR]

Cost: Project cost (excluding tax), operation and maintenance costs, etc.

Benefit: Reduction of transmission loss rate, etc.

Project Life: 40 years

5. Prerequisites and External Factors

(1) Prerequisites: Before starting this Project, the land necessary for this Project must be acquired in line with Uganda's national procedures.

(2) External Factors: None in particular

6. Lessons Learned from Past Projects

The ex-post evaluation (FY2016) of the ODA loan to the Republic of Indonesia, "Java-Bali Transmission Line/Substation Development Project" (L/A signed in 1991 and 1992), suggested that detailed studies of the development status of other high- and low-voltage transmission facilities planned in the neighboring areas at the time of the project and their influence on the project had been effective in meeting potential demand and achieving stability of power supply after completion of the project.

In Uganda, expansion of the distribution network in the Kampala metropolitan area and development of new power generating sources are under way. In executing this Project, confirmation will be made on the maintenance conditions of facilities outside this Project and progress status of other projects, and their effects on this Project will be taken into account.

7. Evaluation Results

This Project conforms with the development issues and policies of Uganda as well as the assistance policy of Japan and JICA's analysis documents. It will help

improve the stability and reliability of power supply through restructuring of the power transmission system in the Kampala metropolitan area and vitalize Uganda's economic activities. Additionally, it is believed that the Project will contribute to achieving Goal 7 of the SDGs. Therefore, it is highly necessary for JICA to implement this Project.

8. Plan for Future Evaluation

(1) Indicators to be Used

Per 4. (1) - (3)

(2) Timing

Ex-post evaluation: 2 years after project completion