

Ex-Ante Evaluation (for Japanese ODA Loan)

Africa Division 1, Africa Department,
Japan International Cooperation Agency (JICA)

1. Basic Information

- (1) Country: Federal Republic of Nigeria (Nigeria)
- (2) Project Title: Lagos and Ogun Power Transmission System Improvement Project
- (3) Project Site: Lagos State and Ogun State
- (4) Loan agreement: December 15, 2022

2. Background and Necessity of the Project

- (1) Current State and Issues of the Power Sector and Priority of the Project in Nigeria

Nigeria has a GDP growth rate of 1.87% (as of the first quarter of FY2020) and population growth of 2.5% (in 2020), moreover Nigeria is one of the world's leading exporters of oil and natural gas. However, Nigeria's power sector has suffered from a lack of generation capacity: while maximum demand is estimated at 17,700 MW (according to the Transmission Company of Nigeria¹ (TCN), 2020), generation capacity across the sector is limited to 12,974 MW (TCN, 2020), despite major reforms and a shift towards privatization since 2005. TCN itself operates just 7,900 MW of transmission capacity (TCN, 2020), with maximum output to date limited to 5,520 MW (TCN, 2020). In order to restrict demand, Nigeria has introduced a system of nationwide scheduled outages². The Lagos state, in southwestern part of Nigeria, is a designated 24-hour area with no outages, whereas the neighboring Ogun state is a 12-hour area, where power is supplied for half-days only. However, the central and western area of Lagos state, which are the central part of the state, still suffer from multiple power cuts every day, and the average daily supply per customer is limited to five to six hours. Lagos state is Nigeria's commercial hub, generating nearly 50% of the national GDP, and is home to more than 40 Japanese trading companies, manufacturers, and other firms, whose operations are severely limited by the inconsistent power supply. Indeed, this problem is a major obstacle to economic development throughout Nigeria and affects living standards in general. Neighboring state,

¹ The state-owned transmission authority in Nigeria

² The country is split into three regions: Group 1 regions receive power from midday to midnight (12 hours), Group 2 receives power from midnight to midday (12 hours), and Group 3 receives power all day (24 hours). Scheduled outages are carried out according to the available power supply set for each region.

Ogun state, meanwhile, is equally in need of stable power supplies in order to achieve economic growth as the hinterland of Lagos state.

The government's National Development Plan (NDP) 2021-2025, formulated in 2021, outlines four strategic objectives for promoting economic development. One of these is investment in critical infrastructure, including specific targets in the power sector to boost transmission capacity and reduce transmission losses. Similarly, the Master Plan (MP) that was developed with technical cooperation and assistance from JICA under the “Project for Master Plan Study on National Power System Development (FY2015–FY2019)” has also nominated the development of reliable and consistent power supply infrastructure in Lagos and Ogun states (the area covered by the Project) as a priority issue.

The aim of the Project is to boost transmission and substation capacity in Lagos state and Ogun state, which together represent the center of economic and commercial activity in Nigeria, in order to deliver more reliable and consistent power supplies to the region. Thus in turn will stimulate the economic development of the nation as a whole, and is consistent with the government's policy objectives of the power sector, which underscores the importance of the Project.

(2) Japan and JICA's Cooperation Policy and Operations in the Power Sector in Nigeria

The “Yokohama Declaration 2019” from the 7th Tokyo International Conference on African Development (TICAD7) in August 2019 called for improved connectivity and coordination through investment in high-quality infrastructure and noted the importance of highly reliable power supplies to support sustainable growth in Africa. Especially in Nigeria, the power sector is one of a major constraint on economic activities and investments, including 40+ Japanese firms operating there. The Japan-Nigeria Business Facilitation Council³, set up in November 2019 shortly after TICAD7, likewise points out the need for reliable and consistent power supplies.

The Country Development Cooperation Policy for the Federal Republic of Nigeria, formulated by the Japanese government in September 2017, calls for the development of basic infrastructure to provide the foundations for economic activity and strengthen the foundation for high-quality economic growth. Under

³ The Council was launched in November 2019, shortly after TICAD7, to promote bilateral business relations between Japan and Nigeria. Members include the Japanese embassy, JETRO, JICA, Japanese business groups, the National Investment Promotion Committee (NIPC), Japanese government ministries and agencies, and Nigerian business groups.

the policy, the Program for Improving Power Supply is established as one of the Japan's assistance program and the objective of the Program is to boost power network capacity and stability of supply through a combination of infrastructure development (including refurbishment and upgrades as well as new construction) together with strengthening of administrative systems and procedures such as planning, operations management, and maintenance. In addition, the Energy and Mining section of the JICA Global Agenda has stated its objective as realizing societies in developing countries in which all people have access to plentiful, affordable, reliable, sustainable low-carbon energy supplies, with strengthening of transmission networks nominated as a key cluster. By boosting transmission capacity and improving network reliability in the target regions through construction of new transmission lines and installation and upgrading of transformer substations, the Project aligns with the cooperation policy of the Japanese government and the JICA Global Agenda as well as Sustainable Development Goal 7 (Affordable and Clean Energy for All).

(3) Other Donors' Activities

The Donor Coordination Group on Power (DCGP) has been set up to facilitate discussion of issues and objectives in the Nigerian power sector and coordinate different projects and operations. The main donors are the World Bank, the African Development Bank, the U.S. Agency for International Development, the U.K. Foreign, Commonwealth and Development Office, and the French Development Agency. Of these, the World Bank and the U.S. Agency for International Development have not targeted specific regions and are supporting the upgrading of the power sector and power infrastructure development at the national level. The African Development Bank, on the other hand, is concentrating on the northern and north-eastern areas of Nigeria, while the French Development Agency is working in Abuja and the northern part of Nigeria. There is no risk of duplication with the Project.

3. Project Description

(1) Project Description

① Project Objective

The objective of the Project is to enhance the transmission grid wheeling capability and the stability of the electric power supply of the Federal Republic of Nigeria by installing and improving the transmission lines and substation facilities within Lagos State and Ogun State which are the

industrial hub of the country, thereby contributing to the economic and social development of the Federal Republic of Nigeria.

② Project Components

1) Civil engineering and construction: Construction of new transmission lines (approx. 110 km of 330-kV line, approx. 105 km of 132-kV line) and installation/upgrading of transformer substations in Lagos state and Ogun state

2) Consulting services: Preliminary design (transformer substation component), detailed design (transmission line component), tendering process, project management, environmental and social considerations, technical aspects of operations management and ongoing maintenance

③ Project Beneficiaries (Target group)

Residents of Lagos state (approx. 12.55 million) and Ogun state (approx. 5.21 million) (Based on 2016 population statistics from the Nigerian National Bureau of Statistics)

(2) Estimated Project Cost

33,894 million Yen (Japanese ODA loan: 26,180 million Yen)

(3) Schedule

December 2022-December 2028 (Total 73 months)

Handover of the facility is considered as the completion of the Project.

(4) Project Implementation Structure

1) Borrower: The Federal Government of Nigeria

2) Execution Agency: Transmission Company of Nigeria (TCN)

3) Operation and Maintenance System: Transmission Company of Nigeria

(5) Collaboration and Sharing of Roles with Other donors

1) Japan's activity

JICA is implementing "The Project for Emergency Rehabilitation and Reinforcement of Lagos" (Grant-Aid, due to finish in FY2025), which is aiming to reinforce the capacity of substation facilities in central Lagos and it will contribute to the comprehensive enhancement of transmission capacity in Lagos together with the Project.

Also, JICA launched a technical cooperation project called "The Project for Capacity Development of Power Distribution" (due to finish in FY2025) which provides and supports training programs with respect to distribution facilities to accommodate the additional power supplied by newly upgraded transmission and substation facilities provided under the Project, thereby helping to reduce

transmission losses while boosting both the reliability and quality of power supply. Furthermore, it will improve the consistency of supply in the target region by improving the technical capabilities of Nigerian engineers and reducing technical losses.

2) Other donors' activities

The World Bank has been providing financial assistance to the Nigerian government's program called "National Mass Metering Programme" since 2021 to support the installation of meters by distribution companies. The World Bank funding, due to finish up in late 2023, will give power companies more capacity to collect service fees and charges, thus providing TCN with extra revenue. This is expected to complement the Project's anticipated benefits.

(6) Environmental and Social Considerations

- ① Category: A
- ② Reason for Categorization: This project is likely to have significant adverse impact due to its characteristic under JICA Guidelines for Environmental and Social Considerations (April, 2010).
- ③ Environmental Permit: The Environmental and Social Impact Assessment (ESIA) was conducted at the Project site (splitting into three area) and the reports of the assessment in each area were approved by the Federal Ministry of the Environment (FME), in February, May, and July 2019.
- ④ Anti-Pollution Measures: Anticipated impacts such as dust and exhaust gases from construction machinery during the construction phase will be minimized through measures such as: ensuring machinery and equipment is properly maintained, watering to reduce airborne dust and covering materials and supplies during transportation. There will also be impacts associated with the construction of temporary access roads and pylon foundations in marshland areas. Where cement works are used, these could potentially affect water quality in the surrounding area, with associated impacts on local ecosystems. To mitigate these risks, cement will be mixed off-site to prevent wastewater from leaching into local ecosystems, and temporary access roads will be designed for minimal environmental impact (using the piling method, for instance).
- ⑤ Natural Environment: The area covered by the Project does not include any potentially sensitive sites such as national parks and/or adjacent land. Accordingly, undesirable environmental impacts are considered to be minimal. An estimated 227.66 ha of tree felling will be required, as well

as removal of 146 ha of shrubs and other vegetation. The affected land will be rehabilitated through reforestation works.

- ⑥ Social Environment: Implementing the Program requires acquisition of approximately 931 ha, including approx. 87 ha for transformer substations and approx. 844 ha for transmission lines, as well as mandatory resettlement of 1,989 residents in 526 households, including 84 irregular households. Land acquisition and compensation for resettled residents will take place using a resettlement plan formulated in accordance with Nigerian domestic law and JICA guidelines. Some 9.8 ha of land for transformer substations is to be provided free of charge by a religious group, in accordance with JICA guidelines. Community meetings to brief local residents on the Project have not encountered any substantial opposition to date.
 - ⑦ Other/Monitoring: The Executing Agency will be responsible for engaging a dedicated contractor to monitor air and water pollution as well as ecosystem impacts during construction, under the supervision of the project management consultants. After commissioning, The Executing Agency will continue to monitor ecosystem impacts, and will also perform internal monitoring in relation to land acquisition, in conjunction with external monitoring by a suitable NGO.
- (7) Cross-Sectoral Issues
- ① Climate change: The addition of new transformer substations will help to reduce losses, equivalent to adding more power generation capacity. This in itself will have the effect of reducing overall greenhouse gas (GHG) emissions. The Project will deliver a climate change mitigation benefit equivalent to reducing CO₂ emissions by approx. 19,958 tons per year.
 - ② HIV/AIDS prevention: The Project involves construction of large infrastructure facilities in HIV-affected regions, with workers required to be on site for extended periods. To mitigate the risk of HIV/AIDS infection, it has been agreed with The Executing Agency to provide workers entering and leaving construction sites with (1) relevant materials and information on HIV/AIDS safety and (2) education/training on reducing the risk of infection.
 - ③ Special consideration: Vulnerable persons adversely affected by the resettlement process, particularly those living in poverty, will be eligible

for special transitional funds as a one-off measure additional to financial compensation as set out in the entitlement matrix. The Executing Agency will provide the funds, together with assistance with setting up bank accounts where required.

(8) Gender Category: GI (S) (Gender Informed—Significant)

<Reason for Categorization>

The Executing Agency agreed at the preliminary investigation stage to provide eligible women and vulnerable groups with special transitional funds in addition to the financial compensation set out in the entitlement matrix. It was also agreed that The Executing Agency would provide such funds from its own budget.

(9) Other important issues: N/A

4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

Indicator	Description	Baseline (2018 actual value)	2029 target (two years after completion)
Utilization rate (%)	Maximum load (MW) / rated capacity of equipment (MVA) × power factor)	73.9	68.1
Power generation at feed end (TWh)	Generated power sent from target transformer in one year	9.97	11.50
Power restrictions (hours per year)	Power supply restrictions in target area attributable to capacity limitations of transmission lines and/or substations	136.87	47.09

(2) Qualitative Effects

Ensuring greater stability in domestic power supplies; stimulating industrial activity and creating a more conducive investment environment in the target region for Japanese and other businesses; boosting foreign direct investment (FDI); encouraging socio-economic development in the target regions.

(3) Internal Rate of Return

Based on the assumptions listed below, the economic internal rate of return (EIRR) for the Project is 16.1%, and the financial internal rate of return (FIRR) is 16.4%.

【EIRR】

Cost: Project cost (tax excluded), operating and maintenance expenses (tax excluded)

Benefit: Higher transmission capacity, reduced transmission losses

Project Life: 30 years

【FIRR】

Cost: Project cost, operating and maintenance expenses

Benefit: Higher transmission capacity, reduced transmission losses

Project Life: 30 years

5. External Factors and Risk Control

(1) Preconditions

- Consultants engaged by the Project will implement the technology transfer for utilizing the low-loss transmission line in the Project.

(2) External factors

- No sudden deterioration in domestic security or political conditions
- No major natural disasters or calamities in the target regions

6. Lessons Learned from Past Projects

(1) Lessons from past projects

The post-evaluation of “The Project for the Improvement of Mushviq Substation in Baku”, a grant-in-aid project in the Republic of Azerbaijan, found that providing regular training sessions had a beneficial effect by improving the technical capabilities of personnel at its executing agency and enabling more efficient and effective usage and management of construction equipment and supplies. Likewise, establishing a machinery and equipment inspection regime had improved overall project efficiency.

(2) Relevance to this Project

Given that the scope of this Project includes operation of existing substations,

it is important to provide training to operate and maintain the transmission and substation facilities provided through the Project. JICA will also work to promote information sharing within the organization, including technical support from consulting services, and set up maintenance systems and procedures.

7. Evaluation Results

The Project will boost transmission capacity and improve the stability of the power network by constructing new transmission lines and installing and upgrading transformer substations in Lagos and Ogun states, in turn contributing to socio-economic development in the regions. This aligns with the issues in development and policy objectives for development in Nigeria as well as the country development cooperation policy of the Japanese government. Therefore, this project might contribute to Sustainable Development Goal 7 (Affordable and Clean Energy for All). From the reasons listed above, it is highly necessary to support the implementation of the Project.

8. Plan for Future Evaluation

(1) Indicators to be Used

As indicated in Sections 4.

(2) Future Evaluation Schedule

Ex-post evaluation will be made in 2 years after the project completion.

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