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IMPLEMENTATION COMPLETION AND RESULTS REPORT

IDA-56530/TF-A0294

ON A

CREDIT

IN THE AMOUNT OF SDR 97.9 MILLION

(US\$135 MILLION EQUIVALENT)

AND

A GRANT FROM THE GLOBAL ENVIRONMENTAL FACILITY TRUST FUND

IN THE AMOUNT OF US\$8.2 MILLION

TO THE

REPUBLIC OF UGANDA

FOR AN ENERGY FOR RURAL TRANSFORMATION PROJECT

IN SUPPORT OF THE THIRD PHASE OF THE RURAL ENERGY TRANSFORMATION PROGRAM

February 28, 2024

Energy & Extractives Global Practice
Eastern And Southern Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective {Aug 14, 2023})

Currency Unit = Uganda Shilling

US\$1 = Ush 3718.75

US\$1 = SDR 0.749767

FISCAL YEAR

July 1 - June 30

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ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Loan
CAS	Country Assistance Strategy
CO2	Carbon Dioxide Emissions
CPF	Country Partnership Framework
EASP	Electricity Access Scale-Up Project
ERA	Energy Regulatory Authority
ERT	Energy for Rural Transformation Program
ERT-2	Energy for Rural Transformation Program, Second Phase
ERT-3	Energy for Rural Transformation Program, Third Phase
ESMF	Environmental and Social Management Framework
E&S	Environmental and Social
GEO	Global Environmental Objective
GHG	Greenhouse Gas Emissions
GoU	Government of Uganda
ICR	Implementation Completion and Results Report
IPP	Independent Power Producers
kWh	Kilowatt-hour
KfW	Kreditanstalt für Wiederaufbau
LV	Low Voltage
PAD	Project Appraisal Document
PAPs	Project Affected Persons
PDO	Project Development Objective
PSFU	Private Sector Foundation Uganda
PV	Photovoltaic
M&E	Monitoring and Evaluation
MEMD	Ministry of Energy and Minerals Development
MoES	Ministry of Education and Sports
MoWE	Ministry of Water and Environment
MW	Megawatt
MV	Medium Voltage
REA	Rural Electrification Agency
RESP-1	Rural Electrification Strategy and Plan 1
RESP-2	Rural Electrification Strategy and Plan 2
SCD	Systematic Country Diagnostic
SHS	Solar Home Systems
SP	Service Provider
ST	Service Territory
UEB	Uganda Electricity Board
UECCC	Uganda Electricity Capitalization Company
UEGCL	Uganda Electricity Generation Company Limited
UEDCL	Uganda Electricity Distribution Company Limited
UETCL	Uganda Electricity Transmission Company Limited
UNBS	Uganda national Bureau of Standards
USEA	Uganda Solar Energy Association

TABLE OF CONTENTS

DATA SHEET	1
I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES.....	6
A. CONTEXT AT APPRAISAL.....	6
B. SIGNIFICANT CHANGES DURING IMPLEMENTATION	12
II. OUTCOME	15
A. RELEVANCE OF PDOs.....	15
B. ACHIEVEMENT OF PDOs (EFFICACY).....	16
C. EFFICIENCY	22
D. JUSTIFICATION OF OVERALL OUTCOME RATING.....	23
E. OTHER OUTCOMES AND IMPACTS (IF ANY).....	24
III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME	26
A. KEY FACTORS DURING PREPARATION.....	26
B. KEY FACTORS DURING IMPLEMENTATION	28
IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME ..	30
A. QUALITY OF MONITORING AND EVALUATION (M&E).....	30
B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE	31
C. BANK PERFORMANCE.....	32
D. RISK TO DEVELOPMENT OUTCOME	34
V. LESSONS AND RECOMMENDATIONS	34
ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS.....	36
ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION	48
ANNEX 3. PROJECT COST BY COMPONENT.....	51
ANNEX 4. EFFICIENCY ANALYSIS	52
ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS ...	54



DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P133312	Energy for Rural Transformation III
Country	Financing Instrument
Uganda	Investment Project Financing
Original EA Category	Revised EA Category

Related Projects

Relationship	Project	Approval	Product Line
Supplement	P146876-UG GEF Energy for Rural Transformation III	05-Jun-2015	Global Environment Project
Supplement	P159112-Uganda Rural Electrification	30-Dec-2016	Recipient Executed Activities
Supplement	P178776-Uganda Rural Electricity AF		Recipient Executed Activities

Organizations

Borrower	Implementing Agency
Republic of Uganda	Ministry of Energy and Mineral Development (MEMD), Ministry of Finance, Planning and Economic Development, Uganda Energy Credit Capitalization Company (UECCC)

Project Development Objective (PDO)

Original PDO

The Project Development Objective is to increase access to electricity in rural areas of Uganda.



FINANCING

	Original Amount (US\$)	Revised Amount (US\$)	Actual Disbursed (US\$)
World Bank Financing			
P133312 IDA-56530	135,000,000	135,000,000	133,751,595
P146876 TF-A0294	8,200,000	8,196,004	8,196,004
Total	143,200,000	143,196,004	141,947,599
Non-World Bank Financing			
Borrower/Recipient	33,200,000	0	0
Total	33,200,000	0	0
Total Project Cost	176,400,000	143,196,004	141,947,599

KEY DATES

Project	Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
P133312	05-Jun-2015	31-Mar-2016	15-Feb-2019	31-Dec-2020	30-Jun-2023

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US\$M)	Key Revisions
12-Jun-2020	59.80	Change in Loan Closing Date(s)
14-Oct-2021	92.28	Change in Implementing Agency Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Reallocation between Disbursement Categories Change in Disbursements Arrangements Change in Institutional Arrangements Change in Financial Management Change in Procurement Change in Implementation Schedule
25-Nov-2022	130.24	Change in Loan Closing Date(s)



KEY RATINGS

Outcome	Bank Performance	M&E Quality
Moderately Satisfactory	Moderately Satisfactory	Substantial

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US\$M)
01	16-Nov-2015	Satisfactory	Satisfactory	0
02	30-Jun-2016	Satisfactory	Satisfactory	0
03	05-Jan-2017	Satisfactory	Moderately Satisfactory	1.42
04	19-Jul-2017	Moderately Satisfactory	Moderately Unsatisfactory	3.92
05	01-Feb-2018	Moderately Satisfactory	Moderately Unsatisfactory	5.32
06	22-Jun-2018	Moderately Satisfactory	Moderately Unsatisfactory	11.77
07	21-Jan-2019	Moderately Satisfactory	Moderately Satisfactory	11.77
08	14-Jun-2019	Moderately Satisfactory	Moderately Satisfactory	18.84
09	13-Dec-2019	Moderately Unsatisfactory	Moderately Unsatisfactory	36.00
10	02-Jun-2020	Moderately Unsatisfactory	Moderately Satisfactory	59.80
11	02-Dec-2020	Moderately Satisfactory	Moderately Satisfactory	84.79
12	14-Jun-2021	Moderately Satisfactory	Moderately Satisfactory	86.85
13	16-Dec-2021	Moderately Satisfactory	Moderately Satisfactory	95.37
14	16-Jun-2022	Moderately Satisfactory	Moderately Unsatisfactory	123.30
15	27-Nov-2022	Moderately Satisfactory	Moderately Unsatisfactory	130.24
16	05-May-2023	Moderately Unsatisfactory	Moderately Unsatisfactory	130.78



SECTORS AND THEMES

Sectors

Major Sector/Sector (%)

Energy and Extractives 11

Renewable Energy Solar 11

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3) (%)

Private Sector Development 5

Enterprise Development 5

MSME Development 5

Finance 5

Financial Infrastructure and Access 5

MSME Finance 5

Urban and Rural Development 91

Rural Development 91

Rural Infrastructure and service delivery 91

ADM STAFF

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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. From 1987 to 2014, Uganda had one of the fastest growing economies in the world at about 6 percent per annum. The economy's growth had benefited from a post conflict rebound, macroeconomic stability and pro-market reforms. Growth had been accompanied by sectoral shifts with the service sector being the largest contributor to GDP (about 46 percent), agriculture declining from 55 percent in 1990 to 25 percent in 2014 and both construction and industrial sectors had benefited from improved availability of affordable electricity.
2. The economic trajectory was one of continued structural transformation with industrial growth expected to benefit from development of oil resources and availability of electricity, agriculture from enhanced productivity and flourishing agribusiness and a rapid population growth at about 3.4 percent per annum¹ accompanied by rapid urbanization at 6.8 percent per annum.
3. The Government of Uganda (GoU) viewed electricity as critical for the economy's growth trajectory and transformation to support better access to education, healthcare, quality of life at household level, better efficiency and service delivery from enterprises and improved personal security. Yet the national access to electricity rate was only 14 percent (52 percent in urban areas and 7 percent in rural areas). The impacts of limited access to electricity and its high costs were felt mostly in delivery of services and development of both small scale and large scale industrial and commercial enterprises. The National Electrification Survey report (2018) indicated that 30 percent of enterprises and 50 percent of manufacturers lacked access to electricity and 44 percent had to turn customers away².
4. While the commissioning of the Bujagali Hydropower Plant (250 MW) in 2012 and the development and strengthening of the transmission and distribution systems improved the cost and reliability of electricity supply, more investment and resources were needed to further strengthen the energy sector, especially given the increasing demand at about 9 percent per year.
5. Uganda's Vision 2040's broad policy directives for the energy sector, therefore, included a target of reaching 80 percent access to electricity by 2040. In addition, the country's first National Development Plan (FY2011-15) and subsequent plans focused on increasing access to, and usage of electricity, by investing in least cost generation, strengthening the transmission and distribution networks, and expanding renewable energy and energy efficiency programs.

¹ Uganda's population had increased from 26 million in 2002 to 36 million in 2013.

² National Electrification Survey (NES), World Bank, 2018



Sector Context

6. A key milestone in Uganda's efforts to reform the electricity sector was the development of a power sector reform strategy in 1999. The reform strategy redefined the role of government as an enabler of private sector actions to improve access and performance and to develop hydropower through Independent Power Producers (IPPs). The GoU passed the Electricity Act (1999) to support implementation of the reform strategy which included: (a) establishment of the Electricity Regulatory Authority (ERA); and (b) unbundling of the vertically integrated Uganda Electricity Board (UEB) into generation, transmission and distribution companies - Uganda Electricity Generation Company Limited (UEGCL), Uganda Electricity Transmission Company Limited (UETCL) and Uganda Electricity Distribution Company Limited (UEDCL). A Rural Electrification Board (REB) was also established in 2001 to oversee implementation of all rural electrification activities in Uganda along with a Rural Electrification Agency (REA) that acted as secretariat.
7. ERA was established in 2000 and the unbundling of UEB was undertaken in 2001. The unbundling created a single buyer market with UETCL as the single buyer of electricity from UEGCL and Independent Power Producers (IPPs) and as the seller to UEDCL and other distribution companies. To increase efficiency, private sector participation was enhanced with the leasing of the Kira and Nalubaale hydropower plants to Eskom of South Africa in 2002 and the leasing of UEDCL's distribution network in major load centers to Umeme Limited, a private sector distribution company in which the International Finance Corporation (IFC) has equity interest.
8. To spearhead its rural electrification agenda, the GoU developed a Rural Electrification Strategy and Plan (RESP-1) for the period 2001-2012. Under RESP-1 the target was to increase access to electricity in rural areas from 1 percent in 2001 to 10 percent. RESP-2 was subsequently developed for the period 2013-2022 with the objective of increasing access to electricity in rural areas from 7 percent in 2013 to 22 percent by 2022.
9. Overall, the unbundled sector yielded some significant performance improvements in Umeme's concession area, especially a reduction in system losses from 45 percent in 2005 to 21.5 percent in 2014, an improvement in bill collection from 80 to 100 percent, and average annual customer connections of 50,000 since 2009 that increased the overall customer base to 613,000 by 2013.
10. The sector's financial viability also improved due to tariff increases (including a 48 percent average increase in 2012) and revisions to tariff setting formulae. A multi-year tariff was also initiated in 2014 with automatic quarterly adjustments for fluctuations in fuel costs, exchange rates and inflation.
11. Despite the improvements, the sector continued to suffer from several challenges.
12. There was a complex organization of the distribution subsector which comprised 14 service territories covering the geography of the country. For each service territory, service providers (SPs) that included UEDCL, Umeme, private sector entities and rural electricity cooperatives operated and maintained the distribution assets which, with the exception of the West Nile region were all publicly owned. New assets were constructed and owned by REA and operated by the SPs. The main challenge with this arrangement was the need to coordinate electricity network planning, operations and maintenance and service quality. In addition, the capacity of SPs was uneven, with some requiring more business



development support from REA than others.

13. Significant investment was also required at every stage of the power supply chain to improve provision of reliable electricity since demand was projected to exceed supply by 2016.

14. There was also a tension between the imperatives of full cost recovery tariffs for financial viability of the sector on one hand and affordable tariffs for access expansion on the other. During previous periods of drought (1991-2000, and some years between 2003 and 2009) there were reductions in cheaper hydropower generation leading to increased reliance on more expensive emergency thermal generation. The average tariff in Uganda had increased to about US\$0.15/kWh in February 2015 compared to US\$0.03/kWh in Ethiopia and US\$0.12/kWh in Tanzania. Thus, reducing the cost of power supply remained an important policy priority at project appraisal.

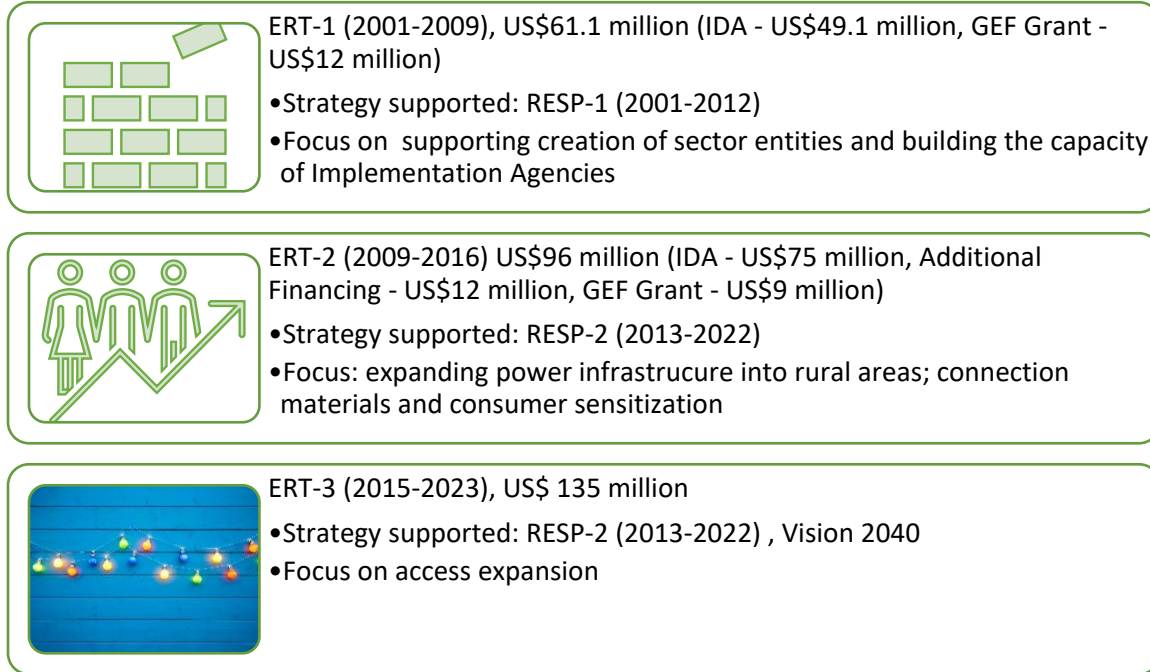
15. Implementation of RESP-1 met with limited success and access increased to only 4 percent compared to the target of 10 percent by 2010 and about seven percent by 2012 (Uganda Bureau of Statistics). The key reasons for the underperformance were: (a) unclear roles and responsibilities of the various agencies involved; (b) limitations in expanded access under the initial concession agreements; (c) insufficient incentives for private sector SPs to expand access; (d) weak capitalization of some SPs and their inadequate managerial and technical experience; (e) affordability constraints related to internal house wiring costs and service connection charges (US\$200 per connection); (f) inadequate efforts to sensitize rural households about the benefits of electricity usage; and (g) ineffectual delivery mechanisms for off grid solar photovoltaic systems.

16. RESP-2 sought to remedy these issues by: (a) centralizing planning and management of rural electrification under REA; (b) spelling out the rights and obligations of REA and SPs under lease agreements and including monitorable targets; (c) expanding concessions to cover the entire country so that all potential customers fell under an ST; and (d) providing incentives for SPs to connect new customers within their concession areas.

17. The World Bank has had a long-term strategic engagement in Uganda's energy sector going back to the 1990s when it supported the power sector strategy that led to the unbundling of UEB as described above. The Bank also supported generation, transmission and access projects, including: (a) the Second Bujagali hydropower development (P089659), (b) the Electricity Supply Development Project (P119737) which helped to increase electricity reliability and access in the South West of Uganda; (c) the ongoing Grid Expansion and Reinforcement Project (P133305) which is focusing on expansion of the transmission network; and (d) the Electricity Access Scale-up Project (P166685) which is supporting access expansion for households, commercial enterprises, industrial parks and public institutions. In addition to these operations, the World Bank supported the Energy for Rural Transformation (ERT) program focused on addressing the challenges of access expansion since its approval in 2001 along with the Phase 1 of the program (P069996). This project represented a continuation of the Bank's engagement with Uganda on access expansion under the ERT program. The program was initially designed as an Adaptable Program Loan (discontinued World Bank Instrument in which a series of loans were approved by the Board with approval of subsequent loans delegated to management upon satisfaction of pre-set triggers). The logic of the ERT as a program was to engage the electricity sector over the long term to create an environment for private sector participation, build institutional capacity to create and assess viable service delivery models and expand access in a sustainable manner.



Figure 1: ERT program content and timelines



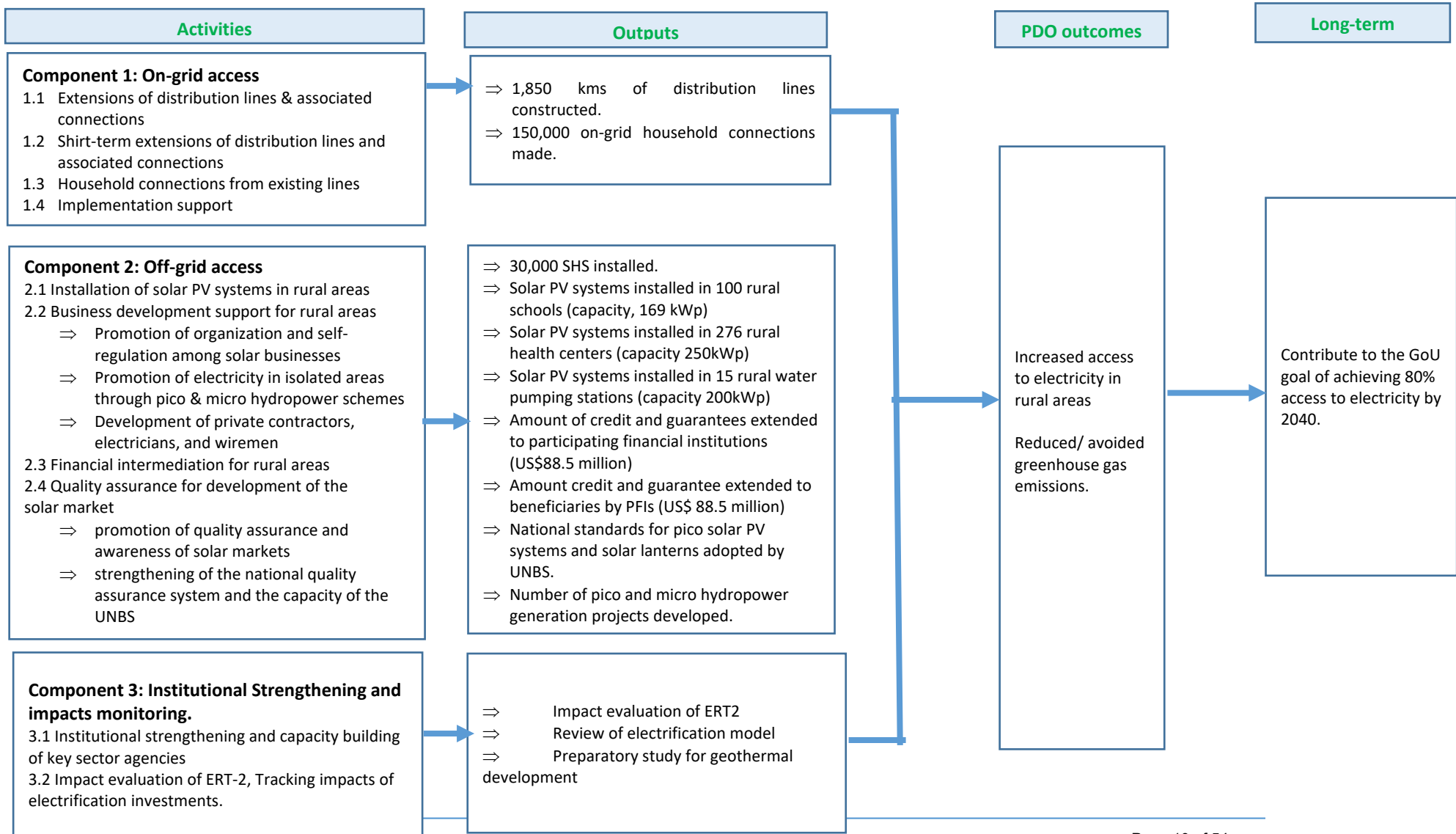
Theory of Change (Results Chain)

18. The aim of the project was to increase access to electricity in Uganda’s rural areas. Its global environmental objective was to reduce greenhouse gas (GHG) emissions. There was no requirement for a theory of change at appraisal, but the Implementation Completion and Results Report (ICR) has derived one from data in the results framework (Annex 1 of the Project Appraisal Document). The theory of change (Figure 2) maps out the project activities for on-grid and off-grid access, that also included financial intermediation, business development for pico and mini hydro power, and the reduction of greenhouse gas emissions. The causal linkages between the project activities, inputs and outputs, and the intermediate outcomes that would lead to the final outcomes of increased access to electricity in Uganda’s rural areas and reductions of greenhouse gas emissions are clear and credible.

19. The project also included other activities which indirectly supported the objective of increasing access and were therefore, an important part of the theory of change. These were technical assistance (subcomponent 1.4) for construction supervision, independent verification of connections, capacity building to strengthen REA’s oversight role (including internal capacity of SPs) quality assurance for the development of the solar market, including capacity building for the Uganda National Bureau of Standards (subcomponent 2.4) and institutional strengthening of key sector agencies (MEMD and REA) and impacts monitoring of the rural electrification program (Component 3).



Figure 2: Theory of Change





Project Development Objectives (PDOs) ▲

20. As stated in the Financing Agreement dated December 16, 2015 (Schedule 1) the objective of the project was to increase access to electricity in rural areas of Uganda. In the Global Environment Facility (GEF) Grant Agreement (Schedule 1) of the same date the PDO was similarly stated as “... to increase access to electricity in rural areas of Uganda and reduce greenhouse gas emissions.”

21. Thus, the PDO had two parts – to increase access in Uganda’s rural areas (PDO#1) and to reduce greenhouse gas emissions (PDO#2 or Global development objective indicator).

Key Expected Outcomes and Outcome Indicators

22. At project appraisal (PAD, p.15) the following three outcome indicators were specified for PDO#1 and PDO#2.

PDO#1 indicators

- i. PDO Indicator #1: Direct project beneficiaries (number of people)
- ii. PDO Indicator #2: Number of people provided with access to electricity under the project by household connections – (number of people)
 - People provided with access to electricity under the project by household connections – Grid (number of people)
 - People provided with access to electricity under the project by household connections -Off-grid – only renewable energy sources (number of people)

PDO#2 (GEO) indicator

- i. PDO Indicator #3: Tons of CO₂ emissions reduced/avoided under the project.

23. PDO indicator #1 included those that were expected to benefit from: on-grid energy access component (Component 1), financial intermediation activities (Subcomponent 2.3), and institutional solar PV systems (Subcomponent 2.1) as summarized in Table 3 of the PAD. The results framework (Annex 1) also provided that 50 percent of the total direct project beneficiaries were expected to be female.

Components

24. The project was structured around three components as follows: (a) Component 1: On-grid energy access; (b) Off-grid energy access and (c) Institutional strengthening and impacts monitoring.

25. **Component 1: On-grid energy access (Estimated cost at appraisal - US\$144.6 million, Actual Cost³ – US\$131.48 million).** This component comprised: (a) extension of 21 medium voltage (MV) distribution lines totaling about 1,800 kilometers (kms) and associated household connections; (b) short extensions of MV and low voltage (LV) distribution lines; (c) household connections within the electrified areas for customers within the “no pole connection distances”, and (d) implementation support on planning and coordination, construction supervision, independent verification of connections and capacity building for REA and the SPs to scale up access.

³ Actual costs include IDA and GEF funding but do not include GoU contributions for which data was not available.



26. **Component 2: Off-grid energy access (Estimated cost at appraisal – US\$ 25 million, Actual cost – US\$22.08 million).** The off-grid energy access component comprised: (a) installation of solar PV systems for public institutions (post-primary schools, health centers and water pumping stations) in rural areas; (b) bushiness development support to – promote emergence of pico and micro hydropower generation in isolated rural areas; facilitate development of private sector contractors, electricians and wiremen; and promote self-organization and self-regulation of the solar market businesses in Uganda; (c) provision of lines of credit and guarantees through the Uganda Energy Credit Capitalization Company (UECCC) to Participating Financial Institutions (PFIs) to facilitate the provision of consumer financing and working capital for solar companies; and (d) implementation of public campaigns to - create awareness on the benefits of solar products and the characteristics of high quality products; and to strengthen the capacity of the Uganda National Bureau of Standards (UNBS) and the national quality assurance framework for solar PV systems.

27. **Component 3: Institutional Strengthening and impacts monitoring (Estimated cost at appraisal – US\$5.6 million, Actual cost US\$4.73 million).** Component 3 was designed to provide technical assistance and capacity building for access expansion to key sector agencies, including regulatory enhancement studies. The institutional part of the component was flexibly designed but some identified indicative areas for support were design and construction guidelines for distribution lines, enhancement of regulations for installations, a systematic review of the electrification model, a study for development of geothermal resources; etc. For the impacts monitoring sub-component the two specific identified activities were: impact evaluation of ERT-2 and tracking the impact of electrification investments to establish changes in incomes and employment at household, enterprises, and community levels.

28. During appraisal the total project costs (**Annex 3**) were estimated at US\$176.4 million inclusive of contingencies of US\$1.2 million. At project completion, the total project cost was US\$158.3 million, including an estimated US\$23.7 million as the Borrower's contribution⁴. The Borrower also informed the ICR mission that ex-post disaggregation of the GoU's contribution was difficult due to the changes in the implementation arrangements involving the mainstreaming of the on-grid component into the Ministry of Energy and Mineral Development through the Statutory Instrument No. 29 of May 2021 which revoked the establishment of REA which had been the main project implementation entity until this date. As of February 27, 2024 about US\$133.75 million of the IDA Credit had been disbursed and it was expected that by the end of the grace period, the IDA Credit would be fully disbursed. If not, the undisbursed balance would be cancelled. The total amount of the approved GEF grant of US\$8.2 million was fully disbursed.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Revised PDOs and Outcome Targets

29. The project underwent three Level 2 restructurings, i.e. the Regional Vice President or Country Director approved these. *None of the restructurings involved revisions to the project development objectives*, but the second restructuring on October 14, 2021, included a change to the target for PDO#2 (GEO) outcome indicator. This change was made to correct an error in the results framework of the PAD which had stated the project end target as the cumulative value of the annual targets of 120,000 metric tons of CO₂ emissions⁵. The first restructuring approved on June 12, 2020, extended the project closing date by 12 months from December 31, 2020, to December 31, 2021. The extension was to allow

⁴ The exact contribution by the GoU could not be established because the Borrower's fiscal management system did not provide for disaggregation of costs related to the project from other activities of the implementation agencies.

⁵ In any case the annual target of 120,000 metric tons of CO₂ could not have been achieved in the project's initial years before implementation for the relevant activities.



enough time for completion of the project which had suffered significant delays due to implementation capacity constraints (especially at REA, the main Implementation agency) and the disruptions caused by the onset of Covid-19. The final restructuring on November 25, 2022, was only for an extension of the project’s closing date to June 30, 2023, and was approved based on an action plan for completion of all outstanding project activities by the revised closing date. Table 2 provides a summary of the changes in PDO outcome indicators and associated targets at appraisal and after the second restructuring (the only restructuring that resulted in changes to PDO Outcome Indicators and targets).

Revised PDO Indicators

Table 1: PDO indicators as at appraisal and after project restructuring

	As at Appraisal		After Restructuring (October 2021)	
PDO	Outcome indicator	Target	Outcome indicator	Target
PDO #1: To increase access to rural areas of Uganda	PDO Indicator #1: Direct project beneficiaries (number of people)	7,600,000	No change	7,600,000
	<ul style="list-style-type: none"> Female direct project beneficiaries (percentage of total) 	50	No change	50
	PDO Indicator #2: Number of people provided with access to electricity under the project by household connections – (number of people)	1,021,000	No change	1,021,000
	<ul style="list-style-type: none"> People provided with access to electricity under the project by household connections – Grid (number of people) 	850,000	No change	850,000
	<ul style="list-style-type: none"> People provided with access to electricity under the project by household connections -Off-grid – only renewable energy sources (number of people) 	171,000	No change	171,000
PDO #2: To reduce greenhouse gas emissions	PDO Indicator #3: Tons of CO2 greenhouse gas emissions per year	600,000	Correction of error in the project Appraisal Document from cumulative to annual statement of CO ₂ reductions	120,000



Revised Components

30. Several changes⁶ were made to the project components in response to delays in project implementation and/or funding constraints. The key changes and the rationale for the changes were as follows:

- i. **Component 1 - On-grid energy access:** During the second project restructuring on October 14, 2021, construction of distribution lines nos. 5-10 totaling 307 kms (Subcomponent 1.1) was dropped at the GoU's request to prioritize funding for other activities and because they could not be completed prior to the closing date of November 30, 2022, at that time.
- ii. **Component 2- Off-grid energy access:** Development of six pico and micro hydro power generation projects which were being promoted by the Private Sector Foundation of Uganda (PSFU) (Subcomponent 2.2) were dropped during the second project restructuring because there were no reasonable prospects for completing the projects within the life of the project. Another change was the scaling down of the financial intermediation component (Subcomponent 2.3) due to a slow uptake of lending to solar energy companies. Thus, during the second project restructuring on October 14, 2021, the amount of working capital and guarantee facilities to the PFIs and through to the consumers and solar companies was reduced by about US\$4.7 million from US\$8.5 million and reallocated to other components. The scope of the installation of institutional solar systems (Subcomponent 2.1) changed significantly because MoWE was able to increase the number of water pumping stations installed with solar PV systems as additional funds became available on reallocation from other components and due to the amendment of the VAT Tax Amendment 8 of 2017. The changes and those on component 3 below, although documented in mission aide memoires, were not formally documented through restructuring papers.
- iii. **Component 3: Institutional strengthening and impacts monitoring:** Several changes were made to this component as follows: (a) the geothermal development preparation study was dropped from the project scope but was carried out separately with GoU funding; (b) review of the electrification model was dropped and replaced with scale up of the certifications of wiremen; and (c) completion of the impact evaluation of ERT-2 was replaced with a baseline survey for ERT-3.

Rationale for Changes and Their Implication on the Original Theory of Change

31. The scale down of the distribution lines and the dropping of the pico and micro hydropower projects under the on-grid and off-grid energy access components respectively were due to implementation delays. The impact of dropping the pico and micro hydro schemes on the TOC was reflected at the output level as the expected completion of six sub-projects was not achieved. Although the PAD had projected that 1,400 community households would be connected resulting in 8,350 beneficiaries, these had not been included in the PDO indicator #1 on total direct project beneficiaries. The reduction of the length of distribution lines constructed under the project would have been expected to result in the loss of connections associated with the six lines and thus also a reduction in beneficiaries. Similarly, the slow uptake of

⁶ Changes in the lengths of the distribution lines targeted for construction under the project and dropping of the pico and micro hydropower subprojects were documented in the second restructuring paper and so were associated targets. The changes for the institutional solar and financial intermediation subcomponents were not formally documented in the restructuring papers.



working capital for solar companies and guarantees for lines of credit reduced the scope of connections that could be achieved by the project through financial intermediation.

II. OUTCOME

A. RELEVANCE OF PDOs

32. At appraisal, the project was well aligned with Uganda's development priorities as described in Vision 2040 and RESP-2 (2013-2022). Vision 2040's aspirational goal was to transform Uganda from a predominantly low-income country to a competitive upper middle income status country by 2040. It set a target of 80 percent access to electricity by 2040. RESP-2 set the framework for increasing access for rural areas from 7 percent in 2013 to 26 percent by 2022. ERT-3 was designed to support implementation of RESP-2 which was part of the GoU's strategies for achieving the overall country targets spelt under Vision 2040.

33. Thus, the project was designed to address one of Uganda's top development priorities – access to electricity. Uganda had low access to electricity rates by global and regional standards and consequently one of the low per capital consumption rates per annum (80kWh compared to 155kWh for Kenya, 300kWh for Ghana and 4,694 kWh for South Africa).

34. ERT-3 was also consistent with the World Bank's Country Assistance Strategy (CAS) for Uganda for FY2011-15 (Report No 54187-UG) and the World Bank's twin goals of reducing poverty and promoting shared prosperity. The project was expected to support achievement of these objectives by providing access to electricity in Uganda's rural areas. The CAS placed emphasis on infrastructure, agricultural poverty, access to markets, amongst other priorities. Outcome 2.1 of the CAS aimed at reducing unmet energy demand and increasing access to electricity through grid extensions and on-grid and off-grid renewable energy.

35. The project was implemented over two CAS periods – Country Partnership Framework (CPF) for 2016-18, and for 2019-21), and during the first half of 2023 when there was no operative CPF for Uganda. The project remained aligned with both CPFs during implementation. In the absence of a CPF for Uganda at project closure, the assessment of relevance of the PDO took account of the last operative CPF (FY2019-21) and the Systematic Country Diagnostic (SCD) Update dated August 1, 2021.

36. The SCD Update identified access to electricity as one of the key constraints to accelerating growth and as one of the explanations for multi-dimensional poverty. The update noted the importance of private sector promotion of increased access to electricity which is essential for increased productivity in both agricultural and non-farm sectors as well as making progress on the human capital agenda (SCD Update, para. 89). It further placed improving access to electricity, internet connectivity and digital technology infrastructure and solutions as one of the key actions under the governance and service delivery priority area.

Assessment of Relevance of PDOs and Rating

37. The relevance of the PDOs was rated **High** because they were: (a) targeted at addressing the objective of increasing access to electricity in rural areas which was and remains one of Uganda's key development priorities; and (b) strongly aligned with the World Bank's last operative Country Partnership Framework for Uganda (FY2019-21).



B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

38. The assessment of efficacy was conducted for the PDO#1 – increasing access to rural areas of Uganda and PDO#2 (the global environmental objective) – reducing greenhouse gas emissions.

39. As stated earlier, the project’s theory of change is clear in describing plausible causal relationships between project activities, intermediate outcomes/outputs, and final outcomes and in specifying measurable indicators for the outcomes.

40. The efficacy assessment for PDO #1 was based on: (a) PDO indicator #1– number of direct project beneficiaries (and the percentage of female direct project beneficiaries as a sub indicator); and (b) PDO indicator #2 – number of people provided with access to electricity under the project by household connections (with two subcategories of those served through the grid and off-grid). The assessment of PDO #2 was based on PDO indicator #3 – metric tons of (CO₂) greenhouse gas emissions avoided/reduced per year. **Table 2** shows the results achieved for all the three PDO indicators compared to appraisal targets. Data on achieved project indicators was derived from the Borrower’s draft ICR, including clarifications made in discussions with the Borrower’s staff during and after the ICR technical mission⁷. In addition to the PDO indicators, the assessment of the project’s efficacy also considered evidence of progress towards meeting the PDOs as measured by intermediate outcome indicators and the project’s contribution towards the GoU’s broader sector goals related to access expansion. The assessment also considered feedback from beneficiaries, as described later in this section.

PDO#1- increasing access to rural areas of Uganda

41. **PDO indicator #1** – The total number of direct project beneficiaries was 8,595,298 and exceeded the target of 7,600,000 (**Table 2**). As envisaged at appraisal, the number of direct project beneficiaries was calculated as the total of the number of people who: (a) received new electricity services from grid related connections (extension of distribution lines, short low voltage extensions and “last mile” connections within electrified areas; (b) benefited from off grid connections enabled by financial intermediary lending through the Uganda Energy Credit Capitalization Company (UECCC); and (c) benefited from solar systems installed at public institutions (post primary schools, health care centers, and water pumping stations). The targeted number of direct project beneficiaries was exceeded because solar systems were installed in more health care centers and water pumping stations than planned (**Table 3** on intermediate indicators), thus enabling more people to benefit from the installed solar PV systems. Institutional solar PV systems accounted for 92 percent of the total number of direct project beneficiaries (7.9 million) compared to the 87 percent implicit in **Table 3 of the PAD**. Conversely, the number of new beneficiaries served with electricity through grid connected households and solar home systems (SHS) were lower at 8 percent of the total number of direct project beneficiaries compared to an estimated 13 percent at appraisal because of constraints in implementing grid connections and SHS as explained below.

42. **PDO indicator #2** – The number of people who received access to electricity by household connections under the project (**Table 2**) was 714,901 of which 695,770 and 19,131 received access through grid and off-grid connections, respectively. The project had targeted provision of access to a total 1,021,000 people with 850,000 served by the grid and 171,000 by off-grid SHS. Thus, the total number of people provided with access to electricity under the project was about 70 percent of the appraisal target with the proportion of people provided with access through grid and off-grid electrification standing at 82 percent and 11 percent of the targets, respectively.



Table 2: PDO indicator targets compared to actual achievements at project completion.

PDO	Outcome indicator	At appraisal		At Completion	
		Target	Actual value	% of Target	
PDO #1: To increase access to rural areas of Uganda	PDO indicator #1: Direct project beneficiaries (number of people)	7,600,000	8,595,298	113%	
	Female direct project beneficiaries (% of total)	50	50	100%	
	PDO indicator #2 Number of people provided with access to electricity under the project by household connections – (number of people)	1,021,000	714,901	70%	
	People provided with access to electricity under the project by household connections – Grid (number of people)	850,000	695,770	82%	
	People provided with access to electricity under the project by household connections -Off-grid – only renewable energy sources (number of people)	171,000	19,131	11%	
	PDO #2: To reduce Greenhouse gas emissions	PDO indicator #3: Tons of CO2 greenhouse gas emissions per year	120,000	96,337	80%

43. **Intermediate outcome indicators:** Several intermediate outcome (IO) indicators linked the project activities to the objective of increasing access to electricity in rural areas of Uganda (**Table 3**). These included: (a) the number and capacity of solar PV installations at public institutions; (b) three intermediate indicators — the lengths of MV distribution lines completed, the number of on-grid household connections and the number of off-grid SHS installed; (c) the amount of credit and guarantees (in US\$ millions) extended to solar companies and end-user consumers for financing off-grid solar systems; and (d) other indicators related to institutional capacity building and monitoring and impact evaluation.

⁷ An ICR technical mission was conducted during November 14-17, 2023 to assess and discuss project outcomes, implementation experiences and lessons learned with project implementation units and other key stakeholders.



Table 3: Intermediate outcome indicators at project appraisal, after restructuring and at completion.

Component	Intermediate Indicator	At appraisal	After restructuring	At completion	% of target
		Target	Target	Actual value	
Component 1: On-grid energy access	Total length of on-grid distribution lines constructed under the project (kms)	1,850	1,543	514	33%
	Number of on-grid household connections made under the project (number)	150,000	150,000	122,783	82%
Component 2: Off-grid energy access	Number of off-grid household and enterprises solar system installations made under the project (number)	30,000	30,000	4,072	14%
	Number of rural schools with solar PV systems installed	100	100	89	89%
	Total installed capacity of solar PV systems installed in rural schools	169	169	114	67%
	Number of rural health centers with solar PV systems installed	276	276	329	119%
	Total installed capacity of solar PV systems installed in rural health centers	250	250	250	100%
	Number of rural water pumping stations with solar PV systems installed	15	15	27	180%
	Total installed capacity of solar PV systems installed in rural water pumping stations	200	200	458	229%
	Number of pico and micro hydropower generation projects completed	6	-	-	0%
	Amount of credit and guarantee extended to Participating Financial Institutions (cumulative in US\$m)	8.5	8.5	3.8	45%
	Amount of credit and guarantee extended to Beneficiaries by Participating Financial Institutions (cumulative in US\$ m)	8.5	8.5	0.8	9%
Off-grid access	National standards for pico solar PV systems adopted by UNBS	Yes	Yes	Yes	100%
	National standards for solar lanterns adopted by UNBS	Yes	Yes	Yes	100%
Inst. Strengthening and impacts monitoring	Completion of a preparatory study for geothermal development	Yes	Yes	No	0%
	Completion of the impact evaluation for ERT-2	Yes	Yes	No	0%
	Completion of the evaluation of the electrification model	Yes	Yes	No	0%

44. For the first group of IO indicators the higher number of installations at health centers and water pumping stations and the corresponding higher capacities (kWp) enabled larger numbers of beneficiaries to be served through public institutions (7.9 million compared to 6.6 m million expected at appraisal, **PAD, Table 3**). The second group of IO indicators – the number of on-grid household connections and off-grid household solar installations fell short of the targets – 126,465 on-grid household connections were achieved compared to a target of 150,000 and 4,072 off-grid household solar installations were made compared to a target of 30,000. The project design had envisaged that 91,945 connections out of the targeted 150,000 were to be enabled by 1,850 kilometers (kms) of MV distribution line extensions constructed under the project (Subcomponent 1.1) and the balance of 58,055 were to be associated with short extensions or grid



intensification activities (Subcomponent 1.2)⁸ and household connections or “no pole connections” (Subcomponent 1.3). However, due to the delayed completion of both subcomponents 1.1 and 1.2 none of the connections were based on distribution lines constructed under ERT 3. Thus, all the 122,783 household connections were based on the pre-existing network. The lengths of MV lines constructed by project was revised to 1,543 during project restructuring because six lines constituting 307 kms could not be feasibly completed within the remaining period to project closure. By the project closing date six distribution lines (including 3 under defect liability period) were completed for a total of 514 kms or 33 percent of the revised target. The status of the balance of the distribution lines was as follows: 166 kms were expected to be completed by December 31, 2023⁹, and 960 kms were expected to be completed by June 30, 2024¹⁰. Under the grid intensification Subcomponent 1.2, a total of 1,470kms of medium voltage and low voltage lines are also expected to be completed by June 30, 2024. Both grid extensions and grid intensification distribution lines are expected to support installation of approximately 68,161 household connections. Thus, although the distribution grid infrastructure financed by ERT-3 did not result in household connections prior to the project closing date, the strengthened and extended network will provide a strong base for access expansion beyond the 68,161 connections. The additional connections will be supported under the GoU’s continuing access expansion program which the Bank is also supporting through the Electricity Access Scale-up Project (EASP, P166685).

45. The shortfalls in the achievement of these IO indicator targets and the target for the associated PDO indicator #2 (number of people served by household connections) reflect the substantial project management, procurement, and social safeguards issues (particularly delayed payment of compensation to project affected persons, (PAPs) faced during implementation of the project. The underlying factors were related to: (a) institutional constraints at REA, including staffing and management of work processes and routines; (b) changes in implementation arrangements (the transfer of the on-grid energy access component to MEMD in 2021 (backdated to October 2020);¹¹ (c) disruptions to project implementation due to Covid-19 pandemic induced challenges such as delays in the manufacture and shipping of equipment, and the related restrictions on the movement of people and motor vehicles during 2020 and 2021; (d) delayed GoU announcement (from targeted date of March 31, 2016 to January 29, 2018) of a new Electricity Connection Policy (ECP) that provided for free or subsidized connections; (e) the interplay between readiness of some project components and implementation capacity; and (f) several factors affecting implementation of the financial intermediary component. Section III (Key Factors that Affected Project Implementation and Outcome) discusses these factors in more detail. The implementation problems for the on-grid access component also resulted in a significant portion of the works related activities being incomplete at closure after cumulative closing date extensions of about 30 months.

46. The IO indicators for the number of people served through off-grid connections were the number of SHS installations and the amount of credit and guarantees extended to the solar companies and end-user consumers. SHS totaled 4,071 or only 14 percent of the target. Credit and guarantees reached only 45 percent and 9 percent of the targets, respectively reflecting the a low appetite for credit, affordability constraints, and initial technical constraints regarding standards for solar based components in the local market. The much lower off-grid connections resulted in a correspondingly lower number of people being connected – 19, 131 compared to the targeted 171,000.

47. **PDO #1 Rating:** The objective of increasing access to electricity in Uganda’s rural areas was substantially achieved

⁸ There was no specific split of the connections between the grid intensification and no pole connections at appraisal since these activities were not defined at the time.

⁹ The rate of completion for the construction of distribution lines was 33% excluding 166kms which were scheduled to be completed by December 31, 2023 but whose completion the ICR team had no confirmation. Inclusion of these kms would raise the completion rate to 44%.

¹⁰ The total lengths of MV distribution lines would be 1, 630 based on completed designs and thus about 5 percent more than the project target of 1,543.

¹¹ In May 2021, the GoU passed Statutory Instrument No. 29 abolishing the REA and transferring ERT3-activities to the MEMD.



because the target number of direct beneficiaries (PDO indicator #1) was exceeded by 13 percent. Also, 70 percent of the target number of additional people to be served with electricity under the project (PDO indicator #2) was achieved. Although the substantial investment in grid expansion and intensification did not result in connections of new households by project closure, about 68,161 connections are expected to result from these investments which are expected to be completed within one year of the project closing date. In addition to the projected connections, the extended and strengthened distribution network will also provide a basis for the further connections under the GoU's access expansion program which is continuing with the Bank's support under the EASP as mentioned above. The efficacy rating for this PDO is, therefore, **Substantial**.

PDO#2 (Global Environmental Objective)

48. The project was expected to contribute to avoided GHG emissions of 120,000 metric tons per year on completion. The GHG emission benefits were expected to result from the substitution of fossil fuels with cleaner renewable energy under both the grid (connected households) and off-grid components (households, enterprises, and rural institutions). The same factors that impacted the achievement of PDO #1 (the much higher achievements on institutional solar installations, lower on-grid household connections and much lower off-grid households and enterprises connections) also affected the achievement of the global environmental objective. Thus, as of project closure (June 30, 2023) avoided CO₂ emissions were re-estimated at 96,337 metric tons per year. This was, nonetheless, a substantial achievement with moderate shortcomings at 80 percent of the target. Thus, PDO #2 is rated **Substantial** for efficacy.

Project's contribution towards broader strategic goals

49. Further consideration was given to the project's: (a) contribution towards improvements in access during the RESP-2 (i.e., the strategic plan which it supported); (b) impact on increasing awareness and acceptance of the key changes to the electrification model that needed to facilitate progress towards the national priority goal of access expansion for socio-economic development under Vision 2040; and (c) impact on the lives of electricity beneficiaries.

50. **Rural Electrification Plan -2 (2013-2022).** The rural electrification rate increased from 7 percent in 2013 to 22 percent in 2022 compared to a target of 26 percent. The financing plan for RESP-2 had envisaged that the ERT-3 would be the second largest financier of the Plan after the GoU. Although data was not available on the total RESP-2 expenditures by the GoU and other financing partners, anecdotal evidence from the Borrower's and Bank's project teams suggest that the Bank's Credit was the largest source of financing and, therefore, the biggest contributor to increased access under the RESP-2.

51. **Improvements in approaches to implementing access projects.** Despite shortcomings in achieving PDO indicator targets as described above, ERT-3 contributed to the process of continually improving approaches to rural electrification in Uganda through learning from experiences. The most important of these experiences highlighted the critical importance of: (a) households' affordability of electricity services, including connection charges; (b) intermediary lending; and (c) building adequate dedicated project staffing and institutional procedures in implementing agencies. Affordability of connection charges, as in most low-income countries, was recognized as a key constraint to access expansion under the ERT program. In ERT-3 the dialogue with the GoU focused on providing targeted partial subsidies for connection costs through a pre-financing scheme and allowing interest free repayments in installments. This benefit was available to households connected to the grid. Given that Uganda has the third largest market for solar energy in Eastern Africa after Kenya and Rwanda and that off-grid options provide the most viable path for rapid access expansion, an important lesson learned through the ERT-3 was the need to establish a similar subsidy mechanism for off-grid solar systems. This approach



has been incorporated in the EASP project by allowing a part of the connection costs to be provided as grant.

52. The Bank team's engagement with REA and MEMD over several years on the critical importance of having a dedicated project implementation team and adequate staffing for technical, environmental, and social safeguards aspects of the project eventually led to the creation of such a team and strengthening of the project staffing complement. There is now an acceptance of the need to engage adequate numbers of consultants (financed by the Bank and with built-in incentives for compliance) in project implementation units – a practice that has been adopted under subsequent projects such as the EASP.

53. The World Bank is making electricity access one of its key priorities going forward as reflected in the recently approved USD 5 Billion ASCENT regional MPA (Accelerating Sustainable & Clean Energy Access Transformation Program P180547) with an objective to triple the pace of access expansion and connect an additional 100 Million people in the Eastern and Southern Africa Region by 2030. The infrastructure built (and under completion) and the experience and lessons drawn from ERT-3 are central to the achievement of these objectives. The prominent role of Uganda in Africa's access challenge is reflected in the initial allocation of up to USD 450 million in future phases of ASCENT adding to the more than USD 600 million already committed under EASP.

54. **KfW Development Bank contribution:** ERT-3 also facilitated electricity access programs of other cooperating partners such as KfW Development Bank (KfW). While the household connections financed by KfW (70,868), and the associated number of beneficiaries are not included in PDO indicators because KfW was not a part of the project (as financier) its contribution to broader RESP-2 sector outcomes are acknowledged. The partnership between the Bank and KfW was important in that the former's financial contribution helped to improve the overall RESP-2 outcomes and the Bank's financing of a verification agent was essential for KfW's financing which would not have been provided in the absence of a verification mechanism for the connections.

55. **Beneficiary impacts.** A video documentary conducted by MEMD provides anecdotal evidence of the socio-economic benefits made possible for millions of Ugandans by the ERT-3 project. The beneficiaries from the business, farming, health, education, and water sectors expressed appreciation for the socio-economic benefits which access to electricity has brought to their businesses, health care services and educational learning opportunities for their students. One school deputy head and colleagues stated that the availability of electricity at their school is providing increased opportunities for students to study and prepare for their examinations as they can now also do so at night. School officials are now able to produce examination papers more cheaply and quickly using laptops which are charged at school premises instead of at distant charging centers. The deputy school head said that he hoped that student performance outcomes would improve given the improved learning environment. Health officials reported improved access to health services at all hours and improved the quality of services because of increased use of solar powered medical equipment. Patients expressed, amongst other things, appreciation for improved lighting conditions in child delivery rooms during night time. Smallholder farmers and small business owners expressed satisfaction with increased productivity and efficiency in their businesses because of the availability of electricity for such applications as refrigeration of perishable foods by vendors and use of electrical tools for welding and carpentry.

Justification of Overall Efficacy Rating

56. The project is rated **Substantial** for efficacy. The project's contribution to the objective of increasing access to electricity in Uganda's rural areas was substantial because the total number of direct project beneficiaries was exceeded by 13 percent (PDO indicator #1) and the number of people provided with access by household connections (PDO indicator



#2) was 70 percent of the target. Although the latter indicator was achieved based on use of the pre-existing distribution network and not through ERT-3 funded distribution network investments which were delayed, their completion within one year of the closing date will allow for a significant number of new connections. Also, the ERT-3 financed distribution network provides a strong foundation for further access expansion under the GoU electrification program which continues to be supported by the Bank’s operations, including the EASP. The objective of reducing GHG emissions (PDO #2) was also substantially achieved with annual reduction reaching 80 percent of the target. The efficacy rating is also further buttressed by the project’s overall contribution to the GoU’s broader accession expansion program under the RESP-2, its contribution to learning and enhancement of the electrification model and finally by the positive feedback received from beneficiaries as summarized above.

C. EFFICIENCY

57. At appraisal, a comprehensive economic analysis was conducted to determine the economic justification of the proposed expansion of electricity access to rural areas of Uganda. The economic analysis was based on the standard cost benefit framework for infrastructure projects and was applied to: (a) the on-grid energy access component (i.e. the extension of distribution lines within and from the electrified areas, and the connection of “last mile” consumers that were reachable without additional poles); and (b) to the installation of SHS and solar PV systems for rural institutions (schools, water pumping stations and health care facilities).

58. For the on-grid access component the costs included: the capital costs of constructing the distribution lines and connecting the associated new customers and the cost of operating and maintaining the assets during the operational phase, the consumer connection charges and the generation costs of supplying the additional power. The benefits comprised the consumer surplus given the consumers’ willingness to pay higher prices to obtain grid electricity instead of relying on fossil fuels for lighting and other energy needs. Similarly, the off-grid component cost benefit analysis included capital expenditures for solar equipment, post installation operation and maintenance costs, including replacement of batteries for schools and health care centers. The key benefits were expected from the avoidance of more expensive diesel fuels in institutions and of paraffin in use by households.

59. The ex-post analysis for the ICR was conducted using the same methodology as at appraisal. Table 4 below compares the outcome of the economic analysis at appraisal and at project completion.

Table 4: Comparison of ex-ante and ex-post Economic returns

Project Completion	Project Results at Appraisal	Project Results at Completion
Overall Project	EIRR: 38 percent NPV: US\$231 million Benefit/Cost ratio: 2	EIRR: 30 percent NPV: US\$123.1 million
Component 1: On grid energy access	EIRR:39 percent NPV: 227 million	EIRR: 33 percent NPV:US\$127 million
Component 2: Off-grid (SHS and Institutional PV systems)	EIRR: 20 percent NPV: US\$3.3 million	EIRR: 3 percent NPV: (US\$ 3.2) million

60. The overall project achieved satisfactory economic returns because the economic incremental rate of return was 30 percent, and the net present value (NPV) was positive at US\$123.1 million. However, these returns were below the EIRR of 38 percent and the NPV of US\$ 231 million estimated at appraisal. Further, returns on the off-grid component were unsatisfactory because the EIRR fell below the hurdle rate of return of 10 percent and the NPV was a negative US\$3.2 million.



61. The lower ex-post returns were due to the much lower number of household connections on the grid component because of the delays and non-completion of the grid extension and, therefore, of the associated connections (122,783 instead of 150,000 targeted at appraisal). The number of installations of SHS and enterprises under the off-grid component was only about 4,000 compared to a target of 30,000. The reduced number of on-grid and off-grid connections also resulted in a reduced amount of avoided CO2 emissions (96,337 metric tons per year instead of the 120,000 targeted at appraisal).

62. At project closure the Borrower estimated that it had incurred a total cost of US\$18 million on the project.

Administrative efficiency

63. The project was implemented over a period of seven and a half years including the period of delayed effectiveness (9 months). There were several inefficiencies in the project implementation process, including: the need to redo some project preparation processes when designs turned out to be misaligned with RAPs, the “suspension” of implementation of some distribution lines because construction had started without full compensation to PAPs, delays in processing renewal of the consultant’s supervision contracts which, at times, resulted in works continuing without supervision. In addition, 307 kms of distribution lines were dropped from the project and so were pico hydropower projects because the remaining time before project closure was no longer adequate to complete implementation. The multiple closing date actions also required extension of the consultants’ contracts for project implementation and coordination support, including beyond the project closure to support completion of remaining activities, including implementation of the Post Closure Action Plan for safeguards.

Assessment of Efficiency and Rating

64. Overall, the project is rated **Modest** for efficiency of implementation because of the marginal returns on the off-grid component, the uncertainties regarding costs to completion for the distribution lines that remained incomplete at project closure, and low level of administrative efficiency as described above.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

65. The project’s overall outcome rating is **Moderately Satisfactory** based on a **High** rating for the relevance of the PDO, a **Substantial** rating for the efficacy of project objectives and a **Modest** rating for efficiency. Both objectives of increasing access to electricity in Uganda’s rural areas (PDO #1) and reducing GHG emissions (PDO #2) were achieved with moderate shortcomings. The project reached more direct beneficiaries (PDO indicator #1) than expected at appraisal because rural institutions alone (health care centers, post primary schools and water pumping stations) contributed more beneficiaries than the target for the project as whole. This was because more funding was available for health care centers and water pumping stations. However, the project had moderate shortcomings on the second PDO indicator -- number of people provided with access by household connections which turned out to be 70 percent of the target due to implementation challenges faced by both the on- grid access component and the off-grid SHS subcomponent. Virtually all the connections were supported by the existing network and not by the grid infrastructure financed by the project. Nonetheless, the distribution lines funded by the project are scheduled to be completed within one year of the closing date and will support addition of a significant number of connections in the near term and under other World Bank supported projects. Hence, the **Substantial efficacy rating** for this objective. The objective of reducing GHG emissions (PDO #2) was also met with moderate shortcomings at 80 percent of the target.



66. The project outcome was rated Moderately Unsatisfactory in the final Implementation Status and Results Report dated May 5, 2023 because construction of most grid extension and intensification projects had been put on hold since October 2022 due to non-compliance with safeguards policies suggesting that the PDO would not be achieved. However, the ICR considered the outcome rating to be Moderately Satisfactory because despite the low achievement of network extensions the connection of households based on the existing network¹², combined with the high outputs of institutional solar PV systems enabled all the three PDO outcome indicators (direct project beneficiaries, number of people provided with access under the project and GHG emissions) to be substantially achieved. Household connections based on the existing network were eligible for financing under the results-based financing approach adopted under the project.

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

Gender

67. The project envisioned that gender would be mainstreamed at all stages from project preparation through implementation with a view to ensuring equitable distribution of project benefits between men and women and among different social groups. Thus, the Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework provided for the participation of women in consultations during preparation and implementation. The Bank also planned to provide technical assistance to REA and MEMD to support development of gender strategies within their institutions and to incorporate gender in monitoring and evaluation through quarterly progress reports.

68. PDO#1, outcome indicator#1 included a sub indicator measuring the percentage of direct beneficiaries who were females. The Borrower's progress reports indicates that the target of 50 percent was achieved. However, there was no specific count of female beneficiaries in the monitoring reports of the project investments. The proportion of females, at ~50%, was based on the population profile from the 2014 National Census Report. MEMD recruited a Gender Specialist in 2019 to support the mainstreaming and piloting of gender under ERT-3. Several key activities were undertaken under the project as follows: (a) a code of conduct for contractors was developed with the objective of preventing sexual exploitation and abuse, encouraging the reporting of abuse, and providing guidance on the recruitment of labor and management; (b) grievance redress committees were structured to include representatives of disadvantaged groups - women, people with disabilities, youths, etc. Gender disaggregated data was collected on female-headed households during preparation of resettlement action plans (RAPs) and during compensation of family-owned property women's consent was made obligatory. Recipients of funding under the project were required to report gender disaggregated data regarding ultimate beneficiaries. This included PFIs who reported through the UECCC gender disaggregated data on recipients of lines of credit for solar systems to households and enterprises, SPs who reported through REA on female-headed household beneficiaries of household electricity connections. The PFSU and ERA were also encouraged to report on the gender make-up of the certified wiremen technicians to the PCU for incorporation in quarterly progress reports (QPRs) However, the gender reporting through quarterly progress reports (QPRs) was generally not comprehensive enough.

¹² Payment for some of the connections made earlier during project implementation and facilitated by the ECP under the results-based financing mechanism, was made at project close once it was ascertained that financing remained available for this purpose.



Institutional Strengthening

69. Strengthening REA, the key institution for national electrification until 2021, was a long and arduous process. By 2019, REA had been adequately strengthened with a dedicated team established with sufficient staff for implementation of the ERT-3's on-grid energy access component. Although REA was abolished in 2021, a large part of the team was transferred to MEMD which became the new Implementing Agency for the on-grid energy access component. In addition, important lessons on building and maintaining implementation capacity in the Uganda context were learned, particularly the need for a dedicated team for project implementation and for appropriate financing incentives to ensure retention of the team throughout project implementation. The lessons learned have been incorporated in the design of the successor project – EASP.

70. Several institutional capacity gains were also achieved as follows:

- i. **PSFU: The Uganda Solar Energy Association (USEA)** received support through the PSFU for developing its strategy and financing its initial establishment costs. Its membership increased from 40 at inception to more than 2000 in November 2023.
- ii. **ERA** received technical support to develop: (a) a framework for reliability target setting and monitoring; (b) a framework for private sector participation in transmission projects, including of requisite documents; (c) a regulatory information management system (RIMS) with the purpose of facilitating availability of data required for regulatory decisions, reducing timelines for those decisions and improving cost efficiency. ERA staff gained on-the-job training working on these assignments with international consultants. ERA jointly with PSFU supported training and certification of wiremen for domestic and commercial premises and thereby helped to increase the labor force that is needed for Uganda's rapid electricity access expansion. Together the two institutions accounted for an increase in certified wiremen of 2,820 of which PSFU trained 860 and ERA 1,960.
- iii. **UNBS** – Through ERT-3 financing the UNBS produced a comprehensive review of the quality assurance framework for the development of the solar market in Uganda. This led to the approval of a quality assurance framework for component based solar systems in December 2020 and adoption of quality standards for plug and play solar home kits and pico products (up to 350W) in March 2021.

71. UECCC has developed a systematic approach for pre-qualifying solar companies.

Mobilizing Private Sector Financing

72. Uganda had increased private participation in its energy sector including in power distribution over the past 20 years. In the solar market, financial intermediation has provided support to solar power companies and to end users who would have injected their own resources to support their investments. Although this was small-scale, the support helped to develop the nascent solar market and could catalyze greater private sector investment in future. The PSFU has indicated an intention to invite the private sector to develop pico hydropower projects whose feasibility studies were funded by the project. Further, a framework for private sector participation developed by ERA under the project could be used to attract private sector investment for transmission in Uganda. There may also be continued private sector participation in other segments of the power sector as GoU embarks on the expected implementation of a second generation of power sector reforms.



73. Several institutional strengthening measures supported by this project will help to strengthen the environment for private sector participation. These include the development of a quality assurance framework for component-based solar systems and for solar lanterns and code of practice for installations. The quality assurance framework will help to keep substandard products off the market and to attract reputable solar companies, and the code of practice will help to ensure quality installations. Another initiative supported by the project was the training and certification of wiremen for domestic and commercial installations. This expansion of the domestic labor force will help expand access to electricity using these certified wiremen.

Poverty Reduction and Shared Prosperity

74. The project contributed to the reduction of multidimensional poverty by providing 7.8 million people the benefit of electricity usage through installation of solar systems at educational, health care and water pumping facilities. An additional 714,901 people benefited from electricity provided through household connections. Connection of enterprises to electricity under the financial intermediation subcomponent (2.3) had the potential to support employment and improve business profitability but only 4,072 connections were implemented (including for households). The ongoing new access operation (EASP) is building on the ERT program in creating awareness of the uses of electricity to support its productive uses thereby facilitating growth, (business enterprises) employment creation and poverty reduction and shared prosperity.

Other Unintended Outcomes and Impacts

Not applicable.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

74. The following four factors during preparation affected project implementation and outcomes:

75. **Results framework.** The results framework comprised straightforward objectives to be achieved through a set of well-defined activities and with clear and measurable/assessable intermediate and outcome indicators. The institutional strengthening activities under Component #3 – Institutional Strengthening and Impacts Monitoring were less well defined and were adaptable because, apart from the TA for preparation of geothermal development, only an indicative list was described in the PAD. The impacts monitoring activities included evaluation of the socio-economic impacts of ERT-3 which was not realistic within the project implementation period because, in practice, socio-economic impacts become evident with a time lag and mostly during the operational phase of the project. The Project Coordination Unit in MEMD was responsible for consolidating M&E data from various implementing agencies and for producing and distributing M&E reports to the World Bank and within the GoU.

76. **Actions for addressing implementation capacity:** A key factor arising from project preparation that had substantial consequences on project implementation was not insisting on upfront strengthening of REA given the much larger size of ERT-3 compared to ERT-2. During the ERT-3 project appraisal in March 2014, the World Bank and GoU conducted a capacity assessment of REA (now MEMD) which highlighted inadequacies in procurement, safeguards, and technical staff to support the high volume of planned rural infrastructure investments. While GoU made a commitment to enhance REA's implementation capacity, this commitment did not materialize. The World Bank started discussions with REA to enhance its capacity using project funds (this had not been budgeted for). This discussion took a long time, REA



was originally against this proposal and instead made several commitments to assign existing staff to ERT-3 implementation. The Bank insisted on setting up a dedicated PIU with staff working exclusively on ERT-3. After a long time, REA agreed, and the staff recruitment took a long time and was completed at the end of 2019 with only one year to go before the original project closing date. A further weakness in the project design was the lack of a team within REA dedicated to implementation of ERT-3, which meant the team also covered other activities financed by the GoU and other donors. These weaknesses contributed to delays in implementation and the non-completion of the on-grid access component. Only 33 percent of the MV distribution lines (514 kms out of 1,543kms) and 32 percent (941 kms out of 2,970 kms) of LV lines¹³ were completed at project closure. The lack of adequate safeguards capacity contributed to non-compliance with OP4.12 -Involuntary Resettlement Policy and OP/BP 4.36 – Forests and to delays and non-completion of several of the distribution lines.

77. However, the engagement with the GoU during ERT-3 helped to highlight the importance of addressing implementation capacity issues upfront to ensure availability of staff across all required disciplines (environmental and social, health and safety, finance, procurement, etc.), when needed. In addition, it also highlighted the need to ensure that adequate safeguards staff (time inputs) are incorporated in the owner, supervision engineer and the contractors' teams. The lessons learned, including use of financial incentives to ensure dedication of adequate staff to Bank financed projects in the sector have been incorporated in the design and implementation of the subsequent EASP Project (P166685).

78. **Readiness status of key activities:** While inadequate implementation capacity and non-compliance with the World Bank's safeguards policies were the main factors behind implementation delays and non-completion of some activities, some deficiencies in the project's readiness also contributed to project implementation delays. Except for the first two fast track distribution lines, detailed designs and RAPs were not ready at the time of financing approvals. In addition, preparation for most components started after project approval (PSFU's pico and micro hydropower projects). The Bank must have assumed that five and a half years from financing approval to closing would be adequate to complete project preparation and implementation. As it turned out, after credit approval, there were substantial delays in the preparation and implementation of various activities. The experience illustrates the challenge of balancing readiness of project preparation with implementation capacity which management and teams routinely face. In some cases, financing for project preparation activities may not be available prior to approval of Bank financing and this seems to have been the case with the preparation of the pico and micro hydropower sub-projects and the working capital and guarantee facilities under the financial intermediation subcomponent of the off-grid access component.

79. **Design of the UECC activities:** Subcomponent 2.3 included a working capital and a guarantee facility to encourage funding for working capital to solar companies and guarantees and lines of credit to PFIs to encourage lending to both solar companies and end users. Once IDA financing had been approved, the recruitment of consultants to design the working capital and guarantee facilities started. The engagement of consultants and the design of the facilities took almost three years before the facilities could be launched in February 2018. There was less market demand from the PFIs at the time as some had already secured alternative funding sources while others indicated concern with the high interest rates. The timing of the launch of the facilities, which could have been advanced with upfront preparation had there been preparation resources and expertise, had an impact on the outcome of this subcomponent.

¹³ LV lines were identified during implementation and were not part of the targets at appraisal.



B. KEY FACTORS DURING IMPLEMENTATION

80. The following key factors that affected project implementation and outcomes:

81. **Non-compliance with the World Bank's safeguards policies:** The issue of non-compliance with the Bank's safeguards policies was one of the key factors that delayed implementation of the grid extensions and grid intensification sub-projects. Soon after the project became effective, fast-track projects were put on hold while a new implementation approach to ensure compliance with the Bank's safeguards policies was being discussed in November 2016. This approach required earlier preparation of Resettlement Action Plans (RAPs) and their harmonization with engineering designs and emphasized that construction would not take place without payment of compensation to PAPs. The introduction of this approach was a pro-active measure by Bank staff to address non-compliance with OP/BP 4.12 – Involuntary Resettlement (regarding non-payment of compensation prior to start of works) – an issue that had arisen under ERT-2. Except for lines 1 and 2, limited construction works were undertaken prior to 2020. The outbreak of the Covid-19 pandemic resulted in travel restrictions which prevented Bank safeguards staff from undertaking field visits. Yet, construction started on many projects during this time without payment of compensation to PAPs and the quarterly progress reports (QPRs) did not reveal this. In September 2022, cases of non-compliance with E&S safeguards policies and poor management of E&S safeguards aspects were registered. About 50 percent of all grid extension lines and grid intensification projects were non-compliant. As a result, on October 7, 2022, construction of all grid extension and grid intensification subprojects was put on hold for non-compliance with the Bank's safeguards policies. Non-compliance with safeguards policies occurred even though the Bank's policies were known to the GoU; the IAs chose to proceed with construction works prior to fully compensating the PAPs.

82. The IAs cited the reasons for delayed compensation payments as: absentee PAPs, incorrect payment information such as Bank details, no-shows at disclosure meetings by PAPs, difficulties in funding for field visits, the Government directive requiring payments to PAPs to be made electronically (2021), delay in executing the MoU between Stanbic Bank and REA under which the bank would pay PAPs and, at times, shortages of GoU funding for compensation payments. As noted above, the lack of adequate safeguards management capacity within REA, coupled with inadequate supervision capacity of the owners' engineers and the contractors contributed to the non-compliance with the Bank's safeguards policies.

83. **Non-compliance with OP4.36 – Forests** affected 4 distribution lines - Lines, 3, 12, 14, and 20 (Atan Forest Reserve), Line 20 (Alito Forest Reserve), which were constructed without compensation to the National Forests Authority (NFA) and, where required, District Local Governments. including a line which was constructed without compensation to the National Forests Authority (NFA). Offset measures/ compensation to NFA were delayed, lengthy periods taken to finalize MOUs with the NFA, difficulties in aligning the separate valuations by the Chief Government Valuer (CGV) and NFA, and long durations taken to obtain the CGV's approvals.

84. **Implementation capacity for the on-grid component:** As noted above a significant weakness in the project's design was the absence of measures to strengthen the REA's implementation capacity upfront. The Bank's implementation support mission records show that during 2016-2019 REA's poor project management led to significant implementation delays. Procurement capacity was inadequate and so was management oversight and decision making. The staffing up of key positions was slow and the full build up was only achieved in 2019. As a result, there was an improvement in project implementation during 2019-2020. There were also internal governance issues at REA in 2020, suspensions and retirements of senior managers - events which together with the onset of Covid-19 slowed down the momentum of project implementation.



85. **Mainstreaming of the REA in the MEMD:** In May 2021, the GoU issued Statutory Instrument No#29 dissolving the REA and mainstreamed the ERT-3 team into MEMD. The impacts of mainstreaming REA in MEMD included delays in transferring the budget to MEMD, updating of internal systems affected access to IDA funding and delays in payments to consultants, PIU staff, contractors, and PAPs. These issues took about six months to resolve (World Bank Mission aide memoire, November 2021). Other impacts were the loss of some members of ERT-3 team at REA, including two procurement specialists and a financial management specialist. Other impacts include the loss of institutional memory as evidenced by difficulties in obtaining data during the ICR mission because the persons previously responsible at REA are no longer available.

86. **Impact of Covid-19:** The global pandemic experienced during the period March 2020 to June 2021 contributed to implementation delays because supply chains were disrupted, restrictions on movement of personnel and motor vehicles disrupted construction works and compensation payments to PAPs. Grid-related contracts awarded by April 2020 could not be signed until July/August 2020. For the financial intermediary component the pandemic financially affected both PFIs and the targeted solar companies and End Users and disrupted local and international demand and supply chains. The economic downturn affected both dissemination and uptake of credit and this explains partially the low uptake of the facility.

87. **Timing of availability of the working capital and guarantee facilities.** UECCC's working capital and guarantee facilities were launched in February 2018 at a time when demand had softened compared to earlier market indications. PFIs that had indicated interest had secured alternative funding arrangements. Demand was further dampened by the macroeconomic downturn arising from the Covid-19 impacts leading to an eventual scale down of the credit allocation during the project restructuring on October 14, 2021, as the activities could no longer be completed within the available time. Other factors that affected the uptake of the credit facilities were the lack of a subsidy to off-grid customers for SHS which, combined with high interests, posed affordability concerns for the solar companies and end users. Further, the restriction of eligible PFIs to regulated commercial banks limited the market for UECCC's financial products. UECCC reported better performance with its direct lending. Under the EASP the following improvements have been made to enhance financial intermediation to solar companies and end user-customers: (a) introduction of a subsidy component to cover connection costs with payment of subsidies on a results-based approach; (b) removal of restriction on eligibility of PFIs to commercial banks, thus opening the market to the participation of SACCOs; and (c) direct lending by UECCC.

88. **Delayed approval of Electricity Connections Policy.** Government issuance of an electricity connection policy (ECP) was initially targeted for March 2016 but was delayed until January 2018 and, therefore, delayed implementation of connections under the project.

89. **Procurement Processing:** Major delays were experienced on MEMD sub-projects, including those subject to single-source selection and for individual consultants. These processing delays were attributed to poor documentation and the capacity of the technical and procurement staff, delays in receiving approvals from agencies' contracts committees. Submissions of procurement proposals were many times incomplete and required remedial editing and clarification.

90. **Contract management.** In early 2022, the Bank supervision team found that the main supervision consultant for the om-grid access component, GOPA Intec, had withdrawn from project areas for Lines 14-21 due to delays in amendments to their contract. Delays in renewing contracts were quite common resulting in contracts being implemented at times without supervision. Some grid intensification works were undertaken without adequate supervision capacity in place despite the agreement with the Bank that MEMD staff and consultants would supervise the works.



91. **Lengthy processing of letters of credit (LCs) and special commitment (SCs):** This affected supply and installations in health centers and schools where implementation was delayed by about one year. A contractor at MoH cancelled their contract in March 2022 citing prohibitive loss-making increases in price by manufacturers as the LC processing was concluded.

92. **Project coordination issues:** The dependency of some technical agencies on other agencies for support on procurement, financial management and other services negatively impacted implementation when the coordination did not function well. This was the case for Uganda National Bureau of Standards (UNBS) which depended on the REA under an MOU agreed between the two agencies. A comprehensive review of the quality assurance system was conducted, assessments of UNBS's capacity building and training needs and its requirements for laboratories testing equipment were completed. However, due to budget constraints, some of the recommended capacity building and training activities and the procurement of laboratories testing equipment were not conducted after the UNBS submitted the requirements and specifications to REA/MEMD. For activities under its control, UNBS developed two technical standards which were publicly consulted, approved, and gazetted. In addition, UNBS conducted a sensitization campaign to create an awareness of the solar market standards.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

93. The project was implemented by eight implementing agencies (IAs) consisting of five-line ministries and three agencies. The on-grid access component was implemented by the REA with institutional support managed by the MEMD. Three ministries (Ministry of Education and Sports, Ministry of Water and Environment and Ministry of Health implemented the institutional solar PV subcomponent of the off-grid component. MEMD implemented institutional and capacity building activities under various components and was responsible, through its Project Coordination Unit (PCU), for overall project coordination and monitoring. The Ministry of Finance, through its Budget and Accountability Department was responsible, with the support of the Uganda Bureau of Statistics, for the impacts monitoring subcomponent of Component #3. Two other agencies, the PSFU and the UCCCC implemented the private sector support and financial intermediation subcomponents of the off-grid component. A Project Steering Committee comprising all IAs representatives and chaired by MEMD was established to provide strategic guidance on implementation issues.

94. Within this implementation framework, the M&E design was organized around quarterly progress reports (QPRs) prepared by the MEMD PCU based on submissions from the IAs. Through the QPRs the PCU tracked the project's outputs, intermediate and outcome indicators. The Budget, Monitoring and Accountability Unit of the Ministry of Finance Planning and Economic Development had the lead role for monitoring and impact evaluation of the rural electrification sector investments, including the evaluation of the efficacy of Uganda's electrification model.



M&E Implementation

95. QPRs were provided in the form of simple excel-based spreadsheets. World Bank missions supplemented the QPRs with briefs provided by the IAs for every mission and meetings with counterparts during every mission. As implementation stalled in the last two years of the project, the Bank instituted bi-weekly meetings with REA (attended also by the PCU) to discuss status of the on-grid component and with PCU to discuss the status of all other components. A monthly meeting between the MEMD Permanent Secretary with the Bank was instituted in the final year before project closure. These meetings helped to supplement the M&E system.

M&E Utilization

96. The M&E systems as augmented by direct briefs prepared for all missions by IAs and the frequent meetings in between missions was used effectively for decisions on reallocation of project funds and repeatedly on devising action plans/measures to try and complete the project within the available time. Although action plans for speeding up project implementation were regularly prepared by the GoU on the advice of the Bank slow implementation progress was reported during most missions.

Justification of Overall Rating of Quality of M&E

97. The M&E system is rated **Substantial** with moderate shortcomings. The shortcomings were that the excel-based QPRs were not comprehensive enough and lacked adequate narrative to explain issues and remedial actions, especially on safeguards issues related to the on-grid energy access component. In addition, the Project Steering Committee (PSC) met only three times over seven years of project implementation from effectiveness to closure. Another shortcoming was that the project implementation plans prepared with data generated by the M&E system and supplemented by the Bank's supervision team were not implemented as speedily as required for completion of the project on schedule. The project is rated **Substantial** because the deficiencies in the Borrower's reporting were compensated for by the level of effort and quality of supervision by the Bank's team which resulted in early detection and flagging of key issues during project implementation.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

98. At appraisal the project was assigned a "B" environmental category because the project's environmental impacts were expected to be small scale, localized and in nature. The following safeguards policies were triggered: (a) OP/BP 4.01: Environmental Assessment; (b) OP/BP 4.04 :Natural Habitats because of the likely impacts on wetlands and forests; (c) OP/BP 4.12: Resettlement Policy; (d) OP/BP 4.11: Physical and Cultural Resources because of civil works that could impact known and unknown physical and cultural resources; and (e) OP/BP 4.36: Forests because of the possibility of power lines passing through forests.

99. The potential environmental impacts from component 1 activities were identified as:

- i. earthworks, vegetation clearance, formation of murrum mounds for poles in wetland areas, wetland access paths, equipment storage areas, displacement of land uses and associated compensation.
- ii. management of residual waste from solar PV systems; preparatory studies for other renewable projects (geothermal development study)



100. The assessment at appraisal was that REA and MEMD had adequate institutional capacity to manage the project's environmental safeguards, including the World Bank's Environmental, Health and safety Guidelines, Power Transmission and Distribution Guidelines and applicable Ugandan laws such as the Occupational Health and Safety Act. The project beneficiaries/host local governments were to be involved in monitoring the environmental and social aspects of the project.

101. The social impacts were expected to include limited impacts on land acquisition for displaced persons hence the trigger of OP/BP 4.12 on Involuntary Resettlement Policy. A Resettlement Policy Framework (RPF) was prepared during project preparation. Two Resettlement Action Plans were prepared for the fast-track distribution lines. Two other social aspects that were considered were gender mainstreaming and grievance redress mechanism. The RPF and the Environmental and Social Management Framework (ESMF) provided guidance on preparation of a project level GRM and on gender mainstreaming. REA and MEMD were to be supported through TA to develop gender strategies and including monitoring arrangements for access gained by female headed households. The institutional capacity to manage social safeguards was to include a social specialist hired by REA (under a previous project) who was expected to work closely with wayleaves officers, environmental specialists and MEMD's environmental and social development officer. MEMD was also expected to hire short-term consultants as needed. A social safeguards monitoring system and reporting was to be established by REA and MEMD to be used as a basis for reporting in the quarterly progress report.

102. As noted, earlier noncompliance with the Bank's safeguards policies was one of the key causes of delayed implementation of the on-grid component. In September 2022, the Bank supervision mission assessed that about 50 percent of the grid extension and grid intensification projects were non-compliant with Bank's safeguards policies, OP/BP 4,12 but also OP 4.36 for projects which had been undertaken without addressing the impacts on forests. Poor management of safeguards issues arose from inadequate E&S staff inputs, limited reporting, inadequate monitoring, and supervision. Further there was limited to the Bank's EHS guidelines – unreported incidences and inadequate reporting of serious incidences.

103. Documenting and addressing grievances arising because of project activities was often inadequate and the implementation of remedial actions was slow. The main complaints related to delayed/unpaid payments of compensation to PAPs, nine injuries and one case of gender-based violence which was subsequently addressed and closed.

104. In February 2023, the GoU and the Bank agreed on a Post Closure Action Plan which set out a framework for implementation by the Government of all outstanding safeguards issues after the closure of the project. These related primarily to actions needed to comply with the Bank's policies on Involuntary Resettlement and Forests – OP/BP 41.12 and OP/BP 4.36, respectively. The Bank is continuing to monitor and document implementation of these actions, including the resolution of grievances until these have been satisfactorily addressed.

C. BANK PERFORMANCE

Quality at Entry

105. The project was well designed with clear PDOs and a strong results framework. However, it had some design shortcomings and the level of readiness for implementation was low on some components, and thus contributed to implementation delays.



106. The main shortcoming was lack of adequate upfront actions to build the implementation capacity of the REA, the IA that was responsible for implementing about 85 percent of the project. There were several factors which could have prompted early attention to implementation capacity measures at REA, including: (a) the capacity assessment during project preparation which had clearly indicated the need for enhanced capacity; (b) experience with non-compliance with the Bank's safeguards policies which could have been used to scale up the staffing in REA to incorporate adequate numbers of safeguards staff and strong monitoring arrangements; and (c) the size of ERT-3 which was much larger than ERT-1 and ERT-2 combined with the fact that REA was also to be the IA for other financiers' projects. The Bank relied on the GoU's commitment to strengthen REA's staff as needed. As it turned out it took almost three years of dialogue before the capacity was finally strengthened to levels consistent with the project's needs.

107. There were several components whose implementation could have proceeded faster if advance preparation had been conducted. These include the design of UECCC's working capital and guarantee facilities and the preparation of pico and hydropower sub-projects under the off-grid component. In both cases the Bank's assessment was that both preparation and implementation could be completed within the five and a half years from financing approval to project closure but implementation delays resulted in significant downsizing of the UECCC subcomponent and complete droppage for the pico and micro hydro power projects.

108. Bank quality at entry is rated **Moderately Satisfactory** because of deficiencies related to the lack of upfront capacity building at the key implementing agency for the on-grid energy access component and inadequate project readiness for implementation of some activities.

Quality of Supervision

109. The quality of supervision was strong and intense after the financing had become effective and when it became apparent that compliance with the Bank's safeguards policies and capacity constraints in REA were going to be the dominant factors impacting project implementation. There was substantial focus on addressing REA capacity although this took three years after the project had become effective. The supervision efforts intensified as implementation stalled and starting in 2020 the Bank team was holding two bi-weekly meetings one with REA to discuss the REA-managed components and a second meeting with the PCU to discuss all the other components. Starting in early 2022 the Bank team also held monthly meetings with PS-MEMD to discuss all major issues related to implementation of the project, and in particular, safeguards. Except during the first and final years (2016 and 2023) at least two Implementation Status and Results Reports were prepared each year to inform management of key issues and seek guidance.

110. A shortcoming in the Bank's implementation support was the failure to formally process all proposed changes to outcome and output indicators targets through restructuring papers. As a result, the Borrower perceived that the project was accountable for achieving lower targets than was the case. Overall Bank supervision is rated **Satisfactory**.

Justification of Overall Rating of Bank Performance

111. The Bank's performance is rated Moderately Satisfactory during preparation and Satisfactory during supervision. The Bank's overall performance is rated **Moderately Satisfactory** because it did not ensure adequate implementation capacity at the main implementing agency, including capacity for implementing the Bank's safeguards policies, the project design was not consistent with the available implementation capacity and there were some deficiencies in its readiness for implementation. In addition, there were some moderate shortcomings in the supervision effort given the oversight to



restructure the project to incorporate all the agreements with the Borrower on revisions to the intermediate outcome indicators.

D. RISK TO DEVELOPMENT OUTCOME

112. The key development outcomes achieved under the project which are subject to sustainability risks are: (a) the access to institutional solar systems of about 7. million beneficiaries; (excluding those for water pumping stations¹⁴); (b) connection to the grid of more than 695,000 beneficiaries and (c) access to solar power of about 19, 000 people in the off-grid space.

113. The risks to the first category would arise from inadequate maintenance of solar systems installed in rural post primary schools and health care centers because of inadequate budget for maintenance and security of physical assets from vandalism. The key measures taken by GoU authorities under the ERT program include ensuring coverage of initial period of at least 5 years maintenance by the service provider, ensuring enough budgetary allocations, adopting a range of administrative security protocols at schools to guard against vandalism (e.g., lockable, and welded cabinets for key assets), remote monitoring platforms to detect faults and order actions for their resolution.

114. However, the experience has shown that solar PV installations at schools and health care centers cease to operate after the five-year O&M contracts because of lack of maintenance caused by budgetary constraints. As a result, under EASP, the GoU has agreed to engage service providers to conduct maintenance of schools and health care solar PV installations. This arrangement removes the responsibility for maintenance from school and health sector authorities and places it in the hands of private service providers who are paid based on results. The GoU commits to budgeting the costs of service providers which are turn covered by the EASP in the short term and by other financiers in future years. The approach would institutionalize budgeting for maintenance and, thus, promote sustainability in the long term.

115. The risks related to the benefits delivered through on-grid connections would result from the inability of: (a) SPs to operate and maintain distribution assets in their concession areas; and (b) connected customers to pay for energy. These risks are managed through the current pricing policy which allows distribution tariffs to recover efficient operating costs and a structure that enables low volume consumers (up to 15kWh per month) to benefit from a subsidized or lifeline tariff.

116. Operation and maintenance risks he decreased for SHS with recent advances in technology such as plug and play and pico solar systems. In additional integrated controller designs now allow centralized monitoring and troubleshooting and thus reduces the burden on individual SHS owners.

V. LESSONS AND RECOMMENDATIONS

117. The preparation and implementation experience of Uganda’s Energy for Rural Transformation III offers the following important lessons:

- i. The design of increasingly complex operations in a series requires an upfront step up of the capacity of the implementing agencies, including establishment of a dedicated Project Implementation Unit with a complement of staff with requisite skills in such areas as project management, technical/engineering, procurement, financial

¹⁴ Maintenance costs are covered by revenues since these are revenue earning operations.



management, environment and social, health and safety, etc. Project preparation did not include establishment of an ERT-3 dedicated team at REA and staffing levels and composition were inadequate for a much larger project size than the previous ERT phases. The human and budget resources required from within REA and from other agencies for project implementation should have been assessed in detail at appraisal, gaps identified, and resource allocation decisions made upfront. This was especially important for implementation of resettlement action plans and other safeguards issues given the experience of non-compliance encountered under ERT-2. Further, consideration of REA's programs with other development partners could have been factored in the assessment of the project 's implementation capacity needs.

- ii. Project designs need to consider both demand and supply side factors through sound market assessments to ensure achievement of objectives. The financial intermediation subcomponent. Experienced low demand because when the working capital and guarantee facilities were launched the products were seen as expensive because of high interest rates and the absence of subsidies to end users. On the supply side the restriction of eligibility for PFIs to regulated commercial banks precluded other financial institutions such as SACCOs which are may have been more open to lending to solar companies and end-users. This resulted in a slow uptake of the available financing and a reallocation of more than 50 percent to other components.
- iii. **Affordability barriers should be addressed through a public financing mechanism to facilitate electricity connections and increased access in low-income areas.** A public financing mechanism helps to reduce connection charges and house internal wiring costs which are key impediments for rural households to access electricity. In Uganda, the rate of connections accelerated after the GoU issued a new connection policy on January 29, 2018, which provided for free connections. This is a common experience in many low-income environments, including in many countries in Sub-Saharan Africa. However, given that the off-grid market is the most viable option for rapid access expansion especially in rural areas, extension of subsidies to SHS would help to increase affordability and be effective in speeding up electrification. This lesson has been incorporated in the design of EASP.
- iv. **A new business model for electrifying public institutions is required for the sustainability of electricity access.** Implementation outcomes show that despite the availability of capital investment to install solar systems at public institutions such as schools, health centers, and water pumps, there is low reliability of supply in schools and health care centers due to inadequate financial support for maintenance. Under the EASP the GoU has agreed to engage long-term service providers for provision and maintenance of institutional solar PV systems in schools and health care centers. The service providers will be paid upon achieving agreed Key Performance Indicators (KPIs) and after verification by an independent agency. This electrification model will ensure sustainability provision of electricity in the public institutions.



ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: To increase access to electricity in rural areas of Uganda

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Direct project beneficiaries	Number	0.00 01-Jan-2015	7,600,000.00 15-Jun-2015		8,595,298.00 30-Jun-2023
Female beneficiaries	Percentage	50.00	50.00		50.00
Comments (achievements against targets):					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
People provided with access to electricity by household connections	Number	0.00 01-Jan-2015	1,021,000.00 15-Jun-2015		714,901.00 30-Jun-2023



People provided with access to electricity by hhold connections-Grid	Number	0.00 01-Jan-2015	850,000.00 15-Jun-2015		695,770.00 30-Jun-2023
Ppl provided wth elec. by hhold conn.–Offgrid/minigrd– Only renewable sources	Number	0.00 01-Jan-2015	171,000.00 15-Jun-2015		19,131.00 30-Jun-2023
Comments (achievements against targets): The number of people who received access to electricity was much lower because the connections were much less due to implementation delays.					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
CO2 emissions reduced/avoided as a result of the project	Metric ton	0.00 14-May-2015	600,000.00 15-Jun-2015	120,000.00 14-Oct-2021	96,337.00 30-Jun-2023
Comments (achievements against targets): 1. The formal revision was only to correct an error in the PAD which recorded cumulative amount instead of annual amounts of CO2 reductions. 2. The actual amount of CO2 reductions excludes the customer connections financed by KfW.					



A.2 Intermediate Results Indicators

Component: On-grid Energy Access

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Total length of distribution lines constructed under the project	Kilometers	0.00	1,850.00	1,543.00	514.00
		01-Jan-2015	15-Jun-2015	14-Oct-2021	30-Jun-2023

Comments (achievements against targets):

1. Only four distribution lines out of twenty one were completed by closing date.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of on-grid household connections made under the project	Number	0.00	150,000.00		122,783.00
		01-Jan-2015	15-Jun-2015		30-Jun-2023

Comments (achievements against targets):

1. The number of connections was slightly lower than the target because of the delays in constructing the distribution lines.
2. The Electricity Connection Policy was delayed by about 2 years and therefore delayed the implementation of connections.

**Component: Off-grid Energy Access**

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of rural health centers with solar PV systems installed	Number	0.00	276.00		329.00
		01-Jan-2015	15-Jun-2015		30-Jun-2023

Comments (achievements against targets):

The off-grid connections were much lower than targeted because the demand was not as high as expected at appraisal.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Total installed capacity of solar PV systems installed at rural health centers	Text	0 kWp	250.00		250.00
		01-Jan-2015	15-Jun-2015		30-Jun-2023

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of rural schools with solar PV systems installed	Number	0.00	100.00		89.00
		01-Jan-2015	15-Jun-2015		30-Jun-2023



Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Total installed capacity of solar PV systems installed at rural schools	Text	0 kWp 01-Jan-2015	169.00 15-Jun-2015		114.00 30-Jun-2023

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Total installed capacity of solar PV systems installed at rural water pumping stations	Text	0 kWp 01-Jan-2015	200.00 15-Jun-2015		458.00 30-Jun-2023

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of off-grid solar	Number	0.00	30,000.00		4,072.00



system connections made to households and enterprises under the project		01-Jan-2015	15-Jun-2015		30-Jun-2023
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Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
National standards for Solar Home Systems adopted by UNBS	Yes/No	No 01-Jan-2015	Yes 15-Jun-2015		Yes 30-Jun-2023

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
National standards for Pico PV Systems adopted by UNBS	Yes/No	No 01-Jan-2015	Yes 15-Jun-2015		Yes 30-Jun-2023

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
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Number of rural water pumping stations with solar PV systems installed (number)	Number	0.00 01-Jan-2015	15.00 15-Jun-2015		27.00 30-Jun-2023
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Comments (achievements against targets):

The number of pumping stations and corresponding installed capacity were increased due to availability of additional financing from reallocations of the funds and tax relief on equipment.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Amount of credit and guarantee extended to Participating Financial Institutions (cumulative)	Text	0 US\$ million 01-Jan-2015	8.50 15-Jun-2015		3.80 30-Jun-2023

Comments (achievements against targets):

Amount of credit and guarantees was reduced due to lack of demand.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Amount of credit and guarantee extended to project beneficiaries by Participating Financial Institutions	Text	0US\$ million 01-Jan-2015	8.50 15-Jun-2015		0.80 30-Jun-2023



(cumulative US\$ million equivalent)

Comments (achievements against targets):

Amount of credit and guarantees was reduced due to lack of demand.

Component: Institutional Strengthening and Impacts Monitoring

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Completion of the baseline survey report for ERT-3	Yes/No	No 12-Feb-2019	No 15-Jun-2015		Yes 30-Jun-2023

Comments (achievements against targets):

The baseline survey was not included in the original results framework that was carried out in replacement of the ERT 2 evaluation.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increase in certified wiremen for household connections	Number	0.00 12-Feb-2019	0.00 15-Jun-2015		1,850.00 30-Jun-2023

Comments (achievements against targets):



The training of wiremen activity was added during implementation and about 1,850 wiremen were certified.



B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1: To increase access to electricity in rural areas of Uganda	
Outcome Indicators	<ol style="list-style-type: none">1. Direct project beneficiaries (number of people)<ul style="list-style-type: none">• Of which percentage of females (50)2. Number of people provided with access to electricity under the project by household connections comprising:<ul style="list-style-type: none">• Number of people provided with access to electricity by household connections- (grid)• Number of people provided with access to electricity by household connections- (off-grid)
Intermediate Results Indicators	<ol style="list-style-type: none">1. Total length of distribution lines connected under the project (kms)2. Installation of solar PV systems in post-primary schools3. Installation of solar PV systems in health care centers4. Installation of solar PV systems at water pumping stations5. Extension of credit and guarantees to PFIs by the UECCC6. Extension of credit and guarantees to beneficiaries by PFIs.
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	<ol style="list-style-type: none">1. Subcomponent 1.1: 514 kms of MV and LV distribution lines were constructed.2. Subcomponent 1.1, 1.2 and 1.3: 122,783 households were connected to electricity through the grid.3. Subcomponent 2.1: Solar P systems were installed in 85 post-primary schools for a total capacity of 114 kWp



	<ol style="list-style-type: none"> 4. Subcomponent 2.1: Solar PV systems were installed in 329 health care centers for a total capacity of 250 kWp 5. Subcomponent 2.1: Solar P systems were installed at 27 water pumping stations for a total capacity o 458Kwp 6. Subcomponent 2.3: 3,336 SHS were installed in off-grid households. 7. Subcomponent 2.3: Solar PV systems were installed in 1,000 enterprises. 8. Subcomponent 2.2 About 2, -- wiremen and electricians were trained and certified 9. Subcomponent 2.4 National quality standards for Pico solar PV systems were approved by the UNBS 10. Subcomponent 2.4: National standards for solar lanterns were gazetted 11. Subcomponent 3.2 ERT-3 baseline survey was completed.
Objective/Outcome 2: To increase access to electricity in Uganda’s rural areas and reduce greenhouse gas emissions	
Outcome Indicators	Tons of CO2 emissions reduced/avoided under the project.
Intermediate Results Indicators	<ol style="list-style-type: none"> 1. Total length of distribution lines connected under the project (kms) 2. Installation of solar PV systems in post-primary schools 3. Installation of solar PV systems in health care centers 4. Installation of solar PV systems at water pumping stations 5. Extension of credit and guarantees to PFIs by the UECCC 6. Extension of credit and guarantees to beneficiaries by PFIs.



Key Outputs by Component
(linked to the achievement of the Objective/Outcome 2)

1. Subcomponent 1.1: 514 kms of MV and LV distribution lines were constructed.
2. Subcomponent 1.1, 1.2 and 1.3: 122,783 households were connected to electricity through the grid.
3. Subcomponent 2.1: Solar P systems were installed in 89 post-primary schools for a total capacity of 114 kWp
4. Subcomponent 2.1: Solar PV systems were installed in 329 health care centers for a total capacity of 250 kWp
5. Subcomponent 2.1: Solar P systems were installed at 27 water pumping stations for a total capacity o 458Kwp
6. Subcomponent 2.3: 3,336 SHS were installed in off-grid households.
7. Subcomponent 2.3: Solar PV systems were installed in 1,000 enterprises.
8. Subcomponent 2.2 About 2, 1,850 wiremen and electricians were trained and certified
9. Subcomponent 2.4 National quality standards for Pico solar PV systems were approved by the UNBS
10. Subcomponent 2.4: National standards for solar lanterns were gazetted
11. Subcomponent 3.2 ERT-3 baseline survey was completed



ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Mitsunori Motohashi, Mbuso Gwafila	Task Team Leader(s)
Howard Bariira Centenary	Procurement Specialist(s)
Paul Kato Kamuchwezi	Financial Management Specialist
Janine A. Speakman	Team Member
Mazhar Farid	Team Member
Vladislav Vucetic	Team Member
Richard H. Hosier	Team Member
Mary C.K. Bitekerezo	Social Specialist
Rachel K. Sebudde	Team Member
Zubair K.M. Sadeque	Team Member
Allison Berg	Team Member
Sudeshna Ghosh Banerjee	Team Member
Barbara Kasura Magezi Ndamira	Team Member
Nuyi Tao	Team Member
Christine Mocheche Makori	Counsel
Chita Azuanuka Obinwa	Team Member
Christiaan Johannes Nieuwoudt	Team Member
Kabir Malik	Team Member
Murat Arslaner	Team Member



Bassem Abou Nehme	Team Member
arbara Katusabe	Team Member
Jenny Maria Hasselsten	Team Member
Damalie Evalyne Nyanja	Team Member
Herbert Oule	Social Specialist
Constance Nekessa-Ouma	Social Specialist
David Vilar Ferrenbach	Team Member
Supervision/ICR	
Federico Querio, Raihan Elahi, Joseph Mwelwa Kapika	Task Team Leader(s)
Ocheng Kenneth Kaunda Odek, Grace Nakuya Musoke Munanura	Procurement Specialist(s)
Paul Kato Kamuchwezi	Financial Management Specialist
Fridah Kunihira	Social Specialist
Christine Katende Namirembe	Social Specialist
Christine Kasedde	Environmental Specialist
Declane Kabuzire Centenary	Energy Specialist
Annette Nabisere Byansansa	Team Member
Naomi Obbo	Environmental Specialist
William Nicholas Bowden	Team Member
Mohammad Ilyas Butt	Procurement Team
Fowzia Hassan	Team Member
Gulgoren A. Cansiz	Team Member
Abdoul Wahabi Seini	Team Member
Harriet Eunice Okello Adong	Team Member
Raima Oyenyin	Team Member



B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US\$ (including travel and consultant costs)
Preparation		
FY13	3.975	55,440.29
FY14	50.433	190,977.87
FY15	67.856	334,367.06
FY16	.525	624.21
Total	122.79	581,409.43
Supervision/ICR		
FY16	20.901	132,190.93
FY17	44.968	240,933.04
FY18	39.401	208,626.18
FY19	36.948	231,149.86
FY20	34.292	300,589.83
FY21	39.001	257,761.15
FY22	35.254	183,619.48
FY23	37.637	206,352.72
FY24	8.026	69,408.71
Total	296.43	1,830,631.90



ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US\$M)	Actual at Project Closing (US\$M)	Percentage of Approval (%)
On-grid Energy Access	144.60	131.48	90.9
Off-grid Energy Access	25.00	22.08	88.3
Institutional Strengthening and Impacts Monitoring	5.60	4.73	84.5
Contingency	1.20	0.00	0
Total	176.40	158.29¹⁵	89.7

¹⁵ Including the Borrower's contribution which is estimated to be approximately US\$23.7 million that was applied towards acquisition of wayleaves.



ANNEX 4. EFFICIENCY ANALYSIS

1. At appraisal, a comprehensive economic analysis was conducted to determine the economic justification of the proposed expansion of electricity access to rural areas of Uganda. The economic analysis was based on the standard cost benefit framework for infrastructure projects and was applied to: (a) the on-grid energy access component (i.e. the extension of distribution lines within and from the electrified areas, and the connection of “last mile” consumers that were reachable without additional poles); and (b) to the installation of SHS and solar PV systems for rural institutions (schools, water pumping stations and health care facilities).

2. For the on-grid access component the costs included: the capital costs of constructing the distribution lines and connecting the associated new customers and the cost of operating and maintaining the assets during the operational phase, the consumer connection charges and the generation costs of supplying the additional power. The benefits comprised the consumer surplus given the consumers’ willingness to pay higher prices to obtain grid electricity instead of relying on fossil fuels for lighting and other energy needs. Similarly, the off-grid component cost benefit analysis included capital expenditures for solar equipment, post installation operation and maintenance costs, including replacement of batteries for schools and health care centers. The key benefits were expected from the avoidance of more expensive diesel fuels in institutions and of paraffin in use by households.

3. The ex-post analysis for the ICR was conducted using the same methodology as at appraisal. An emission factor of 0.14 per household connection was used to calculate GHG emissions. For the public institutions emission factors of 1.73, 1.34 and 1.54 per kWp capacity were used for health centers, water, and schools respectively. All the factors are within the ranges used at project appraisal for each type of installation.

4. Capital costs incurred in currencies other than the US\$ (Ugandan shillings and Euros) were converted into US\$ using historical exchange rates applicable at the time of payment. All capital costs were expressed in 2018 constant prices.

5. Table 5 below compares the outcome of the economic analysis at appraisal and at project completion.

Table 1: Comparison of ex-ante and ex-post Economic returns

Project Completion	Project Results at Appraisal	Project Results at Completion
Overall Project	EIRR: 38 percent NPV: US\$231 million Benefit/Cost ratio: 2	EIRR: 21 percent NPV: US\$68.7 million
Component 1: On grid energy access	EIRR:39 percent NPV: 227 million	EIRR: 23 percent NPV:US\$71 million
Component 2: Off-grid (SHS and Institutional PV systems)	EIRR: 20 percent NPV: US\$3.3 million	EIRR: 3 percent NPV: (US\$ 3.2) million

6. The overall project achieved satisfactory economic returns because the economic incremental rate



of return was 21 percent, and the net present value (NPV) was positive at US\$68.7 million. However, these returns were below the EIRR of 38 percent and the NPV of US\$ 231 million estimated at appraisal. Further, returns on the off-grid component were unsatisfactory because the EIRR fell below the hurdle rate of return of 10 percent and the NPV was a negative US\$3.2 million.

7. The lower ex-post returns were due to the much lower number of household connections on the grid component because of the delays and non-completion of the grid extension and, therefore, of the associated connections (92,132 instead of 150,000 targeted at appraisal). The number of installations of SHS and enterprises under the off-grid component was only about 4,000 compared to a target of 30,000. The reduced number of on-grid and off-grid connections also resulted in a reduced amount of avoided CO2 emissions (72 376 metric tons per year instead of the 120,000 targeted at appraisal).

8. At project closure, data on project expenditures incurred by the Borrower for the on-grid energy access component was estimated to be approximately US\$18.7 million. Data was not available for the off-grid access component.

Administrative efficiency

9. The project was implemented over a period of seven and a half years including the period of delayed effectiveness (9 months). There were several inefficiencies in the project implementation process, including: the need to redo some project preparation processes when designs turned out to be misaligned with RAPs, the “suspension” of implementation of some distribution lines because construction had started without full compensation to PAPs, delays in processing renewal of the consultant’s supervision contracts which, at times, resulted in works continuing without supervision. In addition, 300km of distribution lines were dropped from the project and so were pico hydropower projects because the remaining time before project closure was no longer adequate to complete implementation. The multiple closing date actions also required extension of the consultants’ contracts for project implementation and coordination support, including beyond the project closure to support completion of remaining activities, including implementation of the Post Closure Action Plan for safeguards.



ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

Borrower comments were received and have been incorporated into the ICR.