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IMPLEMENTATION COMPLETION AND RESULTS REPORT

IDA-47430, IDA-58440

ON

CREDITS

IN THE AMOUNT OF SDR 265.4 MILLION

(US$ 398 MILLION EQUIVALENT)

AND

GRANTS FROM THE GLOBAL PARTNERSHIP ON OUTPUT BASED AID

TF-10097, TF-A2191

IN THE AMOUNT OF US$ 8.15 MILLION

TO THE

REPUBLIC OF KENYA

FOR AN

ELECTRICITY EXPANSION PROJECT

June 30, 2018

Energy & Extractives Global Practice
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective May 15, 2018)

Currency Unit =	Kenya Shilling (KSh)
KSh100.45=	US$1
US$1.43=	SDR 1

FISCAL YEAR
July 1 - June 30

Regional Vice President: Makhtar Diop

Country Director: Diarietou Gaye

Senior Global Practice Director: Riccardo Puliti

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Task Team Leader(s): Laurencia Karimi Njagi, Patrick Thaddayos Balla

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ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Lending
AF	Additional Financing
AFD	Agence Française de Développement
CPF	Country Partnership Framework
CRW	Crisis Response Window
DA	Designated Account
EIB	European Investment Bank
EIB-CM	European Investment Bank-Complaint Mechanism
EIRR	Economic Internal Rate of Return
EOCK	Economic Opportunity Cost of Capital
EMP	Environment Management Plan
ERC	Energy Regulatory Commission
ERS	Economic Recovery Strategy
ESH	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
ESRP	Energy Sector Recovery Project
FY	Fiscal Year
GDC	Geothermal Development Company
GDP	Gross Domestic Product
GHG	Green House Gas
GoK	Government of Kenya
GPOBA	Global Partnership for Output Based Aid
GRS	Grievance Redress Service
GWh	Gigawatt hour
ICR	Implementation Completion Report
ICT	Information and Communication Technologies
IDA	International Development Association
IFC	International Finance Corporation
IPP	Independent Power Producer
IPPF	Indigenous Peoples Planning Framework
ISR	Implementation Status Report
JICA	Japan International Cooperation Agency
KenGen	Kenya Electric Generating Company
KETRACO	Kenya Electricity Transmission Company
KEEP	Kenya Electricity Expansion Project
KEMP	Kenya Electricity Modernization Project
KfW	German Agency for Development
KOSAP	Kenya Off-grid Solar Access Project
KPLC	Kenya Power and Lighting Company
KWS	Kenya Wildlife Service
LCPDP	Least Cost Power Development Plan

M&E	Monitoring and Evaluation
MAP	Management Action Plan
MFD	Maximizing Finance for Development
MOE	Ministry of Energy
MOU	Memorandum of Understanding
MTP	Medium Term Plan
MTR	Mid-Term Review
MW	Megawatt
NES	National Electrification Strategy
NPV	Net Present Value
OP	Operations Policy
PAD	Project Appraisal Document
PAP	Project Affected Person
PCT	Project Coordination Team
PIT	Project Implementation Team
PDO	Project Development Objective
PPP	Public Private Partnership
RAP	Resettlement Action Plan
REA	Rural Electrification Authority
SDG	Sustainable Development Goal
SDR	Special Drawing Rights
SIDA	Swedish International Development Agency
SIL	Specific Investment Loan
SRM	Social Risk Management
SESMS	Strategic Environmental and Social Management System
SSA	Sub-Saharan Africa
T&D	Transmission and Distribution
TTL	Task Team Leader
USD	United States Dollar
WB-GRS	World Bank Grievance Redress Service

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P103037	Electricity Expansion
Country	**Financing Instrument**
Kenya	Investment Project Financing
Original EA Category	**Revised EA Category**
Full Assessment (A)	Full Assessment (A)

Related Projects

Relationship	Project	Approval	Product Line
Supplement	P125388-GPOBA W3: Kenya Electricity	24-Feb-2010	Recipient Executed Activities
Additional Financing	P153179-Additional Financing: Kenya Electricity Expansion Project	15-Jun-2016	IBRD/IDA

Organizations

Borrower	Implementing Agency
The Republic of Kenya	KenGen, KENYA POWER AND LIGHTING COMPANY, Rural Electrification Authority, Ministry of Energy and Petroleum, The National Treasury

Project Development Objective (PDO)

Original PDO

The project has two development objectives:
(a) increase the capacity, efficiency, and quality of electricity supply; and
(b) expand access to electricity in urban, peri-urban, and rural areas

FINANCING

		Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing				
P103037	IDA-47430	330,000,000	330,000,000	321,951,623
P103037	TF-10097	5,150,000	5,150,000	5,150,000
P103037	TF-A2191	3,000,000	3,000,000	3,000,000
P103037	IDA-58440	68,000,000	68,000,000	65,327,896
Total		**406,150,000**	**406,150,000**	**395,429,519**
Non-World Bank Financing				
Borrower		169,700,000	0	0
EC: European Investment Bank		168,000,000	0	0
FRANCE: French Agency for Development		220,000,000	0	0
JAPAN: Japan International Cooperation Agency (JICA)		323,000,000	0	0
GERMANY: KREDITANSTALT FUR WIEDERAUFBAU (KFW)		84,000,000	0	0
Local Sources of Borrowing Country		90,950,000	0	0
Total		**1,055,650,000**	**0**	**0**
Total Project Cost		**1,461,800,000**	**406,150,000**	**395,429,519**

KEY DATES

Project	Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
P103037	27-May-2010	01-Oct-2010	01-May-2015	30-Sep-2016	31-Dec-2017
P125388	24-Feb-2010				

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
22-May-2013	78.81	Reallocation between Disbursement Categories
30-May-2014	159.28	Reallocation between Disbursement Categories
20-Apr-2016	290.00	Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Reallocation between Disbursement Categories Change in Implementation Schedule
15-Jun-2016	296.39	Additional Financing

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	29-Mar-2011	Satisfactory	Satisfactory	0
02	07-Oct-2011	Satisfactory	Satisfactory	8.48
03	29-May-2012	Satisfactory	Satisfactory	10.94
04	21-Jan-2013	Moderately Satisfactory	Satisfactory	64.83
05	17-Sep-2013	Moderately Satisfactory	Moderately Satisfactory	114.03
06	05-Apr-2014	Moderately Satisfactory	Moderately Satisfactory	156.66
07	24-Aug-2014	Moderately Satisfactory	Moderately Satisfactory	195.72
08	29-Jun-2015	Moderately Satisfactory	Moderately Satisfactory	260.37
09	05-Jan-2016	Moderately Satisfactory	Moderately Satisfactory	279.99
10	12-Aug-2016	Moderately Satisfactory	Moderately Satisfactory	297.68
11	31-Jan-2017	Moderately Satisfactory	Moderately Satisfactory	319.63
12	30-Jun-2017	Moderately Satisfactory	Moderately Satisfactory	378.66

13	02-Jan-2018	Moderately Satisfactory	Moderately Satisfactory	380.14

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Energy and Extractives	**100**
Renewable Energy Biomass	10
Renewable Energy Geothermal	10
Public Administration - Energy and Extractives	7
Energy Transmission and Distribution	53
Renewable Energy Solar	10
Renewable Energy Wind	10

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Private Sector Development	**29**
Jobs	19
Job Creation	19
Public Private Partnerships	10
Human Development and Gender	**7**
Health Systems and Policies	3
Health System Strengthening	3
Education	4
Access to Education	2
Education Financing	2
Urban and Rural Development	**74**
Urban Development	22
Urban Infrastructure and Service Delivery	19
Services and Housing for the Poor	3
Rural Development	52
Rural Infrastructure and service delivery	52

ADM STAFF

Role	At Approval	At ICR
Regional Vice President:	Obiageli Katryn Ezekwesili	Makhtar Diop
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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. Kenya, at appraisal in 2010, was considered to have substantial potential for economic growth. The country's population of about 40 million was relatively well educated, had a strong emerging middle class, and had a far more diversified economy relative to most other countries in Sub-Saharan Africa (SSA). About 55 percent of Gross Domestic Product (GDP) came from services - transport, finance, tourism, information and communication technology (ICT) and trade. Several of Kenya's economic sectors, including services, operated at international standards. The Government's Economic Recovery Strategy (ERS) for Wealth and Employment Creation (2003-2007) was its main vehicle for boosting economic growth and reducing poverty. During ERS implementation, Kenya's economy grew at an average annual rate of more than 5%, with a reduction in poverty to 47 percent.

2. In 2008, Kenya had developed a long-term development strategy, Vision 2030, which focused on transforming Kenya from a low-income country to a strong middle-income country by 2030. Vision 2030, targeted expanded infrastructure access as a key element of achieving higher levels of economic growth. An average annual economic growth rate of 10 percent between 2013 and 2030 was deemed necessary to meet Vision 2030 goals. To implement the first phase of Vision 2030, the Government prepared a Medium-Term Plan (MTP) covering 2008-2012. The MTP called for rehabilitating the road network, upgrading railways, improving urban transport, and expanding access to electricity and safe water, with special emphasis on expanding access of the rural and urban poor to basic services such as electricity, water, and sanitation.

3. A series of crises in 2008 and 2009 had impeded the strong initial trajectory in economic growth in achieving Vision 2030 goals. At the end-point of the ERS in 2007, the economy had grown by 7 percent. In 2008, political unrest interrupted trade flows and discouraged tourism. The global economic downturn also began that year, and Kenya's economic growth rate plummeted to 1.7 percent. In 2009, a severe drought diminished food production and disrupted electricity supply (A significant part of Kenya's electricity supply came from hydropower generation). The Government projected a budget deficit of 6.6 percent of GDP in 2009/2010 compared to 1.7 percent in 2006/2007. The crises led to a worsening public finance situation that made it difficult for the Government to fully implement its development program, reinforcing the importance of concessional loans and grants, including from the IDA Crisis Response Window (CRW), an important part of the Government's budget to protect core spending on infrastructure, health, education, social safety nets, and agriculture.

4. Kenya's private sector which had been the main source of economic growth faced significant infrastructure constraints. Notwithstanding expansion of the services sector, advantages due to its geographical location, and increasing trade, internal infrastructure bottlenecks, especially in electricity supply and transport were constraining private sector growth. The manufacturing sector, which represented 11 percent of total economic activity and whose competitiveness depended on such infrastructure was showing signs of stagnation. Underinvestment in the power sector had led to unreliable electricity supply which contributed to lower annual sales of Kenyan firms by about 7 percent and reduced annual GDP growth by about 1.5 percent. Rapid demand growth had led to a supply shortfall in the years prior to appraisal. As a consequence, "emergency" high cost

diesel units had been contracted, increasing the share of such electricity generation to 14 percent of the total in 2009.

5. At appraisal, the following were identified as key issues in the electricity sector: (i) heavy dependence on hydropower for electricity which led to unreliable supply in years of drought (2007-2009); (ii) underdevelopment of geothermal sources of energy which were seen as counter weights to dependence on hydropower; (iii) under investments in Transmission and Distribution (T&D) systems leading to unreliable electricity service and unnecessarily high technical losses; (iv) low level of access with the access rate of 20 percent far lower than other African countries with a similar income level; and (v) high cost of electricity service which had become an obstacle to the expansion of electricity access to lower income households. The Government's strategy for expanding electricity infrastructure to support the achievement of Vision 2030 addresses all the above issues. To implement the strategy, the Government of Kenya (GoK) prepared the Electricity Access Investment Program 2009-2014 ("The Program") which adopted a sector-wide approach and addressed increasing generation capacity, expanding and upgrading T&D networks, and extending affordable household electricity access. The Kenya Electricity Expansion Project (KEEP, or this project) was designed to support key components of the Program critical to expansion of electricity access.

6. The Electricity Sector had undergone major reforms since the mid-1990s. The first phase of reforms separated policy and regulatory functions from commercial activities, unbundled generation from transmission and distribution activities, introduced cost-reflective tariffs and opened up generation function to private sector investment. The second phase of reforms (2004- 2008) involved improving the operational and financial performance of the sector utilities, establishing arms' length relationship between the key public sector generation and distribution utilities– Kenya Electricity Generating Company Limited (KenGen) and the Kenya Power & Lighting Company Limited (KPLC) through introduction of market-oriented power purchase agreements to govern their commercial relationship, and establishing new entities with specific mandates for developing transmission, geothermal resources, and rural electrification. The 2004 Energy Policy and 2006 Energy Act established an effective enabling framework for sector regulation, operations and viability of electricity players. Both KPLC and KenGen operated on a commercial basis, are listed on the Kenya Securities Exchange, with GoK holding majority of shares. In late 2008, Kenya Electricity Transmission Company (KETRACO) with a mandate to plan, build, and operate new transmission assets was created. The Energy Regulatory Commission (ERC) created in 2007 as a successor to the Energy Regulatory Board of 1997 – the first sector regulator, regulates wholesale and retail tariffs and issues licenses. The Rural Electrification Authority (REA) was established in 2006 with a mandate to accelerate the pace of rural electrification to promote sustainable social economic development. The Geothermal Development Company (GDC), started operations in 2009, and is responsible for determining the viability of geothermal resources through exploratory drilling and technical studies.

Theory of Change (Results Chain)

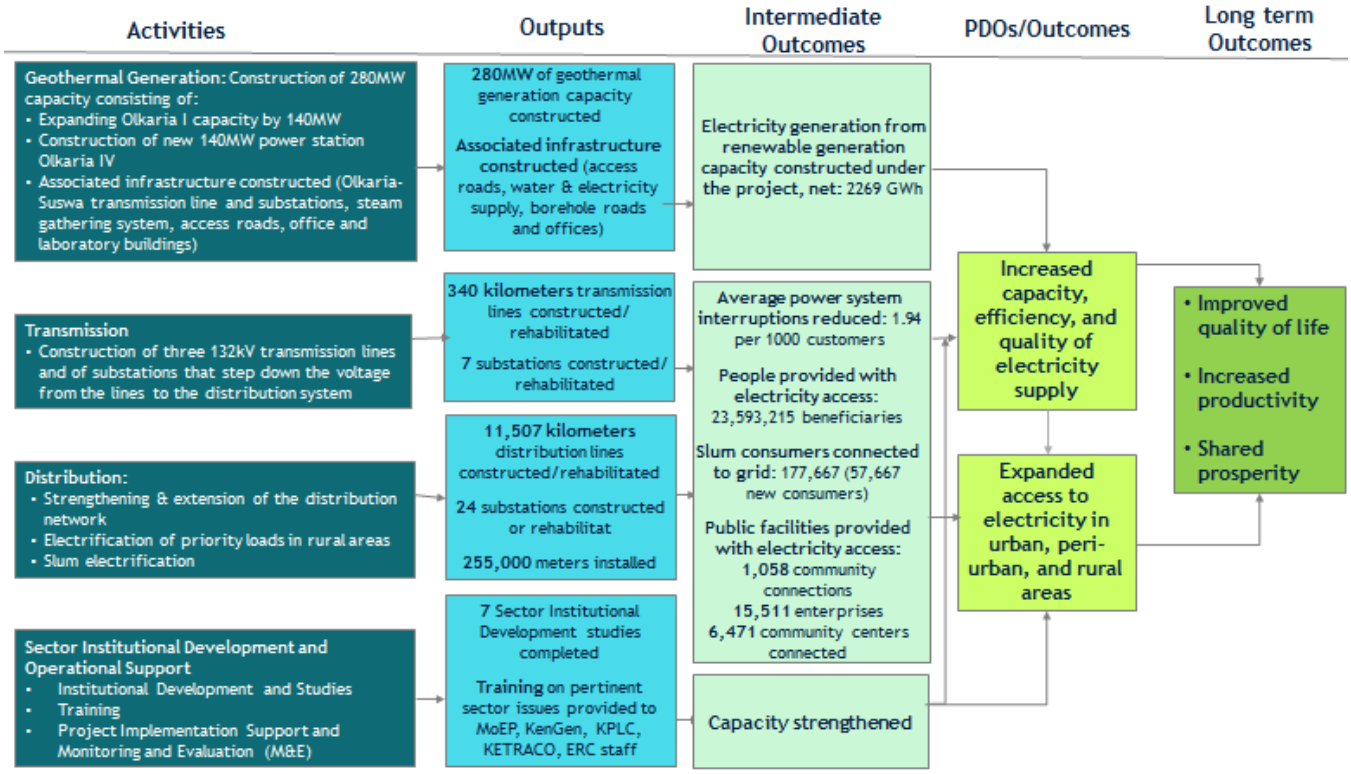
7. The development objectives of this project were aligned with evidence from energy sector literature which shows that delivery of reliable modern energy services contributes to the Bank's twin goals of poverty reduction and shared prosperity, both indirectly through contributions to economic growth, and directly by enriching the lives of beneficiaries of energy services. A recent World Bank literature review[1] of the relationship

[1] Bacon, R., and M. Kojima, Energy, Growth, and Poverty Reduction: A Literature Review, The World Bank Group, 2016. http://documents.worldbank.org/curated/en/312441468197382126/pdf/104866-v1-REVISED-PUBLIC-Main-report.pdf

between Energy, Economic Growth, and Poverty Reduction identified studies that provided evidence of benefits of energy projects by examining links in the following areas: (i) infrastructure and GDP; (ii) energy use and GDP; (iii) power outages and the performance of business; and (iv) household connections to electricity supply and various economic outcomes (income, employment, education, etc.).

8. This Implementation Completion Report (ICR) cites two studies from the literature review that are pertinent to the development objectives of this project. Calderón and Servén (2010a) found that quantity and quality of infrastructure have significant effects on increasing growth rates and on reducing inequality[2]. Khandker, Samad, Ali and Barnes (2012) estimated the effects of electrification of rural households in India on income, employment and education[3]. Their findings show that per capita consumption increased by 18 percent, labor supply of women increased by 17percent, and non-farm income increased by 70 percent. Enrollment, study time at home, and years of education completed were all significant for boys and for girls.

9. This ICR looks at evidence in the project that illustrates some pathways by which expanding electricity access can contribute towards improving development outcomes and meeting Sustainable Development Goals (SDGs). It also examines the evidence showing that increasing capacity, efficiency and quality of electricity supply can enhance quality of life and promote economic growth. A results chain diagram is provided to summarize these pathways.



[2] Calderón, César, and Luis Servén, 2010a, Infrastructure and Economic Development in Sub-Saharan Africa, Journal of African Economies 19, AERC Supplement 1: i13-i87

[3] Khandker, Shahidur, Hussain Samad, Rubaba Ali and Douglas Barnes, 2012, "Who Benefits Most from Rural Electrification? Evidence from India.", Policy Research Working Paper 6095, World Bank, Washington, DC. https://openknowledge.worldbank.org/bitstream/handle/10986/9328/WPS6095.pdf

Project Development Objectives (PDOs)

10. The Project Development Objectives were to: (a) increase the capacity, efficiency, and quality of electricity supply; and, (b) expand access to electricity in urban, peri-urban, and rural areas.

Key Expected Outcomes and Outcome Indicators

11. At the time of approval in fiscal year (FY) 2010, the Kenya Electricity Expansion Project (KEEP) was the largest project in the Bank's program for Kenya and was its flagship program undertaken to unleash Kenya's growth potential by expanding electricity infrastructure. The electrification components of KEEP were intended to reduce inequality and social exclusion. KEEP sought to help improve the quality of life particularly in poor areas, with improvements coming directly from electricity access or indirectly from access to improved services resulting from GoK's Program objectives of electrifying priority loads, including clinics, schools, and trading centers.

12. Key expected Outcome Indicators were:
    (i) Electricity generation from renewable geothermal capacity constructed (GWh)
    (ii) Average power system interruption frequency per year (number)
    (iii) Electricity transmission and distribution losses (%)
    (iv) People provided with access to electricity (number, assuming five people per household connection)
    (v) Direct project beneficiaries

Components

13. The project had four components:

(i) **Geothermal Generation (US$ 1,035 million: IDA US$120 million, JICA US$323 million, AFD US$210 million, EIB US$168 million, KfW US$84 million, KenGen US$130 million):** Construction of 280 MW of geothermal generation capacity, consisting of:
   a. expansion of the capacity of the existing Olkaria I power station by 140 MW;
   b. a new power station, Olkaria IV, with a capacity of 140 MW;
   c. Steam gathering system along with geothermal laboratories and workshops, a new KenGen's office block outside the national park to address the environmental needs of minimizing human (staff) and vehicular movements within the national park, the access road to Olkaria IV and geothermal board of consultants. IDA's contribution of $120 million financed the steam gathering system described above and also financed connection of steam wells to the two power stations with associated facilities for transmitting the power to national grid, installation of construction infrastructure and facilities required to operate the plants such as access roads, water and electricity supply, borehole roads, etc.

(ii) **Transmission (US$ 72.5 million of which IDA US$64.5 million, and KETRACO US$8 million):** Construction of three 132kV transmission lines as well as substations that step down the voltage from these lines to the distribution system. (Kindaruma-Mwingi-Garissa; Eldoret-Kitale; and Kisii-Awendo)

(iii) **Distribution (US$ 272 million of which IDA US$ 134m, AFD US$ 10 million, KPLC US$30 million, GPOBA US$ 5 million, REA US$ 2 million, users US$ 91 million):** Expansion and upgrading of the distribution network along with the connection of additional 300,000 customers, 17% of which will be in urban slums. There were four subcomponents:
   a. Strengthening and extension of the distribution network in the greater Nairobi metropolitan area and in the coast, Mt. Kenya, and Western and Nyanza provinces

b. Electrification of priority loads in rural areas
c. Slum electrification: 50,000 low-income customers in urban slums
d. Revolving fund for Deferred Connection Fee Payments

Activities in the distribution component were supplemented by a grant for US$5.15 million from the Global Program for Output Based Aid (GPOBA) with the objective of increasing access to low income households in Kenya's slums through the provision of grants to subsidize the cost of the connection of eligible consumers.

(iv) **Sector Institutional Development and Operational Support (IDA US$ 11.5m)**: This component had three subcomponents:

a. Institutional Development and Studies
b. Training
c. Project Implementation Support and Monitoring and Evaluation (M&E)

14. The project had five external development partners: IDA, French Agency for Development (AFD), European Investment Bank (EIB), German Development Cooperation Agency (KfW) and Japan International Cooperation Agency (JICA). IDA financed a part of all four components as described in paragraph 13 above. The other four external partners financed portions of the Generation Component (Total cost of generation component: $1.035 billion). The operational entities in the electricity sector (KenGen, KETRACO, KPLC, and REA) were expected to provide about 12 percent of the total cost; new users of electricity, and the external development partners were financing the remaining 88 percent. At project launch IDA was funding about 12 percent of the Generation Component, 88 percent of the Transmission Component, 49 percent of the Distribution Component, and 100 percent of the Technical Assistance Component. IDA's contribution is therefore evaluated in the context of the larger program throughout this assessment. The table below shows the contributions of the five development partners and of GoK to each component of the program.

Component	Financier	Amount Financed
Geothermal Generation	JICA	US$ 323 million
	AFD	US$ 10 million
	EIB	US$ 168 million
	KfW	US$ 84 million
	KenGen	US$ 130 million
	IDA	**US$ 120 million**
Transmission	KETRACO	US$ 8 million
	IDA	**US$ 64.5 million**
Distribution	KPLC	US$ 30 million
	AFD (revolving fund only)	US$ 10 million
	REA	US$ 2 million
	IDA + GPOBA (IDA administered)	**US$ 139 million**
	Electricity Users	US$ 91 million
Sector Institutional Development and Operational Support	**IDA**	**US$ 11.5 million**

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

15. PDOs remained unchanged throughout project implementation

Revised PDO Indicators

16. KEEP underwent a third restructuring in April 2016 (reasons for which are described in paragraph 21 below) during which PDO indicators were revised. In addition, a new PDO indicator was introduced when Additional Financing (AF) for the project was approved (May 2016). Results framework revisions during the third restructuring, which included changes to outcome indicators as well as targets, were designed to make the reporting of results more accurate and concise, and to ensure consistency with proposed changes in project activities envisaged in the restructuring. Target dates were also amended to ensure that end target dates conformed to the proposed extension of the closing date.

17. PDO indicator revisions undertaken during the third restructuring were as follows:

(i) The PDO indicator related to “interruptions frequency” was revised to “interruptions per 1,000 customers,” with a restated baseline and annual targets that included supply interruption incidences which, prior to July 2012, were excluded from the reported incidences. The change did not constitute a material change in the target but was instead a change in the way the indicator was measured.

(ii) Outcome targets related to people provided with access to electricity were adjusted to measure people provided with access to electricity by KPLC, as KPLC was the agency tasked with access expansion in Kenya. Therefore, both PDO level indicators for access were amended. The "people provided with electricity access" indicator was amended to being reported as the number of people connected to the grid by KPLC during the project period of 2010-2017, assuming 5 people per household. "Direct project beneficiaries" was also amended to be reported as number of connections made by KPLC during project period from 2010-2017.

Consistent with activities planned during preparation of the Additional Finance credit, a new indicator titled "New slum consumers connected to the grid". Associated with this indicator, an intermediate outcome indicator titled "KPLC conducts an annual customer satisfaction survey for slum consumers" was added at the intermediate results indicators level.

18. A table summarizing the revision of indicators during the implementation period is shown below. All changes were effective after the 3rd restructuring in April, 2016.

Indicator	Change in Indicator	Comment
PDO Indicators		
1. People provided by access to electricity by KPLC	New	Clarifies that this indicator captures the grid connections made by KPLC during the project period.
2. People provided with access to electricity by household connection	Dropped	The number of people provided with electricity access could not be reported at project level. It was replaced by the newly added indicator 1 immediately above. In addition, a duplicate indicator titled "People provided with access to electricity in the project area (CORE)" was deleted, along with its breakdown indicators – rural off-grid conventional and rural off-grid renewable. Rural off-grid components were no longer being supported by project activities.
3. People provided with access by household connections - grid	Revised	This indicator is a breakdown of indicator 1 above and captures the number of people connected to the grid by KPLC during the project period. The end target date was revised to be consistent with the project end date and the target itself was expanded to reflect increased scope of project activities after the third restructuring.
4. People provided with electricity by household connections – Off grid/mini grid – Only renewable sources	Dropped	Component cancelled at third restructuring. Off-grid activities were no longer being pursued under the project

5. People provided with electricity by household connections – Off grid/mini grid-Any source except renewable	Dropped	Component cancelled at third restructuring. Off-grid activities were no longer being pursued under the project
6. Electricity losses per year in project area	Revised	End target date revised to reflect end project date. End target expanded. In addition, a duplicate indicator "Electricity losses per year in project area (CORE)" was deleted.
7. Electrical generation from renewable generation capacity constructed under the project, net	Revised	End target date revised to reflect end project date.
8. Interruptions per 1,000 customers	Revised	The name was changed from "Average interruptions frequency per year in the project area (CORE)", and end target date was revised to reflect project end date. The name and end target was restated to include supply interruption incidences which prior to Jul 2012 were excluded from reported incidences and to normalize with growth in number of customers. A duplicate indicator was deleted.
9. Direct project beneficiaries	Revised	End target date revised to reflect end project date and target expanded to cover additional beneficiaries
10. New slum consumers connected to the grid	New	New target was set at 174,000 of slum connections vs baseline of 120,000 in the 3rd restructuring. Under the AF credit, KPLC was to continue expansion of slum electrification to connect approx. 54,000 additional households

Intermediate Outcome Indicators

1. Meters installed under the project	New	Added to report the number of meters for household connection bought with KEEP funds
2. KPLC conducts annual customer satisfaction survey for slum consumers	New	Introduced to reflect new activities added during Additional Financing.
3. Community electricity connections constructed and its breakdown indicator of community electricity connections constructed - grid	Revised	End target date revised to reflect project end date. The offgrid/mini grid breakdown indicator was deleted since these connections were no longer supported under KEEP.
4. Distribution lines constructed or rehabilitated under the project	Revised	End target date revised (construction only) to reflect project end date. A duplicate indicator was deleted.

5. Transmission lines constructed or rehabilitated under the project	Revised	End target date revised (construction only) to reflect project end date. A duplicate indicator was deleted.
6. Generation capacity of renewable energy constructed – Wind, Solar	Deleted	Intermediate sub-indicator related to off grid systems. These activities were no longer supported under the project
7. Substations constructed or rehabilitated by KPLC under the project	Revised	End target date revised to reflect project end date
8. Isolated grids constructed or rehabilitated by REA under the project	Dropped	Isolated grids were no longer supported under the project
9. Community (public facilities) electricity connections provided under the project (CORE)	Revised	End target dates for community connections, broken down by community centers and business electricity connections, were revised to reflect end project date. Breakdown indicators for electricity connections to hospitals, schools, enterprises and trading centers with breakdowns for renewable energy source were deleted as these sub-components were no longer supported under the project

19. KEEP was restructured three times which involved revision of components. In the first restructuring in April 2013, the revisions did not constitute a change in materiality – the only revision was that a separate expenditure category was created for financing subsidies paid by IDA for connecting low income households. Previously, there was no distinction between financing for subsidies and that for works, goods, and consultant services for distribution lines. IDA and GPOBA contributed to the payment of the subsidy at a ratio of 1:2. The share of the subsidy paid by the project varied as the cost of connections fluctuated. The separate expenditure category allowed the IDA contribution to be expressed in a fixed percentage of the unit cost.

20. At the time of KEEP's second restructuring in March 2014, there were savings amounting to USD 24.49 million in the T&D Components as a result of lower than estimated prices for transmission and distribution line and substation contracts. The savings amounted to USD 15.75 million in the transmission component and USD 8.74 million in the distribution component. Reallocation of USD 15.75 million from the transmission component to the distribution occurred under the restructuring. The savings were used for construction of additional 217 kilometers of distribution lines from seven substations, namely, Komorock, Ngong, Athi River, Kitale, Awendo, Mwingi and Garissa. The second restructuring also did not constitute a change in materiality

21. At the time of KEEP's third restructuring in April 2016, there had been considerable progress towards implementation with 84 percent of the original IDA credit having been disbursed. However, there was substantial delay in the procurement of the consultancy for the design and implementation of off-grid pilot rural electrification schemes. By the time the procurement of the consultancy was completed, there was inadequate time remaining to allow implementation of the pilots. The funds intended for these schemes (US$8 million) were used to scale-up construction of the distribution network and connection of public facilities in rural areas. As a result, the length of distribution network constructed was more than double the project target while almost

double the target number of public facilities had been connected to electricity supply. These factors led the government to review priorities and make adjustments where possible to project components. As a result, design and implementation of the off-grid electrification activities under Component C (C2 - electrification of priority loads in rural areas) were not pursued under the project and were to be later undertaken in the Kenya Electricity Modernization Project (KEMP, P120014). Subsequently, subcomponent C4, "Revolving Fund for Deferred Connection Fee Payments", US$10 million, was also canceled as it was financed by Agence Française de Développement (AFD).

22. At project appraisal, the project team had anticipated and had planned for the possible volatility of costs. By the third restructuring, KEEP had experienced an increase in total costs of US$64.5million. The increase in costs were as follows: US$53.2 million related to generation (Component A), US$10.23 million related to transmission (Component B), and US$1.11 million related to priority loads electrification (Component C). There were also savings of about US$4.17 million related to the component on institutional development and operational support (Component D). Taking into account unallocated funds of about US$7.1 million, the project had a funding gap of about US$52.54 million. In addition, the strengthening of the USD against the SDR had reduced the USD equivalent amount of the IDA credit by about US$11 million. Consequently, the Bank received a request from GoK to reallocate the savings and unallocated funds to transmission (Component B) and priority loads (Component C) activities.

23. An Additional Financing (AF) credit of US$68 million equivalent was prepared and approved by the Bank's Board on May 19, 2016. The AF supported the following:

(i) Support for the increase in costs of US$53.2 million related to the contract for the Olkaria I and Olkaria IV steam gathering geothermal system (component A);
(ii) US $10.5 million to scale-up slum electrification across Kenya (component C).
(iii) US$4.3 million to support technical assistance and capacity building to sector entities (component D).

The financing table below shows the original IDA credit allocation versus IDA credit allocation after AF approval and restructuring.

Components	Original Allocation (IDA only, US$M)	Allocation after 1st restructuring US$M	Action during 1st restructuring	Allocation after 2nd restructuring US$M	Action during 2nd restructuring	Allocation after 3rd restructuring US$M	Action during 3rd restructuring	Allocation after approval of AF Credit
Geothermal Generation	120.00	114.23	No change	114.23	No change	117.82	Revised	171.02
Transmission	64.5	63.31	No change	47.92	Revised	59.00	Revised	59.00
Distribution	134.00	132.81	No change	148.20	Revised	147.00	Revised	160.50
Sector Institutional Development and Operational Support	11.5	10.43	No change	10.43	No change	6.18	Revised	10.48
Unallocated	N/A	7.70	No change	7.70	No change	0.00	Allocated	
Exchange rate fluctuation	N/A	1.52	Losses	1.52	Losses			
Total	**330.00**	**330.00**		**330.00**		**330.00**		**401.00**

Other Changes

24. An additional US$3 million grant was approved on January 15, 2016 by GPOBA's donor for KEEP (the Swedish International Development Agency, SIDA), which brought GPOBA funding for the project to US$8.15 million. The increase in GPOBA funds were intended to allow additional households to be connected in Nairobi's slums.

25. The closing date for project and associated GPOBA trust fund were extended by 15 months and 20 months from September 30, 2016, and April 30, 2016 respectively, to December 31, 2017. This was intended to allow for sufficient time for project activities (including those that were incorporated into the project as part of the AF) to be completed.

26. The project was subject to an Inspection Panel[4] request related to the financing of the 140 MW Olkaria IV (Geothermal) sub-project, implemented by KenGen, that required the resettlement of members of a local Maasai community from four villages located on or near the project site. Details of the Inspection Panel case are provided in paragraphs 117-123 below.

[4] http://ewebapps.worldbank.org/apps/ip/Pages/ViewCase.aspx?CaseId=102.

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

27. As mentioned above, changes to the project included reallocation of costs between components, cost overrun, cancellation of part of a component and an additional financing. The potential for cost increase in the steam gathering system of the generation component was anticipated and incorporated in the contract design. The cost increase that arose during project implementation can be attributed primarily to three factors:

(i) Final quantities of works measured after works completion (e.g., number of wells, location) were larger than estimated in the contractual bill of quantities. At the time of initiating procurement, only 40 percent of the required number of wells had been drilled and drilling of the rest was planned. Therefore, the design and specification of most wells was based on estimates. Some of the assumed well sites were changed due to insufficient steam, with consequent changes in design.

(ii) Additional work was necessitated by design modifications to the steam field operating pressure as a result of prevailing steam characteristics. The largest part of these works was the construction of three steam let down stations that enabled operation of the steam field at higher pressure to avoid silica scaling damage of the pipes without modification to the power plant design.

(iii) Increase in price due to price adjustment.

28. The scale-up of Slum Electrification was intended to support Gok's ambitious national goal of achieving universal access by 2020. KEEP, through the support of IDA and GPOBA, supported the connection of low-income customers through an output-based mechanism which made electricity more affordable and encouraged households in slums to switch from an informal service to KPLC. KEEP had made substantial progress in connecting low income consumers to electricity access. Successful implementation towards achieving access outcomes had significantly accelerated and exhausted IDA and GPOBA funds ahead of schedule. To maintain momentum, additional financing was requested to scale-up the "Last Mile Connection" program and cater to the basic needs of the urban poor in informal settlements.

29. The AF supported scale-up of the Sector Institutional Development and Operational Support component in the following areas: (i) Following the KEEP Inspection Panel case, the AF presented opportunities to build capacity in environment and social safeguards. This sub-component would also finance aspects of the MAP emerging from the mediation process; (ii) A number of incidents related to health and safety had occurred some of which resulted in fatalities. This sub-component was to put measures in place to improve health and safety, and to improve the capacity of environmental health, safety and security teams; (iii) Feasibility Study to study technical and financial options for Olkaria VII approved at AF was dropped during implementation following changes to the Olkaria VI site. However, a feasibility study for options of hybrid cooling system to enhance the efficiency of water conserved and reinjected into the ground was carried out, and (iv) Monitoring and Evaluation System for slum electrification. The scale-up required development of an awareness campaign, establishment of a feedback system and launch of a beneficiary assessment for slum consumers.

30. As mentioned above, off-grid pilot rural electrification schemes under component C were cancelled. REA, the agency responsible for implementing component C, was not familiar with the long preparation process for mini-grid projects. Capacity for mini-grid project design and selection of appropriate business models needed strengthening. These factors led to long procurement delays, resulting in insufficient time to implement mini-grid activities and cancellation of the off-grid electrification schemes.

31. **Implication on the Original Theory of Change**. Changes during project implementation did not have an impact on the theory of change. The cost overrun was a risk that was evaluated (unknown salient characteristics of remaining wells to be drilled) and planned for during project preparation (flexibility in contracts). Project objectives remained unchanged. Restructurings reallocated loan proceeds amongst different components (e.g.,

transmission to distribution) but did not impact expected results. The AF included support for cost-overruns (in generation) for costs that had already been incurred under the project's original generation component. The scale-up component (of the slum component) increased the scope of the original component, but did not change the objective or desired outcome.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

Rating: HIGH

32. The Project Development Objectives were to: (a) increase the capacity, efficiency, and quality of electricity supply; and, (b) expand access to electricity in urban, peri-urban, and rural areas. PDO's remained relevant at the time of project completion. At the time of appraisal, project PDO's were aligned with Kenya's strategy for expanding electricity infrastructure to support the achievement of its long term development goals set in its long-term strategy document Vision 2030 in which an annual economic growth rate of 10 percent was deemed necessary between 2013 and 2030. The Medium Term Plan (MTP), prepared to implement the first phase of Vision 2030, called for expanding access to electricity inter alia. The PDOs supported key components of GoK's Electricity Access Investment Program 2009-2014 which included the addition of geothermal capacity, and the five year target of connecting one million new customers.

33. The Kenya Country Partnership Framework (CPF) FY2014-2018 aims to support Kenya to improve competitiveness and sustainability of growth to eradicate poverty. It recognizes that "enhanced infrastructure and logistics are the backbone of long-term growth and IDA financing should be used for some publicly merited investments, in the first instance targeted at electricity modernization through upgrading of selected transmission and distribution networks that will hugely improve technical and billing efficiency." The project objectives directly supported the achievement of expected outcomes of domain 1 of engagement in competitiveness and sustainability of the CPF, specifically "Additional 2300 MW installed generation capacity from diversified sources (geothermal, thermal, wind) and reduction of 2.8 percentage points in electricity system losses."

34. In addition to the CPF, the government's own strategy documents add to the evidence demonstrating relevance of the PDO. GoK's Least Cost Power Development Plan (LCPDP) for the period 2015-2035 which supports Vision 2030, confirmed that geothermal power generation is the least cost alternative to supply Kenya's base load power component. The National Geothermal Strategy prepared with World Bank support identifies the means to develop nearly 2,200MW of new geothermal capacity by 2035 and meet the Vision Scenario target of the LCPDP. KEEP remains relevant to both strategic documents mentioned above.

35. The rate of access to electricity was 19.2 percent at project appraisal in 2010. During KEEP's implementation 23.6 million people were connected to electricity, significantly contributing to a massive increase in the access rate. However, a substantial part of Kenya's population, located within and outside the grid footprint, does not have access to electricity. Recognizing that the lack of electricity is a major constraint to economic growth and an increase in quality of life, GoK has accelerated its electricity access goals and has set the target for universal access by 2020. With World Bank support, GoK has prepared a National Electrification Strategy (NES) which identifies least cost options (grid expansion and intensification, mini-grids, and stand-alone

solar systems) and associated investments needed for Kenya to reach universal access in electricity. The NES is expected to launch in FY19. KEEP's PDOs remain relevant to NES' goals of universal access and quality of service.

36. Diversification of power sources remains relevant as a development objective. The PAD stated that heavy dependence on hydropower for electricity did not provide the reliability for an expanding economy. In 2009, nearly half the hydro capacity was not available due to drought. Even though the benefits of diversification and associated security of supply are already being seen in the recent prolonged drought when there was no load shedding, the recent Kenya Economic Update[5] suggests that hydropower remains as an unreliable source affecting the country's economic performance. GDP growth (4.9%) in 2017 was the weakest in five years. One driver of the economic downturn was poor seasonal rains that limited the generation of hydroelectric power for much of 2017, and increased power tariffs put inflationary pressure on households and businesses. In light of these recent events, diversification of energy sources remains relevant.

The relevance of the PDO is therefore rated HIGH

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

Overall Efficacy Rating: Substantial

37. The project had two distinct PDOs: (i) to increase the capacity, efficiency and quality of electricity supply; and, (ii) expand access to electricity in urban, peri-urban, and rural areas. The project achieved its stated objectives. The increase in capacity, efficiency and quality was achieved through development of an additional 280MW geothermal generation capacity at Olkaria I & IV (Component A) and the construction of transmission lines and substations (Component B), as well as improvements to the distribution system (Component C). The expansion of access was realized through implementation of measures to increase electricity connections, including programs to make them more affordable for lower-income households (Component C).

38. At project closing in December 2017, a total of 280MW installed capacity (140MW Olkaria I and 140MW Olkaria IV) geothermal plants, were constructed and commissioned into operation under the project. The amount of electricity generated in FY18 from the two plants is estimated to be 2,269GWh in FY18. All 7 substations and 3 transmission lines have been completed. 24 distribution substations fully financed by KEEP have been completed, with additional 32 others constructed with materials procured under the Project and installed using counterpart funds. A total of 11,057 km of distribution lines have been constructed or rehabilitated. In the access target areas, grid access was provided to 23.59 million people by KPLC in the project period of 2010-2017, doubling the end target of 11 million. 1,058 community electricity connections were constructed under the project, connecting a total of 6,471 Community Centers. Electrification of 15,511 businesses was supported. 57,667 new slum households were connected to grid electricity using GPOBA and IDA funding totaling 177,895 households at the end of project implementation. These achievements in access expansion helped improved the quality of local living conditions, the business environment, and the overall wellbeing of people. The table below summarizes results achieved of post-restructuring PDO outcome indicators.

[5] Kenya Economic Update, December 2017, Edition no. 16, World Bank Group, https://openknowledge.worldbank.org/bitstream/handle/10986/29033/121895-WP-P162368-PUBLIC-KenyaEconomicUpdateFINAL.pdf?sequence=1&isAllowed=y

Post restructuring PDO Outcome Summary

PDO indicator	Baseline	Actual	End target	Delivery ratio	Comment
Number of people provided with access to electricity by KPLC	0.00	23,593,215	11,000,000	214.5 percent	Outcome achieved
Number of new slum consumers connected to the grid	120,000	177,895	174,000	107.2 percent	Outcome achieved
Electricity losses per year in the project area (percentage)	16.3	18.9	15.9	-6.5 percent	Outcome not achieved
Electricity generation from renewable generation capacity constructed under the project-net (GWh)	0.00	2,269	2,020	112.3 percent	Outcome achieved.
Interruptions per 1,000 customers	9.74	1.94	8.5	629 percent	Outcome achieved
Number of direct project beneficiaries (consumers connected)	0.00	4,718,643	2,200,000	214.5 percent	Outcome achieved

39. The project achieved five of the six PDO level indicators and all intermediate indicators. To further assess the project's achievement of the objectives in each area, this ICR quantifies the project's contribution to both objectives of "capacity, efficiency, and quality increase of electricity supply" and "electricity access expansion to urban, peri-urban and rural areas" by analyzing each individual objective and its components in detail.

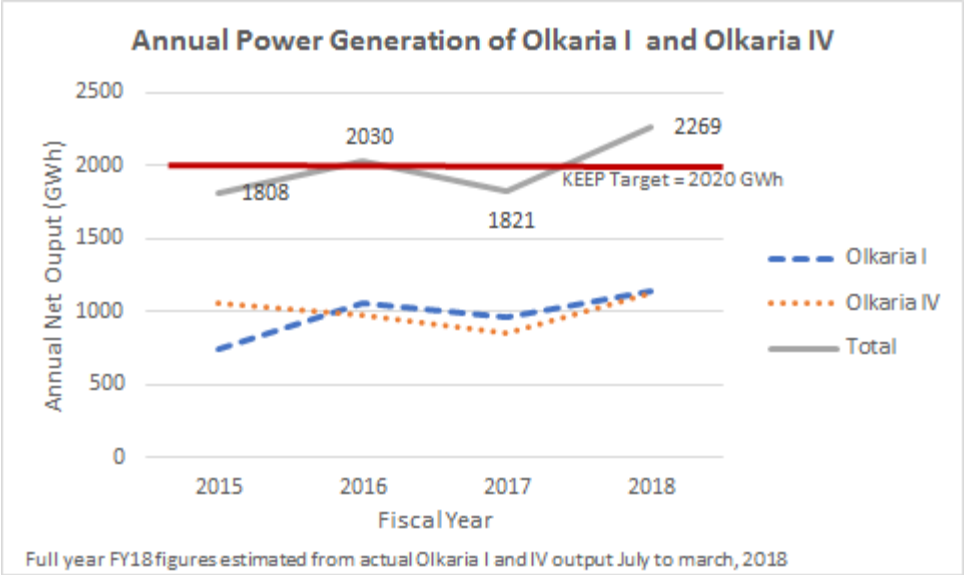
Objective I: Increase the capacity, efficiency and quality of electricity supply

40. As noted above, the first PDO consisted of three distinct elements - capacity, quality and efficiency. An analysis of each element is provided below.

Increasing the **Capacity** of electricity supply (component 1 of Objective I): Pre-restructuring: **High**. Post-restructuring: **High**

41. The project substantially achieved its objective of increasing capacity of electricity. By late 2015 280MW of geothermal capacity developed under the project had been commissioned with 140MW at Olkaria I and 140MW at Olkaria IV geothermal plants. The PDO indicator on units generated from Olkaria I and Olkaria IV was estimated to be 2,269GWh annually for FY18, an amount derived from figures provided to the ICR team for the period July 2017 – March 2018[6], thereby exceeding the target of 2,020GWh. The final ISR states that this indicator was 10 percent less than the target in FY17 (July, 2016 – June, 2017) with a decrease from the previous year. 1,820 GWh was generated in FY17 compared to 2,300GWh in FY16. The fewer units generated in FY17 were due to transmission congestion of the only line evacuating electricity from the Olkaria geothermal field to the load center of Nairobi (220kV Olkaria-Nairobi North) that necessitated the curtailment of generation from the power plants. The overload of the line resulted from the rapid commissioning of more geothermal capacity at Olkaria and delays in completion of the alternative transmission line (400KV Suswa-Isinya) which was completed in the second half of FY17. The lifting of the curtailment once the line was built demonstrated that the PDO indicator for increasing capacity had been met. The chart below shows annual generation output of Olkaria I and Olkaria IV.

[6] KenGen reports that units generated from Olkaria I and Olkaria IV were 1,702GWh from July, 2017, to March, 2018. For an indicator with a target measured annually, this translates to 2,269GWh for the July, 2017 to June, 2018 period.



42. Development of the 280MW geothermal capacity under the project has: (i) increased the generation capacity with a renewable source that is Kenya's firm least cost energy source; (ii) more than doubled developed geothermal capacity from 241MW in 2013 and transformed the country's generation mix; and, (iii) enhanced the security of supply because unlike hydropower, geothermal is not affected by vagaries of weather. At project close, geothermal capacity stood at 652MW, constituting 27 percent of total installed capacity, and providing 45 percent of total energy needs, up from 13 percent in 2013. The increase in geothermal capacity has displaced energy that would have been generated from thermal plants with significant savings in fuel costs. The tariff paid by electricity consumers reduced by about 4 KSh per kWh compared to what the bills would have been in the absence of the electricity produced in Olkaria.

43. Traditionally, Kenya relied on thermal and hydropower energy to meet its electricity demand. However, strong dependence on hydropower left the country exposed to hydrology risks that significantly affected the sector during drought periods. As of June 2017, renewable energy accounts for 65 percent of total installed capacity (approximately, 1,500 MW) and 78 percent of total electricity generation (approximately, 7.9 Terawatt-hour [TWh]). Geothermal became the largest electricity source in Kenya with 43 percent of the electricity generated and is rapidly matching thermal and hydropower sources in terms of installed capacity. The reduction in overall electricity generation costs, as a result of the prominent role of geothermal, has been transferred to the consumers through a reduction in end-user tariffs, with average reductions of 22 percent for domestic consumers and 25 percent for commercial and industrial consumers.

44. There were other significant benefits that accrued due to successful completion of the geothermal generation component. Kenya was placed on the world map of one the 10 leading countries in geothermal energy development. Several development partners have indicated interest in providing financing for geothermal development, a circumstance that can be attributed to the positive demonstration aspects of KEEP's geothermal capacity development. In addition, the geothermal laboratory and workshop, and Board of consultants, have contributed to future sustainable geothermal development.

Increasing the **Efficiency** of electricity supply (component 2 of Objective I): Pre-restructuring: **Negligible**. Post-restructuring: **Negligible**

45. An improvement in efficiency can be observed by the PDO indicator "Electricity losses per year in the project area". This indicator on system loss reduction was not achieved. At project design, the target for system

losses was 14.5 percent from a base of 16.3 percent. The extension of distribution lines in the low voltage network was associated with enormous increase in electricity access. Commissioning of new geothermal and thermal capacity without commensurate expansion of transmission capacity led to an increase in technical losses from 2012, consequently leading to an increase in overall system losses. To address the situation, the sector regulator, the ERC, revised the allowed system losses targets in KPLC's retail tariffs for the period FY14-FY16 to be 16.8 percent, 16.6 percent, and 15.9 percent for each of the years. During the third restructuring, the annual targets for system losses were therefore revised to align with the targets set by ERC.

46. System losses oscillated each year during project implementation. At the end of the project, system losses were 18.9 percent, above the baseline of 16.3 percent at the start of the project and resulting in a negligible achievement of the efficiency component of the first PDO. System losses were higher than the baseline and the target due to: (i) increase in generation capacity over the period located far from the main load centers; (ii) overload of major transmission lines compounded by delays in the commissioning of new transmission lines as a result of increased generation capacity; and, (ii) enormous extension of distribution lines in the low voltage network to connect new consumers without corresponding investment in the medium and high voltage transmission and distribution network.

47. KPLC has prioritized loss reduction in its revised corporate strategy and is currently implementing several initiatives to amend the situation, such as a revenue protection program to monitor consumption of high value consumption customers that is financed under Kenya Electricity Modernization Project - KEMP (P120014); enhanced inspections of metering installations; and improvement in billing accuracy. KPLC has engaged IFC for a period of two years to provide technical support in the loss reduction strategy.

Increasing the **Quality** of electricity supply (component 3 of Objective I): Pre-restructuring: **High**. Post-restructuring: **High.**

48. **Quality.** The improvement in quality of electricity was to be observed by the reduction of service interruptions in the project area as measured by the "Average interruption frequency per year in the project area" indicator. The project team corrected a drawback in this indicator by including the supply interruption incidences which had been excluded from reported incidences prior to July 2012. The indicator was reformulated for this purpose to "Interruptions per 1,000 customers" with an end target of 8.5 and a baseline of 9.1. The project met and exceeded this target with result of 1.94 interruptions per 1,000 customers in the target area.

49. The improvement in reducing the number of service interruptions was dramatic, falling from 9.79 per 1,000 customers in June 2015 to 1.94 at project closing. The improvement can be attributed primarily to enhancements to grid reliability due to the robustness of the distribution network. KPLC employed extensive and effective measures to make the network robust which included a strong focus on maintenance of the low voltage network. A significant number of customers were added to the grid during project implementation. During 2010-2017, an average of approx. 1 million customers were added per year leading to a substantial improvement in the ratio of service interruptions (reduced due to service enhancements) to population served (increased due to substantial numbers of people connected to electricity).

50. KEEP achieved the three components of capacity, efficiency and quality with High, Negligible and High ratings respectively. Considering that two of the three results areas or sub objectives in PDO 1 were High and 1 was Negligible, the **efficacy rating for the first objective is Substantial**.

Objective II: Expand access to electricity in urban, peri-urban and rural areas

Rating: Pre-restructuring: **Substantial.** Post-restructuring: **Substantial.**

51. KEEP was designed to measure increase in electricity access by the "Number of people provided with

access to electricity" indicator. At project closing, KPLC had connected 23.6 million[7] people to electricity, far exceeding the 11.0 million target established during restructuring. In terms of number of consumers connected to the grid (household connections), KPLC connected 4.72 million customers versus a target of 2.2 million. In its latest Annual Report[8], KPLC reports a total of 6.2 million customers at the end of FY17, with an average growth in customers of 30 percent per annum. On average, KPLC reports connecting 1.14 million customers annually for the past three years. As part of the larger program of expanding access to electricity, IDA through its financing of the distribution component was instrumental in contributing to meeting and exceeding the access indicator.

52. The objective of expanding electricity access was stated in the PAD as "expand access to electricity in urban, peri-urban, and rural areas". However, the PAD did not describe how access to urban, peri-urban, and rural areas would be defined, nor did the results framework breakdown connections made by geographical areas. Urban, peri-urban and rural connections to households were provided by KPLC. REA provided connections to public facilities in the rural space. Typically, REA makes the connections and hands them over to KPLC to manage. At the end of FY17, 18.8 percent of KPLC's customers were rural. Applying this ratio to project outcomes as proxy, we can estimate that 4.4 million rural customers were connected through KEEP (18.8 percent of 23.6 million customers connected through KEEP). No distinction can be made for urban versus peri-urban customers due to two factors: (i) a definition of urban and peri-urban categories does not exist; and (ii) it is practically very hard to distinguish between the two areas as boundaries are not rigid and often overlap.

53. The project also provided targeted subsidies for connections of low-income customers in slums through an output-based mechanism supported by IDA and GPOBA in the amount of US$28.65 million (US$20.5 million IDA, US$8.15 million GPOBA). KPLC/GoK shouldered the largest portion of the subsidy at $510 per connection, with IDA and GPOBA contributing $250 and $125 respectively. 57,667 new slum households were connected to grid electricity using GPOBA and IDA funding totaling 177,895 households at the end of project implementation. The project helped address affordability barriers of electricity connections for slum population. Using pay-as-you-go methods, KEEP encouraged households in slums to switch service from informal service providers to KPLC

54. Off-grid component activities under the project were designed as a pilot with the objective of generating demonstration effects to explore alternatives for accelerating electricity access in remote rural areas. Off-grid activities were cancelled due to implementation delays and off-grid component costs were reallocated to support electrification of priority loads in rural areas. Most activities in the rural space were implemented as planned. Targets were met or exceeded, including construction of 1,058 community electricity connections and electrification of 15,511 business centers. Lessons learnt from mini-grid activities were captured in the studies under component D, which served as reference in the designs and preparation of new WB investment projects including KEMP and Kenya Off-grid Solar Access Project (KOSAP, P160009).

While achievement of access targets were exceeded, there were minor setbacks such as the cancellation of the pilot off-grid component, which translates to a **Substantial** rating for PDO2.

Justification of Overall Efficacy Rating

55. The PDO of the project was to: (i) increase the capacity, efficiency and quality of electricity supply; and (ii) expand access to electricity in urban, peri-urban, and rural areas. Both objectives have been assessed to be Substantial. The overall efficacy rating of the project is therefore assessed as **Substantial**.

[7] Assumes 5 people per household

[8] Kenya Power Annual Report and Financial Statements for the year ended 30 June 2017, http://kplc.co.ke/AR2017/KPLC%202016%20-%202017%20Annual%20Report-.pdf

C. EFFICIENCY

Assessment of Efficiency and Rating

Overall Efficiency rating: Modest

56. The economic analysis at project completion was conducted at both project level and component level. As during the appraisal, it covers the three investment components (generation, transmission and distribution) for which economic flows can be quantified. Component D (policy and institutional capacity building activities) is excluded due to the difficulty in monetizing the economic benefits of technical assistance and capacity building activities. The economic analysis at appraisal stage used a 12 percent discount rate as the economic opportunity cost of capital (EOCK) for the calculation of the Net Present Value (NPV). To be consistent, the economic analysis at ICR stage was developed using the same discount rate. The results of post-completion economic rate of returns are compared with those forecasted at the time of appraisal. A summary of the results is presented below and the detailed analysis is presented in Annex 4.

57. Both analysis at appraisal and at completion used cost-benefit analysis approach. Key differences include:

- A combined analysis is done at completion for original IDA credits and additional financing.
- A project-level analysis is done at the completion.
- The ICR analysis includes an estimation of environmental benefits.

58. The economic analysis at project completion shows that the project has NPV of US$368 million (at a 12 percent discount rate) and an Economic Internal Rate of Return (EIRR) of 16 percent[9]. While at appraisal the analysis did not provide EIRR for entire project, it did provide EIRR for each of the three components: 23 percent for generation component, 32 percent for transmission component, and 21 percent for distribution component. An updated analysis was prepared at AF appraisal but only for the generation component and it stated an EIRR of 13 percent. At project completion, the analysis developed for this ICR results in an EIRR of 14.3 percent for generation component, 27 percent for transmission component, and 11.5 percent for distribution component.

59. The key drivers explaining the differences in EIRR at component-level analysis are:

- A decrease in the estimated long-run marginal cost of electricity for the system. Changes in the energy mix [with greater geothermal penetration] lowered the expected marginal cost of electricity in the system, affecting the opportunity cost estimation and, thus, reducing the expected economic benefits of the generation component.
- Delays in the implementation of transmission assets affected the estimated flow economic benefits from the transmission component
- An increase in total system losses affected the estimation of incremental energy saving benefits from the analysis at project closing in 2017.
- Lower estimate of willingness-to-pay based on updated household expenditure results in Kenya Household Budget survey 2016 reduced the expected economic benefits of the distribution component.

[9] Project-level EIRR at 19 percent when including CO2 benefits.

Implementation efficiency

60. Overall, the project achieved a good level of implementation efficiency by successfully completing all project components before the closing date, considering the large scale and complexity of the project, however, the mini-grid component had to be cancelled due to long implementation delays.

61. Actual component costs varied compared to estimated cost at appraisal. A total cost overrun of US$53.2 million in steam field development under geothermal component, which was covered as a major part of Additional Financing in the amount of a US$68 IDA credit. However, the potential for cost variation was expected at appraisal and properly incorporated in the contract design because of the uncertainty at the design phase of the final location of geothermal wells and their characteristics. KenGen communicated and discussed design modifications with Bank task team during implementation supervision missions in a timely and continuous manner. By commencing implementation of the steam gathering system and power plants works at the same time as drilling of the wells was ongoing, the GoK reduced the implementation period by over a year. In addition, the total investment of Olkaria I and IV AU 4 and 5 is about 74 percent of the appraisal estimate, which was primarily due to significant cost savings in final contract values for the power plants and steam well drilling compared to agreed financing packages. This was largely attributed to the emphasis in the contract documents on the balance between turbine performance and equipment price and also to the competitive bidding process.

62. For the distribution component, the main reason for higher actual cost compared to appraisal estimate was due to expanded scope responding to speed-up efforts of GoK to achieve universal electricity service to all households and businesses in Kenya over the shortest timetable. The slum electrification subcomponent was efficiently executed, with 4 percent additional outputs (3,992 slum households) achieved at the end of project implementation.

63. The project achieved lower unit investment cost of Olkaria I AU and IV compared to estimates at appraisal, with $3,327/KW compared to the estimated $4,307/KW at appraisal. This is close to the average unit CAPEX of $3,413/KW for future geothermal power plant candidates that is projected in Long-term Power Generation and Transmission Master Plan prepared by Lahmeyer[10]. This is mainly a result of the lower specific investment costs of larger unit sizes. In addition, by looking at capacity-weighted construction cost of geothermal power plants only, KenGen data shows a decrease trend with $2,340/KW (Olkaria I 4&5) in 2015, compared to $3,780/KW (Olkaria II AU) in 2010. Although construction costs alone do not determine the economic attractiveness of the technology, it has reflected a lesson learnt for future bank's operations to further focus on utility-scale geothermal investment given its economies of scale.

64. Time overruns in transmission component negatively affected the implementation efficiency. There was a significant delay in the implementation of three transmission lines which resulted in delays in expected energy savings from the infrastructure. Serious challenges in right of way and land acquisition, lack of land regulations with clear guidance on compensation and benefits sharing, inadequate budgetary allocation by GoK to KETRACO were the main reasons for the implementation delay. However, it is noted that the challenges faced in the project are common barriers for infrastructure projects across Kenya. In addition, KETRACO, as a newly established agency, implemented the safeguards part for the first time in an IDA-supported project.

64. The above analysis demonstrated a satisfactory project-level EIRR at the completion as well as several strong aspects of implementation efficiency especially under geothermal component. However, there are also some underperformances in the following aspects that affected the project efficiency: cost overruns in geothermal component, delays in the implementation of the transmission component, the cancelation of the

mini-grid subcomponent and the negative impact of higher transmission losses in the transmission component. Based on these considerations, **the overall efficiency of the project is rated as Modest.**

D. JUSTIFICATION OF OVERALL OUTCOME RATING

Overall Outcome Rating: Moderately Satisfactory based on High Relevance, Substantial Efficacy, and Modest Efficiency

65. The PAD noted that Kenya's private sector which had been the main source of economic growth faced significant infrastructure constraints. The resulting lack of reliable generation capacity was seen to increase the cost of doing business, undermine competitiveness and diminish trade prospects. This ICR assessed KEEP's achievements through Kenya's performance in the World Bank's Doing Business Index during the project implementation period. From 2014 onwards, Kenya's global rank has steadily improved, rising from 129 in 2014 to 113 in 2015, 92 in 2016 and 80 in 2017. Of particular interest is Kenya's rank in the "Getting Electricity" sub-category. In 2017 Kenya was ranked 71 in getting electricity, higher than its overall global rank of 80. The table below shows steady improvement in most sub-rankings[11] of the Getting Electricity category.

Year	Getting Electricity - Distance to Frontier	Getting Electricity - Time (days)	Getting Electricity - System average interruption duration index (SAIDI)	Getting Electricity - System average interruption frequency index (SAIFI)
2018	76.68	97	80.9	16.9
2017	64.43	97	162.6	16
2016	58.57	110	188.5	16.5

66. The PDO of the project was to: (i) increase capacity, efficiency and quality of electricity supply; and (ii) expand access to electricity in urban, peri-urban, and rural areas. The overall outcome is rated as Satisfactory which is based on the project addressing a highly relevant objective and meeting that objective with substantial efficacy and efficiency. Five of six PDO level outcome indicators were met and in most cases substantially surpassed. One outcome indicator on system losses was not met because there was a substantial increase in generation capacity without a corresponding investment in the medium and high voltage transmission and distribution network, combined with ineffective loss reduction strategies. KPLC has prioritized loss reduction and is currently implementing several initiatives to amend the situation, one of which is through the Bank financed Kenya Electricity Modernization Project - KEMP (P120014).

67. Geothermal is Kenya's least cost baseload energy source and the addition of the 280MW has not only increased the generation capacity but also more than doubled the developed geothermal capacity from 241MW in 2013. Geothermal capacity now stands at 652MW and constitutes 27% of total national installed generation capacity but provides about 45% of the total energy needs, from 14% in 2013, thereby displacing energy which would have been generated from the thermal plants, with significant savings in fuel costs. The commissioning of Olkaria I and Olkaria IV reduced the share of thermal generation by 53 percent and

[10] Average unit CAPEX of various geothermal power plant candidates with 100MW capacity and above.
[11] SAIDI and SAIFI are defined as follows: SAIDI is the average total duration of outages over the course on a year for each customer served. SAIFI is the average number of service interruptions experienced by a customer in a year.

contributed to a 27.4 percent reduction in average generation costs (from 12.5 US$c/kWh to 9.1 US$c/kWh).

68. In summary, this ICR assesses that KEEP was a transformative project in many ways. At approval, KEEP was the largest IDA project in Kenya's portfolio and was sector wide in scope with many financiers. The addition of 280MW of new geothermal capacity positioned Kenya as renewable energy leader and it was ranked in the top 10 list of geothermal countries[12]. The added geothermal capacity in KEEP transformed the country's power capacity and energy mix. Installed geothermal capacity was doubled and contributes close to 50 percent of energy generated. Security of supply was significantly increased and resulted in substantial savings in fuel costs to consumers and the economy. Project viability encouraged many financiers in geothermal generation. This applied to financiers in T&D and access activities as well. KEEP created a world class slum electrification program with a Results Based Financing (RBF) model, creating conditions/capital assets for the last mile electrification program. The low cost of obtaining a connection to slum consumers (US$ 10) was instrumental in increasing uptake and KPLC and GoK fully embraced the slum electrification program, rolling it out beyond the project's scope of slum areas to the entire country. The studies on mini-grid, off-grids was important for institutional as well as for continuation of sector dialog with GoK. The project was vital for its time and laid the foundation for Kenya's future energy program. This ICR assesses that there was extensive benefit to customers by the project.

Rating Summary Table:

Overall Outcome Ratings		
Rating Dimension	**Original Objectives**	**Objectives after 3rd restructuring**
Relevance of Objectives	**High**	
Efficacy		
Objective 1: Increase the capacity, efficiency and quality of electricity supply		
1.1 Increase capacity of electricity supply	High	High
1.2 Increase efficiency of electricity supply	Negligible	Negligible
1.3 Increase quality of electricity supply	High	High
Overall efficacy of Objective I	Substantial	Substantial
Objective II: Expand access to electricity in urban, peri-urban and rural areas	Substantial	Substantial
Overall Efficacy (Objective I and II)	**Substantial**	**Substantial**
Efficiency	**Modest**	
Outcome Rating	Moderately Satisfactory	Moderately Satisfactory
Outcome Rating Value	4	4
Amount Disbursed (US$ million)	290	108
Disbursement (%)	73.9%	27.1%
Weight Value	2.956	1.084
Total weights	4.04	
Overall Outcome Rating	**Moderately Satisfactory**	

[12] Kenya was ranked 6th in the top ten list of countries with installed geothermal generation capacity in November 2016. http://www.thinkgeoenergy.com/latest-top-10-list-of-geothermal-countries-november-2016-power-generation-capacity/

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

Gender

69. KEEP's Development Objectives included benefits to men, women and children. While there were no components that specifically targeted gender, a World Bank literature [13]review examined benefits of electrification to women and men. The review showed that a study in Nicaragua found that women were 23 percent more likely to work than men (Grogan and Sadanand, 2013). Other studies found that female employment in rural South Africa increased by 30% (Dinkelman, 2011), and Khandker et al. (2012) found that women in India were more likely to work, both without a significant effect for men. The literature review concluded that electrification increased household employment for both men and women. In a majority of cases this was for women, but it was not confined to females.

70. In KEEP's project area, 50.7 percent of beneficiaries were female in 2016[14]. The results of the customer satisfaction survey conducted for slum electrification under the project demonstrated that there were significant positive impacts on women in areas that were connected to electricity, including economic, social and physical improvements to their lives due to legal and safe electricity. Installation of public lighting on streets improved security in slums which is important for minimizing Gender Based Violence (GBV) and also violence directed towards children.

Institutional Strengthening

71. KEEP's component D was designed to help sustain the policy, institutional and regulatory environment that GoK had created with earlier Bank-financed operations. Subcomponents included institutional development and studies to further strengthen the sector institutional framework and management of power companies. Seven studies were financed and completed under KEEP:

(i) Options for development of a power market in Kenya,
(ii) Cost of service study,
(iii) Technical & economic study for the development of small scale grid connected renewable energy in Kenya
(iv) Materials and supply chain management study
(v) Feasibility study for the 400MW Menengai Phase 1 Geothermal Project.
(vi) Development of regulations, revenue arrangements, and technical requirements for private sector renewable energy mini-grids
(vii) Prefeasibility studies for private sector renewable mini grids

72. The staff of Implementation Agencies including MoEP, KenGen, KPLC, KETRACO and ERC benefited from the technical support and training provided under the project. The training was provided by several local and global institutions and covered areas such as: project management, energy policy, power system planning, power system operations, customer service management, public–private partnerships (PPPs), financial management, management and leadership development, utilities regulation, environmental and social

[13] Ibid
[14] Women and Men in Kenya Facts and Figures 2017, Kenya National Bureau of Statistics, https://www.knbs.or.ke/download/women-men-kenya-facts-figures-2017/.

safeguards, procurement and logistics. The training also included on the job training on gas and oil and benchmarking visits.

73. The Bank's engagement with GoK in the electricity sector over the years has contributed to the sector's operational and institutional strengthening. In this regard, Kenya has become a model for other African countries, having created a competitive power market, within the framework of an overall sound institutional and legal framework.

Mobilizing Private Sector Financing

74. Kenya has achieved considerable success in strengthening the energy sector which operates on commercial principles supported by transparent financial relationships between sector utilities and cost reflective retail electricity tariffs. Since 1993, GoK has undertaken key sector reforms which have been supported by the Bank. The energy sector in Kenya has attracted significant private participation in generation since 1997. In 2016, there were 10 IPPs that accounted for approx. 30 percent of installed generation capacity with US$2.4 billion in private equity and commercial loans mobilized to finance privately owned power plants.

75. In Kenya, transmission and access activities are typically funded through public funds due to the low appetite of the private sector to invest in these activities in Sub-Saharan Africa. The large size of Olkaria IV (costing about US$0.5 billion) made it very risky for the private sector, and finding the level of security demanded by the private sector would have been difficult. In addition, KenGen had the rights for of development of geothermal power capacity at Olkaria IV. Having already carried out development of geothermal resources there, transferring those rights to the private sector would have delayed construction of the plant. KEEP was complemented by the Private Sector Power Generation Support project in 2012 which provided IDA Guarantees of US$135 million that enabled development by 3 private sector developers (IPPs) of 3 thermal power plants with a combined output of 250MW. This capacity complemented the geothermal capacity in ensuring adequacy and energy security for the country

76. The Government has set ambitious targets to scale up investments and increase access to 100 percent by 2020 (recently changed to 2022), recognizing, inter alia, that achieving these targets will require involvement of the private sector. KEEP's component D, namely Sector Institutional Development and Operational Support included support to examine what was needed to deepen private sector participation. Subcomponent D1 – Institutional Studies – supported the next phase of electricity sector reforms in the development of the electricity market. Studies supported analytical work to advance the wholesale electricity market and facilitate private sector investment. While there were no direct efforts to mobilize private sector financing for agreed activities under KEEP, its analytical work furthered the work on strengthening the electricity sector. Please see Annex 7 for information on evolution of the power sector demonstrating key milestones in Maximizing Finance for Development (MFD) in Kenya.

Poverty Reduction and Shared Prosperity

77. KEEP's objectives of providing affordable electricity to more people and improving the quality of supply responded to the government's intent to promote greater economic growth and equity. The low level of electricity access was a factor that constrained the achievement of national economic objectives which emphasized greater equity of opportunity. The high cost of electricity service was an obstacle to expansion of

electricity access to lower-income households. KEEP's expansion of the power grid allowed GoK to provide electricity service to areas and groups of people that previously were unreachable.

78. KEEP's slum and rural electrification activities under the distribution component had a strong focus on low-income households and communities. These activities generated numerous socioeconomic benefits that were reported by beneficiaries of households that were interviewed in a slum customer satisfaction survey undertaken at project completion. Key findings of the satisfaction survey are as follows:

(i) Over half of the 477 respondents indicated that they had experienced some form of household savings because of the impact of the electricity connection under the project.

(ii) Installation of new connections also resulted in an improvement in security conditions for residents in the area as indicated by 67 percent of interviewed households. Before the electrification work, members of the community had died or suffered bodily injury due to accidents involving access to illegitimate sources of electricity supply.

(iii) An increase in economic activities within the areas connected was a clear impact of the project. Businesses that provided electricity dependent services opened in the electrified areas such as barber shops, salons, refrigeration services, cyber cafes.

(iv) There was also migration to these connected areas resulting in an increase demand and value for land and housing facilities within the connected areas.

(v) Connected households were also able to utilize electrical appliances to improve the quality of their lives.

Other Unintended Outcomes and Impacts

79. Green House Gas (GHG) Accounting Analysis was not undertaken at the project's initial appraisal, but was considered when the AF credit was appraised. An assessment was made of the project's impact on GHG emissions under the generation component. This ICR provides an updated GHG accounting analysis at project completion for three components (generation, transmission, and distribution), based on actual output values received from project.

The geothermal component led to a decrease in use of diesel-based self-generators. GHG emissions of electricity supplied by geothermal sources (0.128 tCO2e/MWh) are lower than GHG emissions from diesel self-generation (0.65 tCO2e/MWh). An annual average of 932,493 tCO2e is estimated under geothermal component. The total estimate of GHG emission reductions over the expected 20-year lifetime of the geothermal plants is 24,244,809 tCO2e.

For the transmission component, GHG benefits generated from the newly constructed networks are estimated at an annual average of 12,422 tCO2e. Total GHG emission reductions over a 40-year lifetime of transmission infrastructure are estimated to be 496,868 tCO2e. The assumption is that additional electricity goes toward replacing diesel self-generation. GHG emissions of the mix of electricity supplied through the grid (0.504 tCO2e/MWh) are lower than GHG emissions from diesel self-generation (0.65 tCO2e/MWh).

For the distribution component, additional electricity goes toward replacing traditional use of kerosene and diesel in household energy consumption. An annual average of 173,521 tCO2e is estimated. A total estimate of GHG emission reductions over 15-year project lifetime is 3,470,419 tCO2e.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

80. Project design included four distinct components and together addressed the delivery of power services for the entire cycle – from generation to household connections. Project design was responsive to GoK's ambitious goal of achieving universal access by 2030, later revised to 2020 (recently changed to 2022). To achieve this target, all phases of power service delivery needed to be addressed. The Bank team evaluated the Adaptable Program Lending (APL)instrument as an alternative to a Specific Investment Loan (SIL). Utilization of an APL would have allowed for a programmatic series of operations which likely could have been less complex. However, KEEP was more suited to a SIL as the three components of generation expansion, transmission, and distribution were complementary and were not easily amenable to scaling down without compromising the ambitious objective of increasing substantial access in a relatively short period of time. Lessons learned from previous similar projects such as the Energy Sector Recovery Project (ESRP, P083131) were factored into the design which was particularly useful in designing the scope of contracts.

81. The project's objectives were realistic, directly responded to GoK's priorities and were clearly defined. The targets for access to electricity specified during preparation were reasonable and could be achieved under the project. The timing of achieving objectives was realistic - the generation, transmission and distribution components of the project were not expected to show progress in 2011 and 2012. PDO and intermediate monitoring indicators were aligned with project development objectives and appropriate, notwithstanding a small amount of repetition in some indicators which was corrected during implementation.

82. Implementation arrangements were well documented in the PAD (Annex 6). The key implementing agencies – MoE, KenGen, KPLC, KETRACO, and REA were appropriately engaged to oversee areas under their mandate. Each agency was appraised with regards to its overall capacity and arrangements that it had made for implementation, including arrangements for results reporting, and for managing of environmental and social safeguards. Arrangements were found to be satisfactory. KETRACO and REA were relatively new agencies. KETRACO as the agency with the mandate for transmission, would have been expected to implement KEEP's transmission component. After signing contracts with KETRACO, KPLC implemented the transmission component on its behalf. This was expected to have benefits that were twofold: (i) KETRACO would gain valuable experience and increase its capacity; and (ii) KEEP would maintain its momentum and would be able to keep to its aggressive schedule of increasing access. Similar arrangements for REA, which was also a relatively new agency, were not made. However, staff at MoE who previously were involved in rural electrification, were transferred to REA when the agency was founded and continued their work in KEEP. KenGen through an implementation agreement with KETRACO was responsible for the transmission and substation execution under the generation component.

83. The design of KEEP was based on a least cost planning approach that favored first connecting areas with high population density closest to the grid, while at the same time taking into account equity principles to benefit remote areas. Therefore, priority loads in rural and district centers were targeted for electrification.

Cost estimates were developed using the analogous estimating method and feasibility studies, and factoring in completed costs from previous similar projects with appropriate adjustments for price factor changes.

84. Stakeholder consultations were undertaken over a period of four months, between September 2009 to December 2009 to discuss resettlement options and compensation for Project Affected Persons (PAPs). In preparation of the Resettlement Action Plan (RAP), KenGen had conducted site visits which included a census, social survey of PAPs, land and asset valuation, public meetings, consultative meetings with PAPs, interviews with key member of the community and site surveys. Nevertheless, during implementation there were cases of several people who claimed they had been excluded during the 2009 census survey. Some of the claims were found to be of merit. This fact had a significant bearing on KEEP's Inspection Panel case (para 26 above and further discussed in section IV B below).

85. Project design included a well thought-through decision to begin implementation prior to all variables (steam wells number and locations being known in feasibility and design. The benefits of starting project implementation with only 40 percent wells drilled and without waiting for all wells to be drilled resulted in the 280MW plants and the steam gathering infrastructure being completed earlier by more than one year. The benefits to consumers and the economy in terms of displacement of generation from expensive thermal sources were significant and far outweighed the $ 25 million contract price variation. In any event the same cost would have been incurred had the procurement process waited for all wells locations to be confirmed.

86. Despite sound project design and implementation arrangements, the Inspection Panel found that there were shortcomings in applying OP 4.10 (Indigenous Peoples) as it was not applied to the Maasai in Olkaria. However, at the time that the project was prepared and approved, the application of OP 4.10 by the Bank in Africa had been largely restricted to hunter-gatherer groups and was not extended to pastoralist communities. Consistent with prevalent Bank precedent and GoK policy, a number of groups were identified as being present in areas where the T&D components were to be implemented and an IPPF was prepared. However, reflecting prevailing practice, the policy did not extend to the Maasai in Olkaria at the time of project design.

87. There were a few shortcomings observed in the safeguards implementation and in off-grid activities. One challenge was the lack of effective flow of funds arrangements in managing payment of PAP compensation. No mitigation plans were made to manage risks of unanticipated delays between RAP preparation and actual payment of compensation (e.g., engagement with the National Treasury to facilitate timely and adequate funds flow). Off-grid activities were affected by the lack of sound technical assessment of off-grid electrification component. This led to delays ultimately leading to the cancellation of the off-grid component.

B. KEY FACTORS DURING IMPLEMENTATION

88. A key factor during KEEP's implementation was the substantial support that the project received from GoK, both in terms of financial support and commitment, which led to KEEP substantially achieving and surpassing intended outcomes. By the mid-term review (MTR), implementing agencies had contributed US$ 211 million compared to US$170 million assumed in the project financing plan. KenGen had contributed $12 million more than had been originally planned for the generation component. KETRACO also had contributed more than was originally intended with US$ 15.82 million versus US$8 million initially planned. However, the factor with the largest impact on achieving access outcomes was the contribution of KPLC which had been expected to contribute US$ 30 million to upgrade or construct 9 substations and 1,200 km of distribution lines. At project completion, KPLC had constructed/rehabilitated 63 substations and 11,057 km of distribution lines, with a US$ 94.2 million contribution.

89. The project experienced delays in implementation of transmission and distribution components (components B and C). The Bank's early supervision missions flagged the initial delays in project implementation, which were about 13 months behind original contractual schedule at the time of Mid-term Review in 2015. Mitigation measures were taken by KPLC and KETRACO through intensified supervision of the activities and frequent discussions with the contractors on ways of speeding up the execution. As a result, the works under both components were completed before closing of the project. Four major factors contributed to the implementation delays of transmission and distribution components:

(i) Delays by KPLC in acquiring land for substation sites and wayleaves for transmission and distribution lines. Acquisition of land for substations and wayleaves for line routes continues to be a major challenge affecting the development of transmission projects in the country. The challenge has caused significant delays to projects in some cases by more than 2 years.

(ii) Under-performance of transmission/distribution substation contractors. There were some issues observed in project management and supervision arrangements by substation contractors and slow works execution by the contractors and their subcontractors

(iii) Introduction of new taxes on project goods and delays in obtaining tax exemptions for imported project goods.

(iv) Delays associated with development approvals and contractor permits by the newly created County Governments after the 2013 general election

90. As mentioned previously, the project team had prepared for volatility in costs. As implementation progressed, KEEP experienced cost-overruns in the generation component Olkaria I units 4 and 5, and Olkaria IV. The steam field portion of the component had begun before the drilling of wells was completed. Changes in drilling activities and some activities not included in the original scope that were subsequently added led to redesigning of some aspects of the steam field portion, adding to costs for the component. It also became necessary to change the steam field operating pressure to address the silica scaling issue that arose after the project had made substantial progress in component A. Addressing this issue required redesign which contributed to the cost overrun. This ICR assesses that the benefits of earlier commissioning of the generation plants outweighed the cost of the increase in contract price and should be considered a sound implementation approach.

91. Staff turnover at MOE and KPLC had an impact on project implementation. Implementation agencies were staffed with competent professionals who were in high demand and the project was affected by frequent institutional staff transfers. Staff that left were replaced but with no guarantee that incoming staff would be proficient in World Bank procedures. Incoming staff were trained but there was a steep learning curve. Once trained and having become experienced in project implementation, staff became prime candidates for institutional transfer and the cycle was repeated. KEEP therefore presided over an increase in capacity in project management and implementation, albeit with a cost in terms of project delays.

92. Contract management was a noteworthy concern during project implementation. Some contractors, despite having been selected via Bank standard procurement procedures were found to be unable to perform to project expectations leading to delays in implementation. In other cases, contractors and consultants who were awarded contracts changed approved suppliers, sub-contractors and sub-consultants after contract award. There were consequent delays as a review of materials and equipment to be supplied, and of new personnel, needed to be completed.

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

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

M&E Design

93. The M&E framework included five PDO level indicators designed to measure progress and achievement of the project's two stated development objectives. The PDO level indicators of "*Electricity generation from renewable geothermal capacity constructed (GWh)", "Interruptions per 1,000 customers", and "Electricity losses per year in the project area"* were directly responsive to the first objective of increasing capacity, efficiency and quality of electricity supply respectively. The second objective of increasing access to electricity in urban, peri-urban and rural areas was served by the "*People provided with access to electricity in the project area"* and "*Direct project beneficiaries"* indicators. After an increase in the project's scope due to additional financing, a sixth indicator, "*New slum consumers connected to the grid*" was added and directly addressed the increase in scope.

94. In general, outcome indicators were well structured and adequate for measuring the achievement of PDOs. However, there was a shortcoming in the indicator to measure efficiency (Electricity losses per year). An ESMAP study[15]. suggests that system loss reductions, measured as a combination of technical (e.g., heat or copper losses, magnetic losses, transformation losses) and non-technical losses (e.g., commercial losses, metering failures and theft), are difficult to separate. The overall level of inefficiency can be estimated but it does not define where the problems are located. The level of system loss could be affected by multiple factors in addition to the increase in the available transmission and distribution capacity under the project. Indeed, the above-mentioned factors were a concern in KEEP.

95. The outcome indicator for quantifying expansion of electricity access was served by "*People provided with access to electricity in the project area".* However, this indicator was not broken down geographically by urban, peri-urban and rural areas as stated in the PDO. As mentioned above, determining a common definition of urban, peri-urban and rural categories is a complicated undertaking as definitions do not exist and boundaries overlap. Therefore, stating the PDO in the context of geographical areas but having no way of quantifying them other than inference, is considered a weakness of the M&E framework. The PDO was successful in showing that the access expansion would be country-wide as it covers urban, peri-urban, and rural areas, albeit without supporting indicators for measurement.

96. Project teams were vigilant in evaluating whether indicators were suitable and took action to correct where necessary. An example is the indicator to monitor and report service interruptions, "Average interruption frequency per year in the project area" which was amended at the third restructuring. The Bank team came to understand that the baseline data and targets for this indicator were understated as they excluded certain categories of breakdowns, and failed to take into account the corresponding increase in supply interruptions due to growth in number of consumers and substantial extension of the distribution network. The indicator was revised to "Interruptions per 1,000 customers", with a restated baseline and annual targets that included the supply interruption incidences which, prior to July 2012, had been excluded from reported incidences.

97. The M&E framework was designed to include four levels of project monitoring. The first level addressed monitoring of KEEP's outcomes by tracking progress implementation in the project's four components and

[15] Monitoring Performance of Electric Utilities: Indicators and Benchmarking in Sub-Saharan Africa, P. Tallapragada, M. Shkaratan; A. Izaguirre, J. Helleranta, S. Rahman, and S. Bergman, World Bank, 2009

achievement of outcome indicators. This first level is described in para 93 above. The second level was regarding meeting financial performance indicators by implementing agencies. These indicators were selected because of their potential impact on achievement of project outcomes. For example, less than satisfactory financial performance could impact investments needed to meet access outcomes. Financial performance indicators were therefore included and monitored in the KEEP's legal covenants.

98. The third level of performance monitoring was related to environment and social impacts. Each investment component in KEEP had an environmental and social monitoring and evaluation plan. The T&D components also included RAPs which contained arrangements for monitoring and evaluating impacts of resettlement. Project implementation agencies were tasked with compiling data and producing quarterly impact reports. As the fourth level of performance monitoring, MoE planned to undertake third party monitoring and impact evaluation to determine KEEP's welfare impacts and impacts of electrification programs which had not initiated at project close.

M&E Implementation

99. KEEP's PAD describes arrangements made for monitoring and evaluation of each PDO and intermediate outcome indicator. The Project Implementation Team (PIT) of each implementation agency was tasked with collecting required data for monitoring the performance of the component that the entity would manage. Each PIT prepared quarterly progress reports summarizing, inter alia, the outcomes of the project relative to targets. For overall project coordination, monitoring and reporting, a Project Coordination Team (PCT) comprising PIT Heads had been established and operated under the chair of the overall project coordinator in MOE. The PCT consolidated project implementation progress reports and submitted them to MOE and the Ministry of Finance, as well as IDA. The PCT also held quarterly meetings where findings of the quarterly reports and emerging challenges were discussed.

100. There were minor issues with the results framework which ultimately were not a significant factor in meeting project outcomes. A few indicators were duplicated. The indicator monitoring system losses "Electricity losses per year in project area" was duplicate with "Electricity losses per year in project area (CORE)", and "People provided with access to electricity by KPLC" was duplicated with "People provided with access to electricity in the project area (CORE)". It appears that some core indicators were duplicated with custom indicators that measured the same desired outcome. The duplicate PDO level indicators were revised during the third restructuring. A minor amount of duplication at the intermediate outcome indicator level remained (e.g., generation capacity of renewable energy).

101. During implementation, the Bank team assisted KPLC and REA to design a monitoring tool for T&D works contracts and was adopted by the implementation agencies. The tool allowed for more rigorous tracking of contract execution and distribution than was previously possible.

102. From an objective driven perspective, M&E arrangements during implementation for data collection and verification were found to be adequate and effective for successful monitoring of project implementation and its progress towards achievement of project objectives. Minor shortcomings notwithstanding, this ICR's assessment is that PDO and intermediate outcome indicators were more than adequate in measuring generation capacity, efficiency and quality, and expansion of access targeted in the project.

M&E Utilization

103. Implementing agencies utilized their respective quarterly implementation monitoring reports to inform their respective project implementation adjustments and keep project implementation on track. MOE utilized their M&E systems to keep track in terms of monitoring in the following areas: Time, Cost, Quality, Human Resources, Risk, Stakeholders and Fiduciary. Continuous monitoring allowed implementation agencies to be agile in detecting a potential problem and taking measures to mitigate its effects.

104. One example of utilizing project monitoring was relayed to the ICR team by project counterparts. The technical specifications of design of drilling wells was based on the number of wells that had already been drilled, which was only about 40 percent. The design was therefore based on estimated quantities in crucial parameters such as number of wells, location and characteristics. As drilling progressed, KenGen's monitoring showed that some of the well sites assumed in the feasibility report and technical specifications were found to be unsuitable. KenGen changed its well drilling practice from the shallow drilling of under 2,000 meters to deep well drilling of up to 3,000 meters.

105. A consequence of changing drilling practice from shallow to deep was that an optimization study was required to consider the impact of deeper well drilling on the steam field and plant operations. KenGen commissioned an optimization study which indicated that with deep well drilling there was a high risk of silica scaling in the pipelines if the steam field was operated at initial design pressures (5 to 6 bars), and recommended an optimal steam field operating pressure of 13 bars to mitigate the problem. KenGen accepted the study's recommendation to maintain the design of the power generation system and to invest in additional steam field equipment to reduce the plant steam supply pressure, with the option of installation of a steam let down station as a solution to mitigate silica deposits. The new steam field design resulted in cost-overruns due to the resulting requirement of upgrading steam field pipes and material schedules/gauges to withstand expected high pressure of 13 bars. However, monitoring and taking action was key in averting disastrous long-term outcomes as would have been the case if drilling had continued at shallow depths and/or if measures to reduce plant steam supply pressure were not taken.

106. Regular sharing of quarterly monitoring data with the Bank's sector and country teams also helped facilitate discussions around restructurings and other key decisions. Real-time information sharing with Bank Task Team Leaders (TTLs) who were based in Nairobi helped the Bank execute timely follow up actions, which in turn supported implementing agencies in keeping project implementation on track.

Justification of Overall Rating of Quality of M&E

107. The initially designed results framework with appropriately designed indicators for PDO outcomes, its subsequent modifications during implementation, practical monitoring arrangements and deftly executed M&E systems were key factors in successful project implementation. Even though there were weaknesses, given the above factors and the use of the M&E data to take stock and correct, the overall rating of Quality of M&E is rated as **Substantial**

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

108. The project triggered four safeguard policies: Environmental Assessment (OP 4.10); Natural habitats (OP 4.04); Indigenous Peoples (OP 4.10); Involuntary settlement (OP 4.12) and was classified as category A. A number of diverse, environmental impacts due to construction and operation of project components were to be mitigated during implementation. The main impacts identified were:

Environmental: Relatively minor air and water pollution during the construction phases and limited loss of non-critical animal and plant habitats.
Social: Land acquisition due to generation and transmission components resulting in a loss of assets necessary for livelihoods and relocation of people, disruption to Indigenous Peoples with a socio-economic and cultural connection to the project area.

Environment Safeguards

109. Implementation agencies prepared Environmental and Social Impact Assessments (ESIA) and Environmental and Social Management Plans (ESMP) for the generation and transmission components which were disclosed in Kenya and in the Bank's InfoShop between October 23, 2009 and January 10, 2010. Environment and Social Management Frameworks (ESMF) were prepared for the distribution and electrification components and were disclosed in Kenya and the in the Bank's InfoShop between November 17, 2009 and January 8, 2010. Environmental safeguards remained in satisfactory compliance throughout the project implementation period.

110. At appraisal, key concerns with regard to generation component - Olkaria I Units 4 and 5, and Olkaria IV were (a) impacts on water availability and quality, given that drilling relies on water from Lake Naivasha; (b) soil and water pollution caused by brine water discharge and waste disposal; and (c) loss and/or degradation of wildlife habitat in Hell's Gate National Park where the plants are located. KenGen appointed a large and highly qualified team of environmental scientists and specialists, who liaised regularly with Kenya Wildlife Service (KWS) officials in the Park. To mitigate against potential negative impacts on the Park, regular consultative meetings were held between KWS and KenGen to discuss specific Park management issues as provided for by a regularly renewed KenGen-KWS Memorandum of Understanding (MoU).

111. The Environment Management Plans (EMPs) for Olkaria IV and Olkaria I Units 4 and 5 geothermal power plants were implemented in a satisfactory manner. The 10-kilometer road and the steam gathering system were covered in the EIA licenses for Olkaria IV and Olkaria I unit 4 and 5 power plants. Prior to commencement of construction of the 10-kilometer road, an EMP was prepared by an independent EIA expert. An EMP was also prepared by KenGen for installation of two (2) reinjection wells at OW-801 due to the close proximity of the well pad to Olomayiana Kubwa community.

112. Appropriate mitigation measures and EMPs for transmission lines and substations and distribution lines were developed, implemented and monitored during construction in a satisfactory manner and in compliance with the safeguard requirements for each of these project components. With regard to distribution network upgrades, Bank supervision missions reviewed EMPs for substations built under the project and visited civil works at several substations in the Nairobi metropolitan area. ISRs and Aide Memoires documented that appropriate environmental mitigation, and health and safety measures were observed, and that substations are located at an adequate distance from residences and institutional facilities. To ensure the implementation capacity of KPLC, a capacity assessment and operating guidelines for KPLC's Safety, Health, and Environment Department was commissioned under the Project, which led to the hiring of additional environmental engineers and social specialists.

Social Safeguards

113. World Bank operational policies on Involuntary Resettlement (OP 4.12) and Involuntary Resettlement

(OP 4. 10) applied to KEEP due to expected impacts on land and human settlement. Consistent with these policies, implementation agencies for each component prepared safeguard instruments and publicly disclosed them. Instruments included ESIA and Resettlement Action Plan (RAP) for the generation component, ESIAs and RAP for three transmission lines, ESMF and Resettlement Policy Framework (RPF) for the distribution component and an Indigenous Peoples Planning Framework (IPPF). The estimate at appraisal indicated that land acquisition would result in over 10,000 project affected persons (PAPs) being entitled to compensation and more than 3,000 people would require relocation and livelihood restoration support. During implementation, the generation and transmission components required substantial supervision effort, including responding to the Inspection Panel case. A discussion of the social impact on the generation and transmission components is detailed below.

114. Generation component. The main social impact of the geothermal generation (Olkaria) was identified in the PAD as the loss of land, settlements, and cultural property by 685 PAPs who were members of the Maasai community residing in four villages near the geothermal plants who needed to be resettled due to air and noise pollution. OP 4.12 Involuntary resettlement was triggered, a RAP was developed in 2012, and the census was finalized to mitigate adverse impacts.

115. The RAP was developed through robust consultations and broad support from PAPs. During consultations, PAPs expressed a willingness to be relocated as long as KenGen provided equivalent land and improved community services. Agreed compensation measures were outlined in the RAP and started implementation accordingly. As specified by the RAP, a legally binding MoU between PAPs and KenGen was signed. It spelt out the rights and obligations of PAPs and KenGen, compensation measures, and livelihood restoration and enhancement activities. The MoU was amended in August 2014 to provide more time for KenGen to construct the road to the resettlement site (referred to by PAPs and KenGen as RAPland) and to secure legal title for the two parcels of land (RAPland and the Cultural Center).

116. Compliance with Involuntary Resettlement (OP 4.12) of the geothermal component remained a concern throughout the project. The overall project compliance with OP 4.12 was rated moderately unsatisfactory in the period of 2013-2015. The downgrade in safeguard ratings was attributed by several factors related to RAP performance under geothermal component. These included: outstanding transfer of the land title under community ownership to the PAPs, resettlement of the PAPs at the agreed site, compensation and resettlement of PAP households affected by the Ng'ati Farm evictions and re-disclosure of the RAP update that reflected all agreements reached with PAPs. With constant and enhanced supervision, significant improvement was made in the social safeguards implementation of this component, and notable milestones were achieved by KenGen.

117. A request for inspection was submitted to the World Bank's Inspection Panel by some members of the Maasai community affected by the resettlement under the generation component on October 26, 2014. The Requesters claimed that resettlement in the geothermal component had affected their lives and instead of restoring or uplifting their livelihoods, it had increased impoverishment, intra-community disputes, and health concerns. The complaint was processed jointly by the Panel and the European Investment Bank's Complaints Mechanism (EIB-CM), both of which received complaints relating to the same concerns.

118. Upon investigation, the Inspection Panel found non-compliance with respect to OP 4.10, Indigenous Peoples, and OP 4.12, Involuntary Resettlement. The Panel's findings[16] related to four main groups of issues:

[16] Kenya Electricity Expansion Project Investigation Report, 2015, http://ewebapps.worldbank.org/apps/ip/PanelCases/97-Inspection%20Panel%20Investigation%20Report.pdf

a. *Indigenous Peoples and Physical Cultural Resources* where the failure to apply the Indigenous Peoples policy to the Maasai community gave rise to shortcomings in consultation, cultural compatibility of the resettlement, benefit sharing, and the use of Maasai-specific expertise;
b. *The Resettlement Process* where the Panel found methodological flaws in the identification of PAPs and shortcomings in achieving meaningful consultations and inclusive participation because of ineffective communication with the community, sidelining of the traditional authority structure, omission of the Maa language and failure to disclose documents that were accessible in a language understandable to PAPs;
c. *Socio-economic impacts of resettlement* where relocation to RAPland occurred before adequate roads, water supply and electricity were in place, assurance of communal land-title, and houses built that were inconsistent with cultural preferences and lifestyles. RAPland's poor pasture and topography were not considered equivalent in quality to the land where PAPs were previously located
d. *Supervision and Monitoring* where the Panel found insufficient capacity to deal with complex issues arising from resettlement activities and inadequate supervision and monitoring of resettlement activities based on updated sociological data to measure PAP's wellbeing, and the restoration of livelihoods to pre-displacement levels or better.

119. The KEEP investigation was done jointly by the World Bank's Inspection Panel and EIB-CM. The EIB, at the request of KenGen and the Requesters, had started a mediation process with the aim of agreeing on remedial actions to address the investigation's findings. Bank management proposed and its Board agreed that the Bank through its Grievance Redress System (GRS) participate in the mediation process as a co-facilitator to allow the Bank and EIB to synchronize and mutually enhance redress efforts. Management committed to return to the Board within one year to present results of the mediation and to present a Management Action Plan (MAP) for approval.

120. In February 2017, the Bank's Board discussed and approved the MAP[17] which had been agreed with PAPs through the mediation process. It addressed all four areas identified as non-compliant in the Panel's investigative report. Specifically, Bank management and teams were to work with KenGen to:

(i) Ensure PAPs who believe they had been left out understand that they can bring forward their claims; Review claims and revise entitlements where necessary
(ii) Review agreed Grievance and Complaints Handling Mechanism and discuss possible adjustments to improve its functionality with PAPs; Facilitate participation of PAPS in community committees and facilitate access to livelihood restoration opportunities
(iii) Ensure finalization of the land titling process for the 1,700 acres at RAPland and 14 acres for the Cultural Center; Ensure finalization of RAPland infrastructure, including water supply and roads; Ensure rehabilitation/restoration of land at resettlement site
(iv) Have independent post-relocation survey done to determine the overall post-relocation impacts on PAPs, particularly poor and vulnerable people affected by the Project; Formulate tailor-made programs to ensure livelihood activities for the vulnerable and the very poor among the PAPs are enhanced; Work with PAPs to ensure accessibility of houses and facilities provided at RAPland; Formulate training and other programs and advise PAPs on income restoration options, including for youth and women; Provide support to the Cultural Center; Offer support to manage funds generated from leasing out the bus to ensure affordable and cost-effective transportation for PAPs whose income depends on commuting
(v) Ensure strengthened safeguards coverage of the entire portfolio

[17] Addendum to Management Report and Recommendation in Response to the Inspection Panel Investigation Report on Kenya Electricity Expansion Project, October 2016, http://ewebapps.worldbank.org/apps/ip/PanelCases/97-Addendum%20to%20Management%20Report%20and%20Recommendation-30%20Oct%202016.pdf

121. The task team and the GRS team conducted several missions to monitor implementation of the mediation agreement and the MAP. In April 2018, Bank Management reported back to the Board that most of the MAP actions have been completed[18]. Management reporting to the Board on MAP implementation progress will continue on an annual basis until all items in the MAP are completed.

122. Transmission Component. The major social impact for the transmission component identified in the PAD was the loss of land assets for livelihood. Involuntary Resettlement (OP4.12) and Indigenous People (OP4.10) Operational Policies were triggered for the component. With regard to OP 4.10, an IPPF was prepared and disclosed prior to the appraisal of the project in January 2010. The IPPF then indicated that there could be groups who meet the criteria of OP 4.10 along the Eldoret Kitale Line. However, none of the sub-projects under the Eldoret Kitale and Kisii Awendo Lines identified any of those groups and thus no IPPs were prepared. Furthermore, a socio-economic survey undertaken in September 2014 determined that the majority of PAPs by the way leaves were farmers and small-scale business owners. It also confirmed that no Indigenous Peoples were affected by the project.

123. There was an initial delay in RAP implementation and PAPs compensation progressed slowly, but steadily improved throughout the project. At project closing, compensation for PAPs for land affected by the Kisii- Awendo and the 132kV Eldoret-Kitale transmission lines stood at 90.9 percent and 92.36 percent, respectively. The outstanding compensation is due to cases that are beyond KETRACO's reasonable control and ability to resolve. These include missing PAPs, parcels of land with ownership disputes and disputed compensation amounts. KETRACO has opened an escrow account in which the outstanding compensation owed to the PAPs of the two lines amounting to KShs. 63 million has been deposited. The affected PAPs will be paid as their cases are resolved.

124. The Bank had received complaints from some members of the Bangale Asharaf group, a clan of the Somali community claiming to have been excluded from compensation for wayleaves compensation by KETRACO. The complainants also claimed that the transmission lines had traversed a sacred grave at Ashraf Kona. The World Bank hired an independent consultant familiar with the Garissa area and Somali clans in July 2015 to investigate the complaints. The Consultant's Report was submitted to the World Bank on September 7, 2015 which concluded that that the claims had no merit.

Occupational Health and Safety

125. There were several incidents with respect to community, occupational and vehicular safety within the Olkaria project site that resulted in fatalities between 2013-2015. The fatal accidents raised issues of safety during construction and operation, as well as the capacity of KenGen to address systemic issues on safety. KenGen followed up with specific actions to address the safety issues, including (a) appointing a team of three Senior Quality and Safety Officers to carry out a comprehensive internal safety inspection; (b) assessed its safety protocol and current organizational structure and procedures for handling of safety issues as part of the forthcoming Strategic Environmental and Social Management System (SESMS); and (c) conducted a safety workshop with KenGen and contractors' Environment Health and Safety (ESH) personnel to enhance awareness on safety issues and propose remedial measures.

126. Mitigation measures that were put in place after the incidents included: issuance of "permits to work" in activities that posed risk to health and safety, enforcement of the use of Personal Protective Equipment (including harnesses for work at height), formation of an Occupational Health and Safety Committee, safety

[18] First Progress Report on the Implementation of Management's Action Plan in Response to the Inspection Panel Investigation Report on the Kenya Electricity Expansion Project (P103037), April 2018, http://ewebapps.worldbank.org/apps/ip/PanelCases/97-First%20Management%20Progress%20Report-04%20April%202018.pdf

briefings and inductions for new workers, and the use of signaling men to direct delivery trucks.

Procurement

127. The procurement rating at project closing was Satisfactory and throughout project implementation was rated moderately or fully satisfactory. This ICR assesses Procurement to be Moderately Satisfactory as there were both positive and adverse factors at play during implementation. On the positive side, KenGen, KPLC and MOE had substantial experience of World Bank Procurement Guidelines having implemented several World Bank-financed projects in the past. These entities had established procurement units and relevant tender committees and all entities were adequately staffed with qualified and experienced procurement specialists. KenGen, KPLC and MoE completed planned procurements successfully and in full compliance with World Bank Procurement Guidelines.

128. Another positive aspect was the flexibility that was built-in to the generation component. At the time of design, 40 percent of the wells had been drilled with large uncertainty regarding the characteristics of the remaining steam field drilling. Remeasurement was built-in into contracts which was helpful when the location and depth of steam wells changed during implementation.

129. On the adverse side, there were delays in processing procurement packages, sometimes due to lengthy internal approvals, both within the implementation agencies as well as the Bank. While KenGen, KPLC, and MoE had expertise and experience to undertake procurement for World Bank projects, REA's procurement arrangements were not as sound as they lacked prior experience in implementing an IDA project. REA oversaw the implementation of the off-grid component (subcomponent C2 – electrification of priority loads in rural areas) which was cancelled during the third restructuring in April 2016 because of a substantial delay in procurement of the consultancy for design and implementation of the off-grid pilot rural electrification schemes.

130. Overall, these procurement challenges did not have a negative impact on achieving desired outcomes. Financing for off-grid activities was reallocated to on-grid based connectivity in rural areas, and in this context, the project supported connecting a large number of public facilities such as schools, clinics, enterprises, etc. REA gained valuable experience in implementing a project and increased its internal capacity. All procurement activities for the project were successfully brought to a close. This ICR therefore rates procurement performance as Moderately Satisfactory.

Financial Management

131. The project's Financial Management (FM) was rated as moderately satisfactory or satisfactory throughout the implementation period. The World Bank conducted FM missions annually. On the Gok side, an Accounting Officer and an Assistant Accountant were responsible for project FM. About two years into implementation, MoE recruited a Financial Management Specialist to assist in this arrangement. Project finance sections of KenGen, KPLC and REA were established along similar lines.

132. To ensure timely flow of funds, GoK put in place the following flow-of-funds arrangement:

(i) Separate Designated Accounts (DAs) were opened for the four implementing agencies by the National Treasury
(ii) Project accounts were opened by the four implementing agencies through which funds from the DAs flowed to the project
(iii) Implementing agencies prepared Interim Financial Reports (IFRs) to account for funds received, and submitted them to IDA through the National Treasury every quarter

133. Financial management systems including internal control systems were found to be fair and adequate.

All implementing entities were in compliance with obligations relating to submission of IFRs of audited reports. Audit reports were received on time, and no major issues were identified in audited reports in relation to project financial management. There were some challenges encountered during project implementation related to FM:

(i) The flow of funds from the DAs to the project accounts through MoE were lengthy in part due to payment processes in place.
(ii) There were challenges in opening Letters of Credit from various Banks that were acceptable to IDA for issuance of special commitment letters. Banks were not aware of World Bank backed Letters of Credit
(iii) Limited budgetary ceilings allocation affected the project's required budget in some financial years

134. **Retroactive Financing.** At project approval, arrangements were made for retroactive financing up to US$ 3 million for payments made on or after January 1, 2010 for consultancy services related to the E&M contract for Olkaria I and IV development. During the project implementation period, no withdrawals were made against the retroactive financing. The German agency for development (KfW) committed to fully finance consultancy services for the E&M contract.

The ICR assesses Financial Management as moderately satisfactory for the implementation period.

A summary of Implementation Status Report (ISR) ratings for Safeguards and Fiduciary aspects is provided below.

ISR Date Archived	DO	IP	Procurement	FM	Safeguards	Actual Disbursed US$M
03/29/2011	S	S	MS	S	S	0
10/07/2011	S	S	S	S	MS	8.48
05/29/2012	S	S	S	S	MS	10.94
01/21/2013	MS	S	S	S	MS	64.83
09/17/2013	MS	MS	MS	MS	MU	114.03
04/05/2014	MS	MS	MS	MS	MU	156.66
08/24/2014	MS	MS	MS	MS	MS	195.72
06/29/2015	MS	MS	MS	MS	MU	260.37
01/05/2016	MS	MS	MS	MS	MU	279.99
08/12/2016	MS	MS	MS	MS	MU	297.68
01/31/2017	MS	MS	MS	S	MU	319.63
06/30/2017	MS	MS	S	S	MS	378.66
01/02/2018	MS	MS	S	S	MS	380.14

Covenants

135. Seven project covenants were applied to KEEP, three of which included financial covenants for KenGen and KPLC who were expected to meet annual targets for self-financing ratio, debt service cover ratio, and current ratio. In addition, KPLC also had to meet an accounts receivable target. Starting in 2012, financial covenants were not met for a substantial part of project execution and were only met towards the end of the project (as reported for 2016, the most recent financial reports available at project closing).

136. Since project closing, KenGen's Annual Report for 2017[19] shows that it continues to meet targets for financial ratios. However, KPLC's financial position has since weakened and it did not meet the current ratio target in FY17/18[20]. Aggressive electrification expansion has typically caused deterioration of KPLC's financial ratios first seen in the 2012-2014 period and for a second time in 2017-2018. Majority of the new connections have been primarily in domestic consumers who consume less than 20kWh per month. The substantial investment in consumer connections has not been matched by corresponding increases in revenues nor by adequate sources of funding (concessional or subsidies). The connection fees charged to beneficiaries are highly subsidized by the Government from its own sources or from concessionary funding sources. Investments needed to meet the access objective have been more than the available concessional debt or GoK's contribution.

137. It is critical that financial positions of the implementing agencies be monitored as it has an impact on their ability to make investments to meet social objectives of achieving universal access. The Bank has continued its monitoring of financial positions of relevant agencies through KEMP and at the same time continues its policy dialog with GoK. The government has also developed the National Electrification Strategy for its objective of universal access.

C. BANK PERFORMANCE

Quality at Entry

Rating: Moderately Satisfactory

138. KEEP's Development Objectives were highly relevant at the time of appraisal and remained relevant during implementation and at project closing. As mentioned earlier, the project was fully in line with the Kenya CPF and with the government's own strategy documents. KEEP supported GoK's objectives of expanding access and was well situated to respond to the acceleration of that goal to achieve universal access by 2020. KEEP remains relevant to the recently prepared National Electrification Strategy expected to be launched in FY19.

139. The overall project design was sound and supported by thorough technical, economic and financial analysis. KEEP supported the objective of expanding electricity access throughout the value chain – from generation to connection of households. While seeming complex, this structure allowed the Bank to support an aggressive access expansion strategy which has now shown considerable success.

140. Project teams in the Bank and in the implementation agencies were engaged in readying the project for implementation. At the time of project approval, key implementation personnel were in place in all implementation agencies, along with a procurement plan for the first 18 months. Conceptual designs for generation, transmission and distribution components had been prepared. KenGen's supervising consultant had prepared draft pre-qualification documents for all contracts in the generation component. KPLC had also begun preparing technical specifications for the distribution component. Thus, implementation agencies for the two largest components of the project were well positioned for implementation.

141. Bank teams worked with GoK to conduct extensive stakeholder consultations during project preparation. For the generation component alone, the ESIA for the Olkaria I plant included 11 public consultations in 11

[19] Powering a Sustainable Future, KenGen Annual Report and Financial Statements for the year ended June 30, 2017. https://www.kengen.co.ke/sites/default/files/financial-reports/KenGen%20Annual%20Report%202017%20Final.pdf
[20] FY17/18 covers the period July 2016 to December 2017

locations. The ESIA for Olkaria IV included consultations in 10 locations. KenGen held follow up meetings with senior community members and other stakeholders.

142. Procurement, and Financial Management were adapted to KEEP's expected needs during implementation. In particular, Procurement arrangements were designed to mitigate the effects of unknown elements during project design. As mentioned earlier, project implementation for the generation component had begun with only 40 percent of steam wells' characteristics known. Project teams prepared for an expected volatility in costs by structuring the contracts to include remeasurement. This allowed project implementation to start earlier but mitigated the effects of the eventual cost overrun.

143. M&E arrangements were generally sound and allowed active monitoring and enabled the team to take action where necessary. PDO level indicators were adequate to measure and report on project outcomes. The M&E framework had a few shortcomings that did not eventually have a significant impact. There were several instances of intermediate indicators being duplicated, some of which were corrected during restructuring. The system loss reduction PDO indicator was designed in a static and isolated way to monitor efficiency improvement without taking into account other factors such as increased electricity supply in the national systems and overload of major transmission lines. The M&E framework also failed to capture the number of connections made in respective areas of urban, peri-urban, and rural.

Quality of Supervision

Rating : Satisfactory

144. Project supervision was substantial after project effectiveness. Supervision missions were carried out at regular intervals over the seven years of project implementation. Detailed Aide Memoires and a total of 13 ISRs were documented over the project period. Delays in the implementation schedule and procurement, as well as safeguards compliance status were flagged timely in supervision mission Aide-Memoires. Bank teams assessed the Development Objective as moderately satisfactory for a significant portion of the project.

145. Project supervision was regular throughout the implementation period. Bank teams stepped up their support after the Request for Inspection to ensure that the MAP that had been approved by the Board was implemented satisfactorily. Bank teams provided close monitoring of the design and implementation of resettlement through enhanced support for safeguards and RAP implementation. 30 missions were undertaken from October 2011 to November 2014.

146. The challenges of the implementation of the Bank's safeguard policies was not fully understood by implementation agencies initially. Following the Inspection Panel request, the Bank provided KenGen with safeguards implementation support. Underestimation of the complexity of implementation of safeguard policies meant that safeguards implementation was not fully resourced. The burden of RAP implementation was heavy, agencies reported that it cost 40 percent of the transmission component, and in some cases exceeded the cost of the construction/rehabilitation of the transmission line itself. On the Bank's side, a significant increase in supervision resources was required. The Bank also included funding in the AF credit to enhance capacity of implementation agencies to implement safeguard policies.

147. While the Inspection Panel had found that the policy on Indigenous Peoples OP 4.10 had not been applied appropriately to the Maasai, the Bank had followed the practice and precedence that had been in effect at the time. However, a significant effort was ongoing in the Bank to reevaluate the practice in the wake of significant

constitutional developments in Kenya in 2010 which committed the State to addressing the needs of vulnerable groups within society, including members of minority or marginalized communities, and members of particular ethnic, religious or cultural communities. The Bank continued the dialogue on the subject with GoK in 2011 and 2012. A technical study by Bank specialists concluded in June 2012 that the Maasai in many contexts met the requirements of OP 4.10, and in December 2012, the Bank affirmed that the policy would be applied on a project-by-project basis to pastoral-nomadic groups in Kenya that met the policy criteria. Shortly thereafter, in early June 2013, the Government of Kenya decided that "vulnerable and marginalized groups" included pastoral-nomadic groups, such as the Maasai. Since then, OP 4.10 has been triggered for such groups in relevant Bank operations

148. Project teams were sensitive to needs that arose during implementation and accordingly restructured as needed. The project was restructured three times. During the third restructuring, an amount of $68 million additional financing was provided to address the higher-than-expected costs of generation component and the off-grid electrification activities under distribution component were cancelled. The Bank also agreed to extend the loan closing date from September 30, 2016 to December 31, 2017. The changes provided the time needed for completion of activities under additional financing and met the needs of the implementing agencies without compromising the project's performance.

Justification of Overall Rating of Bank Performance

149. The quality of entry and quality of supervision aspects have been assessed to be moderately satisfactory and satisfactory respectively. A few shortcomings as described above were not sufficiently severe to compromise the project. The Bank team and government counterparts worked to keep the project on track and brought the project to a satisfactory closure.

The overall rating of Bank Performance is Moderately Satisfactory.

D. RISK TO DEVELOPMENT OUTCOME

150. Key risks to the PDO are analyzed from the perspective of sustainability:

(i) Ensuring satisfactory financial position of key entities, particularly KenGen and KPLC, is critical for sustainability. Expansion of electricity access targets have put enormous pressure on both KPLC and KenGen's financial positions. The financial position of KPLC remains weak but the company is undertaking a number of actions to improve its financial and operational performance including an organization restructuring review of its processes and costs optimization. FY19 budgetary allocations include provisions for payments of GoK arrears against the last mile electrification program and for additional operation and maintenance costs for rural electrification consumers. KenGen's financial performance has been under pressure due to short term obligations. Cash flow from operations was not large enough to cover investment requirements, external financing has been required to bridge financial gaps. Increasing debt levels have affected KenGen's financial performance and meeting financial covenants has been a challenge. In September 2017, the KenGen debt restructuring option emerged from an Investment and Financing Strategy developed with World Bank support (funded by Public-Private Investment Advisory Facility [PPIAF]). KenGen's debt restructuring would significantly reduce its overall financing costs with consequent benefits on its financial liquidity and solvency level, putting it on a path to financial sustainability. IDA recently approved the KenGen Guarantee Project to enhance KenGen's ability to attract long-term private capital for the sustainable development of renewable energy.

(ii) Environmental and social safeguards risks are substantial. Enhancing social and environmental safeguard standards and capacity in key entities is critical to sustain KEEP's achievements. KenGen does not have its own policy requiring the assessment of the social impacts of a project. Instead, KenGen has developed a system that relies on the requirements of project's financiers and of Kenyan Law for both social and environmental risks and impacts. A recent assessment[21] confirmed that KenGen has adequate systems to handle occupational health and safety risks in project operations. However, the assessment revealed that KenGen has no formal social risk management system currently in place. KenGen has recognized this deficiency and is in the process of developing a system capable of managing its social risks. It has developed a sound understanding of the need for and the principles of social risk management (SRM) which has led to the development of an SRM system as a corporate priority. As such, KenGen is committed to: i) creating a Community Relations Department that will handle social safeguards and community relations; and ii) developing a robust SRM system including a system for assessing the social impacts of a project in addition to the environmental impacts already assessed; a Community Engagement Policy, (addressing grievance redress and focusing on engaging indigenous communities) and a land acquisition and resettlement policy.

151. It is likely that the majority of current sector developments will have a positive impact on the sustainability of the project's development outcomes. However, the risks of financial viability of the agencies and social safeguards risks will need to be monitored and managed. Overall, risk to development outcomes of the project is assessed as moderate.

V. LESSONS AND RECOMMENDATIONS

152. KEEP's design was complex in that it supported GoK in the full cycle of electricity generation to household connections in expanding electricity access. In addition, the project tackled the expansion of access in all spatial areas (urban, peri-urban, and rural). A small component included the use of mini-grid and off-grid electrification, technologies that were new and needed additional capacity to design and implement. This component was eventually cancelled. KEEP's larger and more complex components (generation, distribution) needed substantial attention, leaving smaller components such as mini-grids and off-grids in need of support. In addition, REA, the agency tasked with implementation of off-grid, mini-grid technologies, was itself a relative newcomer to implementation of Bank projects. One can conclude that mini-grid and off-grid components, being relatively new technologies, require substantial, focused attention. Inclusion of such components in a complex project like KEEP which tackled the full life cycle of electricity access and which was spatially diverse, is not optimal as the needed support for the smaller component is absorbed by the larger components.

153. A strong community based approach to connect urban slum consumers can be key in moving consumers away from illegal and poor-quality electricity and in expanding "last mile" access. Adopting a community-based approach meant that it was not simply about taking down illegal connections, but focusing instead on listening to community members and leaders, and marketing the benefits of legal connections – safety, reliability and affordability[22]. The "last mile" approach provided an assurance that electricity was actually reaching individual households and allowed KPLC (with support from IDA and GPOBA) to offer new connections at a subsidized rate. Under this strategy, legal power was less expensive than what people had been paying to middlemen for illegal lines. Success in scaling up electricity connections in urban poor settlements was possible because KPLC's top management bought into the community based approach and committed considerable resources to the slum

[21] Assessment conducted as part of appraisal for the Kenya KenGen Guarantee Program (P162422) in the Project Appraisal Document: http://documents.worldbank.org/curated/en/875091524967279762/pdf/KENYA-PAD-04092018.pdf
[22] Bringing Electricity to Kenya's Slums: Hard Lessons Lead to Great Gains, World Bank, http://www.worldbank.org/en/news/feature/2015/08/17/bringing-electricity-to-kenyas-slums-hard-lessons-lead-to-great-gains

electrification program.

154. The efficacy of utilizing an Output Based Aid (OBA) mechanism was highly effective in KEEP. The OBA mechanism was well-liked by implementation agencies as it allowed them to shorten procurement processing times which are typically longer in standard Bank procurement processes, and allowed them to be more responsive to their customer base. OBA however, is effective when implementation agencies have the resources to fund upfront costs. When resources are scarce, implementation agencies preferred to use a revolving fund to finance an OBA mechanism to subsidize/expand electricity connections as it better resonates with the business cycle. One lesson that can be learned is that OBA can be an effective tool to expand electricity access in cases where resources are available to utilities. In resource scarcity, alternate funding mechanisms such as revolving funds could be utilized for the same.

155. The benefits of an increase in generation capacity are best utilized with a corresponding investment in the medium and high voltage transmission and distribution network. KEEP's substantial increase in generation capacity resulted in an overload of major transmission lines compounded by delays in commissioning of new transmission lines. There was an enormous extension of distribution lines in the low voltage network to connect new customers but with no corresponding investment in the medium and high voltage transmission and distribution network. The gap in investing in the medium and high voltage network can be partly explained by GoK's strong push for universal access that began in 2014 with a strong focus on last mile connectivity. While teams had planned for increased capacity and its evacuation at appraisal, stepping up targets for universal access had an impact on the sequencing of investments along the value chain.

156. The inclusion of a system loss indicator in a project with investments in T&D is inadvisable as improvements in system losses are likely to be realized only after project implementation has completed. The achievement of the PDO target for system losses was based on the assumption of a mature and static system with minimal variations of supply and demand. In such a system, system losses attributed to project interventions could be clearly quantified. Considering KEEP's project's interventions that encompassed the entire cycle from generation to household connections, a mature and static system could not be expected, making the system loss indicator inappropriate for the task at hand. In addition, it is impractical to assess loss reduction during or immediately after project completion. Indeed, most T&D components had not achieved optimum loading at project completion which would have a direct effect on loss reduction. Optimum loading could be expected 1-2 years after commissioning.

158. Kenya is engaged in creating an enabling environment to attract long-term private investments for the sustainable development of renewable energy. One key result of this approach has been that there has been a substantial amount of private sector investment in the generation segment (30 percent of total installed generation capacity). KEEP was an illustrative example of the MFD approach. The geothermal generation component in KEEP directed IDA resources towards steamfield development which was the riskiest component for the private sector which typically invested in power plant construction. The risk for steam fields came into play because only 40 percent of steam fields were drilled at project appraisal, leaving many unknowns for investment purposes. With IDA financing, GoK was able to demonstrate the viability of large geothermal capacity development. The experiences gained by Kenya through KEEP will be important as KETRACO and the GDC seek alternative business models to scale up their infrastructure expansion through funding sources beyond the Government budget.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Increase the capacity, efficiency, and quality of electricity supply

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Electricity losses per year in the project area	Percentage	16.30 30-Jun-2010	0.00 30-Sep-2016	15.90 31-Dec-2017	18.90 30-Jun-2017
Electricity losses per year in the project area- Non-Technical	Percentage	0.00 30-Jun-2010	0.00 30-Sep-2016	0.00 31-Dec-2017	0.00 30-Jun-2017
Electricity losses per year in the project area- Technical	Percentage	0.00 30-Jun-2010	0.00 30-Sep-2016	0.00 31-Dec-2017	0.00 30-Jun-2017
Total net injected generation	Gigawatt-hour (GWh)	0.00 30-Jun-2010	0.00 30-Sep-2016	2020.00 31-Dec-2017	2269.00 30-Jun-2017

Comments (achievements against targets): Outcome indicator on electricity losses not met due to factors beyond the project's control. Data breakdown into technical and non-technical losses not available.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
1. Electricity generation from renewable generation capacity constructed under the project, net	Gigawatt-hour (GWh)	0.00 30-Jun-2010	0.00 30-Sep-2016	2020.00 31-Dec-2017	2269.00 30-Mar-2018

Comments (achievements against targets): Outcome achieved at 112.3 percent of the target

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
3. Interruptions per 1,000 customers	Number	9.74 30-Jun-2010	0.00 30-Sep-2016	8.50 31-Dec-2017	1.94 30-Jun-2017

Comments (achievements against targets): Outcome achieved at 629 percent of the target

Objective/Outcome: Expand access to electricity in urban, peri-urban, and rural areas

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
People provided with access to electricity by KPLC	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	11000000.00 31-Dec-2017	23593215.00 30-Jun-2017

Comments (achievements against targets): Outcome achieved by 214.5 percent of the target

Indicator Name	Unit of	Baseline	Original Target	Formally Revised	Actual Achieved at

	Measure			Target	Completion
New slum consumers connected to the grid	Number	120000.00 30-Apr-2016	0.00 31-Dec-2017	174000.00 31-Dec-2017	177895.00 30-Jun-2017
Comments (achievements against targets): Outcome achieved at 107.2 percent of the target					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
5. Direct project beneficiaries (CORE)	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	2200000.00 31-Dec-2017	4718643.00 30-Jun-2017
Comments (achievements against targets): Outcome achieved at 214.5 percent of the target					

A.2 Intermediate Results Indicators

Component: Geothermal Generation

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Generation Capacity of Renewable Energy (other than hydropower) constructed	Megawatt	0.00 30-Jun-2010	0.00 30-Sep-2016	280.00 30-Sep-2016	280.00 30-Jun-2015
Generation Capacity of Renewable Energy constructed - Other	Megawatt	0.00 30-Jun-2010	0.00 30-Sep-2016	280.00 30-Sep-2016	280.00 30-Jun-2015

Generation Capacity of Renewable Energy constructed-Geo-thermal	Megawatt	0.00 30-Jun-2010	0.00 30-Sep-2016	280.00 30-Sep-2016	280.00 30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 102 percent

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
6. Generation capacity of renewable energy (geothermal) constructed or rehabilitated under the project (CORE)	Megawatt	0.00 30-Jun-2010	0.00 30-Sep-2016	280.00 30-Sep-2016	280.00 30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 100 percent

Component: Transmission

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Transmission lines constructed or rehabilitated under the project	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	334.00 31-Dec-2017	340.00 14-Dec-2017
Transmission lines rehabilitated under the project	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	0.00 31-Dec-2017	0.00 31-Mar-2017

Transmission lines constructed under the project	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	334.00 31-Dec-2017	340.00 14-Dec-2017
Comments (achievements against targets): Intermediate Outcome achieved at 102 percent					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
7. Transmission lines constructed or rehabilitated under the project (CORE)	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	334.00 31-Dec-2017	340.00 14-Dec-2017
Comments (achievements against targets): Intermediate Outcome achieved at 102 percent					

Component: Distribution

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Meters installed under the project	Number	0.00 30-Jun-2010	0.00 31-Dec-2017	255000.00 31-Dec-2017	255000.00 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome Indicator achieved at 100 percent					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
KPLC conducts an annual	Yes/No	N	Y	Y	Y

customer satisfaction survey for slum consumers		30-Apr-2016	31-Dec-2017	31-Dec-2017	31-Dec-2017

Comments (achievements against targets): Intermediate Outcome achieved

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Community electricity connections constructed under the project	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	450.00 31-Dec-2017	1058.00 30-Jun-2017
Community electricity connections constructed – Grid	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	450.00 31-Dec-2017	1058.00 30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 235 percent

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Distribution lines constructed or rehabilitated under the project	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	2280.00 31-Dec-2017	11057.00 30-Jun-2017
Distribution lines constructed under the project	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	2280.00 31-Dec-2017	11057.00 30-Jun-2017
Distribution lines	Kilometers	0.00	0.00	2280.00	11057.00

rehabilitated under the project		30-Jun-2010	30-Sep-2016	31-Dec-2017	30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 485 percent

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
9. Substations constructed or rehabilitated by KPLC under the project	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	26.00 31-Dec-2017	63.00 30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 242 percent

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
12. Community (public facilities) electricity connections provided under the project (CORE)	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	450.00 31-Dec-2017	1058.00 30-Jun-2017
Community Center	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	450.00 31-Dec-2017	6471.00 30-Jun-2017

Comments (achievements against targets): Intermediate Outcome achieved at 235 percent

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

13. Business electricity connections provided under the project (CORE)	Number	0.00 30-Jun-2010	0.00 30-Sep-2016	15000.00 31-Dec-2017	15511.00 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome achieved at 103 percent					

Component: Sector Institutional Development and Operational Support

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
14. Roadmap for implementation of the wholesale electricity market is adopted by MoE	Yes/No	N 30-Jun-2010	Y 30-Sep-2016	Y 30-Sep-2016	Y 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome achieved					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
15. Rural Electrification Master Plan (REMP) annually updated	Yes/No	N 30-Jun-2010	Y 30-Sep-2016	Y 30-Sep-2016	Y 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome achieved					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

16. Cost of service study completed one year before 2014 tariff review is launched	Yes/No	N 30-Jun-2010	Y 30-Sep-2016	Y 30-Sep-2016	Y 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome achieved					

Unlinked Indicators

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
8. Distribution lines constructed or rehabilitated under the project (CORE)	Kilometers	0.00 30-Jun-2010	0.00 30-Sep-2016	2280.00 31-Dec-2017	11057.00 30-Jun-2017
Comments (achievements against targets): Intermediate Outcome achieved at 485 percent					

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1: Increase the capacity, efficiency, and quality of electricity supply	
Outcome Indicators	1.Electricity generation from renewable energy generation capacity constructed under the project, net 2.Total net injected generation 3. Electricity losses per year in project area 4. Interruptions per 1,000 customers
Intermediate Results Indicators	1. Generation capacity of renewable energy (other than hydropower) constructed 2.Generation capacity of renewable energy (geothermal) constructed or rehabilitated under the project 3.Transmission lines constructed or rehabilitated under the project
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. 280MW geothermal generation capacity constructed 2. Associated infrastructure constructed (access roads, water and electricity supply, borehole roads and offices) 3.340 kilometers of transmission lines constructed or rehabilitated 4. 7 substations constructed or rehabilitated
Objective/Outcome 2: Expand access to electricity in urban, peri-urban, and rural areas	
Outcome Indicators	1. People provided with access to electricity by KPLC 2. New slum consumers connected to the grid 3. Direct project beneficiaries
Intermediate Results Indicators	1. Meters installed under the project 2. KPLC conducts an annual customer satisfaction survey for slum consumers 3. Community electricity connections constructed under the project 4. Business electricity connections provided under the project 5. Distribution lines constructed or rehabilitated under the project 6. Substations constructed or rehabilitated by KPLC under the project 7. Roadmap for implementation of the wholesale electricity market is adopted by MoE 8. Rural Electrification Master Plan (REMP) annually updated 9. Cost of service study completed one year before 2014 tariff review is launched

Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. 11,507 kilometers of distribution lines constructed or rehabilitated 2. 24 substations constructed or rehabilitated 3. 255,000 meters installed 4. 7 sector institutional development studies completed 5. Training on pertinent sector issues provided to MoE, KenGen, KPLC, KETRACO, ERC staff

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Supervision/ICR	
Laurencia Karimi Njagi, Patrick Thaddayos Balla	Task Team Leader(s)
Tesfaye Ayele, Lucie Muchekehu, Joel Buku Munyori	Procurement Specialist(s)
Henry Amena Amuguni	Financial Management Specialist
Gibwa A. Kajubi	Social Safeguards Specialist
Gulgoren A. Cansiz	Team Member
Zubair K.M. Sadeque	Team Member
Lien Thi Bich Nguyen	Team Member
Rahmoune Essalhi	Team Member
Gladys Akurut Alupo	Team Member
Marjorie Mpundu	Counsel
Qays Hamad	Team Member
Zijun Li	ICR contributor
Thrainn Fridriksson	Team Member
Ben Okindo Ayako Miranga	Environmental Safeguards Specialist

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY07	1.800	17,314.67
FY08	11.234	62,320.85
FY09	8.035	65,333.14
FY10	64.814	444,385.98
Total	**85.88**	**589,354.64**
Supervision/ICR		
FY11	48.920	273,426.77
FY12	31.825	132,221.84
FY13	28.473	145,590.93
FY14	27.375	165,794.23
FY15	39.477	230,322.85
FY16	59.836	441,530.46
FY17	26.110	194,707.01
FY18	31.770	264,710.84
Total	**293.79**	**1,848,304.93**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
Geothermal Generation	120.00	171.02	142.5 percent
Transmission	64.50	59.00	91.5 percent
Distribution	134.00	160.50	119.8 percent
Sector Institutional Development and Operational Support	11.50	10.48	91.1 percent
Total	**330.00**	**401.00**	**121.5 percent**

* Table above shows the project's IDA financed costs only.

ANNEX 4. EFFICIENCY ANALYSIS

1. The economic analysis at project completion was conducted at both project level and component level. As during the appraisal, it covers the three investment components (generation, transmission and distribution) for which economic flows can be quantified. Component D (policy and institutional capacity building activities) is excluded due to the difficulty in monetizing the economic benefits of technical assistance and capacity building activities. The economic analysis at appraisal stage used a 12 percent discount rate as the economic opportunity cost of capital (EOCK) for the calculation of the Net Present Value (NPV). To be consistent, the economic analysis at ICR stage was developed using the same discount rate. Meanwhile, an economic discount rate of 6 percent was also used for comparison purpose. The results of post-completion economic rate of returns are compared with those forecasted at the time of appraisal. A summary of the results is presented below and the detailed analysis is presented here.

2. Both analysis at appraisal and at completion used cost-benefit analysis approach. Key differences include:

- A combined analysis is done at completion for original IDA credits and additional financing.
- A project-level analysis is done at the completion.
- The ICR analysis includes an estimation of environmental benefits.

3. The economic analysis at project completion shows that the project has NPV of US$368 million (at a 12 percent discount rate) and an Economic Internal Rate of Return (EIRR) of 16 percent[23]. While at appraisal the analysis did not provide EIRR for entire project, it did provide EIRR for each of the three components: 23 percent for generation component, 32 percent for transmission component, and 21 percent for distribution component. An updated analysis was prepared at AF appraisal but only for the generation component and it stated an EIRR of 13 percent. At project completion, the analysis developed for this ICR results in an EIRR of 14.3 percent for generation component, 27 percent for transmission component, and 11.5 percent for distribution component.

4. The key drivers explaining the differences in EIRR at component-level analysis are:

- A decrease in the estimated long-run marginal cost of electricity for the system. Changes in the energy mix reduced [with greater geothermal penetration] lowered the expected marginal cost of electricity in the system affecting the opportunity cost estimation and, thus, reducing the expected economic benefits of the generation component.
- Delays in the implementation of transmission assets affected the estimated flow economic benefits from the transmission component
- An increase in total system losses affected the estimation of incremental energy saving benefits from the analysis at project closing in 2017.
- Lower estimate of willingness-to-pay based on updated household expenditure results in Kenya

[23] Project-level EIRR at 19 percent when including CO2 benefit

Household Budget survey 2016, as well as negligible incremental energy saving benefits due to high system loss of the grid that reduced the expected economic benefits of the distribution component.

Component A: Generation

5. Key assumptions are updated as compared to the original project based on actual investment and operating data of the plants since commissioning in 2015. Key differences include:

   - The latest CAPEX estimate is approximately 74 percent of the appraisal estimate that includes US$53 million of AF. Although there was a total cost overrun of US$53.2 million in steam field development under geothermal component, there were significant cost savings in the total investment of Olkaria I and IV AU 4 and 5. This is largely explained by saving in final contract values for the power plants and steam well drilling compared to the agreed financing packages, which was attributed to the emphasis in the contract documents on the balance between turbine performance and price and to the competitive bidding that was evident at the time.

   - Annual operating and maintenance (O & M) costs are updated based on actual O&M cost occurred for both Olkaria I 4&5 and Olkaria IV since commissioning in 2015, at a three-year average of $56 million. It is higher than the appraisal estimates of $29.3 million per year. Main reasons of higher O&M cost are due to the steam costs variation that is dependent on the dispatched energy, grid availability and other forced outages such as those in 2015 due to failure of cooling water system.

   - In the ICR analysis, it is assumed that net electricity generation of the plants going forward stays at 2017-2018 level (2,269 GWh/yr), and steam well replenishment starts from 2019, with associated costs occurred. In appraisal, an annual estimate of 2,057 GWh/year was applied.

   - Environmental benefit: Global externalities constitute another economic benefit of the project, given that the component led to a decrease in use of diesel-based self-generators. The ICR analysis includes GHG benefits to be generated from the geothermal plants. The assumption is that the additional electricity will go toward replacing diesel self-generation. GHG emissions of electricity supplied by geothermal are lower than GHG emissions from diesel self-generation. An annual average of 932,493 tCO2e is estimated under geothermal component. Total estimate of GHG emission reductions over project lifetime is 24,244,809 tCO2e. Consistent with World Bank's 2017 Guidance Note on Shadow Price of Carbon in Economic Analysis, GHG benefits are valued at US$30/tCO2e in 2017 increasing to US$61/tCO2e in real terms by 2039.

6. Uncertainties remain in future expenditure on steam wells replenishment. So far there has been no expenditure occurred on steam well replenishment since commissioning. This uncertainty is addressed through a sensitivity analysis for O&M cost.

7. ***Base case comparison***. The estimated EIRR of ICR base case is 11.1 percent, excluding environmental benefits, and 14.3 percent when environmental benefits are considered. EIRR is higher by more than one percent point relative to the appraisal case of AF. GHG benefits were not calculated in the original appraisal case.

Table 1. Estimates of EIRR

	KEEP Appraisal	KEEP AF Appraisal	ICR
Excluding environmental benefits			
EIRR (%)	23	-	11.1
NPV at 6% DR (US$Mil)	-	-	1,134
NPV at 12% DR (US$Mil)	841	-	40.3
Including environmental benefits			
EIRR (%)	-	13	14.3
NPV at 6% DR (US$Mil)	-	1,148	902.9
NPV at 12% DR (US$Mil)	-	120.1	126.6

8. ***Sensitivity analysis*** A sensitivity analysis has been performed on annual project O&M cost, in order to evaluate the impact of variation in O&M on economic viability of the project. The results are presented in the table below and it shows that the economic rate of return of the project is resilient to future changes in the generation facilities.

Table 2. Sensitivity Analysis

Scenario (excluding environmental benefits)	NVP (US$Mil)	EIRR (%)
O&M Costs		
Base case	502.9	11.1
130% of base case	330.9	9.5
160% of base case	158.9	7.7
170% of base case	101.5	7.1

Component B: Transmission

9. Major differences in assumptions and applied values in the ICR analysis are summarized below:

- Total capital cost of transmission lines, substation, and consulting services is approximately 94 percent of the appraisal estimate. It was estimated at $58.2 million in the PAD and actual costs of this component is $54.8 million.

- Incremental energy saving benefit. The appraisal assumed incremental energy savings through improved reliability from reduced supply outages valued at the cost of un-served energy at $0.84/KWh. At the completion, system loss of national grid increased to 18.9 percent in 2017 and the two of the three new networks were only commissioned at mid

2016 and the other line (Kisii-Awendo) was only commissioned around the project closing date. The ICR analysis therefore excluded this part of benefit for conservativeness purpose.

- Incremental energy benefit. It is not clear in the PAD how the additional power evacuation capacity is estimated for the three transmission lines. The benefit was valued at LRMC of generation plus incremental transmission cost of US$0.01/ kWh (total US$0.2164/kWh) as a reflection of willingness-to-pay. At completion, given lack of data on increased evacuation capacity of the constructed networks, the ICR analysis estimated a 6MW peak demand added by Kindaruma -Mwingi-Garrissa line since it connected a region that was previously supplied by stand-alone thermal generators at the original size of 6MW. And proxy value of consumer willingness-to-pay was calculated based on 10 percent of household expenditure budget to be spent on electricity-substitutable energy as per Kenya Household Budget Survey 2015-2016.

- Environmental benefits: The ICR analysis includes GHG benefits to be generated from the newly constructed networks. The assumption is that the additional electricity will go toward replacing diesel self-generation. GHG emissions of the mix of electricity supplied through the grid (0.504 tCO2e/MWh) are lower than GHG emissions from diesel self-generation (0.65 tCO2e/MWh). An annual average of 12,422 tCO2e is estimated. A total estimate of GHG emission reductions over 40-year project lifetime is 496,868 tCO2e. GHG benefits were not calculated in the appraisal case.

10. ***Base case comparison***. The estimated EIRRs of ICR base case are 26.7 percent without including price of carbon, and 27 percent when price of carbon is included. EIRR is lower by more than 3 percent point relative to the appraisal case but still above the 12 percent threshold.

Table 3. Estimates of EIRR

	Appraisal	ICR
Excluding Environmental Benefits		
EIRR	32%	26.7%
NPV at 6% DR (US$Mil)	-	290.5
NPV at 12% DR (US$Mil)	182.43	91.4
Including Environmental Benefits		
EIRR	-	27%
NPV at 6% DR (US$Mil)	-	295.3
NPV at 12% DR (US$Mil)	-	93.3

11. ***Sensitivity analysis*** A sensitivity analysis is performed on total project benefits, in order to evaluate the impact of variation in incremental energy benefits on economic viability of the project. The results are presented in the table below and it shows that the economic rate of return of the project is sensitive to future changes in the incremental energy generated and saved by the transmission facilities.

Table 4. Sensitivity Analysis

Scenario (excluding environmental benefits)	NPV (US$Mil)	EIRR (%)
Project benefits		
Base case	290.5	26.7
50% of base case	116.9	17.3
40% of base case	82.2	15
20% of base case	12.8	9.2

Component C: Distribution

12. Actual values of key parameters are updated and applied in the ICR analysis. The main changes in the parameters are summarized below.

    - Number of connections. At appraisal, an overall component's target of connecting 300,000 connections in urban, peri-urban and rural areas was applied in the analysis. An updated figure of 330,305 is applied in ICR analysis, based on prorated contribution of the project to the overall access number achieved by KPLC in the project period 2010-2017.

    - Investment cost. In the PAD, the analysis was done at national program level. A total estimated investment cost of $256.5 million was applied. At completion, the analysis focused on joint contribution of multiple distribution subcomponents of IDA project. Actual CAPEX of $158 million is applied.

    - Willingness to Pay and Consumer Benefits. At appraisal, consumer surplus was calculated for grid-connected consumers at an average of $34.3/month, based on two household socio-economic surveys conducted in 2006 and 2008. The ICR analysis updates the willingness to pay based on 10 percent of household expenditure budget to be spent on electricity-substitutable energy as per Kenya Household Budget Survey 2015-2016. At completion, proxy value of consumer willingness to pay was estimated at $18 per month.

    - Environmental benefits: The ICR analysis includes GHG benefits to be generated from grid connections. The assumption is that the additional electricity will go toward replacing traditional use of kerosene and diesel in household energy consumption. GHG emissions of the mix of electricity supplied through the grid are lower than GHG emissions from kerosene and diesel. An annual average of 173,521 tCO2e is estimated. A total estimate of GHG emission reductions over 15-year project lifetime is 3,470,419 tCO2e. GHG benefits were not calculated in the appraisal analysis.

13. ***Base case comparison*** In ICR base case, EIRR is conducted with focus on joint contribution of multiple distribution subcomponents of IDA project. EIRR is lower by twelve percent point relative to the appraisal case, mainly due to the lower proxy value of WTP and change of analysis scope. When the price of carbon is included, EIRR increase to 11.5 percent in ICR bas case.

Table 5. Estimates of EIRR

	Appraisal	ICR
EIRR (without carbon)	21.1%	9.2%
NPV at 6% DR (US$Mil)	-	31.9
NPV at 12% DR (US$Mil)	93.5	(2.5)
EIRR (with carbon)	-	11.5%
NPV at 6% DR (US$Mil)	-	44.2

14. ***Sensitivity analysis*** A sensitivity analysis has been performed on WTP and project cost, in order to evaluate the impact of variation in the key parameters on economic viability of the project. The results show that ECOK of distribution component is sensitive to the change in loss savings from distribution facilities. Detailed results are presented in the table below.

Table 6. Sensitivity Analysis

Scenario (excluding environmental benefits)	NVP (US$Mil)	EIRR (%)
WTP		
Base case	44.2	11.5
120% of base case	156.7	24.2
Project cost		
90% of base case	103.1	19.4
110% of base case	(14.8)	4.2

Implementation efficiency

15. Overall, the project achieved a good level of implementation efficiency by successfully completing all project components before the closing date, considering the large scale and complexity of the project, however, the mini-grid component had to be cancelled due to long implementation delays.

16. Actual component costs varied compared to estimated cost at appraisal. A total cost overrun of US$53.2 million in steam field development under geothermal component, which was covered as a major part of Additional Financing in the amount of a US$68 IDA credit. However, the potential for cost variation was expected at appraisal and properly incorporated in the contract design because of the uncertainty at the design phase of the final location of geothermal wells and their characteristics. KenGen communicated and discussed design modifications with Bank task team during implementation supervision missions in a timely and continuous manner. By commencing implementation of the steam gathering system and power plants works at the same time as drilling of the wells was ongoing, the GoK reduced the implementation period by over a year. In addition, the total investment of Olkaria I and IV AU 4 and 5 is about 74 percent of the appraisal estimate, which was primarily due to significant cost savings in final contract values for the power plants and steam well drilling compared to agreed financing packages. This was largely attributed to the emphasis in the contract documents on the balance between turbine performance and equipment price and also to the competitive bidding process.

17. For the distribution component, the main reason for higher actual cost compared to appraisal estimate was due to expanded scope responding to speed-up efforts of GoK to achieve universal electricity service to all households and businesses in Kenya over the shortest timetable. The slum electrification subcomponent was efficiently executed, with 4 percent additional outputs (3,992 slum households) achieved at the end of project implementation.

18. The project achieved lower unit investment cost of Olkaria I AU and IV compared to estimates at appraisal, with $3,327/KW compared to the estimated $4,307/KW at appraisal. This is close to the average unit CAPEX of $3,413/KW for future geothermal power plant candidates that is projected in Long-term Power Generation and Transmission Master Plan prepared by Lahmeyer[24]. This is mainly a result of the lower specific investment costs of larger unit sizes. In addition, by looking at capacity-weighted construction cost of geothermal power plants only, KenGen data shows a decrease trend with $2,340/KW (Olkaria I 4&5) in 2015, compared to $3,780/KW (Olkaria II AU) in 2010. Although construction costs alone do not determine the economic attractiveness of the technology, it has reflected a lesson learnt for future bank's operations to further focus on utility-scale geothermal investment given its economies of scale.

19. Time overruns in transmission component negatively affected the implementation efficiency. There was a significant delay in the implementation of three transmission lines which resulted in delays in expected energy savings from the infrastructure. Serious challenges in right of way and land acquisition, lack of land regulations with clear guidance on compensation and benefits sharing, inadequate budgetary allocation by GoK to KETRACO were the main reasons for the implementation delay. However, it is noted that the challenges faced in the project are common barriers for infrastructure projects across Kenya. In addition, KETRACO, as a newly established agency, implemented the safeguards part for the first time in an IDA-supported project.

The above analysis demonstrated a satisfactory project-level EIRR at the completion as well as several strong aspects of implementation efficiency especially under geothermal component. However, there are also some underperformances in the following aspects that affected the project efficiency: cost overruns in geothermal component, delays in the implementation of the transmission component, the cancelation of the mini-grid subcomponent and the negative impact of higher transmission losses in the transmission component. Based on these considerations, **the overall efficiency of the project is rated as Modest.**

[24] Average unit CAPEX of various geothermal power plant candidates with 100MW capacity and above.

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

MINISTRY OF ENERGY

KENYA ELECTRICITY EXPANSION PROJECT (KEEP) (IDA CREDIT NOs. 4743-KE AND 5844-KE) Financed by IDA, KfW, AFD, JICA, EIB, GPOBA, KPLC, KenGen, KETRACO, REA &USERS

REPORT ON EXECUTION OF KEEP

APRIL, 2018

1.0 Project Background

Kenya Vision 2030 identifies energy as one of the key enablers of the Vision's three (3) pillars namely; Economic, Social and Political. The main aim of the Vision is to make Kenya a globally competitive and prosperous country with a high quality life to all Kenyans by 2030. Improved access to energy sources especially electricity improves human development conditions through provision of water; industrial and agricultural productivity; disadvantaged groups empowerment; better health and education conditions and environmental sustainability.

In order to achieve the Vision 2030, the government set the target of universal access to electricity by the year 2030. This meant a lot of investment was required to construct and expand the energy infrastructure. The Kenya Electricity Expansion Project (KEEP) project was conceived during the period where gap between electricity demand and supply was increasing due to inadequate investment in power infrastructure for a long time. In additional the country experienced electricity shortages that resulted in procurement of expensive diesel power plants to supplement the hydropower that was also affected by drought. This state of affairs constrained economic growth significantly.

Therefore KEEP became a key element in the Government's strategy to realize the following objectives.

a) Increase electricity generation capacity to eliminate supply shortages;
b) Expand and upgrade of the transmission and distribution networks to enhance the quality and reliability of supply to customers; and
c) Extend household electricity access, with intention to reducing regional imbalances.
d) Promote the use of "green energy", the use of low-carbon sources for generation, and efficiency in the supply and end use of electricity in line with global environment concerns.

1.1 Sector Issues

The Government of Kenya set out a strategy for expanding electricity infrastructure to support the achievement of Vision 2030 and to simultaneously address the following issues affecting the Kenya electricity sector;

- Heavy dependence on hydropower for electricity supply whose availability is impacted by drought;
- Kenya's abundant geothermal energy which is a viable alternative to hydropower as the main source of power generation was largely underdeveloped;
- Inadequate capacity of the electricity transmission and distribution systems to support major increases in connections without substantial investments;
- Low level of electricity access constraining the achievement of national socioeconomic objectives of greater equity of opportunity; and
- High cost of electricity service as an obstacle to the expansion of electricity access to lower income households.

The Government set a target for universal access to electricity by the year 2030 to enable the planned level of economic development and to reduce imbalances among regions and between urban and rural areas. This target has since been revised to the year 2020. The Government's strategy for expanding electricity infrastructure to support the achievement of Vision 2030 also addresses other challenges in the energy sector. The guiding principle of this strategy is to "promote equitable access to quality energy services at least cost while protecting the environment." This is also in line with global environmental concerns of promoting the use of "green energy" (low-carbon sources) for electricity generation where feasible, along with improving efficiency in the supply and end use of electricity.

1.2 The Electricity Access Strategy

The government scale-up program is based on a least cost planning approach that maximizes the benefits of the program while minimizing the cost. This planning approach makes use of geospatial analysis to determine the technology option (grid, isolated mini-grids or off-grid including solar PVs) for electrifying a given area. The planning approach takes account of population density patterns and the nature of grid rollout that requires strengthening of transmission network concurrently with the extension of the distribution network. The least cost approach favours first connecting areas with high population density that are closest to the existing grid and later connecting those areas that are less densely populated and that are more distant from the grid. Equity considerations compel modification of these strict least cost criteria so that the towns and district centres in more remote areas also benefit from the scale up program. Thus, while maintaining least cost principles, the planning approach also target electrification of all priority loads in rural and district centre.

2.0 Project Development Objectives and Key Indicators

The Project commenced in October, 2010 with the following Project Development Objectives (PDOs);

PDO1: Increase the capacity, efficiency and quality of electricity supply.
PDO2: Expand access to electricity in urban, peri-urban and rural areas.

At the beginning of the project, the key indicators for measuring the achievement of the above Project's objectives were as follows;

- Electricity generation from renewable geothermal capacity constructed (GWh);
- Average power system interruption frequency per year (number)
- Electricity transmission and distribution losses (%);
- People provided with access to electricity (number, assuming five people per household connection); and
- Direct project beneficiaries (number), of which are female (%).

However, the project was restructured and the result framework was updated to include two new indicators:

i. At PDO level: New slum consumers connected to the grid (Number); and

ii. At intermediate level: KPLC conducts an annual customer satisfaction survey for slum consumers. KPLC will take customer feedback into account and the results of this survey will be used to inform its slum electrification program and consumer marketing plans.

Project Components

The project had four components designed to meet these PDOs, along with their cost estimates as follows:

Component A: Geothermal Power Generation (US$ 1,035 million: IDA, US$120 million; JICA, US$323 million; AFD, US$210 million; EIB, US$168 million; KfW, US$84 million; KenGen, US$ 130 million).
This component supports the construction of 280 MW of geothermal power generation capacity in Naivasha (140MW expansion at the existing Olkaria I power station and 140 MW at Olkaria IV. IDA financing supports construction of;

i. Steam gathering and distribution system works for the two power plants;
ii. An access road interconnecting Olkaria I and Olkaria IV plants; and
iii. A geothermal workshop and laboratories.
iv. The funding also pays for technical assistance provided by a geothermal board of consultants that provides independent advice to KenGen on geo-scientific issues, steam gathering systems and power plants design, as well as environmental management.

Component B: Transmission (US$72.5 million of which IDA US$64.5 million; and KETRACO US$8 million).
This component supports the extension of Kenya's electricity transmission network and construction of new 132/33 kV substation. The transmission lines were to meet additional electricity demand, reduce losses, improve reliability, and enhance the quality of service. These lines are;

a) Kindaruma-Mwingi-Garissa;
b) Eldoret-Kitale; and
c) Kisii-Awendo.

Component C: Distribution (US$272 million: IDA, US$134 million; AFD, US$10 million; KPLC, US$30 million, GPOBA, US$5 million, REA US$2 million; users US$91 million).
This component supports:

i. Strengthening and extending electricity distribution networks in urban, peri-urban and rural areas;
ii. Electrifying priority loads (public facilities) in rural areas;
iii. Electrifying urban slums; and
iv. Revolving fund for deferred payment of electricity connection fees.

A significant number of the new customers were to come from lower-income urban areas and rural areas. Therefore, this Component was to support GoK's measures to enhance the affordability by households of new connections.

Component D: Sector Institutional Development and Operational Support (US$ 11.5 million).
This component supports:

i. Institutional development and studies;
ii. Training; and

iii. Project Implementation Support and Monitoring and Evaluation (M&E).

After the project was restructured, the project components were redesigned and new cost estimates for IDA and GPOPA apportioned as follows;

S/NO	Component	Estimated Original Cost (Million USD)	Estimated Cost after 1st restructuring (Million USD)	Estimated Cost after 2nd restructuring (Million USD)	Additional Financing	Final Estimated Project Costs (Million USD)
	Geothermal Power Generation	120	114.23	117.82	53.20	171.02
	Transmission	64.5	63.31	59.00	0	59.00
	Distribution	134	132.81	155	13.5	
	Sector Institutional Development and Operational Support	11.5	10.43	6.18	4.3	

In support of the Project Development Objectives, a results monitoring system was developed to track the implementation of the project. The table below provides summary results monitoring framework.

	Results Monitoring Framework
PDOs	**Outcome Indicators**
(a) Increase the capacity, efficiency, and quality of electricity supply.	Electricity generated from renewable generation capacity constructed under the project, (net GWh/year). Electricity losses per year in the project area (%) --CORE Supplemental information: + Total net injected generation (MWh) + Share of technical losses (%) + Share of non-technical losses (%) Average interruptions frequency per year in the project area (Number) -- CORE Supplemental information: Total number of customers served in the project area.

(b) Expand access to electricity in urban, peri-urban and rural areas.	People provided with access to electricity in the project area (Number) -- CORE. Supplemental information -- breakdown by: grid connection, off-grid connection, conventional, and off-grid connection renewable. Direct project beneficiaries (number), of which female (%) -- CORE.
Intermediate Outcomes	**Intermediate Outcome Indicators**
Component A: Geothermal Generation Increase electricity generation capacity from renewable green source (geothermal).	Generation capacity of renewable energy (geothermal) constructed or rehabilitated under the project (MW) -- CORE.
Component B: Transmission Increase the capacity of the electricity transmission system to supply existing and new customers.	Transmission lines constructed or rehabilitated under the project (km) -- CORE. Supplemental information -- breakdown by: transmission lines constructed, transmission lines rehabilitated.
Component C: Distribution Extend and upgrade the electricity distribution system.	Distribution lines constructed or rehabilitated by KPLC under the project (km) – CORE. Supplemental information: distribution lines constructed, and distribution lines rehabilitated, rural and non-rural. Substations constructed or rehabilitated by KPLC under the project (number). Distribution lines constructed in rural areas by REA under the project (km).

	Isolated grids constructed or rehabilitated by REA under the project (number). Supplemental information: disaggregation by type of generation. Community (public facilities) electricity connections provided under the project (number) -- CORE Supplemental information -- breakdown by community center, hospital, school and other. Business electricity connections provided under the project (number) -- CORE. Supplemental information: breakdown by enterprises
Component D: Sector Institutional Development and Operational Support Improve capacity of sector institutions.	Roadmap for implementation of the wholesale electricity market is adopted by MoE. Rural Electrification Master Plan (REMP) annually updated. Cost of service study completed one year before 2014 tariff review is launched.

3.0 Key Achievements of KEEP and Contributions of the PDOs

The investments and studies under KEEP have contributed to the following achievements classified according to the PDO's:

3.1 PDO1: Increase the capacity, efficiency and quality of electricity supply

KEEP has contributed to the following achievements;

- The investments under KEEP have increased the electricity generation capacity by 280MW (Olkaria I & IV each of 140MW). The installed electricity capacity w 1057 in 2010 and 1631in December, 2017, an increase of 574MW of which KEEP contributed 52%.
- The completion of the 280MW has increased renewable electricity generation from 917MW in 2010 to 1378MW as at December, 2017, an increase of 461MW of which KEEP contributed 65%.
- The average amount of electricity generated from the two power Plants annually is 1965 GWh.
- The interruptions per 1000 customers have improved from 9.1 in June 2010 to 1.8 as at 31st December, 2017.

3.2 PDO2: Expand access to electricity in urban, peri-urban and rural areas

- KEEP contributed to the increase in the number of customers connected to electricity from 1.46million customers in 2010 to 6.456million as at December, 2017.

- Over 1058 public facilities in various market and trading centers have been connected with electricity. These include, health centers, dispensaries, education institutions (pry and secondary schools). This has led to among others;

i. Increased business hours in trading center's
ii. Provision of street lighting in rural towns to improve security
iii. Enhancement of healthcare due to equipment of health centers and dispensaries in rural areas
iv. Improvement of education standard.
v. Establishment of income generating activities.
vi. Provision of clean water for household consumption from community boreholes.

- Over 16,000 business enterprises have been connected to electricity leading to improved economic activities in the rural areas.
- A total of 390 Km of transmission lines, 11,057 Km of medium and Low voltage distribution lines have been constructed. In addition 24 distribution substations and four (4) transmission substations were constructed.

3.3 Analysis and report on achievements with respect to the results framework

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
1.	People provided with access to electricity by KPLC	Number	0	11,000,000	25,032, 580	The number of electricity connections increased from 1,450,000 in 2010 to 6,456,516 as at December, 2017. The government accelerated electrification with a view to achieve the revised target of universal access to electricity from the year 2030 to 2020.
2.	New slums consumers connected to the grid	Number	120,000 as at April, 2016	174,000	177,667	The slum connections since 2016 were 57,667.
3.	Electricity losses per year in the project area	Percentage	16.30	15.90	18.90	Because of the government accelerated electrification program, the number of people connected more than doubled without a commensurate expansion of the upstream infrastructure.
4.	Total net injected generation	Gigawatt-hour(GWh)	0	2020	1965	There were challenges of evacuation to the national grid.
5.	Electricity generation from renewable generation capacity constructed under the	Gigawatt-hour(GWh)	0	2020	1965	There were challenges of evacuation to the national grid.

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
6.	Interruption per 1000 customers	Number	9.1	8.50	1.8	The target was surpassed due Improved maintenance, investments in substations and the MV network and a sharp increase of new connections.
7.	Direct Project Beneficiaries	Number	0	11,000,000	25,032, 580	The number of electricity connections increased from 1,450,000 in 2010 to 6,456,516 as at December, 2017. The government accelerated electrification with a view to achieve the revised target of universal access to electricity from the year 2030 to 2020.
	INTERMEDIATE RESULTS INDICATORS					
8.	Meters Installed under the project	Number	0	255,000	255,000	Target met.
9.	KPLC conduct an annual customer satisfaction survey for slums consumers.	Yes/No	No	Yes	Yes	Target met.
10.	Community electricity connections constructed under the project.	Number	0	450	1058	More public institutions benefited from the government policy that accelerated connection of all public primary schools to support digital literacy by the year 2016.

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
11.	Community electricity connections constructed-grid	Number	0	450	1058	More public institutions benefited from the government policy that accelerated connection of all public primary schools to support digital literacy by the year 2016.
12.	Distribution lines constructed or rehabilitated under the project.	Kilometers	0	2,280	11,057	The increase was due to the accelerated target of universal access by the year 2020 and KPLC committed more internal resources to expand the distribution network
13.	Distribution lines constructed under the project.	Kilometers	0	2,280	11,057	The increase was due to the accelerated target of universal access by the year 2020 and KPLC committed more internal resources to expand the distribution network
14.	Transmission lines constructed or rehabilitated under the project.	Kilometers	0	334	390	The actual survey route was longer than the target. This included a 220kV Olkaria to Suswa connections and diversions
15.	Transmission lines constructed under the project.	Kilometers	0	334	390	The actual survey route was longer than the target. This included a 220kV Olkaria to Suswa connections and diversions

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
16.	Generation Capacity of Renewable Energy (other than hydro-power) constructed.	Megawatt	0	280	280	The power plants are Olkaria 1(140 MW) and Olkaria IV(140 MW). The completion of these power plants increased the proportion of renewable energy in the energy mix by 280MW.
17.	Generation Capacity of Renewable Energy constructed-other.	Megawatt	0	280	280	The power plants are Olkaria 1(140 MW) and Olkaria IV(140 MW). The completion of these power plants increased the proportion of renewable energy in the energy mix by 280MW.
18.	Generation Capacity of Renewable Energy constructed-Geothermal.	Megawatt	0	280	280	The power plants are Olkaria 1(140 MW) and Olkaria IV(140 MW). The completion of these power plants increased the proportion of renewable energy in the energy mix by 280MW.
19.	Generation Capacity of Renewable Energy (Geothermal) constructed and rehabilitated.	Megawatts	0	280	280	The power plants are Olkaria 1(140 MW) and Olkaria IV(140 MW). The completion of these power plants increased the proportion of renewable energy in the energy mix by 280MW.

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
20.	Transmission lines constructed or rehabilitated under the project (CORE)	Kilometers	0	334	390	The actual survey route was longer than the target. This included a 220kV Olkaria to Suswa connections and diversions
21.	Transmission lines constructed under the project (CORE)	Kilometers	0	334	390	The actual survey route was longer than the target. This included a 220kV Olkaria to Suswa connections and diversions
22.	Distribution lines constructed or rehabilitated under the project (CORE)	Kilometers	0	2,280	11,057	The increase was due to the accelerated target of universal access by the year 2020 and KPLC committed more internal resources to expand the distribution network
23.	Substations constructed or rehabilitated by KPLC under the project.	Number	0	26	63	32 were constructed using KPLC counterpart funds and 31 funded by IDA.

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
24.	Community (Public facilities) electricity connections provided under the project (CORE)	Number	0	450	1058	More public institutions benefited from the government policy that accelerated connection of all public primary schools to support digital literacy by the year 2016.
25.	Community Centres	Number	0	450	1058	More public institutions benefited from the government policy that accelerated connection of all public primary schools to support digital literacy by the year 2016.
26.	Business electricity connections provided under the project (CORE)	Number	0	15,000	15,993	Target met.
27.	Roadmap for implementation of the wholesale electricity market adopted by MOE.	Yes/No	No	Yes	Yes	Power Market Study completed in August, 2012
28.	Rural Electrification Master Plan (REMP) annually updated	Yes/No	No	Yes	Yes	Updated report on electrification status of public facilities produced

	Project Outcome Indicators	Unit of Measure	Baseline (2010)	Target at End Date	Actual at End Date	Remarks
29.	Cost of service study completed one year before 2014 tariff reviews was launched	Yes/No	No	Yes	Yes	The cost of service study was completed in January 2013. This was the fifth cost of service study.

4.0 Implementation Arrangements

The Project Executing Agencies (PEAs)--the MOE, KPLC, REA and KenGen—established Project Implementation Teams (PITs) to implement their respective parts of the Project. To avoid the creation of special purpose organizational units for the life of the Project, the PITs were established within the organizational units that are normally responsible for implementing similar projects. The PITs had overall responsibility for monitoring their respective components of the project, including preparation of progress reports, updating of project costs and financing plans, and ensuring that project implementation and procurement plans were kept up to date.

On commencement of the projects the PITs were adequately staffed with project staff and/or consultants with experience and skills in the core functions of project management, power engineering and financial management. The PIT heads of KPLC, REA and KenGen were seasoned project management professionals, with convening power within their PEAs, while the one at MOE was retained from the previous Energy Sector Recovery Project (ESRP). The PIT heads of KPLC, REA and KenGen reported to the chief executives of their organizations, while the one at MOE reported to the Principal Secretary.

MOE's PIT comprised of a Project Coordinator, who was the PIT Head as well as the Coordinator for the overall project, two Power Engineering Consultants, a Finance Management Specialist, MOE's Heads of Accounts, Finance, Procurement, Human Resource Development, Renewable Energy and the Electrical Power Development Departments. The MOE's PIT also oversaw the implementation of ERC's activities on the project.

KenGen's PIT comprised of a Project Team Leader, Procurement Expert, Financial Specialist and supported by qualified technical staff, who included staff from KETRACO. In addition, specialists from other functional departments such as environment, legal and human resources also complemented the project team. Experienced consultants were recruited to assist in supervision functions. KenGen, on behalf of KETRACO was also responsible for the implementation of Transmission Lines and Substation that evacuated power to the national grid.

KPLC's PIT comprised of a Project Team Leader, Procurement Expert, Financial Specialist and supported by qualified technical staff. In addition, specialists from other functional departments such as environment, legal and human resources also complemented the project team. Experienced consultants were recruited to assist in supervision functions. KPLC was responsible for the implementation of KETRACO's project components. KETRACO provided staff who participated in the implementation of the transmission component.

REA's PIT comprised of Project Team Leader, Project Accountant, Procurement Expert and supported by qualified technical staff. In addition, specialists from other functional departments such as environment, legal and human resources also complemented the project team. A supervision support implementation consultant firm was recruited to assist in supervision functions of the project.

For the overall project coordination, monitoring, and reporting, a Project Coordination Team (PCT) comprising the PIT Heads of MoE, KPLC, REA and KenGen was established and operated under the chair of the overall Project Coordinator and MoE's PIT head. The PCT consolidated project implementation progress reports and submitted them to the Ministries of Finance and Energy, and the financing partners.

4.1 Challenges and Successes encountered and Lessons Learnt in deploying these implementation arrangements

Challenges Encountered and Mitigation Measures

- Assignment of other organizational tasks (not part of KEEP) to the PIT members thereby negatively impacting project implementation. The project was not able to address the issue in a timely manner because of organizational constraints.
- Staff turnover in KPLC affected the implementation of the project. Even though the staff that left was replaced, there was steep learning curve.
- High turnover of staff in the accounts department of MOE was experienced during the first two years. As a result the quality of IFRs prepared by MOE suffered. To address this challenge a financial management specialist was recruited for the remaining project duration.
- The turnover of staff in the procurement units of MOE was very high. The procurement staff was all seconded from Treasury to MOE. Whenever staff changes were made, the project received new procurement staff that had no training in World Bank's procurement guidelines. The project would then arrange for their training, but would lose them again shortly thereafter because of the frequent inter-ministerial staff transfers. As a result the quality of procurement documentation prepared by MOE suffered.

Successes

- The skills of staff who have been involved in implementation of the project have been enhanced as a result of implementation of their respective tasks and training programs on procurement, engineering, financial management , project management and supervision of Turnkey Projects.
- The PIT arrangement under KEEP contributed to the decision by KPLC to establish a project implementation division which handles both Development Financial Institutions (DFI) and internally funded projects and fostered stability and consistency in the implementation of KPLC's Project Component.
- The PITs largely executed the scope of the project successfully.

Lessons Learnt

- There should be communication channel to monitor the workload of staff attached to PIT so that the organization tasks do not adversely affect the implementation of the project.
- For project roles where the turnover of organizational staff is likely to be high, projects need to consider hiring external human resources for the duration of the project.

5.0 Project Management Planning

On commencement of the project in October, 2010 the basis of all project work was:

- The World Bank's Project Appraisal Document (PAD) No 54147-KE dated May 3, 2010. It contained a detailed project description, implementation arrangements by which the project would be executed, and how the project would be monitored and controlled;
- Financing Agreement for Credit No 4743-KE signed between the World Bank and the GOK on July 5, 2010. It had a detailed project description similar to that in the PAD and provided details on the project subcomponent. It also had provisions for how the project would be monitored and controlled.

After the project was restructured, the scope of work was revised as detailed in the following documents:

- The World Bank's Project Appraisal Document (PAD) No 1282-KE dated May 19, 2016. It contained a detailed project description, implementation arrangements by which the project would be executed, and how the project would be monitored and controlled;
- Financing Agreement for Credit No 5844-KE as additional financing signed between the World Bank and the GOK on June 29, 2016. It had a detailed project description similar to that in the PAD and provided details on the project subcomponent. It also had provisions for how the project would be monitored and controlled.

5.1 Scope Baseline

The project has four components defining the scope baseline as previously detailed in section 2.0 of this report.

5.2 Schedule Baselines

During project appraisal each implementing agency prepared baseline project schedules for their respective project components. These schedules contained the project activities that would be undertaken to accomplish the approved scope of each project component, their scheduled start and end dates, and their estimated durations. During implementation the schedule baselines were used to measure and report on actual versus planned performance in the quarterly progress reports. The schedules were updated every six months to accommodate any necessary changes and to reflect the true situation on the ground.

5.3 Procurement Plan

The Bank's Approval Date of the Procurement Plan was April 13, 2010 and date of General Procurement Notice was April 27, 2010. During project appraisal a procurement plan for the first 18 months of project implementation was developed providing the basis for procurement methods that would be used. This plan was discussed in detail and refined as appropriate during negotiations and accepted by the World Bank. The procurement plan was disclosed on the Bank's public website after the Credit was approved. Thereafter the Procurement Plan was updated by the implementing entities on an annual basis and re-disclosed after Bank's approval. The plan included relevant information on supply and installation, goods, works and consulting services under the Project as well as the timing of each milestone in the procurement process.

The thresholds for procurement methods and prior review of World Bank funded procurements were agreed as tabulated below;

a) Goods and Works and Non-Consulting Services

Prior Review Thresholds: Procurement decisions subject to Prior Review by the Bank as stated in Appendix 1 to the Guidelines for Procurement:

	Procurement Method	Prior Review Threshold	Comments
	ICB and LIB (Goods)	>=500,000	All contracts
	ICB and LIB (Works/Supply & Installation of Plant & Equipment)	>=5,000,000	All contracts
	ICB (Non-Consultant Services)	>=500,000	All contracts
	NCB	All values	1st contract only
	Direct Contracting	All values	All contracts
	Force Account	All values	
	Shopping	>=70,000	
	Performance Based Procurement	None	

b) List of Contract Packages to be Procured Following ICB and Direct Contracting

Ref. No.	Contract (Description)	Financier	Cost Estimate	Procurement Method	P-Q	Domestic Preference (yes/no)	Review by Bank (Prior/ Post)	Expected Bid-Opening Date
	66/11 & 33/11 KV Power Transformers.	IDA	5.0	ICB	No	No	Prior	November 2010
	Substation Switchgear and equipment including steel structures (several lots).	IDA	18.0	ICB	No	No	Prior	November 2010
	Overhead line equipment for upgrade and reinforcement of the Distribution network (several lots)	IDA	15.0	ICB	No	No	Prior	November 2010
	Substation Civil Works (3 lots).	IDA	3.0	NCB	No	No	Prior	December 2010

Ref. No.	Contract (Description)	Financier	Cost Estimate	Procurement Method	P-Q	Domestic Preference (yes/no)	Review by Bank (Prior/ Post)	Expected Bid-Opening Date
	Pre-payment meters.	IDA	8.0	ICB	No	No	Prior	December 2012
	Geothermal steam gathering and distribution network (Lots A & B)	IDA & KfW	147.0	ICB	Yes	No	Prior	February 2011
	Olkaria I Power Plant.	JICA	305.0	ICB	Yes	No	Prior	November 2010
	Olkaria IV Power Plant.	AFD & EIB	340.0	ICB	Yes	No	Prior	November 2010
	Olkaria 1 & IV Interconnection Lines and Substation.	EIB	32.0	ICB	Yes	No	Prior	December 2010
	EPC for construction of Kindaruma-Mwingi-Garissa 132 kV transmission line.	IDA	40.0	ICB	No	No	Prior	January 15, 2011
	EPC for construction of Kisii-Awendo 132 KV lines and associated substations.	IDA	8.5	ICB	No	No	Prior	March 15, 2011
	EPC for construction of Eldoret-Kitale 132 KV lines and associated substations.	IDA	12.0	ICB	No	No	Prior	March 15, 2011
	EPC for the Construction of 66/11 & 33/11 KV Substations in Nairobi Region	IDA	11.2	ICB	No	No	Prior	April 2011
	EPC for the Construction of 33/11 KV substations in the Coast Region	IDA	5.2	ICB	No	No	Prior	May 2011

Ref. No.	Contract (Description)	Financier	Cost Estimate	Procurement Method	P-Q	Domestic Preference (yes/no)	Review by Bank (Prior/ Post)	Expected Bid-Opening Date
	EPC for the Construction of 33/11 KV substations in the Mt. Kenya Region.	IDA	11.4	ICB	No	No	Prior	June 2011
	EPC for the Construction of 33/11 KV substations in the West Region	IDA	13.4	ICB	No	No	Prior	July 2011
	Supply and installation of Grid Extension Lines (REA).	IDA	3.9	ICB	No	No	Prior	May 2011

5.4 Challenges encountered and lessons learned in project management planning

Challenges encountered and mitigation measures

a) Escalations of the project initial budget due to

i. Non availability of land for some substations sites. Land could not be acquired where it had been initially earmarked and new sites had to be found.

ii. Exchange rate fluctuations between the dollar and SDR. At the beginning of the project the amount of dollars available for the project was USD. 330Million equivalent. By the time of the mid-term review the amount available to the project had reduced to USD 226 million due to depreciation of the Dollar against SDR.

iii. Price escalations due to delays in implementation.

iv. Change in scope between contract and actual works after the design for the transmission lines and the steam fields.

v. Scope changes at Kindaruma substation because of the change in site location arising in order to avoid encroaching on riparian land.

vi. Significant increase in safeguards costs in connection with transmission lines where the final costs of compliance with safeguards requirements exceeded transmission lines costs.

vii. A new legislation that introduced NCA approvals and Railway development levy that was not anticipated led to escalation of project cost.

b) The steam field portion commenced before the drilling of wells was completed and changes that occurred in drilling activities and or results beyond those envisaged in the original scope lead to repetitive design work.

c) Necessary change in steam field operating pressure to address the silica scaling problem that was observed after the project had substantially progressed which lead to repetitive design to adopt/upgrade the entire design to suit the new steam pressure.

d) Delays in procurement processes impacted negatively on the project execution. In particular the design and implementation of the off-grid electrification project including the pilot program was not implemented. This was because the procurement process of the consultant to implement the off-grid component and subsequent approval by the financier took a long time and by the time the process was completed there wasn't sufficient time for implementation.

e) Challenges in acquisition of way-leave leading to delays in construction of the projects.

f) KPLC experienced delays in acquisition of development approvals from the County Governments that came into existence in 2013 (some county governments froze development approvals for a period of about one year) for project sites leading to delays in handover of the project sites to the contractors. KPLC has adopted a consultative approach and close working relationship with the various county governments to enable fast-tracking of the clearance documents.

g) KPLC and REA experienced delay in issuance of tax and duty exemptions by the National Treasury leading to delay in clearance and delivery of materials for implementation of the project. This can be mitigated by including the cost for tax and duty in the financing of the project.

h) The implementation of distribution lines and associated substations under separate contracts is difficult to synchronize.

i) Delay in commencement of steam field subcomponent because of currency restriction. Initially direct payments were to be made to the contractor by the financier. Despite having approved the contract, the financier declined to make direct payment because the currency of payment was not easily convertible. KenGen mitigated this by taking over the payments from their project account.

Lessons learnt

a) Wayleave and land acquisition for substations and distribution lines should be incorporated in the project implementation schedule and preferably acquired before the contract award.
b) The quality and relevance of initial assumptions during the planning stage will determine to a large extent how well the project will be managed;
c) Donor financing to include costs associated with taxes and duties.
d) Distribution Substations contracts should include associated lines.
e) Completion of Pre-development activities-land and way leaves acquisition, feasibility studies, drilling etc before implementation to minimize variation in scope and project delays.
f) Stakeholder management in project implementation to minimize negative impacts on the project.

6.0 Project Time Management

MOE, KPLC and KENGEN divided their project components into several contracts which were executed separately, each with its own defined schedule keeping in mind any interfaces between the contracts. Each Contract was monitored against its own contractual project schedule. Where there were slippages, project schedules were revised to reflect realistic completion times. The schedule would be updated regularly to ensure design, manufacturing, shipping and delivery of material and equipment matched activities at site and provide basis for optimal resource allocation.

REA had two implementation approaches. The first approach was using an EPC contractor for a cluster of projects in the coast region while the other approach was supply of materials and recruitment of labour and transport (L&T) contractors to implement the project. Each contractor was required to prepare an execution schedule that fitted the contract duration. The implemented schedule and activities schedules were reviewed by the implementation consultant to ensure they fitted within the overall project implementation plan. Quarterly and monthly meetings with the contractors were held to review the project schedule and actions were within the planned period. Each contract was monitored against its own contractual project schedule. Where there were slippages, project schedules were revised to reflect realistic completion times.

6.1 Managing the project schedule

Each implementation agency managed their respective project schedules using appropriate schedule management tools such as MS Project and MS Excel.

6.2 Development of schedules for the project

During the development stage of the project, each implementing agency developed the initial schedules of the activities they anticipated to undertake to accomplish their project components. These were

adopted after review and acceptance by relevant stakeholders. The schedules were progressively elaborated and updated as the project moved through the initiation, planning, execution, monitoring and controlling and closing phases. At the implementation stage of each contract on the project, the schedule for each component was reviewed to take into account changes necessitated by unforeseen conditions at Contract commencement.

6.3 Monitoring the status of project activities

The schedules were used to monitor the status of all project activities. They would be updated quarterly when measuring and reporting on actual performance in the progress reports to ensure that all project activities were performed as scheduled. These schedules were also monitored at the quarterly meetings of Project Coordination Team (PCT) meetings where any emerging challenges were addressed.

6.4 Actual performance versus planned performance with respect to time

The generation component comprised of five contracts as follows; one (1) supervision consultancy contract, one (1) development of Steam field contract, two (2) power station development contracts and one(1) high voltage Substation and Transmission Lines development contract. The two power plants 140MW Olkaria I and 140MW Olkaria IV were constructed and commissioned within the project period. The amount of electricity generated from the two power plants in 2017 FY was 1,965 GWh against a target of 2020 GWh. While the original project schedules were revised due to additional scope of works in addition to extensions of time due to excusable delays, the contracts were completed in a timely manner

At the closing of the project 390Km of transmission lines and associated substations had been completed. These lines are 61Km Eldoret – Kitale, 44Km Kisii – Awendo and 226Km Kindaruma – Mwingi – Garissa which were completed within the project period. In addition 25Km 220kV Olkaria I – Suswa and 18Km 220kV Olkaria IV – Suswa lines and associated substations were constructed to evacuate power from Olkaria I & IV power plants. The actual survey route was longer than the target which included 220kV Olkaria – Suswa connections and diversions.

The targets for the distribution component were: Construction or rehabilitation of 26 No. substations; 2,280Km of distribution lines; 450 connections to public facilities; and 15000 connections to business community. By the end of the project period: 63 (32 were constructed using KPLC counterpart funds and 31 funded by IDA) substations and 11,057Km of distribution lines were constructed; 1,058 community (public facilities) and 15,993 business community electricity connections were done; and 177,667 slum connections against a target of 174,000 were realized. The overall number of direct project beneficiaries increased to 25,032,580 as at December 2017against a target of 11,000,000. While works on most of the sites were completed on timely basis, there were also significant delays in other sites with one contract to supply concrete poles cancelled. This part of distribution component had a supervision consultant whose contract was extended in order to supervise to completion the works of the delayed sites.

The rural electrification subcomponent comprised of one(1) supervision consultancy contract, twenty (20) contracts for supply materials, twelve (12) contracts for installation services (L&T) and one turnkey contract in which the contractor supplied materials as well as installation services. All contracts were completed on time apart from two contracts to supply treated wooden poles which were cancelled, and one contract for installation services whose completion period was extended.

6.5 Challenges encountered and lessons learned in project time management

- As project implementation was underway there was a variation between the planned and the actual time and a delay was being realized for some of the project activities. Accuracy of initial estimation of activity durations is important in ensuring decision are made at the right time;
- There was delay in completion of the design and construction of the steam gathering system as drilling of production wells was ongoing and the location of some of the viable production wells changed. It is important to confirm steam availability before procurement of contractors for construction
- The project implementation schedule did not include risk management activities some of which were realized during project implementation resulting in delay in project implementation. Risk management activities need to be identified and included in project implementation schedule.
- Challenges associated with way leave and land acquisition led to delay in implementation of some of the projects. Effective implementation of stakeholder and social safeguards management activities by providing adequate resources to timely implement those activities.
- Many of rural electrification sites were sparsely distributed in remote areas with harsh terrain with insufficient information to implement the project. There is need to provide information using new technologies such as geospatial and consider other alternative electrification technologies.
- Despite selecting contractors in adherence to approved procurement procedures some of them are unable to perform to the project expectations leading to delays in implementation. There is a need to review the procedures to address this and other similar challenges.
- Many contractors and consultants who were awarded contracts changed approved suppliers, sub contractors and sub-consultants after contract award. This brought about delays due to repeat of review of approval of personnel, materials and equipment to be supplied that had not been evaluated. Review the provision in contracts governing change of suppliers, sub-consultants and subcontractors to discourage frequent change requests during project implementation.
- There were incidences of non-adherence to safety procedures which resulted in sites being closed down. The sites could only be opened after a safety audit had been done and this resulted to delays. Implement a penalty system which can lead to termination and subsequent black listing of the contractor. In addition, there is need to conduct sensitization and refresher training to enhance safety especially for specialized operations.

7.0 Project Cost Management

The Project Appraisal Document (PAD), Financing Agreement, Project Agreements, Subsidiary Loan Agreements, Subsidiary Grant Agreements, and Disbursement Letter established the overall policies, procedures and documentation used for planning, managing, expending, and controlling project costs. They provided details on the breakdown of financing into categories and stipulated the limit of allowable expenditure under each category. There were occasions when funding in some categories was exhausted before the corresponding activities had been completed, while other categories had surplus funds despite their corresponding activities having been completed. The Implementing Agencies requested the World Bank for reallocation of funds across categories to optimize utilization of project funds.

The Implementing Agencies that are ISO certified, used ISO Standards to run their business. They have developed simplified Work Instructions, guided by the ISO standards, on how to implement and operate the projects, projects funds flow and projects payments management.
KenGen, REA and KPLC used the SAP system to capture all project data, including costs, generate accounting and financial reports etc. The fund management module helped the implementing agencies to monitor the cost. The system has continuously been improved over the years.

7.1 How project cost estimates were developed

The analogous estimating method and feasibility studies were used to develop most of the project cost estimates. The completed costs from previous similar projects were used as the basis for estimating the costs of the KEEP, with appropriate adjustments being made for factors like inflation, escalation in commodity prices among others.
The cost estimates excluded: Taxes, levies, import duties, Projects management costs, operator's trainings, recommended spares, project funding and capitalized interest. The estimates were reviewed and refined as the project progressed to reflect additional detail as it became available.

7.2 Development of Project Budget

The project budget was prepared on the basis of cash flow projections that informed how much funding would be required for each financial year.

7.3 Cost control while monitoring the status of the project to update project costs and manage changes to the cost baseline

- The approved budget for each fiscal year was used as the basis for controlling project cost during project implementation.
- Quarterly project status reports and Interim Financial Reports were prepared for the project and included a section capturing information on planned versus actual expenditure.

7.4 Actual performance versus planned performance with respect to cost on the project

The details are given in table in section 5.2.4

7.5 Challenges encountered and lessons learned in project cost management.

- Challenges associated with way leave and land acquisition led to increase in implementation cost for some projects. Effective implementation of stakeholder and social safeguards management activities will assist in establishing accuracy in costs estimates of projects.
- Delays in getting exemptions for duties, taxes and levies resulted in claims for demurrages charges. This can be mitigated by including the cost for tax and duty in the financing of the project.
- Lengthy process of disbursing project funds from the exchequer making it difficult for implementing agencies to utilize funds within the financial year. It delayed payments to service providers and in some cases attracted penalties thus escalating the cost of the project.

- Limited budgetary ceilings allocation affecting the project's budgetary requirements in some of the financial years. This is a statutory requirement that can only resolved through a review of existing laws.
- Introduction of new legislation such Railway Development Levy, National construction levy during the project implementation resulted in additional costs to the project. This was statutory requirement that the project was required to comply with.

8.0 Project Quality Management

The project quality requirements were embedded in the various contract documents. The requirements documentation and specifications for each contract defined the quality of the works to be achieved. The contractors developed quality management plans from their Quality Assurance and Control systems. This ensured that the design, material selection, manufacturing, construction, testing and commissioning were largely consistent with specification and achieved the desired results. Designs and engineering methods were reviewed and approved, factory acceptance tests were witnessed by the Implementing Agencies and their consultants, and the inspectors of works at site offered the quality supervision required.

However it was found out that some equipment and materials from some countries were not consistent with the quality standards contained in the bid documents. The project entities should carry out due diligence before contract award and during manufacturing.

9.0 Project Human Resource Management

Project team members were drawn from other functional departments within the Implementing Agencies. Each project team member had the required skills to execute the project roles assigned to them. The project had a clear and well defined scope making it easy to assign clear roles and responsibilities. The selection criteria of members to fit the roles and responsibilities were based on already acquired skills and where gaps were identified, the required training was provided. Project implementation team heads reported to the chief executives of their organizations while project team members reported to their respective project implementation team heads.

MOE's PIT comprised a Project Coordinator, who was the PIT Head as well as the Coordinator for the overall project, two Power Engineering Consultants, a Finance Management Specialist, MOE's Heads of Accounts, Finance, Procurement, Human Resource Development, Renewable Energy and the Electrical Power Development Departments. The MOE's PIT also oversaw the implementation of ERC's activities on the project.

KenGen's Project team members were drawn from other functional departments within the Implementing Agencies. Each project team member had the required skills to execute the project roles assigned to them. The project had a clear and well defined scope making it easy to assign clear roles and responsibilities. The selection criteria of members to fit the roles and responsibilities were based on already acquired skills and where gaps were identified, the required training was provided. Project implementation team heads reported to the chief executives of their organizations while project team members reported to their respective project implementation team heads. KETRACO provided staff who participated in project supervision and wayleave acquisition on the transmission lines under the Generation Component.

In KPLC, designated PIT is part of KPLC's permanent organizational structure and reports to the company's General Manager, Infrastructure Development Division, who then reports to the Managing Director and Chief Executive Officer. The PIT had an overall Project Manager and designated project engineers, procurement, accounting and engineering experts to meet the demands of this Project. The PIT has personnel responsible for: Design and engineering; Procurement and stores management; Accounting; Installation services (substations and lines); and Substation land and way leaves acquisition. An engineering consultant, financed by the project, M/s Aberdare, provided support to KPLC for specific activities, including design approval and procurement, supervision, and other aspects of the project, as required. In addition, the PIT received support from other functions of KPLC, for instance the Distribution and Generation Planning, Network Management and Engineering Design Department and the Engineering Standards Departments. KPLC also recruited civil engineers to enhance the company's in-house capacity in design preparation, reviews, and civil works supervision. The PIT was also responsible for management of all implementation activities, project funds, and the preparation of progress reports, procurement and financing plans. KETRACO provided staff who participated in project supervision and wayleave acquisition on the Transmission Component.

REA's PIT comprised of Project Team Leader, Project Accountant, Procurement Expert and supported by qualified technical staff. In addition, specialists from other functional departments such as environment, legal and human resources also complemented the project team. A supervision support implementation consultant firm was recruited to assist in supervision functions of the project. At the start of the project, REA did not have any environment expert and therefore the project had to rely on Kenya Power for the preparation of environmental instruments.

On the overall, Team members' interaction was largely through their participation at regular project status meetings and at the project monthly contractors' meetings. The Implementing Agencies used their respective performance evaluation tools to track the performance of their project team members. This ensured continuous assessment of the performance of each member of staff on the project; those drawn from other functional areas were partly assessed through the project.

9.1 Challenges encountered and lessons learned in project human resource management.

- Assignment of other organizational tasks (not part of KEEP) to the PIT members thereby negatively impacting project implementation. The project was not able to address the issue in a timely manner because of organizational constraints. There should be communication channel to monitor the workload of staff attached to PIT so that the organizational tasks do not adversely affect the implementation of the project.
- Staff turnover especially at MOE and KPLC affected the implementation of the project. Even though the staff that left was replaced there was a steep learning curve. For projects roles where the turnover of organization staff is likely to be high, project needs to consider hiring external human resources for the duration of the project.

- There was a challenge in getting competent resettlement and social safeguards specialists to address social issues within the project. There is need to carry out targeted training to build capacity in this area.

10.0 Project Risk Management

KenGen and KPLC created a Project Risk Management Plan which identified potential and real projects risks and their treatment plans. The risks were assigned to Project Implementation Team (PIT) members to prepare treatment or contingency plans and ensure that any negative impacts were carefully mitigated. However, the project team leader took overall responsibility for managing and monitoring all the risk and would get updates from each team member on the steps put in place for risk mitigation. The risk register was reviewed every six months.
At the commencement of the project, the REA's PIT did not have a compressive project risk management plan for the project but adopted the overall risk management plan of the Authority. The Project implementation consultants and contractors were compelled to prepare a risk manage plan to manage their risks. These Risks management Plans were discussed during the monthly review meeting of project held between the PIT, Project Consultants and contractors. The PIT also held internal meetings where potential risk areas that could affect the time, cost, scope and quality of the project were identified and analyzed. They categorized the risks into external and internal risks, where external risks were attributed to external stakeholders while internal risks were attributed to internal stakeholders.

10.1 Challenges Encountered and Lessons Learned In Project Risk Management

- The risk matrix prepared at the beginning of the project was not comprehensive enough to sufficiently address the risks within the project. These risk omissions affected project performance. It was noted that risk management in projects is an essential tool in helping the project team to identify, analyse, assess, allocate and mitigate risks, always prevalent in the project environment. The development of the risk matrix at the start of the project helps the team to anticipate and plan adequately when the risk occurs. This should always be a requirement from the client and those offering services to the project.
- The project implementation schedule did not include risk management activities some of which were realized during project implementation resulting in delay in project implementation. Risk management activities need to be identified and included in project implementation schedule.

11.0 Project Procurement Management

Procurement for the project was carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004 and revised October, 2006; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004 and revised October, 2006, and provisions stipulated in the Legal Agreement. The parallel financiers followed their own procurement rules.

Planning procurement management included documenting project procurement decisions, specifying the approach and identifying potential installation contractors. The authority prepared procurement plan for the project component which was approved by the Bank. The plan was reviewed annually or when the need arose. The plan contained the mode of packaging the project subcomponent and the methods of

procurement such as ICB, NCB, QCBS, SS, e.t.c. as governed by the agreed monetary value thresholds.

11.1 Conducting procurements – obtaining bids/ proposals, selecting contractors/ consultants, and awarding contracts;

On commencement of the project, KenGen, REA and KPLC procured consultants to provide them with Engineering and Supervision Services for the Generation, Transmission and Distribution components of the project respectively. These consultants prepared the bidding documents for all contracts undertaken in the three project components, and following review and approval by KenGen, REA, KPLC and the Financiers, the bid documents were issued for tender. The consultants assisted KenGen, REA and KPLC with bid evaluation and contracts were awarded after all evaluation reports and recommendations to award had been cleared by the Financiers. However, MoE's PIT prepared all the bid documents for their project components and these were issued for tender after clearance by the Bank.

11.2 Controlling procurements – managing procurement relationships, monitoring contract performance, and making changes and corrections as appropriate

The project implementation teams, together with the engineering and supervision consultants where appropriate, ensured that both the sellers' and buyers' performances met procurement requirements, according to the terms of the various contracts as well as managing interfaces amongst various providers.

Payments to the project's contractors, consultants and other service providers were monitored to ensure that the terms defined in their contracts were met, and that the payments matched the actual works done.

The performance of the contractors, consultants and other service providers was regularly reviewed against their respective contracts and documented in the project status reports.

11.3 Closing procurements – how procurements were completed

The administrative activities pertaining to all contracts under this project were finalized including payments, updating of records to reflect the final results, and archiving of the project's information for future use.

11.4 Challenges encountered and lessons learned in project procurement management.

- Lengthy procurement internal approvals negatively affected the project. These were statutory requirements to which the project was subject to.
- Delay in obtaining tax and duty exemptions which led to demurrage costs, time extension and attendant costs. Future Loan Agreements from Development Partners should include financing of taxes and duties.
- There were quality gaps in procurement documents submitted to the Bank that contributed to delays in obtaining No Objections from the Bank. However, there were instances when the Bank took longer than the agreed time to provide No Objections. Well prepared quality documents would hasten the process of obtaining No Objection from the Bank.

- In an effort to win the tenders, some bidders under-quoted and then wasted a lot of time looking for cheap sources of materials/subcontractors, or presented designs that compromised on specification hence a lot of time was wasted in back and forth movement design approval. A credible engineers estimate should be used to guide realistic bid prices besides carrying out due diligence of the bidder before contract signature.

12.0 Project Stakeholder Management

KenGen and KPLC implemented their stakeholder management plan which identified all internal and external stakeholders and how their influence affected the project and ways of engaging them. The key stakeholders were the County governments, other government agencies, local community, power sector utilities, the consultants, the contractors, GoK(its agencies including, MoE, the National Treasury NEMA, KRA), the financiers (World Bank, EIB, AFD, KfW, JICA).

There was Stakeholders consultation during implementation of MOE and REA's project components. This was built into the various contracts managed by them. The Consultants and contractors presented their output to stakeholders at public forums as was required. Where the stakeholders included members of public, invitations to public consultation were published in local newspapers with wide circulation.

Implementing agencies prepared an Environmental Impact Assessment where necessary and Project Report for this project component which were approved by NEMA. Comprehensive and an all-inclusive stakeholder consultations were held during the ESIA studies and their input incorporated in the reports. Issues that could impact on the local communities were identified and documented in the Environmental and Social Management Plan (ESMP). Other stakeholders' issues were attended to as they arose or became imminent. Various scheduled and ad-hoc meetings were held to discuss and resolve emerging issues with the respective stakeholders. KenGen also established a stakeholder's coordination committee that met quarterly to address stakeholder concerns and shared benefits from the project such as economic and employment opportunities during the construction period. KenGen Stakeholder's coordination committee was the umbrella committee; comprising of four sub-committees namely Resettlement Action Plan Implementation committee (RAPIC), Employment sub-Committee, Economic opportunities sub-committee and Environment Health & Safety (EHS) sub-committee. In other instances, consultations were through formal communications. Financiers in particular had scheduled appraisal missions.

12.1 Implementation of RAP KenGen and KPLC

KenGen

KenGen undertook a study on noise and air quality dispersion modeling was that informed the decision for resettlement of the community living in the affected areas. Resettlement Action Plan (RAP) studies were undertaken and the report shared with financiers who gave a 'No Objection'. The RAP reports were submitted to the National Environment Management Authority for approval. Census for the project affected persons (PAPs) was undertaken and a cut-off date set. There were various categories of PAPs; including PAPs with assets, PAPs without assets and tenants. Inventory of assets for the PAPs and their socio-economic status noted. Government valuers and surveyors were involved to assess the value of the land. Numerous consultations were held with the PAPs including benchmarking. Stakeholders' identification and mapping was undertaken and a Stakeholders Coordination Committee with a sub-

committee on Resettlement Action Plan Implementation (RAPIC) was operationalized. A complaint handling mechanism was formed. The PAPs chose land for land compensation with requirements, rather than monetary compensation. There were challenges in getting suitable land for relocation, since the PAPs had cultural attachment and thus wished to be resettled in one area, not far from the KenGen project. The PAPs finally agreed to be involuntarily resettled at Olkaria IV Resettlement Site. A binding agreement was signed between the PAPs and the proponent. KenGen constructed houses and necessary infrastructure for the PAPs as per the MoU, and facilitated their movement to the resettlement site. Part of the land was set aside for social amenities such as dispensary, social hall & school. Monetary compensation was offered to the tenants, while PAPs were given disturbance allowance. Capacity building for the PAPs was offered and livelihood restoration projects undertaken. The community formed a welfare group to manage the livelihood restoration projects, and also to be the custodian of the land title deed. Land ownership was transferred to KenGen and then to the community welfare group.

The Olkaria IV resettlement action plan was implemented as per the requirement of the financiers and in particular in adherence to the WB social and environmental safeguards. Appraisal missions were undertaken by the financiers. The financiers also facilitated independent evaluation panel and clinic mediation, which emerged after the resettlement. The community gave additional demands following the mediation clinic and these are under implementation such as construction of additional 5 houses, rehabilitation of gullies and perimeter fencing for RAPland and Cultural Centre. The Financiers facilitated post resettlement assessment and studies including feasibility study on potential business plan for Cultural Centre, post resettlement vulnerability assessment, capacity building for livelihood restoration and RAPland productivity assessment and stabilization study. Closure of Olkaria IV RAP project is almost complete.

KPLC

Most of the land to be used for construction for substations belonged to KPLC after purchasing voluntarily through open tender system (Willing Seller, willing buyer basis) from individual owners. The Medium Voltage Lines were mostly constructed along the road reserve after seeking consent from the various roads authorities and where the power line necessitated passing near individual property (e.g. Buildings, crops and trees) ROW consents were acquired and the affected persons were compensated appropriately. RAPs was mainly to be carried out on 66kV Lines in cases where they passed through individual property but if it was wholly constructed along the road reserve it was not done. Environmental screening was done for the 11kV lines to ensure those affected are gathered for and adequately compensated.

12.2 Challenges encountered, lessons learned and recommendations in project stakeholder management

- In instances where there was more than one implementing agency operating in the same area, there were conflicts arising due the variations in their individual stakeholder management plans. Future similar projects need to consider harmonizing their stakeholder engagement strategies for multiple implementing agencies.
- Inadequate legislation and policy guidelines on land and wayleaves acquisitions which include compensation, valuation and resettlement made it extremely difficult to reach timely agreement with various stakeholders leading to delay project implementation. There is need to expedite comprehensive legislation in this area.

- Low awareness of the financier's environment and social safeguards requirements led to gaps in implementation of RAP. There is need for training on the financier's requirements prior to project commencement.
- The operations of the Grievances Redress Mechanism (GRM) were undermined by the unrestrained provision for complaints to be addressed to the financiers. Rather than follow the prescribed hierarchy for addressing grievances, complainants elected to go direct to, and were entertained by, the financiers. For future projects, the financiers should only allow complains that have been registered with and have not been adequately resolved by the GRM/GCHM.
- Challenges in implementing the World Bank policies relating to indigenous people and involuntary resettlement (cut off dates). The contentious definition of indigenous people needs to be agreed upon between the financiers and the government.
- Inadequate budget to finance social-environment safeguards issues and pre-development activities such as wayleave acquisition and stakeholder engagement. Pre activities should be budgeted for by implementing agencies/ Bank

13.0 Financial Management and Disbursement

On commencement of the project in October, 2010 credit number 4743-KE of USD 330 million was made available to the project and was to be disbursed over five (5) years. The initial Project Completion Date was set at 30th September, 2016 while the actual Project Closing Date was 31st December 2017.

To ensure the timely availability of funds to the Project, the following flow of funds and reporting arrangements were put in place: (i)separate Designated Accounts(DA) for the four PEAs were opened by the National Treasury ; (ii) All Implementing Agencies opened project account through which funds from the DAs flowed to the project; (iii)All Implementing Agencies prepared Interim Financial Reports(IFRS) to account for funds received and submitted them to IDA, through the National Treasury every quarter;

KPLC and KenGen entered into subsidiary loan agreements with the GoK for the funds that were made available to finance their respective activities, at on-lending terms and conditions discussed and agreed with IDA. The IFR formats were also reviewed and agreed during negotiations. REA entered into a subsidiary grant agreement with the GOK to finance their project component.

The Accounting Officer for MoE and the CEOs of KPLC, REA and KenGen were responsible for the overall financial management of the project**.** They oversaw the management of the project accounts, the preparation of IFR's and annual financial statements, withdrawal applications and other financial requirements of IDA. Initially, MoE assigned a Senior Accountant and an Assistant Accountant to be responsible for project financial management, and they reported to the Ministry's Principal Secretary through the Head of the Accounting Unit. About two years into project implementation, MOE recruited a Financial Management Specialist to assist in this arrangement. The Project finance sections of KPLC, REA and KenGen were established along similar lines, with Chief Officers - Finance ultimately reporting to the respective CEOs.

The following arrangements were put in place when the project commenced:

i. The Financial Statements for MOE and REA project components were audited by the Auditor General. The Annual audits of the financial statements for KPLC and KenGen, including project accounts, were subcontracted by the Auditor General to independent private auditors to ensure effectiveness and efficiency of the audit process.
ii. A significant portion of project costs related to procurement of goods and services that required prior review, and/or approval and direct payment by IDA; and
iii. Regular IDA supervision missions closely monitored performance and assisted in the timely resolution of issues.

13.1 Disbursement Arrangements

Requests for disbursement from IDA to the Implementing Agencies were made on the basis of approved work plans and cash flow projections for eligible expenditures (report-based disbursements). IDA made advance disbursement from the proceeds of the Credit by depositing into the DAs managed and operated by the National Treasury.

13.2 Reporting and Monitoring

Interim Financial Reports – these were prepared by each Implementing Agency on a quarterly basis in formats agreed with IDA, to provide quality and timely financial information to project management and relevant stakeholders on project performance. Their content included;

a) Sources and Uses of Funds by Funding Source;
b) Uses of Funds by Project Activity/Component;
c) Designated and Project Account bank reconciliation;
d) Activity statement;
e) Six month cash flow projections.

Financial Statements
The MoE's financial statements were prepared in accordance with International Public Sector Accounting Standards. Those for KPLC, REA and KenGen were prepared on the accrual basis of accounting in accordance with International Financial Reporting Standards (IFRS). These were submitted to the OAG (or subcontracted to private auditors, in the case of KPLC and KenGen) for audit within three months after the end of the Financial Year. In turn, the audited financial statements were submitted to IDA within six months after the year-end; in line with the World Bank's Audit Policy Guidelines.

13.3 Audit Arrangements

Internal audit functions for KPLC, REA, KenGen and MoE carried out regular internal audit reviews of their respective project components.

External Audit: The Office of Auditor General (OAG) was responsible for the auditing of project. The audits for MoE and REA were handled directly by the OAG while that of KPLC and KenGen were sub contracted

to private auditors acceptable to IDA.

13.4 World Bank Financial Management Supervision Missions

World Bank Financial Management supervisions missions were conducted annually. The missions' objectives included ensuring that strong financial management systems were maintained for the project throughout its life. Reviews were necessary to ensure that expenditures incurred by the project were eligible for IDA funding.

13.5 Challenges Encountered and Lessons Learned in Financial Management and Disbursement.

- The flow of funds from the Designated Accounts to Project Accounts through MOE took long (in some cases up to 120days). The payments processes need to be reviewed to shorten the time taken.
- There were challenges in opening Letters of Credit, from the various Banks, that were acceptable to IDA for issuance of special commitment letters. Banks need to be sensitized on World Bank backed letters of credit.
- Limited budgetary ceilings allocation affecting the project's budgetary requirements in some of the financial years. This is a statutory requirement that can only resolved through a review of existing laws.

14.0 Other Challenges and Lessons Learned

- Vandalism of powerline infrastructure eg conductors, transformers etc. This usually affects the project completion as replacement was always done especially if the line was within the defect liability period. Stakeholder involvement in project implementation eg rural communities provide security of the infrastructure to minimize vandalism
- High charges levied by Kenya Wildlife Services (KWS), Kenya Forest Services and other government institutions for acquisition of wayleave and access. There is need to be have an inclusive and consultative approach to deal with crosscutting issues between government agencies to minimize delays and costs.
- For projects located in geographically wide-spread locations it is necessary to package the contracts into manageable lots and restrict the number of lots a bidder can participate in.

16.0 Key Issues and Way Forward

a) The target of 15.90% of electricity losses at the end of the project was not realized. The losses increased from 16.30% in 2010 to 18.90% as at December 2017. This increase was attributed to the government accelerated electrification program which resulted to more than double the number of people connected with electricity without a commensurate expansion of the upstream infrastructure.

b) Delays in procurement processes impacted negatively on the project execution. In particular the design and implementation of the off-grid electrification project including the pilot program was not implemented. This was because the procurement process of the consultant to implement the off-grid component and subsequent approval by the financier took a long time and by the time the process was completed there wasn't sufficient time for implementation.

c) Delays in acquisition of development approvals from the County Governments that came into existence in 2013 (some county governments froze development approvals for a period of about one year) for project sites leading to delays in handover of the project sites to the contractors. There is need to adopt a consultative approach and close working relationship with the various county governments to enable fast-tracking of the clearance documents.

d) Delay in issuance of tax and duty exemptions by the National Treasury leading to delay in clearance and delivery of materials for implementation of the project. This can be mitigated by including the cost for tax and duty in the financing of the project.

e) Challenges associated with way leave and land acquisition led to delay in implementation of some of the projects. Effective implementation of stakeholder and social safeguards management activities by providing adequate resources to timely implement those activities.

f) Many of rural electrification sites were sparsely distributed in remote areas with harsh terrain with insufficient information to implement the project. There is need to provide information using new technologies such as geospatial and consider other alternative electrification technologies.

g) Despite selecting contractors in adherence to approved procurement procedures some of them are unable to perform to the project expectations leading to delays in implementation. There is a need to review the procedures to address this and other similar challenges.

h) Introduction of new legislation such Railway Development Levy, National construction levy during the project implementation resulted in additional costs to the project. This was statutory requirement that the project was required to comply with.

i) There was a challenge in getting competent resettlement and social safeguards specialists to address social issues within the project. There is need to carry out targeted training to build capacity in this area.

ANNEX 6. SUPPORTING DOCUMENTS (IF ANY)

1. KEEP Project Appraisal Document (P103037; Report No: 54147-KE, May 3, 2010)
2. KEEP Additional Financing Project Paper (Report No: PAD1282, May 19, 2016)
3. Financing Agreements for KEEP
4. Project agreements signed with project implementing entities and REA
5. Subsidiary loan and grant agreements signed with implementing entities and REA
6. Grant agreement between IDA acting as administrator for the Global Partnership on Output-Based Aid and KPLC, February 20, 2012
7. Aide Memoires on file
8. ISRs (13)
9. Kenya Country Partnership Strategy (FY14-FY18), Report no: 88940 v2, June 2014
10. Kenya economic update - Poised to bounce back? : reviving private sector credit growth and boosting revenue mobilization to support fiscal consolidation, December, 2017
11. World Development Indicators (WBG online database)
12. KenGen Annual Report FY17: Powering a Sustainable Future, KPLC Annual Report 2017, *http://www.kengen.co.ke/sites/default/files/financial-reports/KenGen%20Annual%20Report%202017%20Final.pdf*
13. KPLC Annual Report FY17, *http://kplc.co.ke/AR2017/KPLC%202016%20-%202017%20Annual%20Report-.pdf*
14. KEEP Inspection Panel Investigation Report, July 2, 2015, *http://kplc.co.ke/AR2017/KPLC%202016%20-%202017%20Annual%20Report-.pdf*
15. Management Report and Recommendation in response to the Inspection Panel Investigation Report, September, 2015, *http://ewebapps.worldbank.org/apps/ip/PanelCases/97-Management%20Response%20on%20Panel%20Investigation%20Report.pdf*
16. Addendum to the Management Report and Recommendation in response to the Inspection Panel Investigation Report, October, 2016, *http://ewebapps.worldbank.org/apps/ip/PanelCases/97-Addendum%20to%20Management%20Report%20and%20Recommendation-30%20Oct%202016.pdf*
17. First progress report on the implementation of Management's action plan in response to the Inspections Panel Investigation, April 2018, http://ewebapps.worldbank.org/apps/ip/PanelCases/97-First%20Management%20Progress%20Report-04%20April%202018.pdf

ANNEX 7. Maximizing Financing for Development- Power Sector in Kenya