Report Number: ICRR0024075

1. Project Data

Project ID	Project Name
P120014	KE Electricity Modernization Project
Country	**Practice Area(Lead)**
Kenya	Energy & Extractives

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IDA-55870,TF-A0579	30-Jun-2020	229,340,328.30
Bank Approval Date	**Closing Date (Actual)**	
31-Mar-2015	30-Jun-2023	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	257,500,000.00	7,500,000.00
Revised Commitment	257,500,000.00	4,660,434.29
Actual	229,340,328.30	4,660,434.29

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2. Project Objectives and Components

a. Objectives

According to both the International Development Association (IDA) Financing Agreement (p.5) dated June 29, 2015, and the Project Appraisal Document (p.14) dated October 8, 2015, the project objectives were “(a) to increase access to electricity; (b) to improve reliability of electricity service; and (c) to strengthen KPLC’s financial situation,” where KPLC stands for the Kenya Power and Lighting Company Limited.

b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

The project consisted of four components and one guarantee scheme (The ICR provides the actual component costs in Special Drawing Rights (SDR), the currency used in the Financing Agreement. The exchange rate at appraisal is used to calculate the US$ equivalents of the actual costs):

A. Improvement in Service Delivery and Reliability. *(Appraisal cost: US$50.0 million; actual cost: US$ 38.9 million)*

This component consisted of three subcomponents:

A.1. Upgrade of the Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS): This subcomponent was to finance the upgrade of the SCADA/EMS of the KPLC by incorporating the existing substations into the system. This upgrade was expected to result in enhanced flexibility in operation and efficiency in management of the distribution network.

A.2. Distribution system enhanced flexibility: This subcomponent was to finance the installation of 1,000 load break switches in distribution assets operating at 11 kilovolts, 33 kilovolts, and 66 kilovolts along with associated remote terminal units and communications features for remote control and operation. These activities were to increase the automation of the 90 percent of the networks in Nairobi and reduce the duration of system interruptions.

A.3. Enhance maintenance practices to improve the reliability of electricity supply: This subcomponent was to finance equipment, tools, and intensive training of KPLC operations staff for live-line maintenance to further reduce interruptions in the electricity supply.

B. Revenue Protection Program. *(Appraisal cost: US$40.0 million; actual cost: US$31.2 million)*

This component was to finance the creation of metering control centers and investments in information technologies to operate them, incorporation of the meter data management software and training of staff, and supply and installation of advanced metering infrastructure (AMI) meters for the 4,300 high and medium voltage users and 40,000 large voltage customers, and incorporation of these customers to the metering control centers. These activities were to be implemented according to the KPLC's Revenue Protection Program with the aim of optimizing the systematic use of the information provided by the metering system. This was expected to result in systematic billing of the large and medium customers according to accurately metered consumption and a reduction in commercial losses.

C. Electrification Program. *(Appraisal cost: US$164.5 million; actual cost: US$156.0 million)*

This component consisted of two subcomponents:

C.1. Peri-urban electrification: This subcomponent was to be implemented by KPLC and finance the design, acquisition of materials, and construction works for the electrification of all households and

businesses in high population density peri-urban areas in 50 locations in seven geographical regions. The peri-urban settlements in these locations were to be selected during project implementation. It was expected that 125,000 households would have gained access to electricity through grid connections.

C.2. Off-grid electrification: This subcomponent was to be implemented by Rural Electrification Authority (REA), which later became the Rural Electrification and Renewable Energy Corporation (REREC) and finance the construction of mini-grids supplied by hybrid generation systems—solar and wind combined with thermal units running on diesel. The mini-grids were to be developed in six locations under a private-public-partnership approach. As a result of the activities under this subcomponent, electricity was to be supplied to locations whose connection to the national grid was not viable in the short and medium-terms.

D. Technical Assistance and Capacity Building. *(Appraisal cost: US$7.5 million; actual cost: US$3.3 million)*

This component was to finance consultancy services and trainings to support the preparation of the National Electrification Strategy (NES), development of detailed national technical specifications and standardization for the construction of electricity networks to supply new users, development of regulations for the enforcement of electricity service quality, preparation of feasibility studies for new investments and project monitoring and evaluation, and capacity building for the sector entities including the Ministry of Energy and Petroleum, KPLC, REA, Kenya Electricity Transmission Company, Kenya Electricity Generating Company Limited, and Energy Regulatory Commission.

IDA Guarantee: The project was to provide a US$200 million IDA guarantee to enhance KPLC's credit quality and enable the electricity distribution utility to raise US$500 million of new commercial debt with lower interest rates and longer tenors. This was expected to support KPLC in refinancing its commercial debt obligations and significantly reducing the utility's financing costs with savings of over US$10 million per year. As the PAD (p.18) reports, the request for proposals for the refinancing was issued on February 5, 2015, and the proposals were received on February 26, 2015. The financial close of the IDA-guaranteed commercial financing was expected within two to four months after the approval of the IDA guarantee by the Boards of Directors of the World Bank.

Revised Components

The project could not install AMI meters to the large customers because of a litigation process initiated by a bidder to the procurement of the related contract that resulted in implementation delays. The project's scope was changed to install those meters in small and medium size enterprises (SMEs).

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The project cost was originally estimated at US$262 million excluding US$500 million that was expected to be raised with the support of the US$200 million IDA guarantee. The actual investment cost of the project was US$229.3 million, which did not include the borrower's spending estimated at US$4.5 million, because the information was not available. The actual project cost was lower than the estimate at appraisal because of lower prices offered by the bidders for the investment activities.

Financing: At appraisal, the IDA credit amount was estimated at US$250 million and IDA guarantee was US$200 million. The Strategic Climate Fund-Scaling-Up Renewable Energy Program (SCF-SREP) was to

provide US$7.5 million as grants (fully blended with IDA) for the implementation of activities related to stand-alone photovoltaic and micro-grid products under the third component. The project disbursed US$224.7 million of IDA credit and US$4.7 million of SCF-SREP grants.

Borrower's contribution: At appraisal, the KPLC's contribution was estimated at US$3.5 million and the REA's contribution at US$1.0 million for the implementation of peri-urban electrification under the third component. The actual contribution of KPLC and REA were not available.

Project Restructurings: The project was restructured three times.

- **First Project Restructuring (December 15, 2019 – Level 2):** The project closing date was extended by 18 months from June 30, 2020, to December 31, 2021 to allow time for the completion of project activities that were delayed because of inadequate budgetary allocations by the National Treasury to KPLC between July 2017 and December 2018 and litigations instituted by one of the bidders at the Public Procurement Administrative Review Board, which delayed the implementation of the Revenue Protection Program under the second component by almost one year. At this project restructuring the baseline and target of some indicators were revised based on the data gathered during project implementation to better reflect realities on the ground and accurately measure the achievement of the project objectives and align the indicators for the IDA guarantee with the covenants in the Guarantee Facilities Agreement.
- **Second Project Restructuring (September 10, 2021 – Level 2):** The project closing date was extended by 12 months from December 31, 2021 to December 31, 2022 to allow time for the completion of project activities that were delayed because of the restrictions caused by the COVID-19 pandemic. At the same restructuring, credit savings under the first and second component were allocated to the third component to increase the number of household connections to the grid. This resulted in an increase in the target of people gaining access to electricity through grid connections from 618,750 to 815,000.
- **Third Project Restructuring (December 8, 2022 – Level 2):** The project closing date was extended by six months from December 31, 2022 to June 30, 2023 to allow time for the completion of project activities that were further delayed because of the COVID-19 pandemic restrictions and the issues related to the compensation of project-affected peoples because of land acquisitions under the off-grid electrification subcomponent. The poor performance of contracts also contributed to project implementation delays. The credit savings from training budget were allocated to finance studies under the fourth component.

Dates: The project was approved on March 31, 2015 and became effective on September 17, 2015. The Mid-Term Review was conducted in May 2019. The original project closing date was June 30, 2020, but it was extended by 3 years (see the project restructurings above for the reasons of project closing date extensions). The project closed on June 30, 2023.

3. Relevance of Objectives

Rationale

The project objectives are highly aligned with the World Bank's current strategy as defined in the Country Partnership Framework (CPF) for the Republic of Kenya, FY2023-2028. The project sought to address the development problem of insufficient and unreliable access to electricity supply service in peri-urban and rural areas of Kenya while strengthening the financial viability of the electricity distribution sector utility to ensure the sustainability and further expansion of reliable electricity supply service. The project was to achieve these results through on-grid and off-grid electricity supply infrastructure investments and the technical improvements in KPLC's electricity bill collections from medium and high consumption customers supported by an IDA guarantee to refinance KPLC's high cost and short-term debt. The project objectives support the achievement of "CPF Objective 5: Extend infrastructure services to last mile" with the goal of achieving universal access in Kenya during the CPF period subject to the improvement of the financial viability of the electricity sector. The project objectives also indirectly support the achievement of "CPF Objective 3: Foster micro, small, and medium size enterprises and small producer success for faster job creation" and "CPF Objective 6: Increase household resilience to, and national preparedness for, shocks," for both of which access to electricity is a precondition among others. As the ICR (p.13) notes with reference to the IFC's Kenya Country Private Sector Diagnostic of 2019, "from private sector's perspective, reliability and high costs associated with power supply remain major issues." Through its support to the achievement of these three CPF objectives, the project should be expected to contribute to all three high level objectives of the CPF—faster and more equitable labor productivity and income growth, greater equity in service delivery outcomes, and greater resilience and sustainability of Kenya's natural capital.

The project objectives are highly relevant to the country context. The project directly supported the government's key priority of universal access to reliable and efficient electricity supply defined in the Kenya's Vision 2030. While Kenya has significantly increased the electrification rate in the country by progressively managing its electricity sector (CPF, p.34), the financial viability of the sector poses a risk for the attainment of universal access. Therefore, the project objectives are appropriately pitched for the development status in the country. Although the first objective to increase access to electricity is output-oriented, the other two objectives to improve reliability of electricity service and strengthen KPLC's financial situation, the project objectives were outcome-oriented. Overall, it was reasonable to expect the project objectives could have been achieved given the development status of the country and the outcome orientation of the project objectives.

The World Bank has been a long-term development partner of Kenya in the electricity sector and urban and rural electrification. While IDA leads the policy dialogue, it does so in consultation with the IFC and MIGA, both of which are active in the electricity sector in the country. The World Bank has had sufficient experience in the country and electricity sector. As explained in the previous paragraph, although the project objective to increase access to electricity was output-oriented, the other two objectives were outcome-oriented. Given the World Bank's long-term engagement in the electricity sector in Kenya, the project objectives were sufficiently challenging for an electrification project that also targeted improvements in the reliability of electricity supply service. However, in retrospect, the objective to strengthen KPLC's financial situation through a single investment project was overly ambitious given the complex factors that affect the financial viability of the sector such as political influence, aggressive electrification targets, and irregular adjustment of tariffs.

Overall, given the strong alignment and clear response to a given development need, the relevance of objectives is rated High.

Rating
High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective
To increase access to electricity.

Rationale
Theory of Change for Objective 1

The first project objective was output-oriented; therefore, the theory of change was simple and straightforward. The project funds (IDA credit) were to be used to finance the expansion of the electricity distribution network and construction of six mini-grids under the third component. The project outputs would have been distribution network expanded and internal house wirings or ready boards (to use electricity where internal housing is not possible) installed in the semi-urban locations of Nairobi, and six mini-grids with hybrid generation constructed in six locations. These outputs would have been expected to connect 160,000 households (618,750 people) to grid or mini-grids, which could best be assessed as intermediate outcomes of the project's intervention. The project's impact on the electricity supply quality, which is an outcome, was captured by the second objective. The development of the mini-grids under a PPP model would have been expected to positively affect the sustainability of those services. In addition, the procurement model of bulk purchase of materials for the expansion of the distribution network and installation of household connections would have been expected to lower the cost of the project activities leading to a higher number of household connections. Furthermore, the improvement of the financial viability of the KPLC through the technical improvements in bill collection and refinancing of its debt with the support of an IDA guarantee (captured by the third objective) would have been expected to indirectly contribute to the sustainability of the operation and maintenance of electricity supply service through grid. Overall, the causal links from project inputs and outputs to the expected intermediate outcomes (i.e., households connected to grid and mini-grids) were direct and valid, and the achievement of the first objective could be attributed to the project's intervention.

Outputs

- **Distribution lines constructed or rehabilitated under the project:** The project financed the construction of 11,509 kilometers of distribution line against the original and revised targets of 3,500 kilometers and 7,000 kilometers.
- **Distribution transformers installed:** The project financed the installation of 749 distribution transformers against the target of 1,000, but the number of transformers was sufficient to support the expanded distribution network for new household connections.
- **Mini grids constructed with public-private participation:** The project started the construction of seven mini-grids for rural electrification and completed four of them under a PPP approach falling short of the target of six mini-grids. The implementation of these activities faced challenges such as delays in land acquisition, supply chain disruptions affecting the delivery of solar panels because of

COVID-19 restrictions, and inadequate contractor performance. As a result, only four mini-grids could be developed fully. The generation plants of the remaining three mini-grids had already been installed by project closing. REREC continues with the financing of the installation of the transformers and the construction of the distribution lines of the remaining mini-grids. The project team reported that these works were expected to be completed by August 2024.

- **Annual electricity output from mini-grids constructed with public-private participation:** The target was 2,780 megawatt-hours per year electricity generation by six mini-grids. However, because the project could develop only four mini-grids, the total electricity generated was at 1,422 megawatt-hours per year, lower than the target.
- **Total number of residential connections made under the project:** Through the on-grid and off-grid investments, the project financed the connection of approximately 209,000 households to on-grid or off-grid electricity supply service against the original and revised targets of 160,000 and approximately 205,000 households, respectively.
- **Total number of new non-residential connections made under the project:** In addition to the households, the project financed the connection of 1,243 new non-residential customers to electricity through grid or mini-grids. The target was 1,250 non-residential customers.
- **National Electrification Strategy adopted:** Under the technical assistance component, the project supported the preparation and adoption of the National Electrification Strategy.

Intermediate Outcomes

- **People provided with access to electricity by household connections:** This indicator is another way of measuring the number of connections installed under the project. The average household size assumed to be 5 persons. The original target was to connect 618,750 people to grid or mini-grid. The target was revised up to 815,000 people because of the credit savings allocated to the electrification component. The achievement at 1,071,280 people was substantially higher than the revised target. The breakdown of the number of people who gained access to electricity through grid or mini-grid connections is given in the following two indicators.
- **People provided with access to electricity by household connections-Grid:** The project provided electricity to 1,063,635 people through grid connections. The original and revised targets were 605,250 and 801,500 people, respectively.
- **People provided with access to electricity under the project by household connections – Off-grid/mini-grid only:** The project provided electricity to 7,655 people through mini-grid connections. The target was 13,500 people, which was not revised. The achievement was lower than the target because of the construction of fewer mini-grids than planned. The ICR (p.14) reports that once the remaining mini-grids are completed, the total number of people gaining access to electricity through mini-grids will increase to 19,000.

The project was successful in achieving the project targets for the on-grid household connections. Although the project fell short of the achievement of the target for household connections through mini-grids by project closing, following the completion of the ongoing three mini-grid works, it is estimated that 19,000 people will gain access to electricity higher than the project target of 13,500. This is likely to occur given current construction commitments. Furthermore, a private sector operator will operate and maintain the mini-grids under a 15-year operation and maintenance agreement with KPLC. This arrangement should be expected to significantly contribute to the sustainability of electricity supply service through mini-grids. Overall, although the project's achievement in connecting people to electricity through mini-grids by project closing was lower than the target, when the project's overall achievement in connections (both residential and non-residential)

and the sustainability of the electricity supply service are taken into consideration, the project's efficacy in achieving the output-oriented project objective to increase access to electricity is rated Substantial.

Rating
Substantial

OBJECTIVE 2
Objective
To improve reliability of electricity service.

Rationale
Theory of Change for Objective 2

The project activities were to result in SCADA and EMS upgraded, load break switches installed, and KPLC equipped with equipment and capacity to implement live-line maintenance. The expected outcomes would have been enhanced flexibility in operation and efficiency in managing the distribution network (such as more efficient detection of network faults and breakdowns and load balancing) because of upgraded SCADA and EMS and reduced duration of system interruptions because of automated restoration of service due to installed load breakers and ability to address system issues through live-line maintenance. The improved financial viability of the KPLC (captured under the third objective) should have been expected to contribute to the improvement of reliability of electricity service because of the availability of funds to adequately finance operation and maintenance activities. Overall, the causal links from project inputs and outputs to the expected outcomes (improved reliability of electricity service) were direct and valid, and the achievement of the second project objective could be attributed to the project's intervention as long as the national electricity network did not experience any non-distribution system related interruptions, which was a critical assumption, and the distribution network preventive maintenance was implemented adequately and regularly.

Outputs

- **Automatic load break switches installed in the Nairobi distribution network in the project areas:** The project financed the installation of 710 load breakers against the original and revised targets of 1,000 and 650, respectively. The target was revised down to 650 following the detailed designs that showed that 650 would have been sufficient to achieve the project outcome of reduced duration of system interruptions.
- **Substations added to the SCADA/EMS:** The project financed the addition of 69 substations to the SCADA and EMS. The original target was 146 substations, which was revised down to 69 because following the completion of detailed designs, it was assessed that the addition of 69 substations to SCADA and EMS would have been sufficient to improve the operation of the distribution system.
- **Implementation by Energy Regulatory Commission (ERC) of a regime on service quality:** The project supported the ERC to develop regulations to implement a regime on service quality (including reliability of electricity supply) based on systematic monitoring of key parameters through direct access to the records of the KPLC's information systems.

- The project also purchased 28 trucks with mounted aerial platforms and tools for live-line maintenance and conducted training sessions. The project also constructed a laboratory in Nairobi for testing equipment. The results framework did not capture these outputs.

Outcomes

- **Average outage duration for customers served:** This indicator measures the average outage duration in hours for customers served by KPLC. It is also called System Average Interruption Duration Index (SAIDI). The baseline was 12 hours. The project's original target was to lower the SAIDI to 6 hours, and it was later revised down to 5 hours. The achievement was 8 hours 24 minutes, showing only a partial improvement in system reliability.

The project was successful in achieving its outputs in terms of SCADA and EMS upgrading, installation of load breakers on medium voltage distribution lines along with its associated thermal units and communication systems, and provision of equipment, tools, and training for live-line maintenance. However, the decrease in SAIDI was lower than expected falling substantially short of the target. The ICR (p.14) notes that the SAIDI did not correctly measure the average duration of outage per customer in the project area because it covers interruptions in the entire medium voltage network of the KPLC and that all customers mapped to an interrupted feeder were included in the measurement of SAIDI although some of those customers could continue receiving electricity from another feeder. Six major national blackouts (two in 2022 and four in 2023) because of issues in generation and transmission of electricity, and insufficient investment in the preventive maintenance of the distribution network contributed to a lower reduction in SAIDI.

Because of the shortcomings of SAIDI in accurately measuring the project's impact on system reliability, the ICR (p.14) provides information based on the data collected through the advanced distribution management system developed under the project, which covers the Nairobi area only. According to the data, the system average interruption frequency index (SAIFI) in the Nairobi region doubled between July 2020 and September 2023. However, because of the strengthening of the KPLC's distribution network operation and monitoring capacity as a result of the investments made under the first component of the project, the customer average interruption duration index (CAIDI) in the project areas dropped from 3 hours 24 minutes to 1 hour 42 minutes during the same period. This shows the impact of the advanced distribution management system so that the KPLC is now capable of fixing faults and restoring electricity supply service much faster than before the project.

Overall, while the project was successful in completing the project outputs that would have been expected to contribute to the improvement of electricity supply reliability, the project's intervention was insufficient to achieve that outcome because reliability of electricity supply depended on other factors that were not covered by the project, such as issues related to generation and transmission, and adequate preventive maintenance of the distribution network. In addition, the SAIDI was not an appropriate indicator to measure the project's impact in the project area. Although the project laid the groundwork for the improvement of electricity supply reliability in the medium and long-terms, the project's efficacy in achieving the project objective to improve reliability of electricity service is rated Modest because of insufficient measurement of the project's impact and continued reliability issues in the distribution network in the project area.

Rating

Modest

OBJECTIVE 3

Objective

To strengthen KPLC's financial situation.

Rationale

Theory of Change for Objective 3

The project activities were to result in the project outputs of metering control centers established, a Meter Data Management software installed, and advanced metering infrastructure installed. These outputs would have been expected to lead to the project outcomes of systematic billing of customers based on accurately metered consumption; thus, ensuring the protection of the revenues KPLC receives and contributing to the financial viability of the KPLC. In addition, with the availability of a US$200 million IDA guarantee, the KPLC was expected to raise US$500 million commercial debt with lower interest rates and higher tenure to refinance its costly debt obligations lowering the utility's debt service cost. Overall, the causal links from project activities and outputs to outcomes were valid and direct, and the achievement of this objective could be attributed to the project's intervention, but the success of the project's intervention in strengthening the KPLC's financial situation was heavily depended on other factors such as the regular and transparent adjustment of tariffs, allocation of sufficient budgetary funds to support the KPLC's electrification program, and operational reorganization of the utility. As a standalone lending operation, the project did not address these issues.

Outputs

- **Establishment of a modern meter control center with satellites:** The project financed the establishment of seven metering control centers in Nairobi and regional offices. A target was not set for this indicator. All seven centers are operational.
- **Installation of advanced metering infrastructure (AMI) meters:** The project financed the installation of 67,000 AMI meters in small and medium size enterprises (SMEs). The project was to originally install 55,000 AMI meters in large customers whose electricity consumption represented 53 percent of the total consumption. However, because of a litigation lodged by a bidder challenging the award of this contract, delays in the disbursement of advanced payment to the contractor, and delays in the opening of the letter of credit caused by inadequate budgetary allocation to the project resulted in a change in the project's approach in using the project funds to install AMI meters in SMEs rather than large customers.
- The US$200 million IDA guarantee agreement became effective in 2016 with some delay because of the need to clarify some technical requirements of the KPLC and the delayed finalization of KPLC's financial strategy.
- The project financed the installation of an Advanced Meter Management software and provided training for its use. As a result, the KPLC's existing AMIs were integrated to the software completing the integration of the system (ICR, p.15). The results framework did not include an indicator to capture the achievement of this project output.

Outcomes

- **Private Capital Mobilized:** Because of the US$200 million IDA guarantee, the KPLC raised US$500 million private capital to refinance its approximately US$354 million commercial debt. The target was US$450 million.
- **KPLC Commercial losses:** The baseline for KPLC's system-wide commercial losses was 6.7 percent. The original and revised targets were 3.70 percent and 6.1 percent, respectively. The target was revised because of the change in the scope of installation of the AMI meters from large customers to SMEs. The large customer's consumption constituted 53 percent of the total consumption, whereas the consumption of the project SMEs constituted 20 percent of the SMEs in the country, the total consumption of which constitutes 16 percent of the consumption in the country. Therefore, the installation of the AMI meters covered only about 3 percent of the electricity consumption in the country. Because of this significant low coverage, the project had a marginal impact on reducing KPLC's commercial losses. On the other hand, system-wide commercial losses at project closing were estimated at 8.93 percent out of the 23.3 percent technical and commercial losses showing a deterioration. This is attributed to "the continued rapid expansion of the low voltage network to cater to the aggressive connection campaign without a commensurate increase in the medium voltage network as well as inadequate measures by KPLC to curb electricity theft due to institutional instability" it was faced with between 2018 and 2023" (ICR, p.16). On the other hand, the ICR (p.16) reports that the commercial losses from customers covered by the project decreased by 3.3 percent; however, the ICR does not provide sufficient information about how this reduction was calculated, and the results framework did not include an indicator to capture this achievement; hence, there was no target.
- **KPLC's Current Ratio:** Current Ratio is defined as an entity's ability to fulfill its short-term financial obligations and calculated as a ratio of current assets to current liabilities. KPLC's baseline Current Ratio was 1, and the target was to increase it above 1. The achievement was 0.61 indicating that the short-term ability of KPLC to fulfill its financial obligations deteriorated.
- **KPLC's Gearing Ratio (ratio of debt to equity):** Gearing Ratio is the ratio of an entity's debt to its equity. The KPLC's baseline was 1.28 and the target was to keep it under 2.5. The achievement at 1.74 was better than the target but worse than the baseline.
- **Debt Service Coverage Ratio:** This is a ratio of an entity's net operating income to its debt service. The baseline for KPLC was 1.1 and the target was a ratio higher than 1.2. The achievement was 1.8 indicating a significant improvement in KPLC Debt Service Coverage Ratio because of the refinancing of its debts using the IDA guarantee.
- **Free operational cash flow to debt:** This ratio measures the fraction of all debt that would be paid back in one year using all free cash flow. The KPLC's baseline ratio was minus 10 percent indicating a very precarious financial situation for short-term debt payment. The target was to increase it to 6 percent through debt refinancing. The achievement at 27.49 percent was significantly higher than the target.
- **Reduction in interest rate of refinanced USD-denominated commercial loans:** The reduction in interest rate was 0.60 percentage points falling short of the target of 1.50 percentage points.
- **Debtors Receivable Days:** This ratio shows the average number of days it takes KPLC to settle its bills with debtors. It is calculated by dividing the debtors' receivables by the revenue of KPLC and multiplying that ratio by 365 days. The baseline for KPLC 62 days. The target was to lower it below 60 days. The achievement at 28.55 days was significantly better than the target because of the refinancing of KPLC debt using the IDA guarantee.

The achievement of the indicators show that the project's intervention had a positive impact on improving KPLC's some financial ratios (such as debt service coverage ratio, free operational cash flow to debt, and

debtors receivable days), whereas the commercial losses and other ratios had worsened by project closing (such as current ratio and gearing ratio). The ICR (pp.16-17) lists the external reasons for the worsening of the KPLC's financial situation as the following: (i) insufficient tariff to recover increased operational costs because of a five-year delay in carrying out of a scheduled tariff review; (ii) insufficient revenues because of political decisions that increased the threshold for customers on the lifeline from 10 kilowatts-hour to 100 kilowatts-hour in October 2015 and decreased tariffs by 15 percent between December 2021 and August 2022; (iii) insufficient fiscal transfers to KPLC for the implementation of the last-mile connection program; and (iv) deterioration in operational performance that resulted in increased technical and non-technical losses.

The results show that the project's positive effect on the financial situation of the KPLC was temporary. However, the project's intervention resulted in a significant technical capacity improvement in real time tracking of anomalies in the system and billing through the establishment of metering control centers and installation of AMI meters. These applications are scalable and expected to further benefit the KPLC's operation and bill collection through the addition of new metering points. Although the full benefit of these investments may not be realized without institutional change in management and business process engineering in KPLC, the project nevertheless laid a solid groundwork for improved bill collection (ICR, p.15 and footnote 3 on p.16). As a standalone intervention, the project did not address the other factors that have been systematically and adversely affecting KPLC's financial situation; however, the project resulted in a productive dialogue with the Kenyan authorities regarding how to improve the KPLC's financial situation and resulted in the inclusion of certain DLIs in the follow-on World Bank-financed Green and Resilient Expansion of Energy Program for Results (GREEN PforR) that are expected to directly strengthen the operational autonomy and improve the financial situation of the KPLC. Overall, although the project's achievement fell short of initial targets, the project's efficacy in achieving the project objective to strengthen KPLC's financial situation is rated Substantial taking into consideration the overall impact of the project on the technical capacity of the utility, the establishment of a productive policy dialogue, and the preparation of follow-on interventions to address the other barriers to the strengthening of the utility's operational autonomy and financial viability.

Rating
Substantial

OVERALL EFFICACY
Rationale
The project was successful in establishing household connections to the grid and partially successful in connecting households to mini-grids. Therefore, the efficacy of the project in achieving the project objective to increase access to electricity is rated Substantial. On the other hand, the project efficacy in achieving the project objective to improve reliability of electricity service is rated Modest because of lower achievement due to external factors such as issues related to generation and transmission, and adequate preventive maintenance of the distribution network, and the weakness of the indicators to measure the achievements in the project area. Although the project's achievement fell short of the financial targets, the project's efficacy in achieving the project objective to strengthen KPLC's financial situation Substantial because the project significantly improved the technical capacity of the KPLC in metering, resulted in a positive policy dialogue

with the authorities in sector reform, and led to the follow-on World Bank project that is expected to further strengthen the operational autonomy of the utility.

Overall, the project's efficacy in achieving the project objectives is rated Substantial. The modest rating for the project's efficacy in achieving the second objective will be taken into consideration in driving the overall outcome rating below.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Analysis

At appraisal, a cost-benefit analysis was conducted for investment activities excluding the benefits from technical assistance activities, which were not quantifiable, and those from the IDA guarantee because they were typically financial. The analysis included two main quantifiable benefits as incremental electricity consumption resulting from the improvements in service delivery and the electrification program, and energy cost savings resulting from reduced non-technical losses among large and medium customers. Other assumptions related to electricity supply and demand were realistically derived from the KPLC's 2014 Annual Report. The costs of the investment activities and their maintenance (2 percent of the investment cost per year) were included in the analysis for a period of 20 years. The calculations resulted in an overall Economic Rate or Return of 20.9 percent and a Net Present Value of US$218.2 million at a discount rate of 10 percent.

At project closing, the same methodology with actual project benefits and costs was used to conduct a post-project economic analysis. The calculations resulted in an overall ERR of 16.1 percent and an NPV of US$78.3 million. The post-project EIRR and NPV were lower than those estimated at appraisal because of project scope shifting from large customers to SMEs that resulted in the achievement of lower benefits and the revised assumption for monthly consumption of newly connected household from 50 kilowatt-hours to 36 kilowatt-hours. However, the post-project ERR was still higher than the hurdle rate of 9 percent calculated for Kenya using the Ramsey formula that links discount rates to economic growth rates. Overall, the economic analyses conducted at appraisal and after project were typical and appropriate for an electrification and service delivery improvement project, and the ERR and NPV calculations confirmed the economic viability of the project's intervention.

Operational and Administrative Efficiency

The project was faced with some moderate operational and administrative issues that delayed project implementation. In early stages of project implementation, the delays in the government's allocation of funds from the budget to the project because of tight fiscal space slowed down the implementation of project activities. A court litigation further delayed the implementation of the power protection component consequently resulting in a change of scope in the installation of AMI meters from large customers to SMEs. In addition, the frequent changes in top management of KPLC and the suspension of senior management because of forensic audits also delayed project implementation. There were also noncompliant aspects of the safeguard implementation, but these did not have a major adverse effect on project implementation. As an external factor, the restrictions

imposed by the government and disruptions to global supply chains because of the onset of COVID-19 in March 2020 delayed project implementation. Although these delays resulted in a three-year extension of the project closing date, the project had delivered most of the outputs by revised project closing date except the construction of all six mini-grids with no cost-overruns.

Overall, the project's efficiency in achieving the project objectives is rated Substantial.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	20.90	97.00 ☐ Not Applicable
ICR Estimate	✓	16.10	98.00 ☐ Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The project objectives were highly aligned with the World Bank Strategy and relevant to the country context. The project objectives to increase access to electricity and improve the reliability of electricity service were sufficiently challenging whereas the objective to strengthen the KPLC's financial situation was overly ambitious given the multi-faceted complexity of the financial viability of the sector, but it nevertheless was a necessary intervention to lay the groundwork for future strengthening of the financial situation of the utility. Overall, the relevance of the project objectives is rated High. Although the project's success in achieving the results related to system reliability was modest, the project delivered all the technical outputs that are expected to be scaled up in the future to further improve the reliability of electricity supply. Similarly, the project had an overall positive impact that would be expected to support KPLC in strengthening its financial situation (because of improved technical capacity, positive policy dialogue, and follow-on World Bank projects) although the initial project results were lower than the targets. The project was also successful in connecting new households to electricity despite some shortcomings in expanding the coverage of mini-grids. Overall, the project's efficacy in achieving the three project objectives is rated Substantial. The post-project cost-benefit analysis resulted in an ERR higher than the hurdle rate calculated of Kenya (although it was lower than the ERR calculated at appraisal), and the project did not encounter any major shortcoming in operational and administrative aspects. Therefore, the project's efficiency in achieving the project objectives is rated Substantial. Overall, in accordance with the Bank Guidance (p.38), the project's outcome is rated Moderately Satisfactory because of the modest rating of the project's efficacy in achieving one of the project objectives.

a. Outcome Rating
Moderately Satisfactory

7. Risk to Development Outcome

Financial: The financial viability of KPLC poses a high risk to the sustainability of the project outcomes. This is partly mitigated by the inclusion of a Disbursement Linked Indicator (DLI) under a new Program for Performance, which requires regular three-yearly adjustment of tariffs, the last of which was process on April 1, 2023. However, KPLC continues to have a significant amount of foreign currency debt liability. This adversely affects the utility's cashflows and profitability. Because of the aggressive expansion of the distribution network (see the entry titled Technical below), KPLC is likely to be faced with insufficient funds problem. Such funding constraints could result in improper operation and preventive maintenance of the assets developed under the project resulting in a deterioration of service delivery quality.

Technical: The infrastructure investments implemented under the project used proven technologies. If they are operated and maintained properly, the likelihood of the arising of a major technical issue is low. However, because of the aggressive expansion of the distribution network to achieve the government's universal access goal by 2026 has been stretching the technical capacities of KPLC resulting in less attention given to the implementation of preventive maintenance works. Coupled with technical issues in the generation and transmission of electricity, the issues in the distribution network are likely to continue for some time. This can adversely affect the reliability of electricity service.

Organizational: The organizational instability at KPLC has been a recurring problem during project implementation such a frequent managerial changes and suspension of senior managers because certain audits. Such organizational instability can result in a deterioration of the overall performance of the utility. However, the follow-on World Bank-financed project included DLIs to improve the independence of the board of directors of KPLC. This is expected to contribute to the organization stability of KPLC.

8. Assessment of Bank Performance

a. Quality-at-Entry
Increasing access to electricity while improving the reliability of electricity service and strengthening the financial viability of the distribution utility was of high strategic importance for the Government of Kenya in order to achieve universal access by 2030 and spur economic growth through reliable supply of electricity to businesses. The project activities to increase access to electricity were relevant and sufficient to achieve this goal through distribution infrastructure and mini-grids investments (through a PPP scheme). The project activities to improve the reliability of electricity service and to strengthen the KPLC's financial situation were relevant but insufficient because the achievement of these objectives depended on addressing sector-wide political and organizational barriers. The economic analysis was robust to assess the economic viability of the project's intervention. Technical aspects were sufficient to establish the foundation of a technical infrastructure that would have been expected to support KPLC improve its operational and financial situation resulting in an improvement in system reliability. Safeguards and fiduciary aspects of the project were adequate to efficiently implement the project; for example, the

identification of the provisions of the national public procurement law that were inconsistent with the World Bank procurement guidelines and their implementation with modifications. While all the major risks were adequately identified and mitigation measures were in place, the risks of insufficient budget allocations to the project and organizational instability of the KPLC were insufficiently identified and mitigation measures were ineffective. The materialization of those risks led to project implementation delays. Monitoring and evaluation (M&E) arrangements of the project had significant shortcomings. As discussed in section 9. M&E Design, Implementation, & Utilization below, some outcome indicators were irrelevant and not measurable to capture the project's impact on reducing commercial losses and improving the reliability of the electricity supply. These limitations in the M&E design and implementation made it difficult to test the causal links in the theory of change.

Overall, the quality at entry is rated Moderately Satisfactory.

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision
The project team conducted in-person supervision missions approximately twice a year except during the COVID-19 restrictions period when virtual super missions were conducted. The presence of the World Bank Task Team Leader and other members of the project team in Nairobi facilitated a close dialogue with the authorities and project implementing entities, and a close supervision of the project activities. The close dialogue with the authorities helped solve the insufficient budgetary allocation issue in early 2019. Based on a review of the Implementation Status and Results Reports (ISRs) and Aide Memoirs, the performance reporting is assessed to be candid and detailed manifesting the project team's sufficient focus on the development impact of the project. Using the experience and increased knowledge gained during the implementation of the project, the project team designed the follow-on Green and Resilient Expansion of Energy Program for Results (GREEN PforR) operation to include two DLIs to address the financial challenges of the KPLC and improve its operational stability. The project team's supervision of the safeguard implementation was satisfactory; the project team's guidance was critical in finding an in-kind compensation solution to acquisition of unregistered community lands in line with the preference of the local communities (see Safeguards in section 10). To address the project implementation challenges, the project team restructured the project three times. However, these restructurings were insufficient to address the shortcomings of the results framework in adequately capturing the improvement in the reliability of electricity services through SAIDI and commercial loss indicator.

Overall, the quality of supervision was Satisfactory.

Quality of Supervision Rating
Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The project objectives were clearly and concisely formulated. At appraisal, the preparation of a theory of change was not required, but the information contained under the components was sufficient to derive a theory of change of the project's intervention, and it was adequately reflected in the results framework. The intermediate results indicators were mostly sufficient to capture the contribution of the project activities and outputs toward achieving the expected outcomes. However, the results framework did not include indicators to capture the achievement of some outputs related to the live-line maintenance and metering software. The objective-level indicators also adequately encompass the outcomes expected from the project's intervention. The indicators capturing the results in increasing access to electricity were specific, measurable, achievable, relevant, and time-bound. However, some indicators capturing the improvement in the reliability of electricity service and strengthening of KPLC's financial situation were not specific, measurable, or achievable, such as the SAIDI, commercial losses indicator, and various financial ratios for the KPLC's financial situation. These indicators mostly measured the results at KPLC's entire-system level; therefore, it was not possible to adequately measure the project's impact on electricity service reliability in the project area or the KPLC's financial situation. There were also methodological weaknesses in those indicators. For example, the SAIDI overstated the number of people of customers affected by system interruptions because of inadequate metering, and the KPLC's commercial losses could not be calculated for the project area because technical losses could not be accurately measured due to absence of metering at the distribution transformers.

b. M&E Implementation

The indicators in the results framework were regularly measured and reported using the KPLC's SCADA system and annual reports, contractors' monthly progress reports, and the registration of new households to electricity service. The changes in commercial losses were estimated from total losses based on a methodology developed in 2013. However, the weaknesses in the outcome indicators in capturing the project's impact on the reliability of electricity service and the strengthening of KPLC's financial situation were not corrected during project implementation. These weaknesses in the specification and methodology of some indicators made it difficult to assess the achievement of the project objectives and test the links in the results chain. The M&E functions and functions are institutionally sufficiently embedded and are likely to be sustained after project closing. It is also expected that with the installation of more meters at the distribution transformers, the SCADA system will provide more accurate data on interruptions and commercial losses system-wide.

c. M&E Utilization

The M&E did not lead to a major shift in the implementation direction of the project, but the project was restructured based on the M&E finding. Notwithstanding the significant weaknesses in the specificity and methodology of some main indicators, the M&E data collected through the results framework were adequately used to provide evidence of achievement of outcomes. Most importantly, the M&E findings

and lessons learned from the implementation of the project led to the preparation of the GREEN PforR, which will support the critical reform measures in the electricity sector.

Overall, the M&E quality is rated Modest because of significant shortcomings in the M&E design and implementation that made it difficult to measure the achievement of the project objectives and test the links in the results chain. The assessment of the achievement of the project's results was possible because of the additional evidence provided by the ICR.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

The project was classified as Category B under Environmental Assessment (OP/BP 4.01) and triggered the Natural Habitats (OP/BP 4.04), Indigenous Peoples (OP/BP 4.10), Physical and Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12) safeguard policies.

Environmental Assessment (OP/BP 4.01): The project was classified as Category B because of limited and reversible site specific and temporary adverse environmental effects because of the construction works. An Environmental and Social Management Plan (ESMP) for the activities under the first component was prepared and disclosed in country and on the World Bank's InfoShop on January 9, 2015. Two Environmental and Social Management Frameworks (ESMF) one for each peri-urban and off-grid electrification activities were prepared and disclosed in country and on the World Bank's InfoShop on February 3, 2015. The insufficient enforcement of the safe work procedures related to poles handling resulted in a fatal accident during the implementation of grid electrification activities. The work was suspended for two months until the implementation of the corrective actions agreed by the KPLC and the contractor and approved by the World Bank project team.

Natural Habitats (OP/BP 4.04): The project triggered this safeguard policy because of the likely but minimal impact of the peri-urban and off-grid electrification activities on natural habitats and that of small wind-power projects (if adopted under the off-grid electrification component) on migratory bird corridors. The project team confirmed that the project did not have any adverse effect on natural habitats, because all subprojects were screened to avoid natural habitats.

Indigenous Peoples (OP/BP 4.10): The project triggered this safeguard policy because of the potential impact of the off-grid electrification activities in six communities where indigenous peoples live that meet the criteria under this safeguard policy. A Vulnerable and Marginalized Groups Framework (VMGF) was prepared and disclosed in country and on the World Bank's InfoShop on February 3, 2015. The project confirmed that subprojects were screened to have any adverse effect on the indigenous communities. As discussed under Involuntary Resettlement safeguard below, the project compensated some indigenous communities in return for the acquisition of their unregistered community land.

Physical and Cultural Resources (OP/BP 4.11): The project triggered this safeguard policy as a precaution for chance finds. The project team confirmed that there were no chance finds of physical or cultural resources during project implementation.

Involuntary Resettlement (OP/BP 4.12): The project triggered this safeguard policy because not all off-grid subproject were identified at appraisal that might require land acquisition, and the peri-urban electrification activities were assessed to result in compensation payments for crops and trees that could be damaged during wayleave acquisition. Therefore, a Resettlement Policy Framework (RPF) was prepared and disclosed in country and on the World Bank's InfoShop on February 3, 2015. The project was to prepare subproject specific Resettlement Action Plans (RAP) if needed. During project implementation, there were issues that were non-complaint with the requirement of this safeguard policy. In the early phases of project implementation, the KPLC's documentation of wayleave acquisition was insufficient because project-affected peoples' (PAPs) compensation requests were not logged appropriately. The World Bank project team supported the KPLC in the preparation of a wayleaves acquisition consent form. In addition, the implementation of this safeguard policy faced challenges during the installation of three mini-grids because these mini-grids were located on unregistered community land. The World Bank project team supported REREC team in facilitating an in-kind compensation for the acquisition of unregistered community lands in the form of infrastructure investments rather monetary compensations. An Action Plan was agreed with the REREC to ensure compliance with this safeguard policy for the mini-grid activities that continued beyond project closing. The project had a grievance redress mechanism, but the grievances were not recorded appropriately, which led to delayed compensation payments.

b. Fiduciary Compliance

Financial Management

The project implementing units submitted project's unaudited interim financial reports regularly but with occasional delays. The external audits raised issues related to internal controls, procurement, assets in the books and outstanding balances. With the support of the World Bank project team, KPLC addressed these shortcomings. The last opinion of the external auditor was unqualified. However, there were significant issues with the availability of counterpart funding. Because the National Treasury significantly reduced budgetary allocations to the Ministry of Energy starting from the Fiscal Year 2017, the KPLC was not able to draw from IDA funding under the project because of insufficient budgetary allocations. The insufficient budgetary allocations have been a recurring issue during project implementation that led to halting of project activities once the KPLC depleted the budgetary allocations for a specific fiscal year. Because of increased risk of fraud, collusion, and corruption, the fiduciary risk of the project was reassessed and increased to Substantial during project implementation.

Procurement

Although the project hired a senior procurement specialist, procurement faced challenges starting from early phases of project implementation. The project implementation units (PIUs) formed under the KPLC, and the REA and REREC did not have sufficient familiarity with the World Bank's procurement process and guidelines. Bidding documents were not adequately prepared; decision-making was generally delayed; and the bid evaluation reports were of poor quality. The project team supported the PIUs in procurement, and procurement of major contracts were completed in 2017. However, a litigation process initiated by a

bidder to the procurement of activities under the Revenue Protection Program delayed implementation of those activities and consequently led to the installation of the AMI meters to SMEs rather that large customers. In addition, the procurement of the mini-grid contracts was delayed because of the REA did not meet the withdrawal condition of the adoption of strategy for PPP implementation of off-grid electrification. Overall, the procurement was compliant with the World Bank procurement requirements and guidelines, but because of insufficient procurement capacity, contracts were procured with delays.

c. Unintended impacts (Positive or Negative)

None.

d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	
Bank Performance	Satisfactory	Moderately Satisfactory	The Quality at Entry is rated Moderately Satisfactory because of moderate shortcomings in the identification of risks and effectiveness of mitigation measures, and significant shortcomings in the design of the M&E system.
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

12. Lessons

This review has drawn three lessons based on the information in the ICR.

In a project with the objective to improve the reliability and efficiency of electricity supply, the use of the system-wide indicators can prevent the accurate measurement of the project's impact on service delivery. The results framework included SAIDI and commercial loss indicators to measure the reductions in the average duration of supply interruptions and the improvement in the bill collection (resulting in a reduction in commercial losses). Although the project delivered all outputs related to the achievement of these outcomes, the achievement of the indicators showed a worsening both in reliability and commercial losses. Because these two indicators measured

system-wide interruptions and commercial losses (the latter estimated as a percentage of total losses), they were irrelevant and insufficient to measure the project's impact. This shortcoming made it difficult to assess the achievement of the project objectives.

In a complex political-economy environment, a standalone investment project can be less effective in achieving sector-wide governance reforms. The project aimed at improving the financial situation of KPLC through the implementation of advanced metering technologies to decrease commercial losses and the issuance of a US$200 million IDA guarantee to refinance the costly and short-tenure debt of KPLC. The project successfully delivered all related outputs (except installing meters to high consumers which were replaced by SMEs). However, being an entity, the majority of which is owned by the state, the KPLC is affected by political decisions and interference. The political decisions to delay tariff adjustment and increase the allocation to low consumption households resulted in lower revenues for the KPLC. The government's aggressive goal of achieving universal access by 2026 also stretched the finances of the utility. The organizational instability caused by frequent changes of the senior management of the KPLC adversely affected the implementation of project activities and later the sustainability of the outcomes.

Compensating rural communities in-kind (i.e., as infrastructure investments) can be critical in successful implementation of the project activities in remote locations. The implementation of mini-grid projects in rural areas required the acquisition of unregistered community land. The related safeguard policy required monetary compensation, but the communities requested in-kind compensation in the form of infrastructure investment. As the ICR (p.28) notes, "there is much ambiguity in the applicable legislation on what kind of compensations are required for a particular compensation." The project team worked out a plan that resulted in the payment of in-kind compensation to rural communities. After that, the project implementation improved in rural areas but because of insufficient capacity of the implementing agency, poor contractor performance, and insufficient supervision because of the remote location of the project sites, the project closed with four mini-grids completed and three ongoing.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is a tightly written and complete critique of the project's performance. Its narrative is candid and highly evaluative rather than descriptive. The report sufficiently interrogates evidence highlighting the shortcomings in the indicators that made the assessment of the achievement of the project objectives difficult. To address these shortcomings, the ICR provides additional evidence. The overall evidence base of the report is complete and robust and supports the achievements reported. The report is internally consistent; the discussions in different parts of the ICR are logically linked and the results are mutually reinforcing. The ICR broadly responds to the Bank guidance, except the section on fiduciary compliance, which is missing, and the discussion on the implementation of safeguard policies is insufficient. The lessons are based on the experience of the project and sufficiently linked to the report's narrative. However, there were some minor discrepancies in some information in the report. The Bank Performance rating is given as Satisfactory in the data sheet, but it reads Moderately

Satisfactory in the main text of the report. The actual costs of the components are not given in the main text; Annex 3 does not provide a clear breakdown of the actual component costs, either.

Overall, the quality of the ICR is rated Substantial.

a. Quality of ICR Rating
Substantial