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Report No. 69252-AFR

PROJECT APPRAISAL DOCUMENT

ON

PROPOSED CREDITS

IN THE AMOUNT OF SDR 156.8 MILLION
(US$243 MILLION EQUIVALENT)

TO THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

AND

IN THE AMOUNT OF SDR 284.5 MILLION
(US$441 MILLION EQUIVALENT)

TO THE REPUBLIC OF KENYA

FOR THE

EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

UNDER THE FIRST PHASE OF THE
REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
IN A GLOBAL AMOUNT EQUIVALENT TO US$1,100 MILLION

June 14, 2012

Energy Unit
Sustainable Development Department
Africa Region

CURRENCY EQUIVALENTS

Exchange Rate Effective April 30, 2012

Currency Unit	= Ethiopian Birr (ETB)
17.53 ETB	= US$1
US$1.55	= SDR 1

Currency Unit	= Kenya Shillings (KSh)
83.25 KES	= US$1
US$1.55	= SDR 1

FISCAL YEAR

Kenya:	July 1	–	June 30
Ethiopia:	July 8		July 7

ABBREVIATIONS AND ACRONYMS

AC	Alternating Current
AfDB	African Development Bank
ADF	African Development Fund
AFD	Agence Française de Développement
APL	Adaptable Program Loan
ARCCH	Ethiopian Authority for Research and Conservation of Cultural Heritage
CAS	Country Assistance Strategy
CDM	Carbon Development Mechanism
CEO	Chief Executive Officer
COMESA	Common Market for Eastern and Southern Africa
CPS	Country Partnership Strategy
CRAPT	County Resettlement Action Plan Committee (in Kenya)
DC	Direct Current
EAC	East African Community
EAPP	Eastern Africa Power Pool
EEA	The Ethiopian Electric Agency (a sector regulatory body)
EEPCo	Ethiopian Electric Power Corporation
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EPC	Engineering, Procurement, and Construction Contract
ERC	Energy Regulatory Commission
ESMF	Environment and Social Management Framework
ESMP	Environmental and Social Management Plan
FPPA	Ethiopia's Federal Government Public Procurement Proclamation of 2009

GDP	Gross Domestic Product
GoE	Government of Ethiopia
GoK	Government of Kenya
GTP	GoE's Growth and Transformation Plan for the period FY2011 – 2015
HVAC	High Voltage Alternate Current
HVDC	High Voltage Direct Current
ICB	International Competitive Bidding
ICS	Interconnected System
ICT	Information and Communications Technology
IDA	International Development Association
IFRs	Unaudited Interim Financial Reports
INT	Integrity Vice Presidency
IPP	Independent Power Producer
JPC	Joint Project Coordinator
JPCU	Joint Project Coordination Unit
JSC	Joint Steering Committee
KENAO	The Kenya National Audit Office
KenGen	Kenya Electricity Generating Company Ltd.
KETRACO	Kenya Electricity Transmission Company Ltd.
KFS	Kenya Forest Service
KPLC	Kenya Power and Lighting Company Ltd.
KWS	Kenya Wildlife Service
LCPDP	Least Cost Power Development Plan
MDG	Millennium Development Goal
MoE	Ministry of Energy in Kenya
MoFED	Ministry of Finance and Economic Development in Ethiopia
NBI	Nile Basin Initiative
NEMA	National Environmental Management Authority
NEPAD	New Partnership for Africa's Development
NMK	National Museums of Kenya
NPV	Net Present Value
O & M	Operations and Maintenance
OPGW	Optical Power Ground Wire
PAP	Project Affected Persons
PIU	Project Implementation Unit
PPA	Power Purchase Agreement
PPARB	Public Procurement Administrative Review Board
PPP	Public and Private Partnership
RAP	Resettlement Action Plan
RoW	Right-of-Way
RPF	Resettlement Policy Framework
SAPP	Southern Africa Power Pool
SCADA	Supervisory Control and Data Acquisition
SDDP	Stochastic Dual Dynamic Programming
SDR	Standard Drawing Rights
SNNPRS	Southern Nations and Nationalities People's Regional State

SOE	Statement of Expenditures
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPDEA	The Union of Producers, Transporters and Distributors of Electric Power in Africa
USAID	United States Agency for International Development
WAPP	West Africa Power Pool

Regional Vice President:	Makhtar Diop
Regional Director:	Elizabeth Lule (Acting)
Country Directors:	Guang Zhe Chen (E), Johannes Zutt (K)
Sector Director:	Jamal Saghir
Sector Manager:	Lucio Monari
Task Team Leader:	Paivi Koljonen
Program Assistant:	Lily Wong Chun Sen

PAD DATA SHEET

Africa

Regional Eastern Africa Power Integration Program
Eastern Electricity Highway Project (APL 1) (P126579)

PROJECT APPRAISAL DOCUMENT

Sustainable Development Department

Africa Energy Unit (AFTEG)

Basic Information

Date:	June 14, 2012	Sectors:	General energy sector (100%)
Regional Director:	Elizabeth Lule (Acting)	Themes:	Regional integration (90%), Infrastructure services for private sector development (10%)
Country Director (Ethiopia):	Guang Zhe Chen		
Country Director (Kenya):	Johannes Zutt		
Sector Manager: Sector Director:	Lucio Monari Jamal Saghir		
Project ID:	P126579	EA Category:	A - Full Assessment
Lending Instrument:	Adaptable Program Loan		
Team Leader(s):	Paivi Koljonen		

Joint IFC: No

Borrowers: Federal Democratic Republic of Ethiopia and Republic of Kenya

Responsible Agency 1: Ethiopian Electric Power Corporation

Contact:	Mr. Miheret Debebe	Title:	Chief Executive Officer
Telephone No.:	251-11 1560041	Email:	miheretdw@gmail.com

Responsible Agency 2: Kenya Electricity Transmission Company Ltd.

Contact:	Eng. Joel Kiilu	Title:	Chief Executive Officer
Telephone No.:	254-20 4956000	Email:	Jkiilu@ketraco.co.ke

Project Implementation Period: Start Date: July 10, 2012 End Date: December 31, 2018

Expected Effectiveness Date: December 31, 2012

Expected Closing Date: June 30, 2019

Project Financing Data(US$M)

[ ]	Loan	[ ]	Grant	[ ]	Terms: Standard IDA Credit terms with 40 year maturity, including 10 years' grace period.
[X]	Credit	[ ]	Guarantee		

For Loans/Credits/Others

Total Project Cost (US$M): 1,262.50

Total Bank Financing (US$M): 684.00

Retroactive financing terms: For Kenya: SDR 2,000,000 (US$3 million equivalent) amounting to 0.5% of the total credit amount for payments made for Eligible Expenditures under Category (2) (consultant's services, training and workshops under the Project) after January 1, 2012 and before the date of signing of the Kenya Financing Agreement.

Financing Source	Amount(US$M)
Recipients:	
- Federal Democratic Republic of Ethiopia	21.20

- Republic of Kenya	85.00
International Development Association (IDA)	684.00
African Development Bank (the African Development Fund, ADF)	354.30
Agence Française de Développement (AFD)	118.00
Total	1,262.50

Expected Disbursements (in USD Million)

Fiscal Year	2013	2014	2015	2016	2017	2018	2019		
Annual	2.00	5.50	145.00	150.00	192.00	126.00	63.50		
Cumulative	2.00	7.50	152.50	302.50	494.50	620.00	684.00		

Project Development Objective(s)

The Project has two objectives: (a) to increase the volume and reduce the cost of electricity supply in Kenya; and (b) to provide revenues to Ethiopia through the export of electricity from Ethiopia to Kenya.

Components

Component Name	Cost (USD Millions)
A. HVDC transmission interconnector	1,207.50
B. Project Management and Capacity Building	55.00

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [X]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation? Procurement plan is in place and draft bidding documents are being developed but the major contract for converter substations will not be ready for signature by effectiveness.	Yes [ ]	No [X]

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04	X	
Forests OP/BP 4.36		X
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11	X	
Indigenous Peoples OP/BP 4.10		X
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37		X
Projects on International Waterways OP/BP 7.50		X
Projects in Disputed Areas OP/BP 7.60		X

Description of Covenant

Credit effectiveness conditions for both countries

(a) Each of the Subsidiary Credit Agreement and the Subsidiary Grant Agreement has been executed on behalf, respectively, of Ethiopia and Kenya and each of EEPCo and KETRACO, respectively.

(b) Each of the Co-financing Agreements has been executed and delivered and all conditions precedent to its effectiveness or to the right of EEPCo or KETRACO, as the case may be, to make withdrawals under it (other than the effectiveness of the IDA Financing Agreement) have been fulfilled.

(c) EEPCo and KETRACO have taken the actions required on their behalf for the establishment of the Joint Project Coordination Unit under terms of reference and with staff in numbers and with qualifications satisfactory to the Association.

(d) EEPCo and KETRACO have established their respective PIUs under terms of reference and with staff in numbers and with qualifications satisfactory to IDA. The following staff shall be in place and assigned to each PIU: the national project manager, a substation engineer, a transmission engineer, a procurement specialist, an accountant, an environmental specialist and a social expert or specialist, all of them under terms of reference and with qualifications and experience satisfactory to the Association.

(e) EEPCo and KETRACO shall have adopted the Project Implementation Manual in form and substance satisfactory to the Association.

Additional Credit effectiveness condition for Ethiopia

(a) Ethiopia has furnished to the Association the financial viability plan for EEPCo.

Additional Credit effectiveness condition for Kenya

(a) All conditions precedent to the effectiveness of the Ethiopia Financing Agreement have been fulfilled.

Disbursement condition for Ethiopia

(a) No disbursements will be made under Category (1)(b) (works, goods and non-consulting services) for the converter substation to be constructed in Ethiopia, until and unless EEPCo has adopted, consulted upon and disclosed the RAP for the converter substation as approved by the Association and the displaced persons have been compensated in accordance with the provisions of the RAP.

Disbursement condition for Kenya

(a) No disbursement will be made under Category (1)(b) (works, goods and non-consulting services) for the converter substation to be constructed in Kenya, until and unless all conditions of disbursement to finance the construction of the converter substation in Ethiopia (Part A.2 of the Project stipulated in the Ethiopia Financing Agreement) have been met.

Retroactive financing for Kenya

(a) SDR 2,000,000 (US$3 million equivalent) for payments made for Eligible Expenditures under Category (2) (consultant's services, training and workshops under the Project) after January 1, 2012 and before the date of signing of the Kenya Financing Agreement.

Additional Event of Suspension of Disbursements under the Ethiopia Credit

(a) The Kenya Financing Agreement shall have failed to become effective twenty-four (24) months after the Effective Date.

Additional Event of Suspension of Disbursements under the Kenya Credit

(a) Kenya shall have failed to submit to the Association, not later than twelve (12) months after the Effective Date, the Wheeling Agreement between KPLC and KETRACO as approved by the Kenya Energy Regulatory Commission.

Dated Covenants in Financing Agreement for Ethiopia and EEPCo Project Agreement:

(a) Not later than 3 months after the Effective Date, EEPCo shall recruit a financial specialist, under terms of reference and with qualifications and experience satisfactory to the Association, to oversee the accounting functions between EEPCo and the PIU.
(b) Not later than 6 months after the Effective Date, EEPCo shall assign to the Project an internal auditor under terms of reference and with qualifications and experience satisfactory to the Association to strengthen the internal control arrangements under the Project.
(c) The Recipient shall cause EEPCo to prepare and furnish to the Association a plan designed to ensure its financial viability in the next three (3) years following the Association's approval of the Project ("Financial Viability Plan").
(d) Not later than May 15 of each year during project implementation, starting in calendar year 2013, the Recipient shall cause EEPCo to prepare and furnish to the Association, an annual progress report on the implementation and update of the Financial Viability Plan, including measures recommended to ensure the continued financial viability of EEPCo. The Recipient shall afford the Association and EEPCo a reasonable opportunity to exchange views with the Recipient and EEPCo and make recommendations on the proposed measures.
(e) The Recipient shall cause EEPCo: (i) not later than six (6) months after the Effective Date, to conduct a review under terms of reference acceptable to the Association, to identify any issues related to its accounting software and billing interface, and to recommend measures to address such issues; and (ii) to resolve all issues identified under the review carried out under the preceding sub-paragraph (i) not later than twenty four (24) months after the Effective Date.
(f) EEPCo shall take all measures required on its behalf to ensure its Environmental Monitoring Unit is maintained throughout project implementation within its structure under terms of reference satisfactory to the Association and with financial, technical and administrative resources adequate to enable it to carry out the Environment and Social Impact Assessment, the Environment and Social Management Plan, the Resettlement Policy Framework, and the Resettlement Action Plan in a timely and diligent manner.
(g) EEPCo shall: (i) prepare and carry out the Resettlement Action Plan as designed and stipulated in the Resettlement Policy Framework; and (ii) implement the provisions of the Environmental and Social Impact Assessment and the Environmental and Social Management Plan (ESMP), all in a manner satisfactory to the Association.

Dated Covenants in Financing Agreement for Kenya and KETRACO Project Agreement:

(a) KETRACO shall implement the provisions of the Environmental and Social Impact Assessment, the Environmental and Social Management Plan, and the Resettlement Action Plan, in a manner satisfactory to the Association.
(b) KETRACO shall take all measures required on its behalf to establish, not later than December 31, 2013, one or more County Resettlement Action Plan Committees in each of the Isiolo, Laikipia, Marsabit, Nakuru, Nyandarua and Samburu counties to be responsible for the day-to-day implementation of the RAP, all under terms of reference and with staff with experience and qualifications satisfactory to the Association. The said County Resettlement Action Plan Committees shall be led by the environmental specialist/land economist/social economist of the PIU and shall include, *inter alia*, the administration at the county-level, village elders and project affected persons.
(c) KETRACO shall, not later than December 31, 2013, employ a firm or group of independent persons to serve as an independent resettlement evaluation panel charged with the task of: (i) monitoring the progress in the implementation of the RAP, including reviewing and verifying the reports on safeguard instruments and making site visits to obtain information from the project affected persons; and (ii) conducting semi-annual audits and a close-down audit thereon.

Team Composition			
Bank Staff			
Name	**Title**	**Specialization**	**Unit**
Paivi Koljonen	Lead Energy Specialist	Team Leader	AFTEG
Kyran O'Sullivan	Senior Energy Specialist	Energy sector in Kenya/M&E	AFTEG
Raihan Elahi	Senior Energy Specialist	Energy sector in Ethiopia	AFTEG
Marcelino Madrigal	Senior Energy Specialist	Technical/regulatory/regional power integration	SEGEN
Bobak Rezaian	Senior Energy Specialist	Energy sector/technical	AFTEG
Mitsunori Motohashi	Energy Specialist	Energy sector/financial analysis in Kenya	AFTEG
Elvira Morella	Energy Specialist	Regional integration/economic analysis/M&E	AFTEG
Rahul Kitchlu	Young Professional	Financial analysis in Ethiopia	AFTEG
Noreen Beg	Senior Environmental Specialist	Environmental safeguards in Kenya	AFTEN
Zarafshan Khawaja	Lead Social Development Specialist	Social development/resettlement	AFTCS
Yasmin Tayyab	Senior Social Development Specialist	Social development/resettlement in Ethiopia	AFTCS
Edward Felix Dwumfour	Senior Environmental Specialist	Environmental safeguards in Ethiopia	AFTEN
Nyambura Githagui	Senior Social Development Specialist	Social development/resettlement in Kenya	AFTCS
Arlene Fleming	Consultant	Physical cultural heritage	OPCQ
Claudia M. Pardiñas Ocaña	Senior Counsel	Law	LEGAF
Yusuf Abdurahman	Consultant	Power sector in Ethiopia	AFTSN
Wolfgang Chadab	Senior Finance Officer	Senior Finance Officer for Kenya	CTRLA
Jose Janeiro	Senior Finance Officer	Senior Finance Officer for Ethiopia	CTRLA
Pascal Tegwa	Senior Procurement Specialist	Procurement in Kenya	AFTPC
Efrem Fitwi	Procurement Specialist	Procurement in Kenya	AFTPC
Richard Olowo	Senior Procurement Specialist	Procurement in Ethiopia	AFTPC
Tesfaye Ayele	Senior Procurement Specialist	Procurement in Ethiopia	AFTPC
Patrick Piker Umah Tete	Senior Financial Management Specialist	Coordination of financial management	AFTFM
Josphine Kabura Ngigi	Financial Management Specialist	Financial management in Kenya	AFTFM
Lillian Brenda Namutebi	ET Consultant	Financial management in Ethiopia	AFTFM
Dukjoong Kim	Financial Analyst	Financial analysis in Ethiopia	AFTEG
Luiz Maurer	Principal Industry Specialist	Energy sector/regional integration	CBGSB
Ian Mills	ET Consultant	Macroeconomic analysis	AFTP2
Lily Wong Chun Sen	Program Assistant	Program Assistant in Washington	AFTEG
Rosemary Ngesa Otieno	Team Assistant	Team Assistant in Kenya	AFCE2
Azeb Afework	Temporary	Team Assistant in Ethiopia	AFCE3

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM

EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

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I. STRATEGIC CONTEXT

A. Regional Context

1. **Regional integration is critical to East Africa's transformation for greater economic opportunities to overcome poverty.** The East Africa region,[1] with its 270 million people, had an average economic growth of six percent a year during 2003-2008. A combination of prudent economic policies and financial support from development partners lessened the adverse impact of the global economic crisis, resulting in only a slight decline in economic growth, to about five percent during 2009-2010. However, all countries in the region are low-income countries with per capita GDP below US$1,000, ranging from US$192 in Burundi to US$795 in Kenya. A substantial reduction of poverty will require sustained economic growth rates above six percent. And sustaining high levels of economic growth will require massive investments to make up for current deficits in infrastructure, which are serious obstacles to doing business, reducing productivity by much as 40 percent. The high cost of infrastructure, particularly in some of the smaller countries, has been a barrier to development. Therefore, the World Bank's strategy for Africa[2] has emphasized that a regional approach to infrastructure development, which can lower capital costs and operational costs by giving smaller countries access to more efficient technologies and a larger scale of production. Integration of physical infrastructure will also enable emerging economies to access larger regional markets that can spur not only faster growth but also the competitiveness required to participate in the global economy.

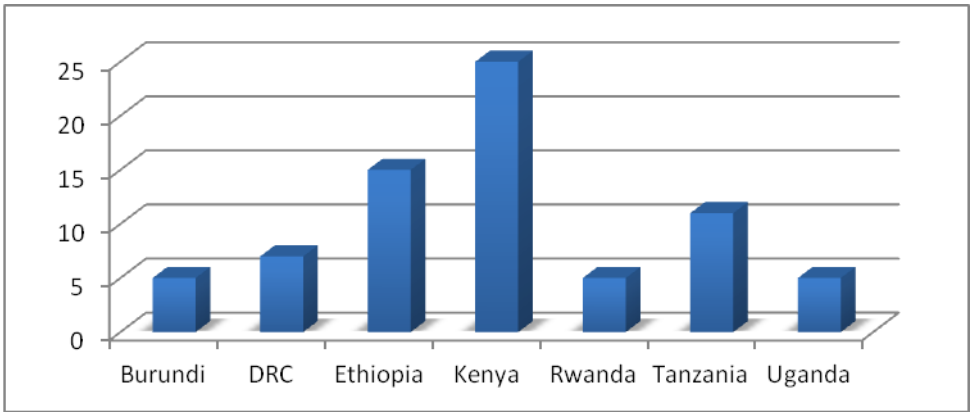
2. **East Africa has huge regional energy resources but the region consists of countries with relatively small economies and low levels of electricity access.** Energy resources in Africa are concentrated in a few countries. The Federal Democratic Republic of Ethiopia (Ethiopia) and the Democratic Republic of the Congo (DRC) together account for over 60 percent of Sub-Saharan Africa's hydropower potential. The Republic of Kenya (Kenya) has substantial geothermal resources and wind energy while Tanzania has considerable natural gas potential. Despite energy abundance at the regional level, East African countries have the lowest rates of household electricity access and per capita electricity consumption in Africa[3]. Figure 1 shows that Kenya has the highest rate of electricity access in East Africa – 25 percent of the country's population has access to electricity. Three of the seven countries in the region have access rates below 10 percent. In terms of population, the countries range from a high of 85 million in Ethiopia to a low of 8.5 million in Burundi.

[1] For the purpose of this Project, the East Africa Region is defined as the group of countries that comprises the East African Community (EAC) (Kenya, Tanzania, Uganda, Rwanda and Burundi) as well as Ethiopia and Sudan owing to the central role of the Nile Basin in determining hydropower potential for the region. With the exception of Uganda, these six countries are members of the Eastern Africa Power Pool (EAPP), which also includes the Democratic Republic of Congo (DRC), Egypt and Libya (nine countries total) and may soon extend further to Djibouti, Uganda, Eritrea, Somalia and South Sudan.

[2] World Bank, *Africa's Future and the World Bank's Support to It*, March 2011.

[3] World Bank, AICD, *East Africa's Infrastructure: A Regional Perspective*, 2010.

Figure 1. Electricity Access in Various Countries
(Percentage of each country's population having access to electricity)



3. **The regional integration of East Africa's power systems will facilitate large-scale development of the region's cost-effective and clean energy sources.** The cost of producing power from fossil fuels can reach US$0.20 per kilowatt-hour in some countries – above the average for Africa.[4] Power outages are frequent in many countries resulting in big economic losses, equivalent to about four percent of GDP in Tanzania and six percent of GDP in Uganda.[5] Regional integration will allow the countries in the region to access the benefits of regional hydropower, geothermal power, wind and natural gas resources, substantially reducing operating costs though this access will entail investment in generation capacity and the interconnection of transmission systems. Improved reserve margins and the possibility to access peak capacity of other countries will enable countries that import power to postpone, reduce, or avoid large and lumpy investments in domestic generation, greatly reducing the fiscal burden of power sector development. Estimates indicate that power trade at full potential can displace 20,000 megawatts of thermal generation capacity and save the East Africa region an estimated US$1 billion in annual costs of power system operation and development. [6] Imported power from the integrated system will improve the resilience of countries adversely affected by climate change. Furthermore, the increase in the share of renewable energy could reduce carbon emissions by an estimated 20 million tons per year, or about eight percent of Sub-Saharan Africa's anticipated emissions through 2015.[7]

4. **The economic benefits of integration in East Africa outweigh political concerns about reliance on power imports from neighboring countries.** Some countries may be reluctant to rely on imports for a large part of their power supply and political will to cooperate with neighbors may vary. Also imports may compete with existing plans for expanding domestic generation, including through increased private sector participation (i.e. Independent Power Producers, IPPs). In East Africa, the benefits of integration clearly outweigh such

[4] Ibid. Estimate refers to average historic cost of power of about US$0.18 per kilowatt hour.
[5] Ibid.
[6] Ibid.
[7] Ibid.

concerns. Importing lower-cost power from neighbors makes economic sense for countries currently facing major supply constraints and load shedding such as Burundi, Kenya, Rwanda, Tanzania and Uganda. Increased reliance on power imports also will benefit countries that depend heavily on imported petroleum for power generation such as Djibouti and Sudan. Kenya's Least-Cost Power Development Plan (LCPDP), prepared by the Ministry of Energy (MoE), recognizes power imports from Ethiopia as one of the priority sources of base load capacity in the medium- to long-term. Imports will complement large-scale geothermal and wind projects developed by the public and private sectors in the diversification of Kenya's energy mix away from unpredictable domestic hydropower and fuel price-sensitive thermal power. Exports will provide energy-rich countries with the opportunity to monetize their surplus capacity. Thermal capacity currently being developed in Kenya through IPPs will provide much needed reserve margins for the stability of Kenya's grid and will also be available for export elsewhere in the region through the Eastern Africa Power Pool. Finally, hard-currency revenues from power exports can help achieve a better macroeconomic balance in countries such as Ethiopia, which has faced double-digit inflation.

5. **Lessons learned from power-pool development indicate that regional power sector integration can take different forms and one size does not fit all.** There are many levels of regional power sector integration, leading to different power pool structures. Full integration of multiple national electricity systems into an interconnected regional system with synchronous operations and a competitive regional power market with multiple buyers and sellers can take decades to develop. Only a few industrialized regions have achieved this level of integration (i.e., Nord Pool in Scandinavia). Levels of integration are driven by political and economic incentives, institutional capacity at the regional and national levels, and the adequacy of transmission infrastructure for system interconnections. The security of power supply is a major concern and countries prefer to rely on long-term Power Purchase Agreements (PPA) for their import requirements. In the Southern Africa Power Pool, which has a fully competitive auction market (Day-Ahead Market), short-term transactions account for no more than one percent of the overall volume of energy traded. A fully interconnected competitive power pool requires specialized regional institutions. In Africa, regional power pool institutions are relatively new and are currently building-up the needed legal, institutional, and technical capacity to drive integration. Africa's experience also suggests that power pools are not firm structures but evolve as conditions change, and that a committed champion in a high level position is critical for initiating and broadening integration.

6. **A regionally integrated transmission network is necessary for power trade in East Africa and for leveraging investments in regional generation projects.** Some small transmission projects are completed and others are underway in East Africa, including connections between Ethiopia and Djibouti for 180 MW (AfDB-financed, commissioned in late 2011) and between Ethiopia and Sudan for 200 MW (IDA-financed, to be commissioned in 2012).[8] These interconnections will help relieve localized power shortages. However, integration on a much larger scale is required to provide the Region with access to large, diverse, regional resources through power trade. An integrated, regional transmission network is also a pre-requisite for catalyzing investments in large-scale, transformative regional generation

[8] In addition Kenya and Uganda were interconnected in the 1960s through a 1,180 MW line and Tanzania and Uganda in the 1970s through a 50 MW line.

projects by multiple sources, including governments, development partners and the private sector.

7. **Power trade favors the introduction of more efficient institutional models in the power sectors of participating countries.** Kenya is a credible off-taker for Ethiopian power exports because it has established a well-governed sector that underpins the commercial agreements for trade. Other countries entering into trade similarly have to advance institutional and regulatory capacity development of their power sectors to achieve financial sustainability. The adoption of commercial practices for power trade complements ongoing reforms and even stimulates broader reforms in the power sector of participating countries. In addition, regional integration requires strong interaction between energy sector institutions across borders, leading to a valuable transfer of knowledge and practices. In particular, the successful outcomes of Kenya's reform program for power sector, including unbundling, tariff reforms, and creation of an independent regulator, offer many good lessons for other countries that are in the process of modernizing their energy sectors.[9]

8. **The evolving Eastern Africa Power Pool (EAPP) is the regional institution for coordinating and advancing the vision of regional power systems' integration.** EAPP was created in February 2005 through the signing of an Inter-Governmental Memorandum of Understanding (MoU) by Ministers of Energy of Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, and Sudan. Also in 2005, utilities representing these countries signed an Inter-Utility MoU. In 2006, EAPP became a specialized agency of the Common Market for Eastern and Southern Africa (COMESA). Tanzania joined in 2010 and Libya in 2011. Uganda is planning to join in 2012. The mandate of EAPP, as stated in the intergovernmental MoU, is to coordinate, within the framework of the New Partnership for Africa's Development (NEPAD),[10] investment in power generation and transmission projects for integration of the region's power systems. The EAPP complements the inter-governmental Nile Basin Initiative (NBI), which has, as its mission, the equitable and sustainable management and development of the shared water resources of the Nile Basin.[11]

9. **EAPP is in the preliminary stage of developing a future, integrated power market**. Development partners have been assisting in the development of EAPP as an institution able to facilitate further regional power integration, including increased regional interconnectivity, coordinated planning and operation of the interconnected regional system, and a more competitive regional power market. With funding from the AfDB and the European Commission, EAPP has completed a Regional Power System Master Plan (EAPP Master Plan) and a Grid Code Study for governing the operations of the regional, interconnected electricity network. USAID is helping EAPP develop model agreements for electricity trade. In addition, the Government of Norway is funding studies on the development of the pool. However, in

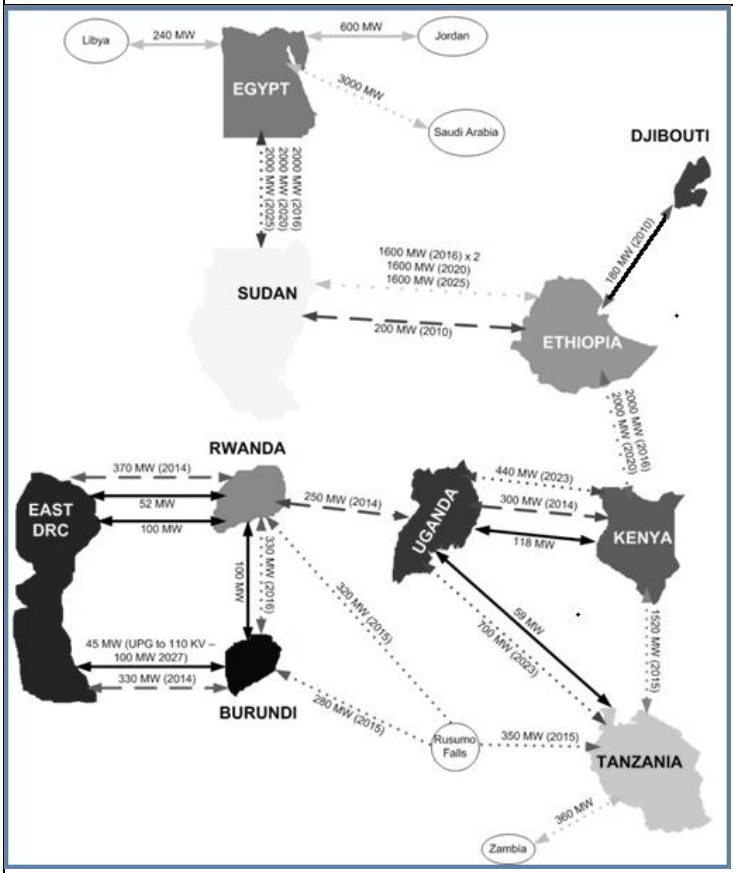
[9] The reform originated in the crisis that engulfed the sector in the late 1990s and that reached its nadir about 2002, as a result of lack of regulatory framework and investment, compounded by drought. Since then, Kenya has ensured that tariffs underpin the financial sustainability of the sector entities and that fair and transparent economic regulation and appeals processes sustain private sector operations.

[10] NEPAD is a program of the African Union (AU) adopted in Lusaka, Zambia in 2001. The program is spearheaded by African leaders to enhance Africa's growth, development, and participation in the global economy.

[11] NBI members are Burundi, DRC, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda.

tandem with such institutional strengthening, the region needs considerable transmission infrastructure development before a regional power market can materialize. Planned investments in interconnections, over a 30-year period, total an estimated US$3.7 billion.[12] Figure 2 shows existing interconnections, those in the process of construction, and planned interconnections in East Africa.

Figure 2. Existing and Planned Power System Interconnections in East Africa



1. Solid, black arrows show existing interconnections.
2. Broken, dark gray arrows show interconnections in progress of construction.
3. Dotted, light gray arrows show planned interconnections.
4. The Ethiopia-Sudan interconnection links Ethiopia to the Republic of the Sudan.

10. **The Program described in this document supports the integration of power systems of five countries with a combined population of 212 million and GDP of US$107 billion.** Within the framework of the EAPP, the Program has three phases for connecting the power grids of Ethiopia, Kenya, Tanzania, Uganda and Rwanda. The EAPP's Master Plan, endorsed by the governments of the EAPP member countries, has designated the transmission interconnections among these countries as priorities for the development of the Eastern Africa power market. These interconnections will create the transmission backbone for the region. Kenya is expected to become the central node of the integrated system. On the supply side, Ethiopia initially will provide much of the electricity traded in this network. In the future, power will be also exported from Kenya, Tanzania, and Uganda. In addition, the Program will facilitate a much larger regional integration through linking with the ongoing interconnections among Kenya, Uganda, Rwanda, Burundi and eastern DRC, which are part of the Nile Equatorial Lakes Subsidiary Action Programme (NELSAP) under the Nile Basin Initiative. Also, once the planned Tanzania-Zambia interconnection is built, the EAPP power systems will be linked to the Southern African Power Pool.

[12] This estimate derives from two least-cost expansion plan studies prepared by the EAPP Secretariat, EAC, and by the Nile Basin Initiative.

11. **The first phase of the Program, the Eastern Electricity Highway, will connect the strategically positioned power systems of Ethiopia and Kenya.**[13] The transmission line is a system-to-system interconnection between these two countries and will be a core development laying the basis for the broader regional transmission backbone. The interconnection initially will help Kenya to meet its increasing demand. Following the implementation of the subsequent two phases of the Program, the line will serve a larger number of East African countries that will interconnect to the EAPP network. Initially power will flow southward from Ethiopia to Kenya. However, the direction of the flow may change seasonally, depending on the availability of generation capacity in both countries and relative supply costs. Full integration of the regions' power systems in the future – from the Southern African Power Pool to Egypt - will allow the optimization of power generation at regional level, with the utilization of least-cost regional energy resources, and a change in the direction of the power flow from south to north. In such a scenario, a multitude of lower-cost generation plants will feed the interconnected system to help meet demand in the region including in Ethiopia, Sudan and Egypt, the largest power market in the EAPP.

12. **Ethiopia's generation expansion program will provide enough capacity to meet domestic and export demand even if some plants are not commissioned**. Ethiopia is rapidly increasing its generation capacity. By 2018, nine new hydropower stations are expected to become operational, with a total capacity of about 9,000 MW (Annex 6). Among these new plants is the Gibe III hydropower plant, which will come on-line by 2014, providing about 5,242 GWh of energy to the system. By the time the Ethiopia-Kenya interconnector is operational, in 2018, Ethiopia's power system will have a supply capacity in excess of the projected total domestic and export demand (paragraphs 17 and 18). Clearly, even in the absence of Gibe III, Ethiopia will have enough energy available to accommodate all possible exports through the proposed interconnector

13. **The planning for bilateral power trade between Ethiopia and Kenya is well advanced, with a long-term PPA already in place.** In December 2011, Ethiopia and Kenya agreed to a 25-year PPA for exports of 400 MW of electricity from Ethiopia to Kenya. The agreement has provisions for increasing the exports over time depending on Kenya's electricity needs and power availability in Ethiopia. The agreed minimum level of exports ensures the economic viability of the Ethiopia-Kenya interconnector. Other bilateral power trade agreements in the region include the PPAs Ethiopia signed with Djibouti in 2011 and Sudan in 2012.

B. Country Context

Ethiopia

14. **Ethiopia is on a trajectory for improving human development through high economic growth that will require massive infrastructure expansion.** Although Ethiopia is Africa's fifth largest economy, per capita income remains low, approximately US$370, and the country ranks 174 out of 187 nations on the Human Development Index of the United Nations.[14]

[13] See Section II. D for description of the other phases.
[14] Based on 2010 data.

During 2004-2010 Ethiopia's economy, which has diversified significantly, grew at seven to eight percent per year, according to IMF estimates. As a result, poverty has declined and the country is currently on track to achieve, or come close to, many of its Millennium Development Goals (MDGs) by 2015. Ethiopia's prudent macroeconomic policies, including fiscal and monetary adjustments to protect vulnerable groups helped reduce inflation to single digits by mid-2009. However, in the last few years, inflation has been again rising and stood at about 32 percent at the end of March 2012, aided by significant increase in international food and fuel prices. In this context, the Government of Ethiopia (GoE) has launched the ambitious Growth and Transformation Plan (GTP) for the period FY2011-FY2015. To achieve major improvements in income levels and social indicators, this plan envisages annual economic growth of at least 11 percent and universal access to basic services, including water and electricity. Achieving this high growth rate will require structural changes, especially improvements in the investment climate and related growth in the private sector.

15. **Utilizing the potential of Ethiopia's large hydropower resources is critical to Ethiopia's sustained development**. Development and monetization of the country's energy resources is important in Ethiopia's growth strategy. As a landlocked country, Ethiopia has a lot to gain from regional integration. The country has vast hydropower potential estimated at 45,000 MW, of which less than four percent is currently developed. The long-term marginal cost of developing this generating capacity is around US$0.04-US$0.05 per kilowatt-hour, significantly below that of neighboring countries. If there were no barriers to developing and trading Ethiopia's hydropower, the country would have the potential to export more than 55 terawatt hours (TWh) of electricity per year, or about a third of the total demand in EAPP countries by 2030 (excluding Egypt). Exports to Kenya alone will earn Ethiopia gross revenues of US$200 million per year on average, based on the agreed volume of 400 MW of firm energy to be traded.

16. **The Ethiopian Electric Power Corporation (EEPCo) is supporting the Government's GTP through investments in power capacity and exports.** EEPCo is a vertically integrated, government-owned utility responsible for implementing the GoE's policy objectives for power development. The corporation is supporting the GTP by executing investments to: (a) increase access to electricity and (b) expand electricity exports. EEPCo's electrification program has been very successful. Over the last five years, more that 12 million people have gained access to electricity (14 percent of the population).[15] Concurrently electricity sales have increased at an annual rate of 12 percent compared to the average rate of eight percent for Sub-Saharan Africa.

17. **Ethiopia is rapidly increasing its generation capacity to support the projected major expansion in domestic and regional demand.** Based on recent trends, domestic electricity demand projections indicate a continued increase, at a rate of about 10-11 percent per year until 2018. However, under the GTP, the Government plans to connect 75 percent of the country's rural towns and villages to the electricity grid by FY2015, which would double the number of electricity connections from the current two million to four million. Based on this planned huge increase in connections, EEPCo projects annual demand for electricity to grow by 24-32 percent during the coming years. The Government is also planning to ramp up electricity exports (to Djibouti in 2011, Sudan in 2012, and Kenya in 2018), by developing the country's hydropower

[15] Two million connections, each connection estimated to serve six people.

potential and other renewable energy resources. The construction of three large hydro plants with a total installed capacity of 1,180 MW, commissioned between 2009 and 2010, increased Ethiopia's installed hydro capacity from 850 MW to over 2,000 MW. In FY2011, total electricity consumption was 4,000 GWh and electricity production capability 6,000 GWh.

18. **Ethiopia has sufficient energy resources to meet projected domestic and export demand and has secured considerable financing for related investments.** In 2018, when the Ethiopia-Kenya interconnector is expected to be commissioned, EEPCo is projecting domestic demand at 4,000 MW and export demand at 600 MW. The Bank's analysis of EEPCo's generation expansion plan has confirmed that the company will be able to meet the projected demand from a mixture of hydro, wind, and geothermal plants that are under various stages of construction and are expected to enter into service by 2018. These plants will add about 9,000 MW to the system. Of this capacity, more than 800 MW is wind and over 1,000 MW is geothermal (Annex 6). In addition, feasibility studies have confirmed the viability of 15,000 MW of additional hydro, wind, and geothermal plants. The Government has raised nearly US$3.5 billion towards financing of the power system development projects for generation, transmission and distribution from multilateral development partners (IDA, AfDB, etc.), foreign investment banks (India and China), and from domestic and Diaspora bond issuances. GoE is seeking an additional US$4 billion for investments in the remainder of the GTP period (through 2015). Annex 6 provides the details of the power system expansion program.

Kenya

19. **Kenya is among the five African countries considered likely to attain middle-income status in the next decade provided it can grow six percent annually.**[16] Kenya's economy is more diversified than most other countries in Sub-Saharan Africa. About 55 percent of Kenya's GDP comes from services, transport, finance, tourism, information and communications technology (ICT) and trade – sectors that critically depend upon reliable power supply. In 2011, GDP growth was 4.4 percent and in 2012, five percent growth is predicted if sound macroeconomic policies persist. If growth accelerates to six percent per annum, Kenya can expect to reach middle-income status by 2019. Recent macroeconomic stability gives hope for the remainder of 2012 with inflation expected to remain below 10 percent, half of what it was at the end of 2011. Debt levels have returned to below 45 percent of GDP, which would propel Kenya to the top performers in the European Union by the debt criterion. However, Kenya's current account deficit has reached record levels and risks remaining at 15 percent of GDP in 2012, susceptible to external shocks, such as sharp rises in oil prices. Nonetheless, with relatively low levels of debt, a stable exchange rate, and declining inflation Kenya is now able to run higher fiscal deficits to maintain its public investment program, especially in infrastructure.

20. **Kenya is experiencing rapid population growth, but its dynamic private sector faces serious infrastructure constraints.** The population in Kenya doubled over the last twenty-five years and by 2040, Kenya – with a predicted 75 million people – is expected to become the 21st

[16] The other four countries, according to the World Bank's Africa Regional Strategy, are Comoros, Ghana, Mauritania and Zambia. According to the World Development Indicators, middle-income countries currently have a minimum GDP per capita of US$1,000.

largest economy in the world. Kenya's vibrant private sector is already a major source of economic growth, driven by expanding services in telecommunications and transport. The country benefits from a geographical location that is favorable to trade, with the port of Mombasa serving as the most important gateway for imports to the EAC countries, South Sudan and eastern DRC. The EAC is now trading more with itself than with other regions of the World, and Kenya's top trading partners are no longer European countries, but Uganda. Trade offers potential for Kenya to mitigate its external vulnerability and reduce its current account deficit. However, increasing demand is exerting great pressure on existing infrastructure and Mombasa port is characterized by high dwell times and inefficient operations that result in significant time and cost bottlenecks. Matching capacity with demand in the ports, road and rail sectors will be a key challenge going forward if predicted growth rates in the EAC are to be maintained. Electricity supply and transport bottlenecks need to be relieved if Kenya is to maximize its potential for private sector-led growth. Developing under-exploited hydropower potential in the region would help meet electricity demand, as well as improve security of supply, enhancing environmental quality and ensuring improved economic efficiency.

21. **Electricity imports from Ethiopia can reduce electricity costs and improve the security of supply.** The lack of reliable and affordable generation capacity is a major impediment to Kenya's transformation into an industrialized, middle-income country. Insufficient investment in electricity infrastructure has led to energy supply deficits. At the same time, climate variability has constrained the availability of hydropower, which accounts for 48 percent of the country's total installed capacity of 1,584 MW in 2011. The output from hydropower stations, most of which are located on the Tana River, has been severely curtailed during drought years, most recently in 2009/2010.[17] Deficits in available hydropower capacity have led to power shortages that undermine the profitability and competitiveness of Kenyan firms. Studies indicate that unreliable electricity supply lowers the annual sales revenue of Kenyan firms by about seven percent and reduces Kenya's annual GDP growth by about 1.5 percent.[18] To meet demand during periods of supply shortage, the Government contracts "emergency" generation capacity – consisting of containerized units running on diesel fuel. But the cost of power from these units is exorbitant, about US$0.32 per kWh, triple the cost of base load power from geothermal plants (US$0.10 per kWh) and more than quadruple the cost of imported power from Ethiopia (US$0.07 per kWh). Electricity imports from Ethiopia, projected to supply up to 25 percent of Kenya's power requirements between 2020 and 2024, will reduce costs and increase security of supply. In particularly, the increased security of supply will allow Kenya to increase the contribution of its wind energy resource, which is seasonally variable.

22. **Kenya has been highly successful in implementing reforms for efficient commercial operations in the power sector**. These far-reaching reforms have advanced quickly, particularly compared to other African countries. The Government established its long-term vision and policy framework for the sector in the late 1990s and early 2000s, culminating in the Electric Power Act of 1997, the National Energy Policy of 2004, and the Energy Act of 2006. These instruments eliminated monopoly in electricity generation and vested the sector's

[17] Latest annual data is for 2010/2011 i.e. up to June 30, 2011. Output of hydropower was 2,170 GWh in the drought year of 2009/2010 compared to 3,427 GWh in 2010/2011 when rainfall was normal.

[18] This finding of the multi-donor Africa Infrastructure Country Diagnostic in 2008, noted Kenya's underinvestment in the power sector.

regulatory functions to an independent regulatory authority. The sector, once vertically integrated, now consists of three functional lines, operating on a commercial basis: Kenya Electricity Generating Company, Ltd. (KenGen) for power generation, the Kenya Electricity Transmission Company Ltd. (KETRACO), established in 2008 for planning, building, and operating new transmission lines, and the Kenya Power and Lighting Company, Ltd. (KPLC) for electricity distribution. The Government created the independent Energy Regulatory Commission (ERC) in 2007. Tariffs increased to cost recovery levels in 2008, subject to review every three years. The Rural Electrification Authority (REA), established in 2006, plans and implements rural electrification programs. The creation of the Geothermal Development Company (GDC), which began operations in 2009, was a major step toward the large-scale development of renewable energy. And with ten IPPs there is a strong private sector presence in the power sector. Furthermore, feed-in-tariffs have created opportunities for local firms to develop wind, solar, mini-hydro and biogas.

23. **Power imports from Ethiopia will boost Kenya's capacity to achieve ambitious targets for household electricity access.** Despite major institutional reforms in the power sector, household access to electricity is still low in Kenya. Flanking the reforms, access to electricity has been increasing steadily, but the countrywide rate[19] is only about 25 percent (2009), with the other 75 percent relying on fuel-based lighting, dry cell batteries, and other electricity substitutes that are costly and often unreliable. The Government has set a target of 40 percent household access by 2020 to accelerate economic development and reduce imbalances between urban and rural areas. As a result of expanded electricity access and planned GDP growth at an average annual rate of six percent, electricity demand is expected to grow much faster than the economy, at an average annual rate of nine percent.

24. **Power system interconnection with Ethiopia will help Kenya diversify its sources of power, enhancing both security of supply and environmental quality**. Kenya's LCPDP emphasizes the need to develop a diversified portfolio of generation assets that balances sources of power and types of technology. As an interim measure, Kenya will turn to a combination of thermal and geothermal generation options to help meet urgent needs for power until about 2017-2018. However, at that time, generation from thermal plants will likely shift from the provision of full-time base load power to part-time duty. The anticipated development of large-scale geothermal and wind projects together with electricity imports, in addition to providing less expensive base load power, will contribute to a reduction in the projected carbon intensity of Kenya's power grid.

C. Higher Level Objectives to which the Program Contributes

25. **The Program and the Project support the implementation of the World Bank's Africa Strategy,[20] which highlights regional integration potential.** Specifically, the Program and the Project reflect the two pillars of the Strategy: competitiveness and employment; and vulnerability and resilience. The Strategy specifically emphasizes support to transmission

[19] Source: National Census of August 2009 with 23 percent of households reporting access to grid electricity and two percent access to off-grid sources.
[20] World Bank, *Africa's Future and the World Bank's Support to It*, March 2011.

interconnections and engagement in regional integration. The provision of reliable and affordable energy from a regional resource base is critical for raising productivity and competitiveness and creating jobs. And access to considerable clean regional energy resources will reduce the dependence of individual countries on imported fossil fuels, reducing pollution and vulnerability to climate change, thus strengthening environmental resilience. Both the Program and the Project are consistent with the Strategy's implementation framework, which entails working in partnerships with African governments, development partners, and the private sector. Under the Project, the Bank's convening power has successfully leveraged IDA resources by crowding in co-financing from the African Development Bank (AfDB), the French Development Agency (AFD), as well as Ethiopia's and Kenya's own resources.

26. **The Program is aligned with the goals and strategies of relevant regional and sub-regional organizations including the NEPAD and the EAC.** The Program is consistent with NEPAD's development strategy toward regional integration of electricity networks, recognizing EAPP as a framework for integration. The Program is also aligned with the priorities and the development plans adopted by the EAC. The EAC Treaty highlights the need for regional cooperation in infrastructure and encourages EAC members to prioritize coordinated energy investment in their policies and strategies. The EAC's Fourth Development Strategy for the period 2011/2012 to 2015/2016 has identified the development of regional infrastructure as a priority for removing constraints along the regional value chain and facilitating a competitive, regional economy that attracts investment for economic growth, job creation, and poverty alleviation.

27. **The Program supports the implementation of the EAPP's Strategic Roadmap for regional power pool development**. The Strategic Roadmap, approved by the Eastern Africa Conference of Ministers, covers the period 2011-2025. The preliminary stage is the establishment of the necessary physical infrastructure to enable country-to-country power trade. Future stages envisage the development of a bilateral market with a balancing mechanism, the creation of a spot market for power, and ultimately, a full regional power trade environment.

28. **The Program and the Project are consistent with the World Bank's Regional Integration Assistance Strategy for Sub-Saharan Africa (RIAS)**. The first pillar of RIAS concerns regional infrastructure and identifies the development of stronger and better-connected infrastructure platforms as a mean to unlock economies of scale, sharpen competitiveness, and support Africa's agenda for economic growth. Improving access to clean energy and supply reliability is one of the three areas of focus for the Bank's assistance in the development of regional infrastructure under the RIAS. The Program also meets the three key criteria for regional projects: (a) involvement of more than two countries; (b) economic benefits that will accrue to several countries; and (c) evidence of regional ownership and commitment of the participating countries along with the provision of a platform for policy harmonization in power sector development. By enabling a diversification of the energy mix in the region, with the incorporation of a larger share of renewable energy, the Program and the Project will put Eastern Africa on a less carbon intensive path and reduce the region's vulnerability to climate change. As such the Program and the Project are in line with IDA 16 special theme on climate change and low-carbon growth.

29. **The Project is consistent with the criteria of engagement and selectivity set out in country assistance strategies.** In the Kenya Country Partnership Strategy (CPS) Progress Report (No. 67224-KE), which was discussed at the Board on May 10, 2012, the Bank sets out to advance the interconnection of the power systems of the East African countries as one of the key factors unleashing Kenya's growth potential. Similarly, the Ethiopia Country Assistance Strategy for 2008-2011(Report No. 43051-ET) sees enhanced regional integration of physical infrastructure critical for fostering the country's economic growth. The new CPS under preparation for Ethiopia will continue focusing on regional integration as a key driver of growth.

II. PROGRAM AND PROJECT DEVELOPMENT OBJECTIVES

A. Program Development Objective

30. **The Program objective, supporting the EAPP's mission, is to help integrate the power systems of EAPP member countries including Ethiopia, Kenya, Tanzania, Rwanda and Uganda**. The planned, phased integration will accelerate the development of regional energy resources that will help meet increasing electricity demand and reduce the cost of electricity to the participating countries.

31. **The interconnections included in the Program will strengthen the infrastructure platform for a major future expansion of the Eastern African power market**. They will allow the participating countries to exploit the large potential of diverse energy resources available for power generation. The greater resource diversity will enhance security of supply and will reduce costs. Also, because the major supply countries will transmit surplus energy generated largely from renewable energy resources, the interconnections will result in improved environmental quality from the reduced generation from fossil fuels.

32. **The Program-level result indicators are the amount of electricity traded annually among the countries participating in the Program and the resulting operating cost savings**. The Program will be successful if the participating countries will actively trade electricity between them and earn savings in energy supply costs. The target values of the results indicators for the future phases of the Program will be quantified at the appraisal stage of each phase, based on the trading volumes and prices agreed between the participating countries.

B. Program Eligibility Criteria

33. **Program design promotes cooperation among countries and ensures coordinated actions under a common framework.** For a country to be or remain eligible for Bank support under the Program, the following "eligibility criteria" are proposed.

- Borrowers should be members of EAPP.
- Utilities involved in the project should reach agreement on transmission wheeling charges with relevant transmission line operators either through bilateral agreements

with all parties involved, or based on regionally agreed wheeling rules developed by EAPP and endorsed by its members.

34. **The Program will complement existing and ongoing interconnections**. Together with the existing and committed interconnections (Table 1), the Program will support the interconnection of all the countries in the greater East Africa Region in line with EAPP's 30-year Master Plan vision depicted in Figure 2 and its future updates. Once Zambia and Tanzania construct the planned Zambia-Tanzania interconnectior, the EAPP power systems will be linked with the networks of the SAPP countries.

Table 1. Existing and Committed Interconnections

Interconnection	Voltage (kV)	Distance (km)	Capacity (MW)	Status	Completion date
Uganda-Kenya	132	117	118	Existing	1960s
Tanzania-Uganda	132	85	59	Existing	1970s
Ethiopia-Djibouti	220	283	180	Existing	2011
Ethiopia-Sudan	220	321	200	Under construction	2012
Uganda-Kenya	220	127	300	Under construction	2014
Uganda-Rwanda	220	172	250	Under construction	2014
Rwanda-DRC	220	68	370	Under construction	2014

C. Lending Instrument

35. The Bank will provide investment and capacity building support using the Adaptable Program Loan (APL) instrument, used horizontally on a regional basis to support EAPP's member countries and vertically, in principle with each Regional Member able to receive support from more than one APL phase over the APL program period.

36. The APL instrument, by visibly committing substantial resources and complementing activities supported by other development partners, will help ensure the availability of adequate resources to fund priority investments for creating a functioning electricity market. The APL instrument will enable the Bank to provide support in a flexible manner – when individual countries have met the triggers and when individual projects are ready to receive Bank support. The proposed size of the APL is US$1.1 billion (representing 61 percent of the US$1.81 billion estimated total Program cost). An amount of US$684 million equivalent is proposed for approval for the first phase.

D. Program Phasing

37. **The Program is aligned with the EAPP/EAC Regional Power System Master Plan and has three phases**. The selection of the projects in the Program reflects the sequencing of investments that the Master Plan has identified for the achievement of maximum regional economic benefits. In addition, the selection takes into account the overall level of preparedness and the status of negotiations for energy exchange among the countries participating in the

Program. Each phase will provide significant benefits to the participating countries even without the implementation of the subsequent phases. However, the implementation of the entire Program will maximize regional benefits. The Program will support the following three phases:

- **Phase 1 (APL 1)**: **Ethiopia-Kenya (500 kV HVDC).** This connection will be operational in 2018 at a total estimated cost of US$1.3 billion. Power can flow in either direction. Feasibility confirmed by the EAPP Master Plan[21] and the Ethiopia-Kenya Robustness Study[22]. Basic design studies have been finalized, detailed design under preparation.

- **Phase 2 (APL 2)**: **Kenya-Tanzania**, a double-circuit 400 kV line. The feasibility study for this connection was completed in August 2011[23]. The estimated cost is US$350 million.

- **Phase 3 (APL 4): Tanzania-Rwanda and Tanzania-Uganda**, both lines at 200 kV. The Tanzania-Rwanda connection has an estimated cost of US$100 million and the Tanzania-Uganda line of US$100 million. Both interconnections are at the prefeasibility level.

E. Triggers for Subsequent Phases

38. The Program design includes a number of predefined milestones that countries have to meet to help ensure that the Program as a whole promotes not only bilaterally based-power exchanges but also contributes to the gradual development of the EAPP's integration process. The project readiness "triggers" will apply on a case-by-case basis to determine whether a given project is ready to join the Program. For the Program, the following triggers are proposed:

- An analysis of technical, economic and financial feasibility should have been completed for the project in question. The analysis should indicate the conditions precedent (or other projects) for the project in question to become feasible; and
- Borrowers should enter into project-specific agreements, such as a Memorandum of Understanding or similar commitments, for each interconnection, including: (a) cost-allocation; (b) maintenance and operation; (c) energy sales and purchases.

39. The two recipients under the first phase of the Program (APL 1), the Ethiopia-Kenya Interconnector, i.e., the Eastern Electricity Highway Project, have already met all the triggers. The EAPP, with the financial support of USAID, is currently developing sample trading agreements for use by its members, including rules to transfer electricity from a seller to a buyer through a transmission network owned by a third party (third-party wheeling). Such rules will be relevant to the Eastern Electricity Highway Project since KETRACO plans to sell the excess capacity of the HVDC line to other EAPP countries. Since the Project will serve as the foundation of electricity trade, it is proposed to develop the required third-party trading arrangements during the Project's implementation period.

[21] SNC-Lavalin International and Parsons Brinckerhoff, January 2011.
[22] SNC-Lavalin International and Parsons Brinckerhoff, May 2011.
[23] RSW International, August 2011.

40. The triggers for the second phase (APL 2) are:

- Completion of a Power Purchase Agreement between the utilities involved;
- Completion of an implementation agreement between the utilities involved;
- Completion of third-party wheeling agreements if the line will provide third-party usage, which should be aligned with EAPP regulatory principles of non-discrimination and transparency; and
- Completion and disclosure to the public of an environmental and social impact assessment, resettlement action plan, and any required mitigation plans, acceptable to the Bank, for both the facilities in Kenya and those in Tanzania.

41. The triggers for the third phase (APL 3) are:

- Completion of a Power Purchase Agreement between utilities involved;
- Completion of an implementation agreement between utilities involved;
- Completion of third-party wheeling agreements, if the lines will be providing third-party usage, which should be aligned with EAPP regulatory principles of non-discrimination and transparency; and
- Completion and disclosure to the public of an environmental and social impact assessment, resettlement action plan and any required mitigation plans, acceptable to the Bank, for the facilities in Rwanda, Tanzania, and Uganda.

42. Phase 2 (APL 2) is at an advanced stage of preparation and no special issues that may delay its implementation have arisen so far. Phase 3 (APL 3) will be re-assessed depending on the development of the power sectors in the region, the updates of the Master Plan, and the results of detailed design studies. For this reason, specific projects included in this phase may vary in the future.

F. Project Development Objectives (PDO) (APL 1)

43. The Eastern Electricity Highway Project has two objectives: (a) to increase the volume and reduce the cost of electricity supply in Kenya; and (b) to provide revenues to Ethiopia through the export of electricity from Ethiopia to Kenya.

G. Project Beneficiaries (APL 1)

44. Direct benefits for the end-user under the proposed Project are difficult to define due to the nature of the Project, which does not finance electricity distribution. Indirect beneficiaries of the Project will be the current and future electricity consumers in Kenya who will benefit from the Project through the reduction in the cost of electricity supply and improved reliability.[24] An

[24] Since the cost of imports is only a one factor in the cost of electricity it may be difficult to establish direct attribution of benefits at household level, therefore beneficiaries are defined as indirect project beneficiaries. Reliability refers to bulk supply of electricity since the Project does not include investments in the transmission and distribution networks.

estimate of the average cost reduction during the first years of implementation of the Project (2018-2021) is US$0.014 per kWh (12 percent of the average cost).[25] This will help make electricity more affordable for households and along with greater security of supply, will improve the competitive edge of Kenyan firms to create jobs and spur economic growth. The enhanced affordability will help Kenya reach its target of providing 40 percent of the country's households with access to electricity by 2020.

45. In Ethiopia, revenues from electricity exports will help EEPCo increase its income substantially. The company will earn an estimated US$156 million from power exports to Kenya on the first year after commissioning of the line, a 52 percent increase over domestic revenues. Export revenues will increase over time with increasing volumes. The Project also will create an estimated 750 skilled and unskilled jobs in Ethiopia during construction.

H. PDO Level Results Indicators (APL 1)

46. The Project's proposed PDO indicators are:

- Amount of electricity exported from Ethiopia to Kenya each year (GWh).
- Savings to Kenya on electricity supply costs (US$/kWh).
- Revenues to Ethiopia from electricity exports to Kenya (US$/year).
- Number of indirect project beneficiaries.

47. The Project's intermediate outcomes relate to the commissioning of the Project's components on time and budget. The following intermediate outcome indicators will be monitored:

- Transmission lines constructed under the Project (km).
- Converter substations constructed under the Project (no.).
- Availability of the interconnection line (%).
- Substations reinforced under the Project (no.).
- Project Supervision Consultant hired and in place (yes/no).
- KETRACO staff trained in HVDC operation and maintenance, procurement and financial management, environmental and social management (no.).
- Number of project staff receiving knowledge transfer on HVDC (no.).

[25] This is based on 9 percent annual demand growth and capacity additions as per Annex 9.

III. PROJECT DESCRIPTION

A. Project Components

48. The Project has two components: Component A is the construction of a High Voltage Direct Current (HVDC) transmission interconnection; and Component B is project management and capacity building.

Component A. Construction of a High Voltage Direct Current (HVDC) Transmission Interconnection between Ethiopia and Kenya

49. Sub-Component A1. Transmission Line (US$308.1 million[26]). This sub-component will finance the construction of about 1,045 km of bipolar 500 kV HVDC overhead transmission line to interconnect the electricity network of Ethiopia, at the Wolayta/Sodo substation, with the Kenya network, at the Suswa substation. The line will have a transmission capacity of 2,000 MW in either direction, using a bipolar and earth-return configuration and consists mainly of self-supported lattice tower structures, conductors, and insulators. About 433 km of the line will be in Ethiopia and 612 km in Kenya. The AfDB Group (under its concessional window, the African Development Fund, ADF) will finance the Ethiopia portion of the sub-component while the AfDB and AFD will co-finance the Kenya portion on a parallel basis.

50. Sub-Component A2. Converter Substations (US$628.8 million). This sub-component will finance the engineering design, construction, and commissioning of one converter substation on each end – one in Ethiopia and one in Kenya - of the transmission line to be constructed under Component A1. of the Project, and provision of goods required for such construction and for the maintenance and surveillance of the transmission network, including an helicopter for each country. Ethiopia, Kenya, EEPCo and KETRACO have confirmed that the maintenance and surveillance activities to be carried out with the helicopter shall be carried out exclusively by, or under the control of, civilian authorities of EEPCo and KETRACO and for the purposes of the Project. No military or any other purposes unrelated to the objectives of the Project is foreseen or will be allowed with the helicopters.

51. Each substation will have a capacity of 2,000 MW. These substations convert AC power into DC in Ethiopia and DC power into AC in Kenya (and vice versa as needed). The substation main equipment include specialized transformers, breakers, filtering equipment, inverters, controls, ground electrodes, and static and dynamic compensation equipment. In Kenya, IDA will finance the cost of the Kenya substation to the maximum extent; any amount that may not be covered by the IDA credit will be financed by KETRACO out of its own resources. Similarly, in Ethiopia, IDA will finance the cost of the substation to the maximum extent; any amount that may not be covered by the IDA Credit will be financed by the AfDB and, as the last resort and to the extent needed, by EEPCo out of its own resources.

52. Sub-Component A3. Environmental and Social Management (US$30 million). This sub-component will implement the Environmental and Social Management Plans, as defined in the ESIAs, the Resettlement Policy Framework in Ethiopia, and the RAPs. Financing will be made available by the Project implementing entities.

[26] Cost estimates exclude contingencies.

53. Sub-Component A4. System Reinforcement (US$87 million). The sub-component includes reinforcements in Kenya of the substations and other parts of the network necessary to integrate regional interconnections, while managing the increased demand in Kenya at the commissioning time of the interconnection for reliable operation of the Kenyan grid. The reinforcements include the upgrading of the Isinya and other substations to 400/220 kV operation (including transformers) and additional reactive power compensation and transformers in the Nairobi area. These reinforcements are in addition to investments in KETRACO's ongoing "Phase I Nairobi Ring" project, financed by AFD. IDA, together with KETRACO, will finance this component.[27] A study on additional reinforcement needs will be carried out under Component B of the Project.

Component B. Project Management and Capacity Building

54. Sub-component B1. Project management and Supervision (US$45 million). This sub-component will strengthen the project management and implementation arrangements as follows:

- B1(a): Engagement of a Supervision Consultant to supervise construction of Components A1 and A2 in both countries (AfDB-financed).
- B1(b): Engagement of a Supervision Consultant for Kenya System Reinforcements (Component A4), short-term consultants, project management equipment (IDA and KETRACO-financed).
- B1(c): Operating costs for KETRACO's Project Management Unit (KETRACO-financed).[28]

55. Sub-component B2. Capacity Building and Technical Assistance (US$10 million). The sub-component will provide technical assistance, planning and engineering studies, and capacity building to EEPCo, KETRACO, and KPLC focusing on HVDC operations and maintenance, power trading, project management, procurement and financial management, environmental and social management. The sub-component is financed by AfDB in Ethiopia and AfDB, AFD, and IDA in Kenya through parallel financing.

B. Project Cost and Financing

56. **The estimate of the total project cost is US$1,262.5 million.** This estimate is based on the 2009 feasibility study and the 2012 inception report prepared by the Project's design consultant. It was reviewed and adjusted during appraisal in consultation with EEPCo and KETRACO. The cost estimate includes a five percent physical contingency and a 10 percent price contingency. The estimate includes an allowance for system reinforcements in Kenya. This allowance was not included in the feasibility study but subsequent studies carried out by KETRACO's consultants have confirmed that reinforcement of certain parts of the network are required to ensure seamless operation of the DC line with the Kenyan grid. Necessary

[27] The Ethiopian network is being strengthened under other projects.

[28] At the request of EEPCo, the cost of project management activities in Ethiopia has been excluded from the cost estimates. EEPCo will finance these from its own funds in parallel.

reinforcements of the Ethiopian grid are ongoing under other projects. The cost estimates for environmental and social management are based on the recommendations of the disclosed ESIAs and RAP.

57. **Current cost estimates may require refinements following the completion of ongoing design studies**. These studies, scheduled for completion in October 2012, will prepare the Project's conceptual design for bidding purposes and final cost estimates. Therefore, the cost estimates presented in this document may have to be revised when the design studies have been completed. However, since the bidding for the major components is scheduled for mid-2013, any cost estimate made now is bound to have some degree of uncertainty. In particular, the uncertainty of the global economic outlook can affect the demand and supply situation for materials and work required for the Project.

58. **Technical studies have identified additional system reinforcements of the transmission systems for reliable operation of the Kenyan grid following interconnection**. The cost estimates for system reinforcements in Kenya (Component A4) are based on the results of technical analysis that has been completed for the Nairobi network by KETRACO's consultants in March 2012. These reinforcements are required for the reliable integration of the HVDC line in to the Kenyan grid and handling of 400 MW imports at peak time for the first three years of the interconnector's operation. Further reinforcements, to cater for imports greater than 400 MW, will depend on system conditions that can only be determined as commissioning of the interconnector nears. These conditions include confirmation of the commissioning dates for future geothermal projects, status of the network at that time, and the level of electricity demand. If further reinforcements are required, financing for these could be included in the proposed Kenya Menengai Geothermal project and other World Bank supported operations, currently at conceptual stage, or under the second phase of the APL for which preparation will start in FY13.

59. **IDA will provide 54 percent of total financial requirements for the Project with remaining 46 percent financed by the project owners and co-financiers.** The co-financiers are the African Development Bank Group (AfDB's concessional window, ADF) with US$354 million and the French Development Agency (AFD) with US$118 million. The project owners, EEPCo and KETRACO together will finance about US$106 million or 8.4 percent of the total project cost.[29] Table 2 shows the cost estimates by component.

[29] EEPCo and KETRACO have confirmed their counterpart financing during negotiations.

Table 2. Cost Estimate by Component

Project Components	Project cost US$ million	IDA Financing US$ million	% of Financing
A. High Voltage Direct Current Interconnector			
A1. 500 KV transmission line	308.1	0	0
A2. Converter substations	628.8	552.0	88%
A3. Environmental and Social Management	30.0	0	0
A4. System reinforcement in Kenya	87.0	37.4	43%
B. Project Management and Capacity Building			
B1. Project management and supervision	45.0	3.0	7%
B2. Technical assistance	10.0	3.0	30%
Total Baseline Costs	1,108.9	595.4	54%
Physical contingencies	51.2	29.5	58%
Price contingencies	102.4	59.0	58%
Total Project Costs	1,262.5		
Interest During Implementation		683.9	54%
Total Financing Required	1,262.5		

60. Tables 3 and 4 below show the financing arrangements for Ethiopia and Kenya.

Table 3. Financing Arrangements for Ethiopia

Project Components	AfDB US$	IDA US$	EEPCo US$	Total*) US$
A. High Voltage Direct Current Interconnector				
A1. 500 kV transmission line	126.1			126.1
A2. Substations	63.5	211.2	4.4	279.1
A3. Environmental and Social Management			16.0	16.0
B. Project Management and Capacity Building**)				
B1. Project management and supervision	15.4			15.4
B2. Capacity building and technical assistance	3.0			3.0
Contingencies	28.4	31.7	0.7	60.8
Total Financing	**236.4**	**242.9**	**21.1**	**500.4**
% of Total for Ethiopia	47%	49%	4%	

*) Excludes taxes and duties.
**) EEPCo will finance its share of local project management costs, which are not shown in the above table.

61. The Government of Ethiopia will on-lend the IDA funds to EEPCo under a Subsidiary Credit Agreement on terms acceptable to IDA. EEPCo is expected to pay the Government a premium over the IDA concessional terms that will support the Government's poverty reduction

activities. Similar onlending terms have been used in previous IDA Credits supporting EEPCo's investments.

Table 4. Financing Arrangements for Kenya

Project Components	AfDB US$ million	IDA US$ million	AFD US$ million	KETRACO US$ million	Total*) US$ million
A. High Voltage Direct Current Interconnector					
A1. 500 kV transmission line	80.3		101.7		182.0
A2. Converter substations		340.9		8.7	349.6
A3. Environmental and Social Management				14.0	14.0
A4. System reinforcement		37.4		49.6	87.0
B. Project Management and Capacity Building					
B1. Project management and supervision					
B1. (a) Supervision Consultant for Component A1 and A2	22.6				22.6
B1. (b) Supervision Consultant for Kenya System Reinforcements, short-term consultants, equipment		3.0		2.0	5.0
B1. (c) PIU costs				2.0	2.0
B2. Capacity building and technical assistance	3.0	3.0	1.0		7.0
Contingencies	12.1	56.7	15.3	8.7	92.8
Total Financing	**118.0**	**441.0**	**118.0**	**85.0**	**762.0**
% of Total for Kenya	15%	58%	15%	11%	

*) Excludes taxes and duties.

62. The Government of Kenya will make available the IDA credit to KETRACO on a non-reimbursable basis under a Subsidiary Grant Agreement. However, GoK has informed IDA that it may consider modifying the terms to on-lending arrangements in future depending on the financial performance of KETRACO and the overall economic performance of Kenya. Any such modification of the Subsidiary Grant Agreement will be subject to the Association's review and prior approval.

C. Lessons Learned and Reflected in the Project Design

Component/Lesson	Reflection in Project Design
Institutional arrangements for developing international interconnection Without sound coordination at all levels of operation, cross-border interconnection projects risk delays in execution that can diminish time-sensitive expected benefits.	Since the conception of the Project, the two countries have implemented an organizational structure for the execution of the feasibility studies. The institutional structure will be strengthened to manage the increased responsibilities as the Project nears execution and operation. The organizational structure has been endorsed at the highest level by both countries. Besides the project-specific execution mechanisms, the project loans will finance some institutional development of the entities that should continue ensuring a coordinated planning and operational framework for the Project.
Managing expectation in regional integration, properly accounting benefits and risks Without streamlined institutional arrangements, and a strong commitment to accelerate the evolution of a competitive power pool, transformational economic and environmental benefits may take longer to materialize than planned, even with the physical infrastructure in place on time.	The Project reflects the fact that trade in the EAPP will evolve gradually, from bilaterally-agreed projects to more organized and competitive pool-type trading. The Project is based on sound technical and economic rationale for the two countries, and will pave the way for broader development of trade in the EAPP. The Project does not depend on other EAPP projects. In the absence of broader regional development, the Project will still have significant value (in terms of economic and technical benefits) for the two parties. If the EAPP region further develops, the Project's value will increase. Multiple risk-based planning and economic studies have tested the economic robustness of the line from the perspective of the participating countries and region as a whole.
Technology Without the transfer of sufficient knowledge for HVDC operations, even for experienced utilities there is an increased risk of operations and maintenance problems that could diminish the reliability of power system interconnections.	The Project has a three-track strategy to incorporate this lesson. First, the EPC contractors and the Supervision Consultant will transfer HVDC operations and maintenance capacity to KPLC, KETRACO, and EEPCo. Second, KETRACO has already entered into a collaboration agreement with Power Grid of India by means of which they are and will continue to receive training and knowledge on HVDC design and operation. Third, the Project's capacity Building Component will finance additional training in HVDC design, operations and maintenance. This strategy ensures that KPLC, KETRACO and EEPCo are able to manage the technical operations and maintenance of interconnection for the life of the Project.
Procurement Although turnkey contracts are efficient for large projects such as interconnections, performance risks increase if there are not sufficient EPC contractors available in the market and strong supervision of these contracts is lacking.	The Project has been divided in the lowest number of packages that ensure competition and at the same time reduces complexity given the multiple sources of financing. As required by HVDC technologies, converter stations have been integrated for single bidding to ensure the use of the same technology in both countries. The Project will finance an experienced firm to supervise the construction and commissioning of the Project.
Project Cost Without sufficient contingencies reflecting changing conditions, the capital costs of materials, and experience with other interconnection projects, there is a high risk of underestimating project costs.	A recent, initial engineering report has indicated an increase in project cost. Cost estimates have been updated at appraisal based on engineering estimates and include adequate contingencies to reduce the risk of under-estimation. In addition, EEPCo and KETRACO have confirmed that they will finance from their own funds any additional price escalation. AfDB, AFD and IDA will need to consider increasing their lending envelope to cover possible cost increases during implementation.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

Partnership Arrangements

63. **The Project will have three external development partners: IDA, the African Development Bank (AfDB, under its concessional window) and the French Development Agency (AFD)**. The financing arrangements have considered the need to reduce the complexity in procurement arrangements because of the involvement of multiple co-financiers while at the same time taking into account the financiers' constraints with regard to their available allocations for each country. Both AfDB and AFD have country specific allocations, which limit the design options for procurement packaging. The greater flexibility of IDA's regional funding envelope has allowed closure of the financing plan while reducing the administrative complexity to the borrowers as much as possible.

64. **AfDB will finance the Consultant for the Supervision of the Project and procurement has already started in advance of AfDB's Board approval**. The call for expressions of interest was advertized on March 15, 2012 and the Project is currently finalizing the shortlist of consultants and the request for proposal documents. AfDB is financing, under a separate grant arrangement, the ongoing work of the Design Consultant to prepare the technical specifications and the draft bidding documents for the converter substations and the transmission lines

65. **The contract for the converter substations will require joint financing and joint procurement procedure due to its large size and technical constraints.**[30] AfDB and IDA will finance this component. For this partnership, AfDB has agreed to the use of the World Bank's procurement guidelines because its portion of the financing is smaller than that of IDA's. In order to do so, AfDB will request a waiver from its Board of Directors. For disbursement and contract management purposes, the contractor will sign two separate contracts (each contract covering one country). IDA will finance the entire cost of the Kenya substation and the major portion of the cost of the Ethiopia contract to the maximum extent possible; any amount that may not be covered by the IDA Credit in Ethiopia will be financed by the AfDB and, as the last resort and to the extent needed, by EEPCo out of its own resources. The exact percentage of IDA and the AfDB joint co-financing of the Ethiopia contract will depend on the final bid price for the contract.

66. **The five turnkey contracts for transmission lines will be parallel-financed**. AfDB will finance four of them (two each in Ethiopia and Kenya) and AFD one in Kenya. Each financier will follow its own procurement guidelines.

[30] Technical specialists have confirmed that procuring the converter substations as one package is the best international practice.

67. **IDA will finance the system reinforcements in Kenya**. These contracts will be financed by IDA with counterpart contribution from KETRACO. Procurement will follow World Bank guidelines.[31]

68. **Technical Assistance and Studies.** Each co-financier will finance separately selected training and capacity building activities and short-term consultants and studies based on EEPCo's and KETRACO's capacity building plans. The table below summarizes the procurement arrangements for each major contract.

Table 5. Procurement Arrangements by Major Investment Contract

Contract name	External Financiers	Cost estimate US$ million*)	Procurement guidelines to be used
Supervision Consultant	AfDB	38.1	African Development Fund
HVDC converter substations	World Bank & AfDB jointly	628.8	World Bank
Transmission lines in Ethiopia (2 lots)	AfDB	126.1	African Development Fund
Transmission lines in Kenya (2 lots)	AfDB	80.3	African Development Fund
Transmission lines in Kenya (one lot)	The French Development Agency (AFD)	101.7	AFD
System reinforcement in Kenya	World Bank	87.0	World Bank

*) Excluding contingencies.

69. **Based on the agreed contract packaging design, IDA will finance about 49 percent of the Ethiopian portion of the Project and 58 percent of the Kenyan portion**. AfDB will finance 47 percent of the Ethiopian part and 15 percent of the Kenyan part. AFD's financing will all go to Kenya, accounting for 15 percent of Kenya's financing needs. The implementing entities, EEPCo and KETRACO together, will finance about 8.5 percent of the total cost of the Project. IDA's total contribution to the cost of the Project is 54 percent. Table 6 summarizes the financial partnership arrangement for the Project.

Table 6. Financial Partnership Arrangements by Financier and Component

Financier	Project component (financing in US$ million)			
	HVDC transmission lines and substations*)	Project Management and Capacity Building	Total**)	%
EEPCo	21		21***)	2
KETRACO	81	4	85	7
AfDB (ADF-window)	310	44	354	28
AFD	117	1	118	9
IDA	678	6	684	54
FINANCING AVAILABLE	**1,207**	**55**	**1,262**	
TOTAL COST	**1,207**	**55**	**1,262**	

*) Includes environmental management, resettlement and compensation.
**) Financing of eventual duties and taxes by the Governments of Ethiopia and Kenya is not included in the table.
***) Excludes the cost of Project Management in Ethiopia.

[31] AFD may cover a portion of KETRACO's counterpart contribution. In such case, the reinforcement components will be re-packaged and the IDA-financed package will follow the World Bank procurement guidelines while the AFD-financed package will follow AFD's guidelines.

70. **The development partners are preparing the Project jointly and coordinating implementation arrangements**. The Project's three external financiers are discussing the principles for their cooperation in all matters of common interest relating to the safeguards, procurement and implementation of the contracts they intend to finance, either on a parallel or a joint basis, under the Project. All of the Project's co-financiers have a good existing working relationship with the Governments of Ethiopia and Kenya, EEPCo and KETRACO, gained through work in previous projects with these institutions. Both AfDB and AFD are planning to go to their respective Boards for approval of the Project in September 2012. Thus the co-financing approval schedules is well aligned with the Project's implementation schedule.

Project Timeline

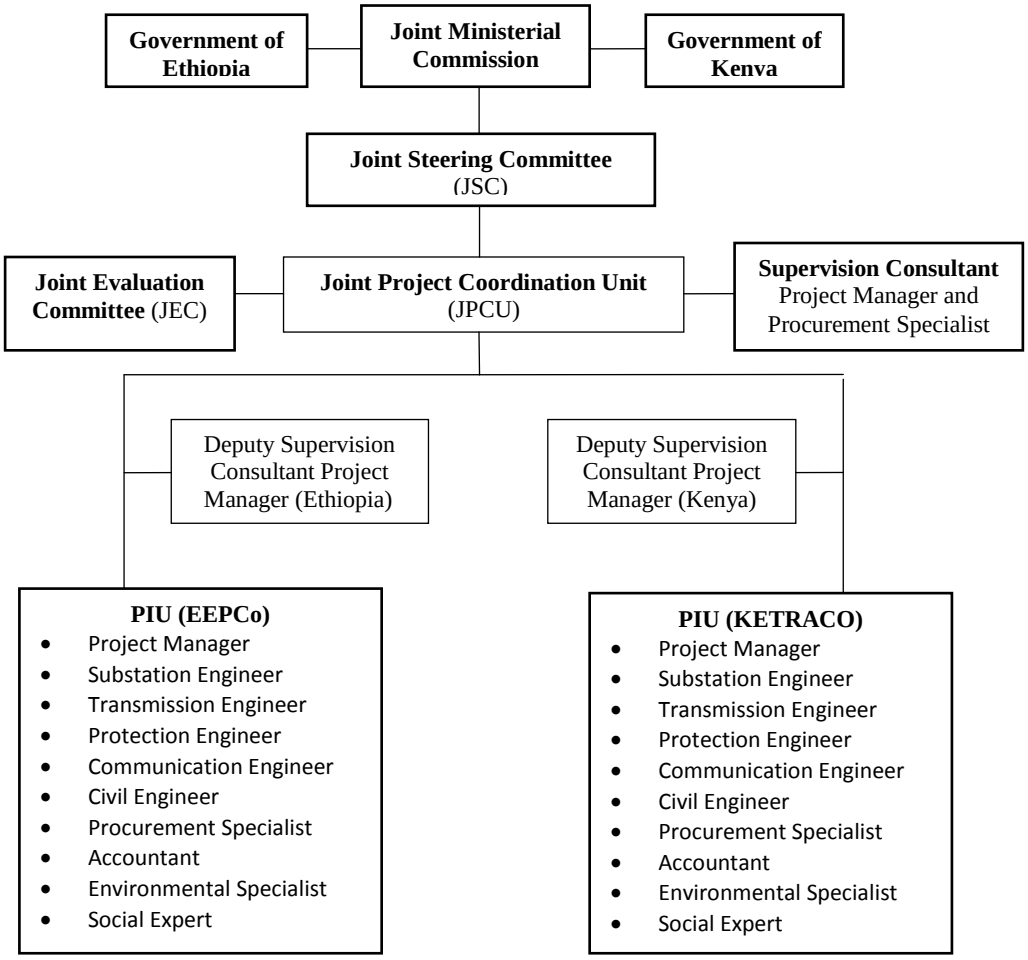
71. **The Project's Implementation Schedule foresees commissioning in 2018**. According to this schedule the bid documents for the turnkey contracts for the converter substations and transmission lines will be issued in April 2013 with contract award in late 2013/early 2014 following bid evaluation, approvals by KETRACO's and EEPCo's respective Tender Boards, and the review and no-objection by the lenders. The construction time for the Project is expected to about 48 months and the commissioning of the Project is therefore projected to take place in early 2018.

72. **The Project's disbursement profile is common to large infrastructure projects with an initial design phase.** The first 12-18 months of implementation are the Project's design phase during which the Supervision Consultant is hired to finalize the bidding documents and assist the implementing entities with the bidding for the investment components. AfDB will be the first disburser because it is financing the Supervision Consultant. The first major IDA disbursement for the converter substations is expected to take place during the third year of implementation (FY2015). Because of this, the team has elaborated on various options for postponing the Project's processing timetable from FY2013 to FY2014. However, the Governments of Ethiopia and Kenya have expressed their reluctance to initiate the procurement of the large investment components without having secured the full financing. Therefore, significant delays in processing timelines would only serve to delay the start-up of the Project and the benefits from it, with no significant gains in improving the disbursement schedule.

Project Implementation Structure

73. Figure 3 shows the structure of the implementation arrangements for the Project. The arrangements are similar to those used successfully in the AfDB-financed Ethiopia-Djibouti Interconnection that was officially commissioned in October 2011, but taking into account the larger size and complexity of this Project.

Figure 3. Implementation Arrangements



Overall Project Oversight and Coordination

74. **Joint Ministerial Commission (JMC)**. This Commission, comprised of the Ministers responsible for Energy in the respective countries, will provide guidance on strategic and policy issues and meet at least annually to discuss project progress. It has already been established.

75. **Joint Steering Committee (JSC)**. Consisting of the Chief Executive Officers and the Department Heads responsible for Transmission of EEPCo and KETRACO, the Chief Executive Officer of KPLC and the Heads/Accounting Officers of the Ministries responsible for Energy, this committee will oversee implementation and ensure effective cooperation between the countries. It will meet every quarter or more often if required and report to the Joint Ministerial Commission. Meetings of the Steering Committee will be chaired by the Head of the Energy Ministry of the country in which the meeting is held. The JSC has delegated the day-to-day oversight of the Project to EEPCo's and KETRACO's Department Heads responsible for Transmission.

76. **Joint Project Coordination Unit**. EEPCo and KETRACO have established a Joint Project Coordination Unit (JPCU). Its final staffing and working arrangements will be confirmed before effectiveness. Located in Addis Ababa, the JPCU's responsibilities include (a) coordination among all relevant institutions, streamlining the Project's preparation and implementation; (b) managing joint procurements; (c) serving as a single-point for tracking of the progress of implementation and the Project's outcomes; (d) monitoring costs and financing; and (e) preparing reports for the Project's owners, the Governments of Kenya and Ethiopia, and financiers, according to the agreed results monitoring plan. The JPCU will report to the Joint Steering Committee. The procurement Specialist in the JPCU will support the PIUs.

77. A Joint Project Coordinator (JPC) will manage the JPCU. The national Project Managers from EEPCo and KETRACO will be part of the JPCU alongside with other experts EEPCo and KETRACO will assign to it on an as needed basis depending on the workload from one time to another. EEPCo and KETRACO will jointly appoint the JPC.

78. **Joint Tender Evaluation Committee**. The JPCU will form Joint Tender Evaluation Committees, consisting of senior technical and procurement staff designated by each of the project owners to participate in tender evaluations when needed. EEPCo and KETRACO will follow their respective corporate procedures for internal clearances of all procurement and contract awards.

79. **Supervision Consultant**. This Consultant, to be selected through a competitive process, will deploy a consultant team for the JPCU and separate teams for the two countries. The team assigned to the JPCU will include a Procurement Specialist. The Consultant will be responsible for all procurement for the converter substations undertaken at the JPCU and assist in coordinating the procurement and contracting activities for the transmission lines that will be separately undertaken at EEPCo and KETRACO. The Consultant will review the design and tender documents for approval, assist with tendering and contract awards, certify contractors' payments, supervise the EPC contracts until handing over and commercial operation of the facilities and assist with coordination among all relevant institutions. The country teams will include technical, procurement, environmental and resettlement specialists to assist with the implementation of the Project. The Consultant will appoint a single team leader with responsibility for both national teams. The Consultant's team leader will report to the JPC. KETRACO will appoint a separate Supervision Consultant for the Kenya system reinforcement component.

National Project Implementation Units

80. EEPCo and KETRACO will each have their own Project Implementation Unit (PIU). These units will provide technical support to the JPCU, responding to country-specific issues, and managing the Project's country-specific financial flows and environmental and resettlement matters. The PIUs will consist of existing staff from EEPCo and KETRACO. Each utility will assign, to the national PIU, a Project Manager, one Substation Engineer, one Transmission Engineer, one Protection Engineer, one Communications Engineer, one Civil Engineer, one Project Accountant, one Environmental Specialist, one Social Specialist and one Procurement Specialist. One of these staff members will be assigned the responsibility for Monitoring and

Evaluation (M & E). Other relevant experts from the two utilities may support the teams. The Supervision Consultant's national teams will support the PIUs. The recipient Governments have agreed to this arrangement and have identified the staff for the PIUs. Their job descriptions will be submitted to IDA as an effectiveness condition.

Environmental and Social Safeguards Management

81. EEPCo and KETRACO will implement the Project's Environmental and Social Management Plan and RAP in their respective countries (Section VI. I and Annex 3).

82. EEPCo has adequate institutional arrangements in place to ensure the implementation of the ESMP for the project components in Ethiopia by qualified environmental and social staff. EEPCo's Environmental Monitoring Unit will assign one of its experienced staff members as the focal point person for the Project to work closely with the PIU. If required for timely and effective implementation of the ESMP, EEPCo will outsource some activities to qualified consultants. The implementation of the Resettlement Action Plan in Ethiopia will involve the Woredas (counties) along the transmission line route. Each affected Woreda Administration will establish a Committee for the purpose of verifying and valuing resettlement and compensation requirements in the presence of EEPCo staff.

83. On the issues relating to the protection of physical and cultural resources (i.e. Konso Cultural landscape and the archaeological and paleontological sites), EEPCo will be working closely with and under the guidance of the Ethiopian Authority for Research and Conservation of Cultural Heritage (ARCCH). ARCCH will conduct an orientation and training session for relevant project participants and construction contractors to alert the latter to the cultural heritage aspects of the Project's impact area and to the characteristics and management procedures for possible chance find procedures during construction.

84. KETRACO's environmental specialists will support the PIU in the implementation and monitoring of the ESMP for the project components in Kenya. The responsibilities of implementation of the ESMP will be shared between KETRACO and the construction contractors, with NEMA undertaking control audits to check compliance with the ESMP and to verify adequacy of the mitigation measures. KETRACO, with the help of the Supervision Consultant, will be responsible for conducting regular monitoring of the implementation of environmental mitigation measures contained in the ESMP and the Project's construction contract clauses.

85. KETRACO will also have the direct responsibility to implement and monitor land acquisition and compensation issues as outlined in the RAP. As per the provisions of Kenya's Constitution, not later than December 31, 2013, KETRACO shall set-up County Resettlement Action Plan Committees in each of the Isiolo, Laikipia, Marsabit, Nakuru, Nyandarua and Samburu counties to be responsible for the day-to-day implementation of the RAP. These Committees shall be led by the environmental specialist/land economist/social economist of the PIU and shall include, among others, the administration at the county-level, village elders and Project Affected Persons. However, given that the new County Administrations are yet to be fully established, KETRACO in consultation with the Project's co-financiers, will review the

arrangements for the RAP's implementation before the start of the construction of the project facilities. In addition, not later than December 31, 2013, KETRACO shall engage a firm or a group of independent persons with experience in resettlement to serve as an independent Resettlement Evaluation Panel charged with the task of: (a) monitoring the progress in the implementation of the RAP, including reviewing and verifying KETRACO's quarterly progress reports on Resettlement and making site visits to obtain information from the Project Affected Persons; and (b) conducting semi-annual audits and a close-down audit thereon. The approval of the close down audit will mark the end of liability of KETRACO to the resettlement process.

86. With regard to physical cultural heritage matters, KETRACO will liaise with the National Museums of Kenya (NMK), which will conduct an orientation and training session for relevant project participants and construction contractors to alert the latter to the cultural heritage aspects of the Project's impact area and to the characteristics and management procedures for possible chance finds during construction.

Communication and Stakeholder Engagement Strategy

87. The project owners, in consultation with the co-financiers, will design and implement a comprehensive Communication Strategy to enable information sharing and dialogue with different stakeholder groups (such as implementing agencies, civil society, affected communities, general public, etc.). The Strategy will support and coordinate with different safeguards related activities to promote an active engagement of stakeholders at various levels.

88. The communication intervention will apply a range of most appropriate and effective communication tools and techniques. These will include, among other things, a dynamic project website to disseminate information about the Projects' implementation progress, contract awards, and other information that will help increase transparency and facilitate third party monitoring of progress. Other communication tools, techniques, and channels will include: awareness raising activities, new media platforms, print and electronic media materials, workshop and seminars, and different other popular forms of local communication tools. A feedback mechanism will be established to receive and process information from the stakeholders on a regular basis. The Communication Program will also include information that is publicly available as per the World Bank's disclosure policy.

Capacity of the Implementing Entities

89. Both EEPCo and KETRACO have experience constructing cross-border transmission lines. EEPCo has constructed connections with systems in Djibouti and Sudan. KETRACO is constructing a connection with Uganda. EEPCo has capacity in the construction and operation of high voltage AC transmission lines and it is developing its capacity as a power exporter in a broader regional context. The interconnection projects with Djibouti (283 km of 230 kV line) and Sudan (297 km of 220 kV line) include capacity-building programs to strengthen EEPCo's technical, institutional and commercial abilities, enhancing its capacity as a power exporter. KETRACO has been gradually building up its portfolio of high-voltage transmission lines. The company is managing 286 km of newly constructed transmission lines and is implementing 17 on-going projects that include 400 kV lines and the 255 km 220 kV interconnection with

Uganda. For building its HVDC capacity, KETRACO has a cooperation Agreement with Power Grid Corporation of India and the Kenya Government has bilateral agreements with Egypt for provision of training at Egypt's excellent training facilities. In addition, both utilities will receive training in the construction, maintenance, and operation of HVDC facilities from the EPC contractors and separately under the Project's capacity building component.[32] KPLC has more experience than KETRACO in power trading. It currently has three PPAs for cross-border connections – one with the Uganda Electricity Transmission Company, one with TANESCO of Tanzania, and one recently signed with EEPCo.

90. EEPCo, KETRACO, and KPLC are members of regional power sector associations, such as the EAPP and the Union of Producers, Transporters and Distributors of Electric Power in Africa (UPDEA). As members of these associations, they have experience cooperating on sector issues beyond the national framework.

91. The Project's preparatory work assessed the capacity of EEPCo and KETRACO for procurement, financial management and environmental and social management. This assessment resulted in a plan of actions to strengthen areas of weaknesses to which the two companies have agreed (Annex 3).

Regulatory and Operating Arrangements for the Interconnection

92. **Power Purchase Agreement (PPA)**. In January 2012, EEPCo and KETRACO signed a 25-year PPA for the Project. The electricity trade will consist of both firm power sales and non-firm power sales. When the line is commissioned, the contracting parties will purchase and sell 400 MW of firm power with associated energy (at 85 percent availability factor) at a cost of US$0.07 per kWh. This price has been fixed for the entire duration of the PPA. The parties may trade additional non-firm power above the firm committed capacity at a price to be agreed between the parties three months before the additional exports start. Ethiopia shall guarantee a minimum capacity of 300 MW. The PPA sets out clearly other standard aspects such as the delivery point, metering, scheduling, billing, maintenance allowances (11 days per annum), force majeure, and agreed dispute resolution mechanisms. Finally, the PPA provides for Low Availability Liquidated Damages, consisting of US$0.07 per kWh to KPLC in case EEPCo's delivered energy falls below the minimum guaranteed amount of firm supply. The same level of penalty applies to KPLC if it fails to absorb the minimum firm supply. The PPA has been signed and approved by all relevant authorities in Ethiopia and the Kenya Energy Regulatory Commission (ERC) as required by Kenyan law.

93. The Project's economic analysis in Section VI.A has confirmed that an electricity trading volume of 400 MW will ensure the Project's economic viability. The minimum volume required for viability is just above 300 MW for the entire duration of the PPA. However, actual imports are likely to be higher and increase over time given the strong demand for electricity in Kenya and availability of supply in Ethiopia, as assessed in detail in Annexes 9 and 6 respectively. Based on Kenya's projected demand-supply balance, by 2022, the country is likely to import 1,000 MW of both firm and non-firm power.

[32] KETRACO has already prepared a detailed training program for financing from the IDA credit.

94. **Transmission System Ownership**. KETRACO will own the interconnection assets in Kenya. The company, created in 2008, is owned by the Government of Kenya (GoK). On the Ethiopian side, EEPCo will own the interconnection assets. EEPCo is a vertically integrated company that generates and distributes the majority of the electricity in Ethiopia and develops and operates the national transmission system.

95. **National and Regional Transmission Regulations for Pricing and Open Access**. KPLC will be the off-taker of the power imports from Ethiopia. KPLC will enter into a transmission ("wheeling") agreement with KETRACO for the use of the interconnector. This agreement will specify the technical and commercial (tariffs) conditions for the provision of the transmission services by KETRACO, subject to approval by the ERC. Kenya's transmission grid is operated by KPLC who also owns and manages the control center that manages the grid. While government policy envisions KETRACO becoming the system operator in the future, KPLC will continue to operate the grid until such time. This arrangement is formalized in an agreement[33] entered into by KPLC and KETRACO in July 2010 through which KETRACO appointed KPLC to provide technical and operational services while KETRACO continues to develop transmission infrastructure and its technical capacity. The agreement includes, among others, the provision by KPLC of operation and maintenance of transmission assets, engineering support, and overall system control functions to KETRACO.

96. On the Ethiopian side, EEPCo will supply power to Kenya by means of its own transmission system – including the Ethiopian part of the interconnector. Therefore, no internal transmission agreement is required in Ethiopia. Transmission capacity not utilized between the parties will be made available in an open and non-discriminatory basis for third-party use by EAPP members. The technical and commercial rules governing third party wheeling will be set by EAPP and agreed by the parties.

97. **Imports and Exports of Electricity**. In Kenya, the ERC has the authority to approve imports of electricity on a case-by-case basis. In addition to approving the imports through the Ethiopia-Kenya interconnector, ERC had previously approved imports from Ethiopia to supply small, isolated systems on the Kenyan border. The costs associated with imports, along with any other national generation cost, are passed-on to retails tariffs. In Ethiopia, the Ministry of Trade is responsible for export licensing. The Ethiopian Electric Agency (EEA), operating since 2000, as a regulatory body accountable to the Ministry of Energy approves technical standards for electricity generation, transmission, and distribution.

98. **Power Pool Operation**. Mindful of the complexities involved in developing regional platforms for energy trade, EAPP's Strategic Road Map has established three stages for the development of the Eastern Africa Power Pool. In the first stage, corresponding to the current status, trade will take place based purely on bilateral arrangements between neighboring countries. The PPA underpinning the Project is the major bilateral agreement of this first phase. Ethiopia and Kenya will operate their own generation and transmission systems. EEPCo and KPLC, as system operators, will control power flows across the interconnector and the energy trade will be based on the 25-year PPA signed between EEPCo and KPLC for 400 MW of firm

[33] Agreement between Kenya Electricity Transmission Company Ltd. and the Kenya Power and Lighting Company Ltd. with respect to Mutual Co-operation and Provision of Services, July 21, 2010.

energy. EAPP's present organization consists of a Conference of Ministers, a Steering Committee with the participation of the Chief Executive Officers of the member utilities, three sub-committees for Planning, Operations and Environment and a Permanent Secretariat.

99. In the second stage of EAPP's Road Map, the proposed Regional Control and Dispatch Centre and the Regional Regulatory body would become operational. As interconnections determined in the regional Master Plan continue to develop, bilateral trade between non-neighboring countries may emerge, at which stage there may be a need for a regionally coordinated balancing mechanism. The investments under the Program and the Project will facilitate third-party trade in the region. A revised intergovernmental MoU and inter-utility MoU have been prepared embodying these proposals but the Conference of Ministers is yet to endorse their establishment. EAPP is expected to enter into this stage several years after the Ethiopia-Kenya transmission line becomes operational.

100. In the third stage, once the Dispatch Center and Regional Regulatory Body have increased their capacity and trade has further developed in the region, a coordinated short-term spot market could develop to exploit short-term trade opportunities that will emerge as the number of trading agents in the regional market increases. This represents the final vision for the EAPP, which may take as much as 10 to 20 years beyond the implementation of this Project.

B. Results Monitoring and Evaluation

101. A Results and Monitoring Framework to document and measure the Project's development impact was discussed and agreed with EEPCo, KETRACO, KPLC and the co-financiers during appraisal (Annex 1). The Framework identifies results indicators for the Project as a whole, as well as intermediate results for each of the Project's components. The implementing entities have provided annual target values for the results indicators and baseline data against which results can be measured. The implementing entities and the Bank have agreed on the annual target values for the various results indicators. The Project Implementation Manual will document the arrangements for results monitoring with institutional responsibilities. The four levels of project monitoring are discussed in Section 4 of Annex 3.

C. Sustainability

102. **The Project is sustainable based on financial and technical factors as well as demonstrated commitment of the project owners.** The sustainability of the Project largely depends on: (a) the long-term availability of surplus generation capacity in Ethiopia at a substantially lower cost than Kenya's domestic alternatives; (b) the financial condition of KPLC, the off-taker, such that the company is able to meet its payment obligations to EEPCo under the PPA; (c) the financial and technical strength of KETRACO to maintain the HVDC line; and (d) the long-term commitment by both governments to the objectives of the Project. At a later date, the opportunity for increased use of the line to transmit Ethiopian (or Kenyan) power to other countries in the region will enhance its sustainability.

103. **Ethiopia has surplus capacity available for export and is likely to meet demand during the period of the PPA.** This finding is based on a probabilistic risk analysis of Ethiopia's electricity demand and supply projections under various scenarios. During project preparation, the team requested detailed information from EEPCo on the construction status of several power plants in Ethiopia. The information received included a description of the physical progress in each contract involved in the plant's construction, the financing status, and description of factors that potentially could cause delays. With that information, the team has defined various supply scenarios and combined them with different internal demand projections.

104. The supply scenarios indicate that Ethiopia is highly likely to meet its domestic demand and export obligations with a reasonable reserve based on its committed generation expansion plan. For instance, even if the domestic electricity demand grows at a very high rate (26 percent per year in the coming years and gradually reducing to 15 percent by 2022), Ethiopia will have sufficient supply to meet both its domestic demand and export obligations. The key factor affecting supply availability is the commissioning schedule of the planned power plants. The supply-demand analysis of the first five years of the Ethiopia-Kenya interconnector's operation shows that Ethiopia is able to accommodate both domestic and regional demand even in the event of a two- or a three-year delay in the commissioning of all power plants under construction, with only a low likelihood of momentary shortfalls few years after commissioning of the line. Even in the absence of Gibe III, the system will have enough energy available to honor export commitments through the proposed interconnector. A sensitivity analysis indicates that supply shortfalls would occur only if both the Grand Renaissance and Gibe III power plants were excluded (Annex 6).

105. An issue of key importance is the financial viability of EEPCo and the Ethiopian energy sector, in general. In terms of core financial performance, EEPCo's revenues are adequate to cover its operating expenses and to make cash operating profit of about US$100 million in FY2012-2016. However, to finance its aggressive growth plan, EEPCo has borrowed substantially in recent years and repayments of those loans have now started. The Government has not allowed EEPCo to increase its tariff since 2006, in real terms. EEPCo's tariff revenue has effectively reduced, given the high inflation in Ethiopia and the rapid devaluation of the Ethiopia Birr against the US Dollar. The level of operating profit that EEPCo will earn will not be adequate to service its current and projected level of debt service obligations of US$300 million a year in FY2012-2016.

106. GoE should implement measures to ensure EEPCo's financial viability, but presently, GoE is concerned about the adverse effect of doubling the tariff rate in the short-term on poor segments of the population (inflationary and socio-political repercussions). GoE is already considering debt restructuring of limited outstanding loans (concessional lending from multilateral banks). However, even if all of the concessional loans (on-lent to EEPCo) are restructured, it would amount to less than a 20 percent reduction in the debt service obligation shortfall for EEPCo in FY2012-2020. In order to maintain financial health of EEPCo and the sector, GoE needs to pursue a strategy to revise the tariff structure to reflect full cost recovery (estimated to be US$0.06–0.07/kWh) in the medium-term, while also pursuing options for efficient debt management in the near term, such as debt restructuring.

107. **The off-taker, KPLC, has the financial capability to pay for the contracted amount of power under the PPA.** The Project is financially attractive to Kenya because it will help reduce electricity supply costs by displacing higher-cost sources. This cost decline and KPLC's sound operational and financial performance in recent years are strong indicators of the Project's sustainability. KPLC improved its Return on Assets (RoA) from 1.4 percent in FY2004 to 4.2 percent in FY2011. During this period, the company's gross profit margin improved from -10.8 percent to 8.0 percent. The company's billing and collection performance has improved, evidenced by a reduction in the number of days of receivables from 67 days in FY2005 to 53 days in FY2011. The company has also expanded its customer base, has maintained a healthy financial position, and has not defaulted on any of its PPA commitments.[34] KPLC will remain profitable despite taking on increased debt to finance network expansion and its debt service coverage ratio is expected to stay above 1.3, assuming borrowing will increasingly take place on commercial terms. Hence, KPLC has a strong ability to pay for the imports provided there are no unexpected internal or external shocks to significantly alter the underlying assumptions. In 2019, imports will amount to about 15 percent of KPLC's total electricity purchases, increasing to about 25 percent by 2023.[35]

108. **While KETRACO builds its own financial and technical management capacity, KPLC temporarily has agreed to manage transmission lines.** Being a new company, KETRACO has limited technical and financial capacity and the GoK finances its investments. To compensate for these initial challenges, the company has entered into a co-operation and service agreement with KPLC. According to this agreement, KPLC will maintain and operate KETRACO's assets until KETRACO has built sufficient technical capacity of its own. The Project will contribute to the gradual strengthening of KETRACO's financial capacity and the company will enter into a wheeling agreement with KPLC that will commence the flow of transmission income to KETRACO. The terms of the agreement will enable KETRACO to generate sufficient funds to cover the cost of operations and maintenance of the line and to service its obligations according to agreed GoK on-lending terms.[36] These arrangements, together with the GoK policy commitment to the long-term viability of KETRACO, are strong indicators of the Project's sustainability.

109. **The project owners have provided evidence of long-term commitment to the objectives of the Project**. The continued commitment, cooperation and stability for both Ethiopia and Kenya are key factors for the sustainability of the Project. In this regard, the existing Joint Ministerial Commission established for the Project ensures that the benefits of cooperation and integration are evident and shared equitably between the countries.

[34] KPLC currently has PPAs with 10 IPPs, some of them started in the late 1990s.

[35] EEPCo and KETRACO are considering requesting an IDA Partial Risk Guarantee to credit enhance the payment and delivery security under the PPA to ensure timely payments and liquidated damages.

[36] GoK will initially on-grant the IDA funds to KETRACO but plans to convert the agreement into an on-lending agreement once KETRACO's financial position improves through the revenues it receives from the wheeling agreement.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk	Rating	Risk	Rating
Stakeholder Risk	High	**Project Risk**	
Implementing Agency Risk		- Design	High
- Capacity	High	- Social and Environmental	Substantial
- Governance	Substantial	- Program and Donor	Substantial
		- Delivery Monitoring and Sustainability	High
Overall Implementation Risk	**High**		

B. Overall Risk Rating Explanation

110. A detailed Operational Risk Assessment Framework (ORAF) has determined the overall risk of the Project is high for both preparation and implementation. The Project's implementation risk is high because of several factors, including: (a) its large size; (b) high country-level risks; (c) relatively weak implementing entities; (d) stakeholder risks due to the Project's perceived links to large hydropower development in Ethiopia by some NGOs; (e) the challenges posed by the joint implementation and operation of the Project by two countries; and (f) the Project will introduce HVDC technology with which EEPCo and KETRACO lack previous experience. The joint implementation arrangements, various safeguards concerns, and variations in the co-financiers' requirements for project approval and financing could also complicate coordination and increase lead times for procurement, hence increasing the risk of implementation delays.

111. The project design has incorporated adequate measures to address these risks to the extent possible. These include a number of strategic covenants that the recipients will meet at key stages of implementation and a Governance and Accountability Plan for the Project. The Operational Risk Assessment Framework provides detailed description of project risks and the corresponding mitigation measures (*Annex* 4). Table A above summarizes the ratings for the various risk factors.

C. Credit Conditions and Covenants

112. **Anti-Corruption Guidelines.** The "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and Revised in January 2011, will apply to this Project.

113. **Credit effectiveness for both countries**

(a) Each of the Subsidiary Credit Agreement and the Subsidiary Grant Agreement has been executed on behalf, respectively, of Ethiopia and Kenya and each of EEPCo and KETRACO, respectively.

(b) Each of the Co-financing Agreements has been executed and delivered and all conditions precedent to its effectiveness or to the right of EEPCo or KETRACO, as the case may be, to make withdrawals under it (other than the effectiveness of the Financing Agreement) have been fulfilled.

(c) EEPCo and KETRACO have taken the actions required on their behalf for the establishment of the Joint Project Coordination Unit under terms of reference and with staff in numbers and with qualifications satisfactory to the Association.

(d) EEPCo and KETRACO have established their respective PIUs under terms of reference and with staff in numbers and with qualifications satisfactory to IDA. The following staff shall be in place and assigned to each PIU: the national project manager, a substation engineer, a transmission engineer, a procurement specialist, an accountant, an environmental specialist and a social expert or specialist, all of them under terms of reference and with qualifications and experience satisfactory to the Association. EEPCo and KETRACO shall have adopted the Project Implementation Manual in form and substance satisfactory to the Association.

114. **Credit effectiveness for Ethiopia**

(a) Ethiopia has furnished to the Association the financial viability plan for EEPCo.

115. **Credit effectiveness for Kenya**

(a) All conditions precedent to the effectiveness of the Ethiopia Financing Agreement have been fulfilled.

116. **Disbursement condition for Ethiopia**

(a) No disbursements will be made under Category (1)(b) (works, goods and non-consulting services) for the converter substation to be constructed in Ethiopia, until and unless EEPCo has adopted, consulted upon and disclosed the RAP for the converter substation as approved by the Association and the displaced persons have been compensated in accordance with the provisions of the RAP.

117. **Disbursement condition for Kenya**

(a) No disbursement will be made under Category (1)(b) (works, goods and non-consulting services) for the converter substation to be constructed in Kenya, until and unless all conditions of disbursement to finance the construction of the converter substation in Ethiopia (Part A.2 of the Project stipulated in the Ethiopia Financing Agreement) have been met.

118. **Additional Event of Suspension of Disbursements under the Ethiopia Credit**

(a) The Kenya Financing Agreement shall have failed to become effective twenty-four (24) months after the Effective Date.

119. **Additional Event of Suspension of Disbursements under the Kenya Credit**

(a) Kenya shall have failed to submit to the Association, not later than twelve (12) months after the Effective Date, the Wheeling Agreement between KPLC and KETRACO as approved by the Kenya Energy Regulatory Commission.

120. **Dated Covenants in Financing and Project Agreements for Ethiopia**

(a) Not later than 3 months after the Effective Date, EEPCo shall recruit a financial specialist, under terms of reference and with qualifications and experience satisfactory to the Association, to oversee the accounting functions between EEPCo and the PIU.

(b) Not later than 6 months after the Effective Date, EEPCo shall assign to the Project an internal auditor under terms of reference and with qualifications and experience satisfactory to the Association to strengthen the internal control arrangements under the Project.

(c) The Recipient shall cause EEPCo to prepare and furnish to the Association a plan designed to ensure its financial viability in the next three (3) years following the Association's approval of the Project ("Financial Viability Plan").

(d) Not later than May 15 of each year during project implementation, starting in calendar year 2013, the Recipient shall cause EEPCo to prepare and furnish to the Association, an annual progress report on the implementation and update of the Financial Viability Plan, including measures recommended to ensure the continued financial viability of EEPCo. The Recipient shall afford the Association and EEPCo a reasonable opportunity to exchange views with the Recipient and EEPCo and make recommendations on the proposed measures.

(e) The Recipient shall cause EEPCo: (i) not later than six (6) months after the Effective Date, to conduct a review under terms of reference acceptable to the Association, to identify any issues related to its accounting software and billing interface, and to recommend measures to address such issues; and (ii) to resolve all issues identified under the review carried out under the preceding sub-paragraph (i) not later than twenty four (24) months after the Effective Date.

(f) EEPCo shall take all measures required on its behalf to ensure its Environmental Monitoring Unit is maintained throughout project implementation within its structure under terms of reference satisfactory to the Association and with financial, technical and

administrative resources adequate to enable it to carry out the Environment and Social Impact Assessment, the Environment and Social Management Plan, the Resettlement Policy Framework, and the Resettlement Action Plan in a timely and diligent manner.

(g) EEPCo shall: (i) prepare and carry out the Resettlement Action Plan as designed and stipulated in the Resettlement Policy Framework; and (ii) implement the provisions of the Environmental and Social Impact Assessment and the Environmental and Social Management Plan (ESMP), all in a manner satisfactory to the Association.

Dated Covenants in the KETRACO Project Agreement

(a) KETRACO shall implement the provisions of the Environmental and Social Impact Assessment, the Environmental and Social Management Plan, and the Resettlement Action Plan, in a manner satisfactory to the Association.

(b) KETRACO shall take all measures required on its behalf to establish, not later than December 31, 2013, one or more County Resettlement Action Plan Committees in each of the Isiolo, Laikipia, Marsabit, Nakuru, Nyandarua and Samburu counties to be responsible for the day-to-day implementation of the RAP, all under terms of reference and with staff with experience and qualifications satisfactory to the Association. The said County Resettlement Action Plan Committees shall be led by the environmental specialist/land economist/social economist of the PIU and shall include, *inter alia*, the administration at the county-level, village elders and project affected persons.

(c) KETRACO shall, not later than December 31, 2013, employ a firm or group of independent persons to serve as an independent resettlement evaluation panel charged with the task of: (i) monitoring the progress in the implementation of the RAP, including reviewing and verifying the reports on safeguard instruments and making site visits to obtain information from the project affected persons; and (ii) conducting semi-annual audits and a close-down audit thereon.

VI. APPRAISAL SUMMARY

A. Economic Analysis

Overview

121. The economic viability of the Project has been confirmed by several analyses. The EAPP Master Plan, commissioned by the EAPP Secretariat and the EAC in 2010, has demonstrated that the Project is part of the least-cost solution for meeting the region's power needs. This conclusion has been further validated by the Robustness Study commissioned in 2011 (Annex 6). In addition, the Project's appraisal team has carried out a comprehensive cost-benefit analysis, whose results are summarized below and presented in detail in Annex 8.

Least-cost Analysis

122. The EAPP Master Plan has been prepared with the objective of identifying the least-cost generation and transmission projects that ensure electricity supply to the region between 2013 and 2038 under common long-term sufficiency and reliability requirements, as set out by the EAPP Grid Code. The Plan builds on an array of demand forecast scenarios and an extensive catalogue of generation and transmission projects, including existing, under construction, and candidate projects, compiled for each country in the region. The Master Plan analyzed three scenarios of integration based on the degree of coordination among countries in carrying out the needed investments. Using advanced optimization and simulation models, the Plan then identified eleven priority interconnections as part of the regional least-cost expansion plan. Among these, the Ethiopia-Kenya Interconnection with 2,000 MW of HVDC transmission capacity emerged as a key component of each of the three scenarios.

123. Following the completion of the Master Plan, the EAPP Secretariat has commissioned a further Robustness Study - *Verification of the Regional Economic Robustness of the Ethiopia-Kenya Transmission Interconnection Options* – to confirm that the selected configuration of the Ethiopia-Kenya interconnection is the least-cost option and to validate the benefits of the Project under a wide range of assumptions and scenarios.

124. The Robustness Study has analyzed five technical alternatives for the development of an interconnection between Ethiopia and Kenya[37] and tested the viability of each of them under eleven different scenarios entailing less favourable conditions that could affect the viability of the interconnection, including reduced levels of trade and suboptimal expansion of generation and transmission capacity in the region. A regret analysis, also called mini-max procedure, has determined the optimal interconnection option under each scenario. Results from the analysis confirm that the single 500 kV HVDC bi-directional transmission line with 2,000 MW of capacity is the most economically robust option. A further in-depth analysis also shows that whatever is the advancement of other interconnections or generation additions in the region and

[37] The alternatives considered include: (a) no interconnection; (b) 2,000 MW phased, with half of the converter capacity installed in 2016 and the rest completed four years later; (c) 2,000 MW with the full capacity constructed by 2016; (d) 4,000 MW phased, with 2,000 MW built by 2016 and 2,000 MW added four or five years later; and (e) 4,000 MW with the full capacity available by 2016.

the direction of the electricity flow through the Ethiopia-Kenya interconnection, the line will yield significant economic benefits to Ethiopia and Kenya, which will spread to the rest of the region as other EAPP members interconnect. Overall, it is estimated that 60 to 80 percent of the line's capacity will be utilized. Kenya alone may utilize up to 50 percent, as estimated by the electricity supply-demand balance analysis for Kenya prepared by the project team and presented in detail in Annex 9. Finally, the analysis confirms that the Ethiopia-Kenya interconnection is a critical link between the southern and northern sections of EAPP under all the scenarios and that power trade on the line will lead to drastic reduction in energy supply costs across the East Africa region.

Cost-Benefit Analysis

125. The Project's appraisal has evaluated the economic justification from the viewpoint of the economies of the two sponsoring nations, Ethiopia and Kenya. The analysis assumes utilization of the line only for bilateral trade between the two countries and with power flowing in one direction - from Ethiopia to Kenya. In the base case scenario, Kenya will import a maximum capacity of 1,000 MW, equal to 50 percent of the interconnection's total capacity, leaving 1,000M W for other EAPP members. Imports from Ethiopia will include 400 MW of firm capacity, as agreed in the PPA negotiated between the two countries, and a variable amount increasing up to 600 MW over the lifetime of the Project. Economic costs and benefits are estimated by comparing a "with the project" scenario to a "without the project" scenario. It is assumed that the Project is commissioned at the beginning of 2018 (FY2018) and has an economic life of thirty years.

126. **Economic Benefits and Costs.** The Project will have economic benefits for both Kenya and Ethiopia. In Kenya, they include the avoided cost of alternative generation. Imports from Ethiopia are assumed to provide additional mid-load capacity, which will allow Kenya to avoid or defer investments in expensive thermal generation. In particular, it is assumed that imports may substitute for electricity generated from coal and geothermal power, which are among the more suitable sources of mid-load capacity available domestically. The economic value of each unit imported by Kenya is equal to the weighted average cost of these alternatives, estimated at about US$0.12 kWh based on Kenya's 2011 LCPDP, less the cost of imports from Ethiopia. The agreed PPA has fixed the cost of imports from Ethiopia at US$0.07 kWh for imports up to 400MW. For any additional amount, this analysis assumes a fixed charge of US$0.08 kWh. For Ethiopia, the main benefit is the hard currency revenue that the country will earn from the exports. Project costs consist of: (a) capital costs of building the transmission line and substations; (b) costs of supervision of construction and environmental monitoring, compensation, and resettlement; (c) operating costs, including fixed and variable costs of operation and maintenance of the line; and (d) cost of generating electricity for export in Ethiopia. Annex 8 presents a full account of the methodology, including a list of assumptions.

127. **Economic Internal Rate of Return (EIRR) and Net Present value (NPV) of Investments.** The EIRR and the NPV for the Project as a whole are satisfactory at 24.1 percent and US$1,059 million respectively. Disaggregation of these results at the national level shows that the Project is highly beneficial for the economies of both Ethiopia and Kenya. EIRR and

NPV to Kenya stand at 25.5 percent and US$739 million respectively. EIRR to Ethiopia is 21.8 percent; NPV reaches US$320 million.

128. **Sensitivity Analysis.** A sensitivity analysis has tested the robustness of the Project to unfavorable changes in the values of the main variables. The analysis has first assessed the impact of various levels of utilization of the line – as expressed by the volume of energy traded between Ethiopia and Kenya, and secondly the effect of two additional adverse conditions: (a) an increase in investment costs; and (b) a reduced trading price.

129. The volume of electricity traded on the line is the variable that has the most critical impact on the economic viability of the Project. If annual power imports are limited to the firm committed amount of 400 MW, the EIRR drops to 15.9 percent and the NPV to US$246 for the Project as a whole. This is still a satisfactory outcome but underscores the importance of the rate of utilization of the line on its economic viability. A further analysis shows that if the volume of electricity traded is equal to or less than 325 MW, which is close to the minimum capacity according to the PPA, the EIRR for Ethiopia drops below the 12 per cent hurdle rate and the NPV turns negative. Under such a scenario, the Project becomes uneconomic. However, several factors mitigate the risk that this scenario may materialize. A review of Kenya's electricity demand-supply balance presented in Annex 9 suggests that its long-term import needs will not be less than 1,000 MW. The electricity demand-supply balance analysis for Ethiopia, completed by the appraisal team and presented in Annex 6, confirms that Ethiopia will be able to accommodate Kenya's import needs as well as domestic demand with a reasonable reserve margin. In addition, other countries in the region are making plans to interconnect their systems and eventually will be trading electricity through this line.

130. In contrast to variations in the volume traded, changes in the investment costs and the trading price have only marginal impact on the economic viability of the Project as a whole. Investment cost overruns by 15 and 20 percent decrease the EIRR by just a few percent points, to 21.8 and 21.1 percent respectively. A lower price for the electricity traded above the firm committed amount of 400 MW does not influence the EIRR of the Project as a whole, but rather reallocates economic value between Ethiopia and Kenya. A lower price means less export revenues to Ethiopia and more savings to Kenya. As result, the EIRR to Kenya increases from 25.5 to 26.4 percent, while the EIRR to Ethiopia decreases from 21.8 to 20.2 percent.

B. Financial Analysis

131. The financial analysis includes a Financial Rate of Return analysis of the Project, and a review of the historical and projected financial performance of EEPCo, KPLC and KETRACO.

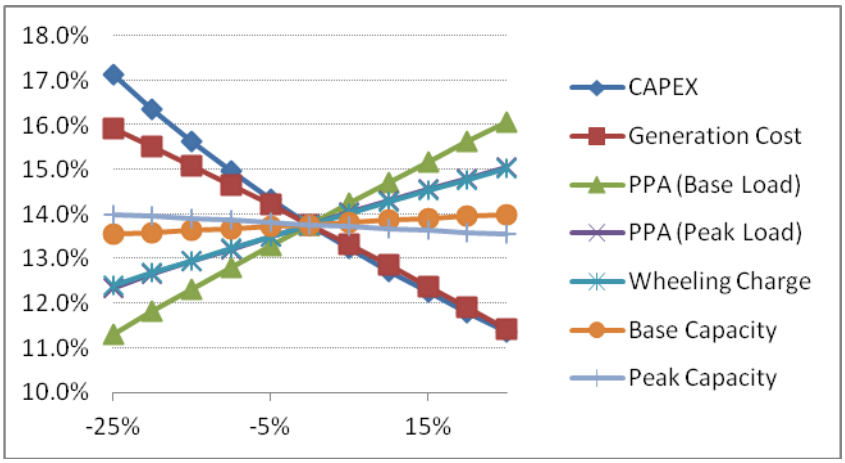
B1. Financial Rate of Return Analysis

132. A financial analysis of the Project estimated the financial internal rate of return (FIRR) and the net present value (NPV) of the Project. To evaluate if the Project is financially viable on its own, it is assumed that power purchase and wheeling through the interconnector line would cover the investment costs, operation and maintenance expenses, and electricity generation costs

in Ethiopia. The volume of electricity sales in Kenya is in accordance with the demand-supply balance described in Annex 6. It is assumed that the average cost of electricity generation in Ethiopia is US$0.042 and the base load power purchase cost in Kenya is US$0.07 per kWh for 400 MW. The peak load power purchase cost in Kenya is assumed to be US$0.08 per kWh for 600 MW. The electricity wheeling for third parties is assumed to start in FY2022, four years after the commissioning of the interconnector, at US$0.02 per kWh using the remaining capacity. A threshold discount rate for this analysis is assumed to be 10 percent, which is a conservative figure given that over 90 percent of funding for the Project comes from concessional lending.

133. The results suggest that under the base case scenario, the Project is financially viable with FIRR of 13.8 percent and NPV (at 10 percent discount) of US$448.0 million. Sensitivity scenarios were constructed where the following key parameters are assumed to increase or decrease by up to 25 percent of the base case levels: CAPEX; average generation cost in Ethiopia; base load PPA; peak load PPA; wheeling charge; base load capacity; and peak load capacity. As shown in Figure 4, in all sensitivity scenarios, FIRRs remain above 11.3 percent and NPV above US$155.4 million. Therefore, the Project is robust against all of the key risks identified.

Figure 4. Summary of Sensitivity Analysis: FIRR (%)



B2. Financial Analysis of EEPCo

134. **Recent Financial Performance**. As part of the GoE's Growth and Transformation Plan for the period FY2011-2015 (GTP), EEPCo is responsible for implementing GoE's two major public policy goals related to the energy sector: to provide universal access to electricity and to generate export revenues. In the past few years, EEPCo has successfully connected a large number of new customers to the grid. Due to the success of the access expansion program, the demand for electricity surpassed the supply capacity in FY2008-2009. As a result, from FY2008 to FY2010, EEPCo was forced to place a partial moratorium on new connections. During the period of moratorium, the rate of new connections slowed down and energy sales were stagnant. However, with new hydropower plants commissioned in FY2010 and FY2011, the number of

connections has increased from 1,600 in 2008 to 2,000 in 2011 while annual energy sales have increased from 2,900 GWh to 4,200 GWh during the same period.

135. Despite the increase in the customer base and energy sales, EEPCo's operating revenue did not grow – operating revenue in FY2011 was US$130 million, which was below the FY2006 operating revenue of US$166 million. The main reasons for the disappointing revenue performance were low tariffs and devaluation of the Birr against the US$.

136. **Financial Outlook**. With the forecast strong demand growth both for domestic and export markets, EEPCo's sales are expected to increase from 4,200 GWh in FY2011 to 7,000 GWh by FY2015 and to about 14,000 GWh by 2020.[38] A large part of the future growth will come from exports to neighboring countries. The Djibouti interconnector has already started power trading (2011) and the Sudan interconnector is expected to start trading in 2012. The Kenya interconnector is projected to begin trading in 2018. On average, EEPCo's annual operating revenues are expected to grow to US$200 million in FY2012-2017 and to US$600 million in FY2018-2021. A detailed analysis of EEPCo's financial position is included in Annex 7.

137. In terms of expenses, after a period of high generation cost due to the use of rental thermal power, the increase in EEPCo's operational costs going forward should be moderate. This is predominantly due to increased reliance on hydropower. It is estimated that EEPCo's operating expenses would grow at about two percent annually to US$100 million a year (on average) in FY2012-2017 and to US$150 million in FY2018-2021. Benefitting from strong domestic demand growth with revenues increasing at around 8-10 percent per year in the coming decade, EEPCo's financial outlook is positive. The prospects of bilateral trade are even more lucrative with potential for huge financial returns in the latter half of the decade. EEPCo should be in a position to operate and manage its assets adequately.

138. Major risks to EEPCo's financial viability in the near to medium term due to the massive investment program undertaken as part of the GTP stems from the following two factors:

- **Debt Service Obligations.** The debt service obligation for EEPCo's investment program would be in the order of US$300 million a year in FY2012-2017 increasing to US$700 million in FY2018-2021. With limited operational cash flow, this amounts to a US$200 million shortfall for servicing debt obligations in FY2012-2017, which increases to US$250 million in FY2018-2021.

- **Outdated Tariff Structure.** Current average tariff of US$0.03 kWh means that EEPCo cannot realize the full potential of revenue growth. However, the company would

[38] It is to be noted, that GoE's plan for electricity access expansion envisage a moderate growth rate of 24%, a target rate of 26%, and a high growth rate of 32%. Assuming the moderate growth rate (24%), the domestic peak load demand will reach about 5,000 MW by 2020 with overall, domestic energy consumption of over 20,000 GWh. Assuming the target growth rate (26%), the domestic peak load demand will reach nearly 6,000 MW by 2020 with overall, domestic energy consumption of over 22,000 GWh. Assuming the high growth rate (32%), the domestic peak load demand will reach nearly 7,500 MW by 2020 with overall, domestic energy consumption of over 29,000 GWh. The total exports (Djibouti, Sudan, and Kenya) increase to nearly 1,300 MW with 7,500 GWh of energy sale.

maintain positive operational cash flow due to low generation costs. A full cost recovery tariff, estimated at US$0.06-0.07/kWh would maintain EEPCo's financial health.

139. In order to ensure EEPCo's financial stability, the GoE must embark on a process of debt restructuring and modernization of the tariff structure. In this regard, beginning with May 15, 2013, EEPCo shall annually review with the Association the financing plan of EEPCo for the upcoming fiscal year, including actions to ensure continued financial viability of EEPCo. Table 7 below summarizes of EEPCo's financial projections.

Table 7. Summary of EEPCo's Financial Projections

(US$ million)	*Coming Five Years FY2012-2016*	*Latter Part of Decade FY2017-2020*
Business As Usual (Current Situation)		
Average Annual Debt Service Obligation	314	713
Average Annual Operating Revenue	216	616
Average Annual Operating Expenses	112	167
Average Annual Operating Cash Flow	104	449
Debt Service Shortfall (based on operating cash flow)	**210**	**264**
Average Domestic Sales (GWh)	5,487	8,177
Average Debt Service Burden (US cents/kWh)	3.83	3.23

140. **Potential Contribution of the Project to EEPCo's Future Financial Performance.** The Project has the potential to greatly expand EEPCo's sales revenue through export sales. In 2011, Ethiopia exported only 33 GWh of electricity to Djibouti. These exports are expected to expand tenfold by the end of 2012, with a major increase in exports to Djibouti (131 GWh) and the start of exports to Sudan (197 GWh). However, when the Ethiopia-Kenya interconnector becomes operational, exports will increase even more. Projections show electricity exports of nearly 7,500 GWh per year by 2022, of which Kenya's off-take will be about 70 percent (nearly 5,100 GWh).

141. As a share of total sales, projected exports will rise from less than one percent in 2011 to 45 percent in 2018. Tariffs for exports vary and are competitive regionally but are considerably higher than domestic tariffs. EEPCo's revenue projections show export tariffs of US$0.05 per kWh for Sudan, US$0.06 per kWh for Djibouti, and US$0.07 per kWh for Kenya compared to EEPCo's domestic tariffs, which range from US$0.028 per kWh for households to US$0.039 per kWh for commercial users. Given the planned major increase in exports and, particularly, the large share of Kenya in the total, EEPCo has the opportunity not only to expand sales, but with supportive government policies, to greatly improve financial performance.

B3. Financial Analysis of KPLC

142. **Recent Financial Performance.** Reflecting a well-designed institutional and regulatory arrangements, KPLC's financial performance has been sound since its financial restructuring in FY2004 (KPLC incurred losses from 1999 until 2003 due in large part to the impact of drought conditions that reduced its sales and increased its costs at a time when its losses were also quite

high). The company has been able to steadily improve profitability, improve operational performance (technical loss reduction, improved billing and collection, etc.), expand its customer base and maintain a healthy financial position, and it has not defaulted on any of its PPA commitments. The ongoing Kenya Electricity Expansion project (P103037) includes a framework for monitoring KPLC's financial performance with agreed annual targets.[39]

143. **Project's Potential Impact.** The Project will help mitigate the electricity tariff increase in Kenya. In the absence of the Project, the increased demand will have to be met by alternative energy sources such as geothermal and coal power. To assess the impact of the Project on retail tariffs, the Bank team constructed an alternative scenario in which increasing demand is met not by the imported electricity from Ethiopia but by increased generation from geothermal and coal power plants. Under this alternative scenario, average retail tariffs would be about 0.46–1.48 US cents per kWh higher than in the "with the Project" scenario during the period from FY2018 to FY2025.

144. **Financial Outlook.** The financial forecast under a base case scenario shows that KPLC's operations, capital adequacy, and liquidity are expected to be sustained. KPLC will remain profitable despite taking on increased debt to finance power system expansion. Projected profitability ratios of KPLC are lower in some years but they are expected to maintain levels comparable to utilities in higher income countries. Even though the company will be leveraged with the increased proportion of debt, its debt service coverage ratio is expected to stay above 1.3, assuming terms of borrowing will increasingly become commercial terms. The regular financial reporting that is required of KPLC (it has currently 49.9 percent private shareholding, mainly by private financial institutions) ensures that its operations and investment decisions are scrutinized by investors, bringing additional transparency to its financial performance.

B4. Financial Analysis of KETRACO

145. **Background.** The Kenya energy policy[40] instructs the GoK to provide financial support for transmission capacity expansion because the transmission grid is expected to remain in the public domain. Reflecting this policy, a fully government-owned state corporation, KETRACO was incorporated in December 2008 to design, construct, operate and maintain new high voltage electricity transmission infrastructure that forms the backbone of the national grid. Fully funded by the Government, the company has been gradually building up its portfolio of newly constructed high voltage transmission lines, owning 286 km of new transmission lines with a capacity of over 132 kV,[41] out of 3,674 km in the entire country, as of August 2011. Besides the regional interconnectors under plan, there are 17 on-going projects that include 400 kV lines. To fulfill its mandate, the company has been setting up its corporate strategy and required organizational structure; investing in ICT infrastructure; training its staff; and has entered into a

[39] These targets are: for each of its fiscal years starting in FY2010/2011 and in each succeeding fiscal year KPLC shall: (i) produce funds from internal sources equivalent to not less than 25% of the three-year annual average of the entity's capital expenditures; (ii) maintain a ratio of current assets to current liabilities of not less than 1.0; (iii) ensure that its estimated net revenues shall be at least 1.2 times the estimated maximum debt service requirements for any fiscal year on all of its debt; and (iv) maintain its accounts receivables at less than 50 days of billing.

[40] Sessional Paper No. 4 of 2004.

[41] They are: Sondu Miriu-Kisumu (132 kV, 50 km); Kamburu-Meru (132 kV, 122 km); Chemosit-Kisii (132 kV, 62 km); and Rabai-Galu (132 kV, 48 km).

Performance Contract with the Government as well as a Technical and a Service Agreement with KPLC to supplement and augment its technical and managerial capacity.

146. **Recent Financial Performance.** The GoK's commitment to finance extension of the national grid is reflected in KETRACO's financial performance. In FY2010, GoK's recurrent funding accounted for close to 60 percent of KETRACO's operating revenues. Although the remaining 40 percent is computed on an assumption that a KSh 0.77/kWh wheeling tariff would be charged to KPLC; however, KETRACO and KPLC are still in the process of finalizing the wheeling arrangements. For this reason, the number of days in receivables is high but is expected to come down once the arrangements are in place and wheeling charges are collected from KPLC. The company's investment is funded through Government's development budget expenditures as well as through on-granting of loans that the Government receives from development partners. Hence, most of the debts that the company incurs are operational in nature, and the proportion of debt in its financial structure is minimal. RoA was a healthy 2.2 percent, and current ratio was over 3 – this level is high because of the lead time between funding from GoK and actual investment in transmission lines but has come down since FY2011 because of the progress the company is making with projects. Asset turnover is low due to a large portion of its fixed capital under construction. The high average number of days' payables (374 days) is due to the process of handing over assets from KPLC to KETRACO.

147. **Financial Outlook.** During the appraisal mission, the Government confirmed that it intends to on-grant development partners' loans to KETRACO for project implementation. The funding plan for the Project is included in the Government's Medium-Term Expenditure Framework as well as the annual budget for FY2012. Government and KETRACO plan to reduce and eventually graduate from subsidies for operational expenditures, while subsidies on capital expenditures are expected to continue at least over a medium-term horizon.

148. Based on a set of conservative assumptions described in Annex 7, it is expected that KETRACO's financial ratios will improve over time and it will graduate from Government support for operating expenses in three years. The company's return on assets is low at 0.2-0.4 percent during this initial expansionary stage; this is the time when rapid investment in transmission lines is expected to take place and operations and maintenance costs and staff costs are expected to increase above the average trend. However, once the investment in transmission assets stabilizes and is back along long-term trend as described in the LCPDP, the company's cost recovery and overall performance will improve. The company is expected to be financially sustainable in operational terms.

149. On the capital expenditures, while the company does not increase financial leverage as its sources of financing are expected to be in grant, there is a risk as to what extent the Government will continue to support expansion of the national grid. This is mitigated by the sound track-record of implementing the energy policy since 2004; the Government has established a transparent regulatory environment and provided resources to expand the national grid. Key transmission lines projects are included in the Medium-Term Expenditure Framework, which is a medium-term commitment of fiscal resources. GoK's strong policy commitment to the long-term viability of KETRACO provides reasonable assurance for the sustainability of the Project.

150. Sensitivity cases of different levels of wheeling charges suggest that setting the tariff level that allows KETRACO to recover its operational expenses and appropriate returns would be important not only for KETRACO's financial viability but also for controlling government's fiscal burdens.

Key Financial Risks

151. Risks that may impact the financial performance of the sector and the Project include the following: lower than anticipated electricity demand due to economic slow-down; other internal events or excess generation capacity in Kenya may reduce import volumes and thus lead to low utilization of the interconnector; given Kenya's major investment needs in the power sector, KPLC may face a challenge in maintaining profitable operations while becoming significantly more leveraged; political or business interests may interfere in the sector; and funds flow challenges at the Ministry of Finance could slow disbursements to KETRACO.

152. These risks are mitigated by the following: (a) if electricity demand slows, Kenya has the flexibility to postpone other planned capacity additions if needed and reduce off-take from domestic thermal generation plants for a lesser penalty (as the cost of power imported through the line is anticipated to be more competitive than domestic thermal generation even when taking the fixed costs i.e. the take-or-pay conditions of thermal generation into account); (b) the relatively independent regulator with a tariff methodology that allows full cost recovery and pass-through mitigates the risk of KPLC not being able to maintain profitable operations; (c) regular financial reporting that is required of all sector entities and the public listing of KPLC ensures that its investment decisions are scrutinized by investors, including private financial institutions, and is an effective mitigant to political interference; and (d) the impact of imports through the line in offsetting thermal oil imports for electricity generation should ensure that Ministry of Finance will ensure timely disbursement to KETRACO.

C. Technical

153. **The design of the Project considered several alternatives, taking into account cost, reliability, and utilization rate.** The Project's preparation considered High-Voltage, Direct-Current (HVDC) technology, High-Voltage Alternating Current (HVAC) technology, hybrid HVDC/HVAC technology, and the phased construction of the line, installing the 1,000 MW of the converter capacity by 2016 and another 1,000 MW by 2020. The alternatives using HVAC technology were rejected because of their inferior cost vs. reliability performance for long transmission lines when compared to HVDC technology. The phasing alternative was rejected because the Robustness Study concluded that the utilization rate of the line for regional power trade would range from 60 and 80 percent of 2,000 MW, on average, during the line's lifetime. Second, phasing would result in delays and cost increases,[42] requiring two rounds of financial closures, two procurement processes for contractors and supervision engineers, and demobilization and remobilization of contractors. In addition, detailed technical studies, including steady-state and dynamic-network stability analyses, concluded that a bi-polar HVDC line is the most cost-effective, reliable option for the Ethiopia-Kenya interconnection. HVDC

[42] According to manufacturers, phasing (installing smaller size converters) could add at least 30 percent in cost to converter stations.

overhead transmission lines also have a smaller right-of-way requirement compared to HVAC lines for the same level of power transmission, thus reducing potential environmental and social impacts. The transmission line and substations will be constructed according to internationally accepted technical criteria and standards.

154. **Being the first HVDC line in the two countries, both project entities will require technical support for the line's construction and operation.** To ensure that the operating agencies are capable of managing the operation of the line, the Project will include operational agreements for knowledge transfer. Therefore, the EPC contractors and the Supervision Consultant will transfer knowledge of HVDC operations and maintenance to EEPCo, KETRACO and KPLC. In addition, KETRACO has signed a cooperation agreement with the Power Grid Corporation of India, a world leader in HVDC implementation, for training and knowledge transfer on HVDC design and operations to Kenyan counterparts.

155. **The selected routing of the line optimizes technical and environmental requirements**. The 2009 Feasibility Study for the line had considered three main route options and recommended the optimal routing. As part of the preparation of the Environmental Impact Studies in 2011, a rapid assessment was carried out of an additional, shorter and a more direct, route from the Sodo substation in Ethiopia straight southward to Kenya in addition to three other options considered in the Feasibility Study. The study found this fourth option to be the most environmentally friendly route because it avoided crossing or passing close to natural reserves and bird migration routes. However, subsequent analyses found that the lack of access roads and technical difficulties in traversing a marshland, which raised biodiversity concerns. After considering the costs and benefits of this new route, including the delay in project start-up that a detailed feasibility study of the route would have necessitated, both countries opted for the originally recommended route in the Feasibility Study.

156. A field investigation of the line routing was performed between September 28 and October 28, 2011. As a result, the route formerly proposed in the Feasibility Study has been verified and modified based on the findings of the ESIAs, including bypassing the Matthews Range Forest Reserve in Kenya (which may be considered a critical natural habitat), to minimize environmental and social impacts. Furthermore, on December 6, 2011, at the request of EEPCo, and at the suggestion of the ESIA consultant on behalf of the Authority for Research and Conservation of Culture and Heritage of Ethiopia, the route was modified in the area of Konso to avoid important fossil (Paleontology) sites.

D. Financial Management

157. The Bank has conducted a financial management assessment of the two implementing entities, EEPCo and KETRACO. The assessment concluded that the financial management residual risk is *substantial* for EEPCo and *moderate* for KETRACO. Although the financial management arrangements of both entities satisfy the Bank's minimum requirements under OP/BP10.02, further improvements are needed to ensure that the systems are able to provide accurate and timely information on the status of the Project as required by IDA. Actions that are needed to reduce the financial management residual risk of EEPCo are documented in the financial management section of Annex 3.

E. Procurement

158. The Project's appraisal has established three procurement related aspects of the Project: (a) procurement arrangements; (b) a procurement plan; and (c) an action plan on readiness for procurement implementation. The Project being a regional integration project, its procurement arrangements have been influenced by the procurement capacity and extent to which the two countries are able to pool their procurement activities together. Similarly, the multi-donor involvement has influenced the procurement arrangements to the extent that the donors are able to harmonize their requirements. Thus, the procurement packaging has aimed to simplify the potentially complex procurement activities and to minimize the potentially high transaction costs to the project owners. Actions that are critical for the readiness for procurement implementation have been agreed between the project owners and the co-financiers.

Project Procurement Arrangements

159. EEPCo and KETRACO will carry out the Project's procurement activities both jointly through the JPCU (Supervision Consultant and Substations) and severally with the JPCU playing a coordination role (Transmission lines). Procurement for the System Reinforcement component (A4) in Kenya will be carried out by KETRACO. The Bank's assessment of the procurement capacity of the implementing entities has resulted in a *high* risk rating to reflect this arrangement and the procurement capacity of the entities (Annex 3).

160. Procurement of all contracts financed in part or in whole by IDA will be carried out in accordance with the World Bank's *"Guidelines: Procurement of Goods, Works and Non-Consulting Services Under IBRD Loans and IDA Credits & Grants by World Bank Borrowers"* (January 2011), "*Guidelines: Selection and Employment of Consultants Under IBRD Loans and IDA Credits & Grants by World Bank Borrowers"* (January 2011), and the provisions stipulated in the Financing Agreements with the countries participating in the Project. "*Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants*", dated October 15, 2006 and revised in January 2011 shall apply to the Project. The procurement of contracts solely financed by AfDB will follow AfDB's requirements and procurements financed by AFD will follow AFD requirements.

Project Procurement Plan

161. The procurement plan is presented in Annex 3. The procurement processes for the main contracts are summarized below.

162. There will be a single selection process for the Supervision Consultant. This assignment is wholly financed by AfDB but all the financiers will review and provide comments on the ToRs and the Request for Proposals for the selection process.

163. The transmission line will be bid out, with prequalification, in two separate packages of two lots in Ethiopia (financed by AfDB) and three lots in Kenya (parallel-financed by AfDB and AFD). The pre-appraisal mission had recommended that the prequalification and invitation for bids for both packages are conducted simultaneously and jointly with coordination by JPCU.

This arrangement would ensure transparency and fairness without denying participation in a procurement process or award to a firm for reasons unrelated to: (a) its capability and resources to successfully perform the contract; or (b) possible conflict of interest. However, EEPCo and KETRACO have agreed to carry out the procurement individually but with close co-ordination with regard to timing.

164. Procurement of a single turnkey (EPC) contractor for the construction of two HVDC converter/inverter substations (one in each country) will be carried out jointly between EEPCo and KETRACO through a joint procurement process conducted by the JPCU under a single set of technical specifications and bidding documents and through joint evaluation.[43] The contractor will sign two separate contracts (each contract covering one country) with EEPCo and KETRACO, respectively. The World Bank will finance the Kenya substation with counterpart financing from KETRACO. The Ethiopian substation will be financed jointly by IDA and the AfDB under its ADF-window; the IDA credit will finance the Ethiopia contract to the maximum extent possible; any amount that may not be covered by the IDA Credit in Ethiopia will be financed by the AfDB and, as the last resort and to the extent needed, by EEPCo out of its own resources. AfDB will be seeking a Board waiver to adopt the use of the World Bank's Procurement Guidelines for this component.

165. The system reinforcement component in Kenya will be financed by IDA. KETRACO will handle all related procurement matters.

166. Advance procurement has been initiated for the procurement of the Supervision Consultant (financed by AfDB). In parallel, the JPCU has also initiated the preparation of the pre-qualification documents for the EPC contracts and plans to issue them before the end of 2012. The hiring of the Supervision Consultant and the EPC contractors will be completed during the first two years after project approval.

Action Plan to Ensure Project Procurement Implementation Readiness

167. IDA and the project owners have agreed to undertake a number of actions to strengthen the Project's procurement capacity as discussed below.

168. EEPCo and KETRACO shall jointly appoint the Joint Project Coordinator (JPC) and designate staff of their respective PIUs with qualifications and experience and on TORs that have been found satisfactory by the financiers. The Procurement Officers in the PIUs will provide procurement assistance to the JPCU.

169. The Procurement Plan for the Project was approved at negotiations. The implementing entities and the Bank will review it at least annually during implementation.

170. The Project has prepared a draft Project Implementation Manual (PIM), which includes a procurement manual as a stand-alone section. The PIM will be finalized and adopted as a condition for effectiveness. The procurement section of the PIM details the procurement

[43] Technical specialists have confirmed that procurement of the converter substation as a single package is best international practice.

management process flow including: (a) applicable policies and rules; (b) procurement institutional arrangements; (c) actors involved in the Project's procurement process and their roles and responsibilities; and (d) business standards.

171. In order to enhance the JPCU's procurement capacity, EEPCo and KETRACO have agreed to include a Senior Procurement Specialist, with qualifications and experience satisfactory to the financiers, in the team of the Supervision Consultant.

F. Social and Environmental

Overview

172. The Project's anticipated social and environmental impacts have triggered OP/BP 4.01 (Environmental Assessment), as well as Ops/BPs 4.04 (Natural Habitats), 4.12 (Involuntary Resettlement), and 4.11 (Physical Cultural Resources). These impacts vary for each of the two countries. Mechanisms acceptable to the Bank are in place to mitigate these impacts and will be assured through the application of the Bank's safeguard policies, discussed below. The social impact, in terms of numbers of persons affected, will be greater in Ethiopia (5,743 persons) than in Kenya (about 1,900 people). However, the environmental impact will be broader in Kenya, affecting plant and wildlife habitats, biodiversity hotspots and bird migration routes. In Ethiopia, the environmental impacts foreseen are those typically associated with any transmission line project during construction and operation, such as electromagnetic emission, air pollution, possible contamination of nearby water resources, and those associated with health and safety issues related to workers' camp site activities.

173. The Rift Valley in southern Ethiopia and northern Kenya contain cultural heritage resources of national and international significance and value. The area has produced the oldest fossil remains attributed to Homo sapiens, as well as important Stone Age archaeological sites. The fact that the region has not been systematically surveyed by paleontologists and archaeologists suggests the possibility that the project works will uncover artifacts as "chance finds". Both Ethiopia and Kenya have national legislation and procedures for the management of chance finds. The Bank's Operational Policy on Physical Cultural Resources (OP/BP 4.11) stipulates that such national law and practice be followed and that provisions for chance finds be incorporated, as appropriate, in the Environmental and Social Management Plans (ESMPs) developed respectively for Ethiopia and Kenya. Other categories of physical cultural resources that may be found in the project impact area include sacred sites (e.g., trees, streams, constructed enclosures), burial grounds, and in southern Ethiopia, traditional water wells and terraces.

174. In addition to social and environmental impacts requiring mitigation, the Project will result in significant social and environmental benefits not captured in the economic analysis in Section VI. A. The social benefits will accrue primarily during the construction phase from opportunities for short-term employment. The Project is expected to create an estimated 1,725 jobs, both skilled and unskilled (750 in Ethiopia and 975 in Kenya) during construction.[44] With regard to environmental benefits, the displacement of fossil fuel based power, resulting from the

[44] AfDB draft Project Appraisal Document for Ethiopia-Kenya Interconnection Project, October 2011.

transfer of extra electricity between two countries through the Ethiopia-Kenya interconnector, will reduce carbon emissions. This will allow participating countries to benefit from the potential sale of carbon credits on the global market if carbon-finance vehicles develop a methodology for quantifying such credits from interconnections between electricity systems for international energy exchange. In addition, the interconnector will provide telecommunication services using fiber optic cables on the transmission towers in towns along the transmission routes, allowing the development of ICT hubs that enable the provision of telecommunication channels for schools and other public facilities.

G. Social (including Safeguards)

Ethiopia

175. **Impact on Land Use and Structures**. The design of the transmission line attempted to minimize to the extent possible adverse social impacts from land acquisition by routing around towns and villages with high population densities. As a result, only a portion of farmlands or irrigation structures will affected, mostly in rural areas. A key impact will be loss of farmland used to grow cereal and perennial crops such as bananas and mangoes. Permanent land acquisition for the right-of-way (RoW) will likely involve footing areas for the towers and the site of the substation in Wolyta/Sodo, which will also affect people currently using the site for grazing purposes. Temporary land acquisition will be required for erection of the towers and stringing of conductors. The construction of access roads will also affect farmlands, perennial corps and tree located within the RoW. The construction of tower foundations will be located in areas where there are no existing buildings. Overall, the Project will affect about 341 hectares of farming and pasture land. The construction of the substation at Wolyta/Sodo will require the acquisition of about 20 hectares of communal grazing land.

176. **Project-Affected Persons (PAPs).** Based on a household survey of the eight woredas traversed by the transmission line of households who reside within the 65 meters of the RoW, current estimates indicate that the Project will affect approximately 5,743 people (1,156 households). Social impacts will be contained within the 65-meter width of the RoW for the transmission line. Most houses and structures will be shifted back or "stepping back" from the alignment and within the existing village or farmland. People who lose part of their land will be able to continue farming activities in those areas where construction activities are not planned and once these activities are over, they will be able to continue to cultivate crops under the transmission line.

177. **The Resettlement Policy Framework (RPF).** The alignment of the transmission line corridor has been determined; however, the precise routing of the RoW has not yet been finalized nor has the final location of the substation. While GoE has taken a preliminary census of PAPs and their lands and assets, they will not finalize the specific compensation for land take and affected assets until shortly after they finalize the precise routing of the RoW. The final alignment will take into consideration measures to minimize impacts on land and structures. In view of which, a Resettlement Policy Framework (RPF) has been prepared to clarify land acquisition and resettlement principles. The RPF consistent with OP 4.12 will serve as guide for

the preparation of a Resettlement Action Plan when final location of the Project's components has been defined. The key objective of the RPF is to ensure that all affected people will be compensated for their losses at replacement cost and provided with rehabilitation measures to assist them to improve, or at least maintain their pre-project standard of living and income earning capacity.

178. Although the Bank is financing only the converter substations, its policy on Involuntary Resettlement applies to all associated facilities, including the transmission line, that are necessary to achieve the objectives of the Project and carried out simultaneously with the Project. To ensure consistency in the application of the involuntary resettlement policies and guidelines, the AfDB and the World Bank have agreed to coordinate implementation of the resettlement instruments for the jointly financed converter substations. In addition, AfDB has agreed to take into consideration any environmental and social concerns raised by the World Bank in connection with AfDB financed contracts, thereby ensuring the Project is carried out in compliance with the environmental and resettlement instruments as approved by both the AfDB and the World Bank.

179. There are no Indigenous Peoples in the project area in Ethiopia.

Kenya

180. **Impact on Land Use and Structures**. The Project is expected to result in change in land use, land acquisition, loss of livelihood and impact assets such as water tanks, gates, animal sheds, toilets, fences and business structures. Temporary and permanent land acquisition will be required for the erection of the towers and stringing of conductors. People who lose part of their land will be able to continue to farm and use the land for grazing purposes in those areas where construction activities are not planned or once construction activities are over. The total land area the RoW will traverse in Kenya is 39.9 km^2. In addition, about 20 hectares of grazing land will also be required for the construction of the substation at Suswa.

181. **Project-Affected Persons (PAPs)**. Based on a socio-economic and census survey, the total affected population is about 1,200 people (380 households), mainly residents of the Central and Rift Valley Regions of Kenya, where the planned transmission line will traverse.[45] Of these, only nine households (45 people) will need to be relocated.

182. In the initial screening of the Project, the Indigenous Peoples policy (OP 4.10) was triggered to take account of the possible presence of groups in Kenya for whom the policy might be applicable. Based on subsequent further analysis, however, there are no groups in the area that meet the policy's applicability criteria as interpreted in the past by the Bank in the Kenya context. The Indigenous Peoples policy is therefore not triggered for the Project in Kenya either.

183. **Management of Social Impacts.** KETRACO has prepared a Resettlement Action Plan (RAP) for the Kenya portion of the Project, in full consultation with the potentially affected people and the relevant Kenyan institutions. The RAP specifies the principles, measures and

[45] The number of affected households has reduced from 433 people to 380 because of the rerouting of the RoW to avoid Matthews range.

procedures to improve or at least restore the livelihoods of affected people. Annex 3 provides a detailed overview of the provisions of the RAP.

H. Environment (including Safeguards)

Ethiopia

184. **Potential Impacts**. These impacts are those normally associated with transmission line construction as well as operations and maintenance (O & M). The construction phase will require clearing vegetation to prepare the site for the construction of transmission towers, campsites, material storage facilities, substations and access roads. The likely impacts of the operational phase include electromagnetic field emissions, the collapse of towers and/or transmission lines due to inclement weather, mishaps resulting from power theft, etc. Also both the construction and O & M phases could result in on-site or near-site soil and water contamination from spillage of potentially hazardous materials, air pollution from dust and noise from vehicles and machines, fires, the destruction of scenic beauty, etc. There is also the potential for discovery of chance finds of fossil or archaeological material during construction and the need to report such discoveries to ARCCH in accordance with Ethiopian law and provisions of the Bank's OP 4.11 – Physical Cultural Resources.

185. A visit to the Ethiopia side of the selected transmission line route in December 2011 had shown that there could be potential threats to the Konso Cultural Landscape and the Konso-Gardula (Borena Administrative Zone) paleontological and archaeological sites. In June 2011, UNESCO demarcated and declared the Konso Cultural Landscape a World Heritage Site. The ESIA consultants have sought advice from the ARCCH and carried out fieldwork in Konso Woreda with the view of studying whether the transmission line could affect these cultural sites. Additional surveys have identified culturally important traditional water wells and religious places currently in use, and burial places in the area of Dubluk within the Borena Zone.

186. **Mitigation Measures**. The Project will mitigate any threats envisaged during the Project's construction and O & M phases. At the outset, the ESMP will ensure that an effective, multi-stakeholder institutional and implementation framework is in place for the management of all aspects of the Project. The ESMP includes effective mechanisms for monitoring, governance, and capacity building required to meet environmental requirements associated with the Project.

187. Following the findings during a field investigation by staff of the ARCCH in December 2011, the line was rerouted so as not to traverse the disclosed Konso-Gardula paleontological and archaeological sites and to pass outside the eastern boundary of the Konso Cultural Landscape.

188. In anticipation of possible chance finds, the ESMP will provide for orientation and training for EEPCo staff, as appropriate, for the Supervision Consultant and construction contractors regarding the nature of fossil and archaeological remains that may be discovered in the project impact area. This two-day training will be conducted prior to commencement of construction, by staff of the ARCCH, and will provide explicit instructions on Ethiopia's laws

and procedures regarding chance finds, as well as contact information for the authorities at the ARCCH.

Kenya

189. **Potential Environmental Impacts**. The Project will have some impact on plant and animal habitats as well as water use in the affected areas, although the design has minimized these impacts. The transmission line will traverse the Marsabit National Reserve and the Losai National Reserve, and pass through Important Bird Areas (IBA) near Lake Ol Bolossat. The construction of the pylons, four to six kilometers from the main road, will require some encroachment of natural habitats, including biodiversity hotspots. The Project's design attempted to reduce the distance of the construction area from the road. However, the October 2011 preparation mission discovered that a routing closer to the road is not possible because of (a) resettlement costs and disturbance to the marginalized communities who depend on road traffic for their livelihoods; and (b) planned expansion of towns. Vision 2030 calls for an expansion of towns and villages along the route, so the transmission line must be sited some distance outside the proposed expansion. Nevertheless, the surveyors will take every precaution to align the route away from ecological hot spots, while at the same time avoiding populated areas to limit social impacts on local communities. It is also possible that chance finds of material cultural artifacts will expand the record of human development and habitation in the project impact area. Finally, there is need to conserve water use, for construction and for workers as much of the Project traverses severely water-constrained areas, where scarcity of water is a potential source of conflict.

190. **Mitigation Measures**. In consultation between KETRACO, the Kenya Wildlife Service (KWS), and Kenya Forest Service (KFS), the Project will limit non-critical habitat loss and degradation, in particular during construction. It will avoid ecological hot spots (such as the habitats of the sand grouse within Losai Reserve). Also, construction contracts will specify the scheduling of construction to avoid wildlife migration times where the line crosses migratory corridors. Guards posted at construction and campsites will discourage the poaching of wildlife and prevent the unauthorized removal of precious woods, such as sandalwood. KFS and KWS will continuously liaise with KETRACO in the implementation of the ESMP particularly along migration corridors and in ecologically sensitive areas. In addition, the Project will design pylons that minimize aesthetic damage to the landscape.

191. KWS officials have confirmed that there are no critically endangered species along the route, and that animals would not be impeded by the line due to its height. The threatened Grevy's Zebra is present in the area of the Project. The report on the selection of the line's routing notes the presence of this species, which inventories of Grevy's Zebra Trust have confirmed. To minimize bird collisions, KETRACO will take appropriate measures in the design and construction of the transmission lines to minimize the risk of electrocution of birds in Important Bird Areas. The ESIA provides a budget for the installation of appropriate bird-warning devices (balls on the lines, platforms on the towers for raptors and nesting birds). Nature Kenya, the Ornithology Department of the Museums of Kenya and KWS will provide guidance on which specific actions are appropriate.

192. In anticipation of possible chance finds, the ESMP will provide for orientation and training for KETRACO staff, as appropriate, for the Supervision Consultant and construction contractors regarding the nature of fossil and archaeological remains that may be discovered in the project impact area. This two-day training will be conducted prior to commencement of construction, by staff of the National Museums of Kenya (NMK) following a general survey of the project impact area by NMK archaeologists. It will provide explicit instructions on Kenya's laws and procedures regarding chance finds, as well as contact information for the authorities at the NMK who, as the legal authority for protection and management of cultural heritage, must be notified in the instance of chance finds.

193. The ESMP will incorporate management plans for water use to ensure the use of appropriate management practices during construction, at worker camps, or in areas where there will be a short-term significant increase in population. The Project's management will seek guidance from the Water Resource Management Authority concerning any permits required for water use during construction. For a comprehensive discussion of the Project's environmental issues, see Annex 3.

194. Capacity exists in KWS and KETRACO to implement these measures, as KWS has had prior experience in managing impacts on fauna and avifauna through identifying and maintaining wildlife corridors. KETRACO has had experience in installing bird-warning systems on transmission lines. The Project shall ensure that construction contracts include the appropriate clauses on wildlife protection and camp management, and will monitor compliance with the ESMP, with particular attention to water management plans, during the Project's construction phase.

195. The Bank is financing the construction of two substations at either end of the transmission line. Both substations require a ground electrode. Each ground electrode will be connected to the substation through a medium voltage ground electrode line. Each electrode line may extend up to 50 km from the planned Suswa substation to the ground electrode location. A study on the design and location of the electrode for Suswa was started in April 2012. The area around the Suswa substation where the electrode will be located is scarcely populated by pastoralists, and the substation itself lies within the boundaries of Akira Farm. The area is not a critical natural habitat.

I. Borrower's Capacity to Implement Safeguards

196. **Ethiopia**. EEPCo has adequate institutional arrangements in place to ensure the implementation of the Environment and Social Management Plan for the project components in Ethiopia. The implementation of the Resettlement Action Plan in Ethiopia will involve the Woredas (counties) along the transmission line route. Each affected Woreda Administration will establish a Committee for the purpose of verifying and valuing resettlement and compensation requirements in the presence of EEPCo staff. On issues related to physical cultural resources, EEPCo will receive technical assistance from the ARCCH, which will also provide orientation and training for EEPCo staff and for the Project's supervisory and construction personnel. The

ARCCH has demonstrated capacity for training, oversight and rapid response in the case of chance finds.

197. **Kenya**. Under the ongoing IDA-supported Electricity Expansion project (P103037), KETRACO is receiving capacity building in environmental management and monitoring. Also the company is the implementing entity for the Mombasa-Nairobi 220 kV high-voltage transmission line, which is receiving financing from AfDB, EIB, and AFD. Therefore, KETRACO has experience in implementing environmental and social management activities. The Project's appraisal has found KETRACO's environmental and social management capacity adequate for its role as an implementing entity. KETRACO's environmental and social staff will be included in training under the Project that may include visits to power utilities that have implemented World Bank safeguards. The financing plan for the Project includes funding for this training. On issues related to physical cultural resources, KETRACO will receive technical assistance from the National Museums of Kenya (NMK), which will also provide orientation and training for KETRACO's staff and for the Project's supervisory and construction personnel. The NMK has demonstrated capacity for training, oversight, and rapid response in the case of chance finds.

J. Safeguards Policies Triggered

198. The Project has received a Category A rating – Full Assessment – assigned to projects that are likely to have "significant adverse environmental and social impacts that are sensitive, diverse, or unprecedented."

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[X]	[ ]
Pest Management (OP 4.09)	[ ]	[X]
Indigenous Peoples (OP/BP 4.10)	[ ]	[X]
Physical Cultural Resources (OP/BP 4.11)	[X]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[X]	[ ]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)	[ ]	[X]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[X]

* By supporting the proposed Project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.

Disclosure of Safeguards Documents

199. The ESIAs, including ESMPs, for both Ethiopia and Kenya have been cleared by the World Bank and were disclosed in the Bank's InfoShop on January 30, 2012; the ESIA for Kenya was disclosed in-country on January 28, and for Ethiopia, on January 29, 2012. The

Kenya RAP was disclosed in Kenya and at the Bank's InfoShop on March 26 and 27, 2012, respectively. The Ethiopia RPF was disclosed in Ethiopia on April 4, 2012 and at the InfoShop on April 5, 2012.

Table 8. Disclosure dates for safeguard documents

Project component/Safeguards document	Disclosed in Kenya	Disclosed in Ethiopia	Disclosed in InfoShop
Kenya			
ESIA	January 28, 2012		January 30, 2012
RAP	March 26, 2012		March 27, 2012
Ethiopia			
ESIA		January 29, 2012	January 30, 2012
RPF		April 4, 2012	April 5, 2012

K. Stakeholder Consultations

200. In accordance with the World Bank's operational policies, the ESIA, RPF, and RAP were prepared in consultation with project affected people and key stakeholders including civil society organizations, traditional leaders (chiefs), research and academic institutions and Government authorities. The objective of the consultation process was to inform affected households, communities, local authorities and other interested stakeholders about the Project's potential impacts and proposed mitigation measures, understand their views to feed into the design of the Project, if possible, and to enable the preparation of the environmental and social safeguard plans. In Kenya a total of 11 community consultative meetings were held on the RAP including in sections of the line that traverse Losai and Marasbit Reserves, with representations of the Northern Rangeland Trust (NRT), representatives of KWS, KFS, and community representatives of the Melako conversancy active in the Matthews Range and Losai areas. Women and others who might otherwise be excluded were encouraged to participate in these public meetings. Similarly, consultations in Ethiopia, on the RPF were carried out with project affected people and key stakeholders, in the five Woredas, which will be traversed by the transmission line. Consultations will continue during project implementation through monitoring and evaluation activities.

201. The Bank's field visits in Kenya took place during the October 2011 preparation mission. KETRACO staff and safeguards specialists from the co-financiers visited project areas in northern Kenya, with particular focus on the sections of the line planned to traverse Losai and Marsabit Reserves. Meetings were held with Northern Rangelands Trust (NRT) representatives, KWS, KFS, community representatives of Namunyak conservancy and community representatives of Melako conservancy active in the Matthews Range and Losai areas.

202. Stakeholder workshops to review the safeguard documents were held in Addis Ababa and Nairobi in November 2011. The workshop feedback has been incorporated into the safeguard documents.

Annex 1: Results Framework and Monitoring

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

Results Framework

Project Development Objective (PDO): (a) increase the volume and reduce the cost of electricity supply in Kenya; and (b) provide revenues to Ethiopia through the export of electricity from Ethiopia to Kenya.														
PDO Level Results Indicators	**Core**	**Unit of Measure**	**Baseline (FY2012)**	**Cumulative Target Values**								**Frequency**	**Data Source/ Methodology**	**Responsibility for Data Collection**	**Description (indicator definition etc.)**
				YR 1 (FY2013)	**YR 2** (FY2014)	**YR 3** (FY2015)	**YR 4** (FY2016)	**YR 5** (FY2017)	**YR 6** (FY2018)	**YR 7** (FY2019)	**YR 8** (FY2020)				
Indicator One: Amount of electricity exported from Ethiopia to Kenya each year	☐	GWh/ Year	0	0	0	0	0	0	1,117	2,234	2,978	Annual	KPLC/EEPCo utility database	EEPCo/ KPLC	Amount of electricity that KPLC purchases from EEPCo each year.
Indicator Two: Savings to Kenya on electricity supply costs	☐	US ml. dollars/ Year	0	0	0	0	0	0	18.0	31.0	39.0	Annual	KPLC utility database/ accounts	KPLC	(Cost of electricity supply in Kenya without imports. Cost of electricity supply in Kenya once imports are included in the energy mix)* Amount of electricity imported from Ethiopia each year.
Indicator Three: Revenues to Ethiopia from electricity exports to Kenya	☐	US ml. dollars/ year	0	0	0	0	0	0	78.0	156.0	208.0	Annual	EEPCo utility database/ accounts	EEPCo	Amount of electricity exported to Kenya each year **x** Price per kWh of exports (as defined by the PPA).

Indicator Four: Indirect Project Beneficiaries[46]	☐	Number	0	0	0	0	0	0	13,900,000	14,800,000	15,700,000	Annual	KPLC utility database	KPLC	KPLC residential customers, potentially benefitting from improved electricity supply and cost reduction.

INTERMEDIATE RESULTS

PDO Level Results Indicators	Core	Unit of Measure	Baseline (FY2012)	Cumulative Target Values								Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR1 (FY2013)	YR 2 (FY2014)	YR 3 (FY2015)	YR4 (FY2016)	YR 5 (FY2017)	YR6 (FY2018)	YR7 (FY2019)	YR8 (FY2020)				
Intermediate Result (Component One): Construction of a High Voltage Direct Current (HVDC) transmission interconnection between Ethiopia and Kenya															
Intermediate Result indicator One: Transmission lines constructed under the Project[47]		Km	0	0	0	0	200	600	1,045	1,045	1,045	Cumulative	EEPCo/ KETRACO	JPCU	Total extension of new transmission lines constructed under the Project.
Intermediate Result indicator Two: Converter substations constructed under the Project		Number	0	0	0	0	0	0	2	2	2	Cumulative	EEPCo/ KETRACO	JPCU	Number of converter substations constructed on each side of the line (in Ethiopia and Kenya).
of which, share completed each year		Percent	0	0	0	10	40	80	100.0	100.0	100.0	Annual	EEPCo/ KETRACO	JPCU	Share of construction completed each year.
Intermediate Result		Percent	0	0	0	0	0	0	93.0	93.0	93.0	Annual	EEPCo/ KETRACO	JPCU	Total hours of downtime/

[46] The mandatory core indicator 'Direct Project Beneficiaries' is not applicable. Direct benefits for the end-user are difficult to define due to the nature of the project which does not finance electricity distribution. Therefore it is more accurate to define the total customer base in Kenya as *indirect* project beneficiaries.

[47] The extension of transmission line may vary and needs to be confirmed once detailed route design is completed.

indicator Three: Availability of the interconnection line															total hours of operation.
Intermediate Result indicator Four: Substations reinforced under the Project		Number	0	0	0	0	0	2	2	2	2	Cumulative	KETRACO	KETRACO	Number of converter substations rehabilitated in Kenya.
Intermediate Result (Component Two): Institutional Capacity Building															
Intermediate Result indicator One: Project Supervision and Management Consultant hired and in place		Yes/No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N.A.	JPCU	JPCU	
Intermediate Result indicator Two:[48] KETRACO staff trained in HVDC operation and maintenance, procurement and financial management, environmental and social management		Number	0	0	30	60	90	120	150	150	150	Cumulative	KETRACO	KETRACO	Gross number of KETRACO staff who undertake training.

[48] T his indicator assesses training undertaken only by KETRACO staff since that is the component financed by IDA. Training to EEPCo staff is financed by the AfDB.

Intermediate Result indicator Three: Number of project staff receiving knowledge transfer on HVDC		Number	0	10	20	50	100	150	200	200	Annual	JPCU	Project manpower deployment reports	Number of EEPCo, KETRACO staff and staff of national consultants and contractors involved in HVDC activities during design and construction phases.

Annex 2: Detailed Project Description

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

Basic Design and Project Components

1. The basic project design consists of constructing a 1,045 km long High Voltage Direct Current (HVDC) bi-directional transmission interconnection between Ethiopia and Kenya, and supporting the related project management and capacity building activities.

2. The project region is located in the central and southern highlands of Ethiopia and the northern and central highlands of Kenya. The Ethiopian landing point/converter station will be located at Wolayta/Sodo, about 200 km south-west of Addis Ababa. The Kenyan landing point/converter station will be located at Suswa, about 60 km north-west of Nairobi. The planned HVDC overhead line will have a total length of approximately 1,045 km interconnecting the electricity networks of the two countries, of which approximately 433 km will be in Ethiopia and 612 km will be in Kenya.

3. The engineering and design of the HVDC Interconnection will ensure that the interconnector will be fully functional and will be able to transfer 2,000 MW. In this respect the Project will consider the actual status of the networks in Ethiopia and Kenya in terms of short circuit capacity strengthening and reactive power compensation requirements and include design of those components directly related to the interconnector, to ensure the satisfactory performance of the HVDC system.

4. Initially, the converter substation at Wolayta/Sodo will use two 1,000 MW HVDC converter blocks to transmit up to 2,000 MW to Suswa substation in Kenya via a ±500 kV HVDC transmission line. From Suswa substation, the power will be initially transmitted into the Kenyan network, and as the regional network expands, other countries linked to the interconnector will also benefit from import/export of power through this network.

5. Based on the Design Consultant's final inception report (March 2012), the Project will include the construction and commissioning of:

- A 400 kV AC substation at Wolayta Sodo to accept electricity from Ethiopian power system or through the HVDC interconnector, with at least 5 full diameters for connection of two short conductor/gantry connections from new 400 kV network substation to be installed under a separate arrangement, four converter transformers, two station service transformers, two AC filter sub-banks, six AC filters and one SVC plant.
- Two x 1,000 MW line-commutated bi-directional HVDC poles (i.e. one 2,000 MW HVDC bipole) at Wolayta/Sodo substation.
- One static VAR compensator (SVC) plant connected to the Wolayta/Sodo 400 kV substation.
- One ground electrode near Wolayta/Sodo converter.

- Up to 50 km of ground electrode line at Wolayta/Sodo between converter and ground electrode.
- Aproximately 1,045 km, ±500 kV, 2,000 MW capacity HVDC bipolar overhead line from Wolayta/Sodo 500 kV DC substation on the Ethiopian side to Suswa 500 kV DC substation on the Kenyan side.
- Two x 1,000 MW line-commutated bi-directional HVDC poles (i.e. one 2,000 MW HVDC bipole) at Suswa.
- One ground electrode near Suswa converter.
- Up to 50 km of ground electrode line at Suswa between converter and ground electrode.
- Four synchronous condensers (plus one spare), 100 MVAr each at the Suswa converter substation.
- A 400 kV AC substation at Suswa in breaker-and-half arrangement to accept the electricity production through the HVDC interconnector or the Longonot geo-thermal field via the new 400 kV Longonot substation or from the Kenyan network, with at least seven full and one half (2 cbs out of 3) diameters for connection of four converter transformers, two AC filter sub-banks, five synchronous condensers, two connections for 400 kV overhead line (OHL) to Isinya substation, two connections for 400/220/33 kV bus- coupling transformers and two station service transformers.

6. The interconnecting overhead line will increase the reliability of power supply in both countries and will create a major backbone for the development of the EAPP. In addition to the potential of energy trading between the two countries the interconnector will also permit the coordination of reserve capacity and outages, so that the reserve margin in both countries can be reduced with all related savings and positive effects.

7. The project components are described below.

Component A. Construction of a High Voltage Direct Current (HVDC) transmission interconnection between Ethiopia and Kenya

8. Sub-Component A1. Transmission Lines (US$308.1 million[49]). This sub-component will finance the construction of about 1,045 km of bipolar 500 kV HVDC overhead transmission line. The line will have a transmission capacity of 2,000 MW in either direction, using a bipolar and earth-return configuration. The line will interconnect the electricity network of Ethiopia, at the Wolayta/Sodo substation, with the Kenyan network, at the Suswa substation. The AC connections on both sides will be operated at 400 kV AC. The design of the transmission line consists mainly of self supported lattice tower structures, ACSR Pheasant conductor, and insulators. The lines will be equipped with OPGW (optical fibers integrated in the ground wire of the overhead lines) for telecommunications system and supervisory control equipment.

9. Each substation requires a ground electrode far away from the substation, and a medium voltage ground electrode line, which is a single conductor that departs from the substation and is connected to the ground electrode at a point up to 50 km away from the substation. The ground

[49] Cost estimates exclude contingencies.

electrodes must be designed for the rated current of 2000 A in monopolar operation. Ground return operation will be necessary during a failure of one pole line of the HVDC overhead line (n-1 criterion). The selection criteria for suitable ground electrode areas are:

- The area is flat with relatively deep soil and no rock outcrops and no gullies or streams.
- The area is readily accessible so that new roads and other infrastructure do not have to be built prior electrode construction.
- The area is available for purchase and there are no legal or environmental reasons why it cannot be used for a ground electrode.
- There are no plans for development of major facilities near the proposed electrode site.
- The candidate site is at a sufficient distance from other public facilities that could be adversely affected such as oil or gas pipelines, urban gas, water and sewer lines, buried cables, existing transmission lines, well casings, buried metal tanks, bridges, substations, power distribution lines and telephone lines.

10. The transmission capacity has been determined based on long-term needs identified by the EAPP Master Plan and the Feasibility Study for the Ethiopia-Kenya interconnector. The design capacity satisfies the needs of the two countries and will serve the gradual needs of other EAPP members as they connect to the network in the future, thus fulfilling the broader objectives of the Program. The bipolar configuration for the transmission line will ensure that in the event of failure in the line or in one conversion unit, the interconnection is still capable of delivering at least 50 percent of its rated capacity. This feature is especially important since the line will be transferring firm supply, which will be used as a base-load-like option in Kenya. As such, the reliability of this supply needs to be guaranteed with higher reliability standards.

11. Sub-Component A2. Substations (US$628.8 million). This sub-component will finance the engineering design, construction, and commissioning of one AC/DC converter substation on each side of the line, one in Ethiopia and one in Kenya as well as goods required for their construction and for the maintenance and surveillance of the transmission network, including an helicopter for each country. Ethiopia, Kenya, EEPCo and KETRACO have confirmed that the maintenance and surveillance activities to be carried out with the helicopter shall be carried out exclusively by, or under the control of, civilian authorities of EEPCo and KETRACO and for the purposes of the Project. No military or any other purposes unrelated to the objectives of the Project is forseen or will be allowed with the helicopters.

12. Each substation will have a capacity of 2,000 MW, distributed between the two poles of the substation. The main equipment for the substation include converter transformers, breakers, AC and DC filtering equipment, bi-directional commutation valve stations, control rooms, and static and dynamic reactive power compensation equipment.

13. The static and dynamic reactive power compensation equipment is necessary to maintain the voltage levels at the two ends of the interconnection during normal and contingent operation and to achieve the necessarily short-circuit levels for reliable operation of the interconnection. This will ensure that power can be transmitted at all times despite unanticipated events. At the same time, dynamic compensation is required to ensure that the DC line can be reliably coupled

with the AC network on both sides. Reactive compensation needs are higher on the Kenyan side given the relatively weaker condition of the network in Kenya.

14. The general description of each Substation is as follows.

Component of Wolayta/Sodo Substation in Ethiopia

- Four converter transformers, two substation service transformers.
- Two AC filter sub-banks, six AC filters and one SVC plant.
- Two x 1,000 MW line-commutated bi-directional HVDC poles (i.e. one 2,000 MW HVDC bipole).
- One SVC plant connected to the Wolayta/Sodo 400 kV substation.

Components of the Suswa substation in Kenya

- Two x 1,000 MW line-commutated bi-directional HVDC poles (i.e. one 2,000 MW HVDC bipole).
- Four synchronous condensers (plus one spare), 100 MVAr each.
- 400 kV AC substation at Suswa in breaker-and-half arrangement to accept the electricity production through the HVDC interconnector and the Olkaria geo-thermal field.

15. Sub-Component A3. Environmental and Social Management (US$30 million). This sub-component will implement the Environmental and Social Management Plans as defined in the ESIAs, Resettlement Policy Framework, and the RAPs. Financing is from the implementing entities.

16. Sub-Component A4. System reinforcement in Kenya (US$87 million). The sub-component includes reinforcements in Kenya of the substations necessary to integrate the DC interconnection with the AC network and reliably inject the associated energy into the Kenyan electricity system. The reinforcement includes additional transformers, bay additions, and accessory equipment so that the receiving substations can operate at 400 kV / 220 kV and transport electricity into the Kenyan grid and reverse the flow when needed, all within the required reliability standards.

17. This sub-component includes the following items:

- Conversion of the Isinya substations to 400/220 kV for the operation of the Nairobi Ring area at 400 KV.
- 220 kV, 200 MVAr capacitor banks at Athi River, Thika Road and Nairobi North substations.
- A third 90 MVA 220/66 kV transformer at Nairobi North substation.

18. The above reinforcements are necessarily to handle 400MW of power injection into the interconnection (based on the current power purchase agreement) in the absence of other system contingencies. Additional reinforcements (e.g. the re conductoring of Suswa-Nairobi-North-

Thika Road lines and others) will be required to handle contingency and higher import volumes and the natural increase of demand in Kenya, specially the Nairobi ring area, as well as the addition of other generation stations.

Component B. Institutional Capacity Building

Sub-component B1. Project Management and Supervision (US$45 million). This sub-component will strengthen the joint project management and implementation arrangements as follows:

B1(a): Engagement of a Supervision Consultant (AfDB-financed).
B1(b): Engagement of a Supervision Consultant for the Kenya System Reinforcement component, short-term consultants to support KETRACO, and acquisition of project management equipment for KETRACO (IDA- and KETRACO-financed).
B1(c): KETRACO's PIU operating costs (KETRACO-financed).[50]

Sub-component B2. Capacity Building and Technical Assistance (US$10 million). This sub-component will provide technical assistance, planning studies, and capacity building to EEPCo, KETRACO and KPLC. The assistance will be focusing on HVDC design, construction and operations and maintenance; substation design and construction; power trading; network analysis and power system planning, economic and financial analysis of interconnector projects; project management; legal, procurement and financial management; and environmental and social management. The sub-component is divided as follows based on the available financing from development partners.

B2(a): Activities financed by AfDB in both Ethiopia and Kenya (US$3 million each in Ethiopia and Kenya, total US$6 million).
B2(b): Activities financed by IDA in Kenya (US$3 million in Kenya).
B2 (c): Activities financed by AFD in Kenya (US$1 million in Kenya).

19. The activities supported under the sub-component are as follows:

(a) **Project Management-Support**. Providing training required for project management through structured training programs as well as knowledge exchanges with transmission utilities in other countries. The areas covered include the following:

- **Project Supervision**. Training courses on project management.
- **Technical Training**. Training courses on transmission system operations and protection; HVDC design, implementation, and maintenance; network analysis and power system planning; economic and financial analysis of trans-boundary interconnector projects; survey and GIS; and power trade techniques.
- **Environmental and Social Safeguards**. Training courses to safeguards staff.
- **Procurement and Financial Management**. Training courses to procurement and accounting staff.

[50] At the request of EEPCo, the cost of project management activities in Ethiopia has been excluded from the cost estimates. EEPCo will finance these from its own funds in parallel.

(b) **On-site Capacity Development**. This activity will provide KETRACO with on-site capacity development through short-term assignments of experts in technical, financial and management areas relevant to KETRACO.

(c) **Studies and Institutional Development** (US$3.5 million in Kenya): This activity will support various studies and assessments related to utility management, regional projects management, development of trading arrangements, legal requirements, and environmental and social assessments, that are required to strengthen institutional capacity and management of KETRACO. Pre-feasibility and feasibility studies for other regional interconnectors and system reinforcements in Kenya will also be supported.

Annex 3: Implementation Arrangements

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

1. Project Institutional and Implementation Arrangements

1. See Section IV. A in the main text.

Project administration mechanisms

2. See Section IV. A in the main text.

2. Financial Management, Disbursement, and Procurement

Financial Management

Introduction

3. In January/February 2012, the Bank conducted a financial management (FM) assessment of the two implementing entities: Ethiopia Electric Power Corporation (EEPCo) and Kenya Electricity Transmission Company (KETRACO). The assessment's objective was to determine the FM capability of each entity, particularly arrangements for: (a) the complete and accurate recording of the Project's financial transactions and balances; (b) the preparation of regular, accurate, reliable and timely financial statements; (c) the safeguarding of the project assets; and (d) the auditing of the Project's accounts in a manner acceptable to the Bank.

4. The FM assessment complied with the Financial Management Manual for World Bank-Financed Investment Operations, which became effective on March 1, 2010, and the Financial Management Assessment and Risk Rating Principles of the Africa Region. Because several development partners will be co-financing the Project, the Project Implementation Manual will include the financial management arrangements to be used by all the co-financing partners. These arrangements will be harmonized in order to reduce the administrative costs of dealing with varying donor requirements.

Financial Management Arrangements

Budgeting Arrangements

5. Both EEPCo and KETRACO have budgeting guidelines and arrangements that are adequate for the Project. The entities' budgets are approved by their board of directors and staff

are qualified and experienced to handle the budget management of this Project. EEPCo submits its budget to Ethiopia's Ministry of Finance and Economic Development. KETRACO submits its budget to Kenya's Ministry of Finance. Both budgets are then consolidated under the government's national budget. Funds released to the Project by the ministries' will be based on an approved budget. KETRACO prepares its budget using Microsoft Excel worksheets but the final, approved figures are transferred to Microsoft Dynamics' budget module for budget monitoring purposes.

Accounting Arrangements

6. **FM Manuals**. EEPCo uses the Finance Procedures and Accounting Manual while KETRACO uses the Finance Policies and Procedures Manual. Both manuals are adequate for project accounting. KETRACO's manual was approved by the Board of Directors in November 2011.

7. **Accounting Staff.** EEPCo will recruit a financial specialist to oversee the preparation of the project accounts within three months after effectiveness of the IDA credit for Ethiopia. KETRACO has adequate accounting staff for the Project with the Head of Finance designated to handle the EAPP. To strengthen the accounting capabilities of the staff of both entities, Bank staff will provide training in the World Bank's Financial Management and Disbursement guidelines on as an needed basis.

8. **Accounting Software.** EEPCo will use its Agresso accounting software to prepare the project accounts. The project office (PIU) has been networked and connected to EEPCo mainframe to ensure that they have direct access to the accounting information system (Agresso) in order to prepare project accounts. However, Agresso has been experiencing problems in interfacing and mapping the software with the billing module for the last couple of years. This has resulted in a backlog of outdated information and data errors. EEPCo has agreed to address this issue by assigning a team to work with the World Bank-financed "Just in Time Study" (JIT) consultants who are tasked to identify the interface problems and recommend solutions to rectify them. The JIT consultants have started working, supported by EEPCo staff, and are expected to provide their findings in July 2012. Addressing the issues related to Agresso is reflected in the Project Agreement with EEPCo in a dated covenant, pursuant to which EEPCo shall: (a) not later than six (6) months after the Effective Date, conduct a review under terms of reference acceptable to the Association to identify any issues related to its accounting software and billing interface, and recommend measures to address such issues; and (b) resolve all issues identified under the review not later than twenty-four (24) months after the Effective Date. KETRACO will use Microsoft Dynamics accounting software although training on using this software is still to be provided to KETRACO staff.

Internal Control and Internal Audit Arrangements

9. **Internal Audit.** EEPCo has an internal audit department; past experience with IDA-financed projects indicates that this department requires capacity development as it has given insufficient emphasis to auditing Bank-funded projects. It is also unclear whether the annual plan is followed. For purposes of this Project and to further strengthen the financial management

of the PIU, not later than six (6) months after the Effective date, EEPCo will assign an internal auditor specific to the Project to oversee the functioning of the PIU's internal control and risk assessment system, as reflected in the Project Agreement with EEPCo. Quarterly internal audit reports for the Project will be prepared and submitted to the CEO of EEPCo for action. EEPCo's audit committee will oversee the management process of addressing audit recommendations. KETRACO has an internal audit department sufficient to handle this Project. The internal auditors are qualified and experienced and report to an Audit and Risk Management Committee, which needs capacity building in corporate governance in order to strengthen its role. The internal audit unit uses a risk-based approach and a draft Internal Audit Policy and Procedures Manual has been prepared, pending approval by KETRACO's board. Both the internal auditors of EEPCo and KETRACO will benefit from training in World Bank Financial Management guidelines. The Bank's Financial Management Specialists will provide this training. In addition, the internal audit units of both companies need to include the Project's internal audit requirements in their annual audit plan.

10. **EEPCo Internal Control System.** EEPCo has relatively good internal control system as described in the Finance Procedure and Accounting Manual, to help the management of the Project to ensure the accuracy of financial reporting and to strengthen the fiduciary aspects of the Project. The entity's Financial Policies and Procedures Manual specify the detailed internal-control procedures to be applied in managing funds. The focus of the internal control is on the segregation of duties, the safeguarding of project assets, authorization and approval, clear lines of communication, arithmetic and accounting accuracy, integrity and performance of staff at all levels, and supervision. However, a review of the audited accounts of EEPCo for the fiscal years that ended on July 7, 2010 and on July 7, 2011, noted internal control weaknesses for which a comprehensive action plan has been submitted showing how EEPCo will address the issues. The Bank will closely monitor the achievement of the actions indicated in the plan.

11. **KETRACO's Internal Control System**: KETRACO's internal control systems are adequately documented under their Finance Policies and Procedures Manual to be used under the Project. Internal control issues were raised by the external auditors in the audit report for the year ended June 30, 2010 but they have since been addressed.

12. **Financial Reporting Arrangements**. EEPCo and KETRACO will prepare quarterly un-audited Interim Financial Reports (IFRs) for the Project in form and content satisfactory to the Association and forward them to the respective Finance Ministries of Ethiopia and Kenya, for submission to the Bank within 45 days after the end of the quarter to which they relate. The format and content of the IFRs for both EEPCo and KETRACO has been agreed with the Bank. The contents of the IFR will include: (a) Statement of Sources and Uses of Funds; and (b) Statement of Uses of Funds by project activity/component.

13. EEPCo and KETRACO will prepare the Project's annual accounts/financial statements within three months after the end of the financial year in accordance with accounting standards acceptable to the Bank. They will furnish the audited financial statements to the respective Finance Ministries of Ethiopia and Kenya for submission to the Bank within six months after the end of the FY. EEPCo and KETRACO will prepare their respective accounts in accordance with International Financial Reporting Standards.

14. **Auditing Arrangements**. An auditor acceptable to IDA and cleared by the Financial Management Unit of the Bank will conduct the project audits. The audits will follow International Standards on Auditing and the audit report together with the management letter will be submitted to the Bank within six months after the end of the FY. The audit report will be disclosed in accordance with the Bank's disclosure policy. EEPCo will submit audited accounts for the Project while KETRACO will submit entity-audited accounts with sufficient disclosures of the Project's sources and uses of funds in the notes to the audited entity accounts. The Project shall be audited annually at the end of each financial year. Both EEPCo and KETRACO have agreed to the Terms of Reference (ToR) for their audits with the Bank.

15. A review of KETRACO's first audited accounts for the period ended June 30, 2010 showed that KETRACO had a qualified opinion related to unsupported expenditure. However, a letter dated March 23, 2012 from the external auditor has since been received showing that KETRACO has addressed the audit qualification.

16. A review of EEPCo's audited accounts shows that in the past, the entity has been late in submitting these accounts to the Bank. The accounts for the FY that ended on July 7, 2011 have been submitted with a qualified audit opinion, similar to the audit qualification issued in the audit for the FY that ended on July 7, 2010. Specifically, the auditors were unable to determine whether or not the debtor balance included in financial statements of July 7, 2011 was correct.

17. This audit qualification is expected to be addressed when EEPCo assigns a team to work jointly with the Just in Time (JIT) Study Consultants to conduct a review to identify issues related to the Agresso accounting software and the billing interface and ensure recommendations are implemented. This is expected to be done within 24 months after credit effectiveness.

18. The other audit qualification related to not complying with International Accounting Standard 21 on the effects of changes in foreign exchange rates thus overstating the cost of property, plant and equipment and also understating the loss for the year. This issue will be monitored to ensure it is addressed in line with the action plan submitted by EEPCo to the Bank.

19. The management letters for EEPCo's audit report for the FYs that ended on July 7, 2010 and on July 7, 2011, have raised similar issues and exposed a number of internal control weaknesses that require urgent follow-up and rectification, as discussed earlier. Therefore, EEPCo has submitted, before negotiations, an action plan that the Bank will use to monitor that the management letter and audit qualification issue are addressed. In addition, going forward the Bank expects EEPCo to provide management comments to the issues raised by the external auditors in the management letter submitted to the Bank.

20. The audit reports that will be required to be submitted by KETRACO and EEPCo and the due dates for submission are:

Table 1. Audit Reporting by Entity

Audit Reporting by Entity	Due Date
EEPCo Project Specific Financial Statements and related management letter.	Submitted within six months after the end of each FY.
KETRACO Entity Financial Statements and related management letter.	Submitted within six months after the end of each FY.

21. **Governance and Anti-Corruption**: Both Kenya and Ethiopia have legislation that establishes institutions to handle corruption cases. In Ethiopia there is the revised Proclamation on the establishment of the Federal Ethics and Anti-Corruption Commission (Proclamation No. 433/2005) while in Kenya the Anti-Corruption and Economic Crimes Act has established the Kenya Anti-Corruption Commission. The public can report any fraud and corruption cases to these institutions that will investigate the cases and bring them to closure. In order to minimize the risk of fraud and corruption, it is expected that both institutions should transparently disclose information particularly in relation to major procurements under the Project and put in place complaint handling mechanisms.

Financial Management Action Plan

22. Table 2 below shows the financial management action plan for the Project.

Table 2. Financial Management Action Plan for EEPCo

	Action	Timing	Responsible entity
1.	EEPCo shall: (i) not later than three (3) months after the Effective Date, recruit a financial specialist, under terms of reference and with qualifications and experience satisfactory to the Association, to oversee the accounting functions between EEPCo and the PIU.	Dated covenant to be met within 3 months after Effectiveness.	EEPCo
2.	EEPCo shall, not later than six (6) months after the Effective Date, assign to the Project an internal auditor under terms of reference and with qualifications and experience satisfactory to the Association to strengthen the internal control arrangements under the Project.	Dated covenant to be met within 6 months after Effectiveness.	EEPCo
3.	EEPCo shall: (i) not later than six (6) months after the Effective Date, conduct a review under terms of reference acceptable to the Association, to identify any issues related to its accounting software and billing interface, and recommend measures to address such issues; and (ii) resolve all issues identified under the review carried out under the preceding sub-paragraph (i), not later than twenty-four (24) months after the Effective Date.	Dated covenant to be met within 6 and 24 months after effectiveness.	EEPCo

Conclusion of the Assessment

23. The Project's financial management arrangements satisfy the Bank's minimum requirements under OP/BP10.02 but improvements are necessary in order for the EEPCo and KETRACO systems to be adequate to provide, with reasonable assurance, accurate and timely information on the Project's status, as required by the IDA. The Financial Management Action Plan above summarizes the agreed improvements. The overall FM residual risk rating for EEPCo is *substantial*, requiring Bank supervision twice a year. The FM rating for KETRACO is *moderate*, requiring Bank supervision once a year.

Disbursements and Funds Flow Arrangements

Table 3. Preliminary Disbursement Table for Ethiopia

Category	Category Description	Amount of IDA financing allocated (expressed US$ million)	Percentage of Expenditures to be financed by IDA (excluding taxes)
1	Turnkey contract payments:		100%
	(a) for the advance payment under Part A.2 of the Project	65.0	
	(b) for goods, works and non-consulting services under Part A.2 of the Project	178.0	
	TOTAL AMOUNT	243.0	

Note: Category 1(a) and 1(b) are for Component A2. The category is split into two sub-categories due to a disbursement condition for the implementation of the RAP for the converter substation in Ethiopia. The RAP cannot be finalized and implemented until the turnkey (EPC) contractor has prepared the final design. Thus, disbursement will be allowed for initial payments to enable the contractor to finalize the designs. Construction, however, shall not proceed before the RAP has been implemented, adopted, consulted upon and disclosed, as approved by the Association, and all the Project Affected Persons have been compensated in accordance with the provisions of the RAP.

Table 4. Preliminary Disbursement Table for Kenya

Category	Category Description	Amount of IDA financing allocated (expressed US$ million)	Percentage of Expenditures to be financed by IDA
1	Goods, works and non-consulting services:		100% (excluding taxes)
	(a) under Part A.2 (a) of the Project	78	
	(b) under Part A.2 (b) of the Project	294	
	(c) under Parts A.4 and B.1 of the Project	44	
2	Consultants' services, training and workshops under the Project	5	100% (including taxes)
3	Unallocated	20	
	TOTAL AMOUNT	441.0	

Note 1: IDA will finance per diems only for overseas training.

24. **Disbursements Arrangements.** Only KETRACO will use the transaction based disbursement method using statements of expenditure when disbursing funds to the Designated Accounts. Other methods of disbursement that can be used by both EEPCo and KETRACO include direct payments to a third party for works, goods and services upon the Recipient's request; special commitments e.g. letters of credit; and reimbursements for expenditures incurred under the Project. GOK, KETRACO and the Bank have discussed the disbursement arrangements and further details are included in the disbursement letter. The Recipient will be obligated to refund to IDA any ineligible expenditures made from the Designated Account. If the Designated Account remains inactive for more than six months, the Recipient may be requested to refund to IDA amount advanced to the Designated Account. IDA will have the right, as reflected in the Financing Agreements, to suspend disbursement of the funds if reporting requirements are not complied with**.**

25. **Banking Arrangements for KETRACO**. The Recipient will open a designated Account denominated in United States Dollars in a local Commercial Bank acceptable to IDA or Central Bank of Kenya. KETRACO will open a Project Account denominated in Kenya Shillings in a local Commercial Bank acceptable to IDA or Central Bank of Kenya. Counterpart funds can be deposited into the Project Account.

26. Both the designated and project accounts need to be opened and the details including the account signatories communicated to the Bank after signing of the financing agreements but before effectiveness to facilitate disbursement immediately after the Credit is declared effective. Transfers from the Designated Accounts to the Project Accounts will be as and when payments in local currencies are required, and specifically to meet eligible operating expenses.

27. **Funds Flow Arrangements.** Funds flow arrangements for KETRACO using the Designated and Project Accounts above are as follows:

- IDA will disburse an initial advance into the Designated Account in US Dollars upon receiving a withdrawal application. Payments in US Dollars related to eligible expenditure can be made from the Designated Account.

- IDA will replenish funds to the Designated Account upon receiving evidence of satisfactory utilization of the advance. This evidence can be a SOE and/or full documentation for payments that are above the SOE thresholds, as the case may be. Replenishment applications shall be submitted regularly on a monthly basis.

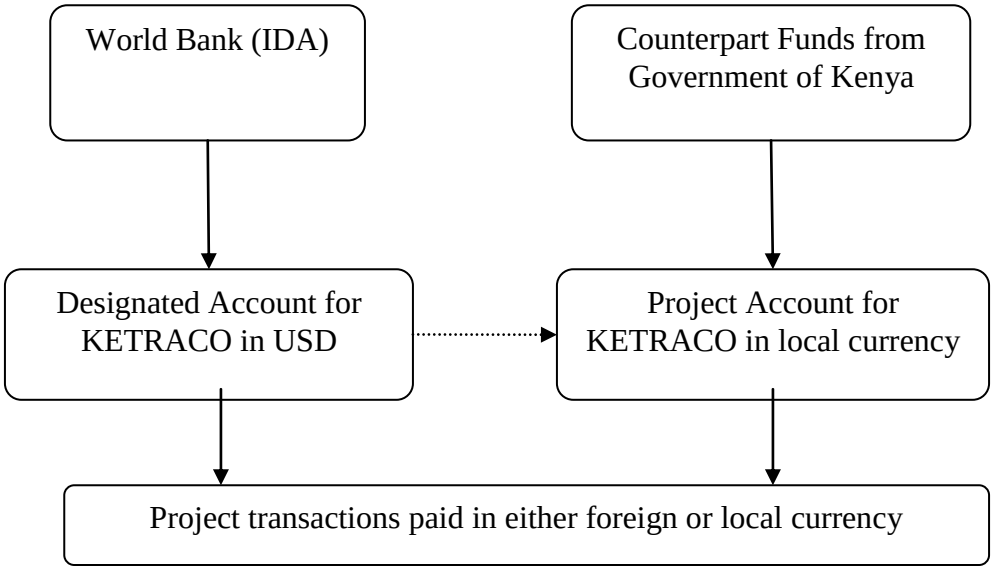
- KETRACO can transfer funds from its Designated Account to the Project Account to make eligible expenditure payments in local currency.

- Counterpart funds from the Government of Kenya will be deposited in the Project Account to pay local currency transactions.

28. Counterpart funds from the Federal Government of Ethiopia can be made to an established account of EEPCo.

29. **Retroactive financing**. For Kenya: SDR 2,000,000(US$3 million equivalent, amounting to 0.5 percent of the total credit amount) for payments made for eligible expenditures under Category (2) (consultants' services, training and workshops under the Project) after January 1, 2012, and before the date of signing of the Kenya Financing Agreement.

Figure 1. Funds Flow Diagram for KETRACO



2. Procurement

30. EEPCo and KETRACO will carry out the Project's procurement activities both jointly through the JPCU (Supervision Consultant and Substations) and severally with the JPCU playing a coordination role (Transmission lines). Procurement for the System Reinforcement component (A4) in Kenya will be carried out by KETRACO. All contracts financed in part or in whole by IDA will be carried out in accordance with the World Bank's *"Guidelines: Procurement of Goods, Works and Non-Consulting Services Under IBRD Loans and IDA Credits & Grants by World Bank Borrowers"* (January 2011), "*Guidelines: Selection and Employment of Consultants Under IBRD Loans and IDA Credits & Grants by World Bank Borrowers"* (January 2011), and the provisions stipulated in the Financing Agreements with the countries participating in the Project. "*Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants*", dated October 15, 2006 and revised in January 2011, shall apply to the Project. The procurement of contracts solely financed by AfDB will follow AfDB requirements and those financed by AFD will follow AFD requirements.

31. The Bank's assessment of the procurement capacity of the implementing entities has resulted in a *high* risk rating to reflect this arrangement and the procurement capacity of the entities (Annex 3).

32. For EEPCo, the risk to procurement under the Project is rated *high* for several reasons. EEPCo's procurement activities are not regulated under Ethiopia's federal public procurement proclamation of 2009 and the entity does not have procurement management units. The experience with the five Bank-financed projects that EEPCo is currently implementing indicates that EEPCo has challenges in preparing bidding documents, evaluating bids, and preparing reports that meet IDA's quality requirements. Lack of business standards for procurement processing and clearly defined quality control procedures may hamper efficient procurement decision making.

33. For KETRACO the procurement risk rating is *substantial*. KETRACO is a new entity and its procurement is regulated under Kenya's Public Procurement and Disposal Act (PPDA) and Regulation, which came into effect in 2007. Well-trained Procurement Officers staff its procurement unit and it has established a satisfactory system for managing procurement records. However, KETRACO has no experience with World Bank-financed procurement including operating in Kenya's fragile procurement environment. Finally, the procurement risk of the JPCU is rated *high* because, currently, the JPCU has no procurement proficient staff, yet it has a key role in facilitating joint procurement of two large contracts (the Supervision Consultant and the Converter Substations). During implementation, the JPCU will benefit from procurement experts in the national PIUs and in the Supervision Consultant's team.

34. **Procurement of Consultancy Services.** There will be a single Consultancy firm selection process (QCBS) for the Supervision Consultant to oversee the construction of the transmission lines and the converter substations (components A1 and A2). This consultancy is wholly financed by AfDB and the selection procedure will follow the AfDB's Rules and Procedures for the Use of Consultants (May 2008 Edition), but all the financiers will review and provide comments on the ToR and the Request for Proposals for the selection process. The

selection of the separate Supervision Consultant for the Kenya System Reinforcement Component (A4) as well as any additional IDA-financed consultancy assignments to be identified in the future shall be carried out using the Bank's standard Request for Proposals (RFP). Consulting firms for services estimated to cost more than US$200,000 equivalent would be selected through Quality and Cost Based Selection (QCBS) method. Consulting firms services estimated to cost less than US$300,000-equivalent may be selected using the Consultants' Qualification (SBCQ) method. Individual consultants will be selected on the basis of their qualifications in accordance with Section V of the Bank's Consultants Guidelines. Consulting services for audits and other services of a standard nature or routine nature may be procured using the Least Cost Selection method. Single source selection may be used where it can be justified. When there is need for capacity reasons, NGOs, universities, research institutions, public training institutions, or any special organizations could be employed to assist where they have an advantage over commercial firms. If the assignments are to be financed by other partners, their procedures may be applied.

35. **ICB Works Contract Procurement for the Transmission Lines (EPC Contracts).** There will be five contracts for transmission lines. These contracts will be procured through ICB procedures of each financer of the respective lots. The transmission line lots will be bid out, with prequalification, in two separate packages of two lots in Ethiopia financed by AfDB and three lots in Kenya parallel-financed by AfDB and AFD. The pre-appraisal mission had recommended that the prequalification and invitation for bids for both packages are conducted simultaneously and jointly with coordination by JPCU. This arrangement would ensure transparency and fairness without denying participation in a procurement process or award to a firm for reasons unrelated to: (a) its capability and resources to successfully perform the contract; or (b) possible conflict of interest. EEPCo and KETRACO have agreed to carry out the procurement individually, but with close co-ordination with regard to timing.

36. **ICB Works Contract Procurement for the Converter Substations (EPC Contract).** The Procurement of a single contract for the construction of two HVDC converter/inverter substations (one in each country) will follow the World Bank's ICB (PQ) procedures and will be carried out jointly between EEPCo and KETRACO through a joint procurement process conducted by the JPCU under a single set of technical specifications and bidding documents and through joint evaluation.[51] The contractor will sign two separate contracts (each contract covering one country) with EEPCo and KETRACO, respectively. The World Bank will finance the entire contract for the Kenya substation and as much as possible of the contract for the Ethiopia substation, with residual financing coming in the second place from the AfDB under its ADF-window and, as needed, counterpart financing from EEPCo to the extent these two sources of co-financing are not enough to finance the totality of the contract. The AfDB has agreed to seek a Board waiver to adopt the use of the World Bank's Procurement Guidelines for this component. This contract being a specialized one and of high value, market responses may be uncertain and therefore its procurement planning and processing needs prudent approach and detail considerations of the market conditions. Therefore, during appraisal, different strategies and risks associated with the procurement process of this package were discussed and it was agreed that EEPCo and KETRACO will agree on the provisions of the final bidding document to

[51] Technical specialists have confirmed that procurement of the converter substation as a single package is best international practice.

guide the bidders on how to price this package so that at the end the successful bidder could sign two separate contracts, one each per country.

37. The system reinforcement component in Kenya will be financed by IDA. KETRACO will handle all related procurement matters.

38. The World Bank's "*Guidelines for Procurement of Goods, Works, and Non-Consulting Services"* and the "*Guidelines for Selection and Employment of Consultants Under IBRD Loans and IDA Credits & Grants by World Bank Borrowers",* both dated January 2011, will apply.

39. No NCB procurement is envisaged now though such need may appear during the Project implementation. The Procurement Plan shall be revised and agreed with the World Bank before undertaking NCB procedure should such need arise.

40. The overall project risk for procurement is *high* and the thresholds for prior review, for international competitive bidding (ICB) including the maximum contract value for which a short list may comprise exclusively national firms in the selection of consultants, are presented in the table below.

Table 5. Procurement Thresholds

Category	Prior review threshold	ICB threshold	National short list Max value
	US$	US$	US$
Works	=>5,000,000	=>5,000,000	NA
Goods	=>500,000	=>500,000	NA
Consultants (Firms)	=>200,000	NA	<200,000
Consultants (Individuals)	=>100,000	NA	NA

Country Procurement Environment

A. ETHIOPIA

41. Ethiopia has a satisfactory Procurement Law (Ethiopia's Federal Government Public Procurement Proclamation of 2009) and enabling Procurement Directives. The Law applies to the Federal Government Procurement and property administration. The regional states have been provided with prototypes of the Procurement Law and directives, based on which they may enact similar procurement legislation. The Procurement Law establishes the Public Procurement and Property Administration Agency (PPA) – the regulator – with a mandate to set national public procurement standards and build procurement capacity. The PPA has published a public procurement manual but has not yet issued Standard Bidding Documents for the selection of consultants and for the procurement of goods and works.

42. EEPCo is a Government Owned Enterprise whose procurement is not regulated under Ethiopia's Federal Government Public Procurement Proclamation of 2009 (FPPA). According to the Public Enterprises Law Proclamation, EEPCo is mandated to prepare and follow its own procurement policies and procedures, which follow the FPPA. Following the Bank's review and based on the agreed need for the improvement of EEPCo's procurement policies and procedures, they are currently under revision with the assistance of an international procurement consultant hired by EEPCo under the IDA-financed Energy Additional Financing project (P120172). Procurement oversight for EEPCo is provided by its Board of Directors and the Electricity Sector Regulator.

43. Ethiopia is yet to conduct a perception survey on corruption in public procurement. Nevertheless, the Government of Ethiopia has acknowledged that leakage of public funds is a major concern.

EEPCo's Procurement Environment

44. ***Adequacy of the Procurement Capacity.*** EEPCo's procurement function falls under the Finance and Supply Chain Process. EEPCo has no professional Procurement Units and procurement is conducted by technical specialists in addition to their main functions. Contrary to the national standard, EEPCo does not recognize procurement as a profession and the procurement function is considered a general service that can be rendered by a technical specialist as and when required. The Bank's assessment of EEPCo's procurement and contracts' management capacity has observed weaknesses in the following areas: (a) monitoring and enforcement of Procurement Plans; (b) timely processing and decision making on procurement activities; (c) quality of procurement documents and delayed preparation of bid evaluation reports that delays award of contracts within bid validity periods; and (c) monitoring the quality and timeliness of implementation of contracts. The major reason for these weaknesses appears to be a lack of business standards and quality assurance procedures. EEPCo has recently taken initiatives aimed at institutionalizing its procurement function and the Bank will support these initiatives.

Risks and Mitigation Measures

45. ***Inherent Risk.*** There is a risk that gaps in EEPCo's procurement legal framework may affect compliance monitoring and procurement audits and the creation and maintenance of the structures required to implement transparent, fair, efficient, accountable and value-for-money procurement. Improving EEPCo's internal technical and administrative control system in the areas of performance audit, quality control, complaint redressal system, and the oversight roles and responsibilities on procurement and implementation of contracts may reduce the risk expected in this regard.

46. ***Procurement Governance and Capacity Risks.*** The lack of a clearly defined institutional structure for handling procurement and staff with procurement skills increases the risk of inefficiencies in project procurement. Further, there is a risk that technical staffs undertaking procurement tasks in addition to their normal duties are not capable to diligently

conduct the procurement tasks. Project design mitigates these risks through: (a) the finalization and adoption of a PIM that includes a Procurement Manual for the Project as a condition for effectiveness; (b) agreement with EEPCo on an efficient procurement decision making structure with adequate oversight; (c) assignment to the PIU of a Procurement Officer with qualifications and experience satisfactory to IDA; (d) procurement training for the Procurement Officer, e.g. at the Ethiopian Management Institute (EMI) during the next six months; (e) EEPCo retaining the services of its existing International Procurement Advisor to support the Project; and (f) the Supervision Consultant's team shall include a qualified Procurement Specialist to coordinate procurement.

47. **Capacity of the Joint Project Coordination Unit (JPCU).** The JPCU will coordinate the work of the Project Implementation Units (PIUs) of EEPCo and KETRACO. The JPCU is responsible to bridge the financers with the PIUs, and the two PIUs with the Joint Steering Committee (JSC). The JPCU will be responsible for preparing Quarterly Project Progress Reports for the JSC and the financiers with the help of inputs from the PIUs. In terms of the procurement function, the JPCU shall be responsible for processing the selection of the Supervision Consultant for Components A1 and A2 and the procurement of the converter substations.

48. Other procurements (transmission lines) will be conducted by the respective PIUs. The role of the JPCU in these cases is to assure quality in procurement documents and to ensure that proper procurement processes are followed including communicating with the PIUs or the respective implementing entity's recommendations with the financiers. In order to competently carry out procurement of the large-value contract for the converter substations and undertake the quality assurance role with regard to documentation and procurement recommendations/decisions, the JPCU will be assisted by a procurement and contract specialist deployed by the successful firm that wins the contract for the Supervision Consultancy. The capacity of the JPCU critically depends on the qualifications of the Joint Project Coordinator (JPC), the qualifications of the staff from the PIUs who will assist in procurement processing, and the quality of the Supervision Consultant. As this is a new unit, no prior experience and staff capability could be assessed.

National Competitive Bidding Procedures

49. Contracts to be procured through National Competitive Bidding (NCB) procedures are not anticipated under this Project. However, in the event that the need to procure contracts using NCB becomes evident during implementation, the procurement of these contracts will be in accordance with NCB procedures as defined in the Ethiopian Federal Public Procurement Law with the following additional provisions and modifications as stipulated in the Financing Agreement:

(i) The tender submission date shall be set so as to allow a period of at least thirty (30) days or the later of (A) the date of advertisement, and (B) the date of availability of the tender documents.

(ii) Government-owned enterprises shall be allowed to participate in the tendering only if they can establish that they are legally and financially autonomous, operate under commercial law, and are independent agencies of Ethiopia's Government.

(iii) Ethiopia shall use, or cause to be used, bidding documents and tender documents containing, *inter alia*, draft contracts and conditions of contracts, including provisions on fraud and corruption, audit and publication of award in form and substance satisfactory to the Association.

(iv) Extension of tender validity shall be allowed once only, and for not more than thirty (30) days, unless otherwise previously agreed in writing by the Association.

(v) Evaluation of tenders shall be based on quantifiable criteria expressed in monetary terms as defined in the tender documents, and not on a merit points system;

(vi) No domestic preference shall be used in the evaluation of tenders. Accordingly, contracts shall be awarded to qualified tenderers having submitted the lowest evaluated substantially responsive tender.

(vii) Notification of contract award shall constitute formation of the contract. No negotiation shall be carried out prior to contract award.

(viii) Shopping procedure will apply for each low value contracts in lieu of Direct Procurement, except as otherwise previously agreed in writing by the Association.

(ix) The two envelope bid opening procedure shall not apply.

50. In addition, each bidding document shall include the following provision in accordance with para.1.14 (e) of the Procurement Guidelines: (a) the bidders, suppliers, contractors and subcontractors shall permit IDA, at its request, to inspect their accounts and records relating to the bid submission and performance of the contract, and to have said accounts and records audited by auditors appointed by the association; and (b) the deliberate and material violation by the bidder, supplier, contractor or subcontractor of such provision may amount to an obstructive practice as defined in paragraph 1.14(a)(v) of the Procurement Guidelines.

Country Procurement Environment

B. KENYA

51. The public procurement system in Kenya covers all government and semi- government entities in accordance with the provisions of the public procurement law, i.e. the Public Procurement and Disposal Act of 2005 (PPDA) and Regulation (2006), which came into effect in January 2007. Section 8 (1) of the Act established a central Public Procurement Oversight

Authority (PPOA) in addition to the Public Procurement Department established under the Regulations (2001) in the Ministry of Finance. The PPOA was officially launched in June 2008. The Act sets out the rules, procedures and institutional arrangements that the public entities should follow in the management of public procurement. The Act also provides mechanisms for enforcement of the law. The PPOA has an oversight function in monitoring compliance with rules and procedures spelt out in the Act.

National Competitive Bidding Procedures

52. Contracts to be procured through National Competitive Bidding (NCB) procedures are not anticipated for the components financed by IDA under this Project. However, in the event that IDA-financed NCB contracts are required during implementation, the procurement of these contracts will be in accordance with NCB procedures as defined in the Public Procurement and Disposal Act of 2005 (PPDA) with the following additional provisions and modifications as stipulated in the Financing Agreement:

(i) The tender submission date shall be set so as to allow a period of at least 30 days or the later between (a) the date of advertisement; and (b) the date of availability of the tender documents.

(ii) Government-owned enterprises shall be allowed to participate in the tendering only if they can establish that they are legally and financially autonomous, operate under commercial law and are independent agencies of the Recipient's Government.

(iii) Kenya shall use, or cause to be used, bidding documents and tender documents containing, *inter alia*, draft contracts and conditions of contracts, including provisions on fraud and corruption, audit and publication of award in form and substance satisfactory to the Association.

(iv) Extension of tender validity shall be allowed once only, and for not more than thirty (30) days, unless otherwise previously agreed in writing by the Association.

(v) Merit points system is not allowed for procurement of goods for works.

(vi) No domestic preference shall be used in the evaluation of tenders. Accordingly, contracts shall be awarded to qualified tenderers having submitted the lowest evaluated substantially responsive tender.

(vii) Notification of contract award shall constitute formation of the contract. No negotiation shall be carried out prior to contract award.

(viii) The two envelope bid opening procedure shall not apply.

53. In addition, each bidding document for contracts financed by IDA shall include the following provision in accordance with paragraph 1.14 (e) of the Procurement Guidelines: (a) the bidders, suppliers, contractors and subcontractors shall permit the Association, at its request, to

inspect their accounts and records relating to the bid submission and performance of the contract, and to have said accounts and records audited by auditors appointed by the association; and (b) the deliberate and material violation by the bidder, supplier, contractor or subcontractor of such provision may amount to an obstructive practice as defined in paragraph 1.14(a)(v) of the Procurement Guidelines.

KETRACO's Procurement Environment

54. KETRACO operates under the Kenya Procurement Act of 2005 and Kenya procurement regulation of 2006. Its capacity has been assessed to be sufficient under the existing Kenya laws and its procurement capacity includes both local and international procurement. Even though KETRACO has yet to manage an IDA-financed project, it is currently implementing projects financed by the AfDB, AFD, and other bilateral agencies. Currently, the procurement function reports directly to the Chief Executive Officer (CEO) and includes five professionals reporting to the Head of Supply Chain Management. The staff consists of a deputy Head, a senior supply Chain Officer, two Supplies Officers and a Supplies Assistant.

Risks and Mitigation Measures

55. ***Inherent Risks.*** All IDA-financed contracts will be procured using the World Bank's procedures and almost all contracts will be prior reviewed. This will mitigate any potential risk in the procurement process.

56. ***Capacity Risks.*** KETRACO being a new organization has recruited a good number of young professionals but has limited capacity in handling international procurement using World Bank Guidelines as well as procurement of high value and complex contracts. The head of Supply Chain Management has 15 years' procurement experience, serving in his position at KETRACO for the past two years. He has attended a three weeks basic training on World Bank procedures (Works, Goods and Consultancy) in India and has also been managing projects financed by JICA, AFD and African Development Bank. KETRACO is conducting capacity building in order to ensure that its procurement staff follow the correct procedures. All these actions at KETRACO will mitigate the procurement capacity risk in addition to the proposed deployment at the JPCU of the Supervision Consultant to support the Project's procurement activities.

57. The Procurement Plan is provided below.

Procurement Plan

May 17, 2012

I. General

1. **Project information**

Project name: Regional Eastern Africa Power Integration Project (EAPP) – Eastern Electricity Highway Project
Loan/Credit Nos._____,

Project Implementing Agencies: Ethiopian Electric Power Corporation (EEPCo) and Kenya Electricity Transmission Company Ltd. (KETRACO).

2. **Bank's approval Date of the procurement Plan** [Original: May 17, 2012]

3. **Date of General Procurement Notice**: March 15, 2012

4. **Period covered by this procurement plan**: January 2012 – June 2017

II. Goods, Works and non-consulting services

5. **Prior Review Threshold**: Procurement Decisions subject to Prior Review by the Bank as stated in Appendix 1 to the Guidelines for Procurement.

	Procurement Method	Prior Review Thresholds	Comments
1.	ICB (Goods)	≥500,000 US$	
2.	NCB (Goods)	<500,000 US$	No contract for NCB is identified
3.	ICB (Works)	≥5 million US$	
4.	NCB (Works)	<5 million US$	No contract for NCB is identified
5.	LIB	All contracts	

6. **Prequalification**. Bidders for converter substations (Component A2) shall be prequalified in accordance with the provisions of paragraphs 2.9 and 2.10 of the Guidelines.

7. Procurement Packages with Methods and Time Schedule

Works Contracts

1	2	4	5	6	7	8	9	10	11
Ref No.	**Contract (Description)**	**Procurement Method**	**Prequal. (yes/no)**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**	**Comments**	**Responsible entity**	**Procurement guidelines to be used**
1.	EPC for converter substations in Ethiopia and Kenya	ICB	Yes	No	Prior	June 2013	One package, but two separate contracts, split between EEPCo and KETRACO. Jointly financed by AfDB and WB.	JPCU, EEPCo and KETRACO	WB guidelines
2.	EPC for HVDC 433 km transmission lines with OPGW in Ethiopia (2 Lots)	ICB	Yes	No	Prior	June 2013	AfDB-financed	EEPCo	AfDB guidelines
3.	EPC for HVDC transmission lines with OPGW in Kenya (2 lots)	ICB	Yes	No	Prior	June 2013	AfDB-financed	KETRACO	AfDB guidelines
4.	EPC for HVDC transmission lines with OPGW in Kenya	ICB	Yes	No	Prior	June 2013	AFD-financed (France)	KETRACO	AfDB guidelines
5.	System reinforcement in Kenya	ICB	Yes	No	Prior	Dec 2013	WB-financed	KETRACO	WB guidelines

III. Selection of Consultants

8. **Prior Review Threshold.** Selection decisions subject to Prior Review by Bank as stated in Appendix 1 to the Guidelines Selection and Employment of Consultants:

	Selection Method	Prior Review Threshold	Comments
1.	Competitive Methods (Firms)	≥200,000 US$	
2.	Single Source (Firms)	Prior Review for all contracts	
3.	Individual Consultants	≥100,000 US$	
4.	Single Source (IC)	Prior Review for all contracts	

9. **Short list comprising entirely of national consultants.** Short list of consultants for services, estimated to cost less than US$200,000 equivalent per contract, may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

10. **Consultancy Assignments with Selection Methods and Time Schedule**

1	2	4	5	6	7	8
Ref. No.	**Description of Assignment**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**	**Comments**	**Responsible entity**
1.	Supervision Consultant (for components A1 and A2)	QCBS	Prior	July 2012	AFDB-financed. One Tender. Contract split between EEPCo and KETRACO for payment purposes.	JPCU, EEPCo and KETRACO
2.	Supervision Consultant for Component A4	QCBS	Prior	Sept. 2012	WB-financed	KETRACO

IV. Implementing Agency Capacity Building Activities with Time Schedule

No.	Activity Description	Estimated Duration	Start Date	*Comments*
1.	Project management training to KETRACO	Three months	2012/ 2013	
2.	Procurement training to KETRACO	Three months	2012	
3.	HVDC operation and maintenance training to KETRACO and EEPCo	Three months	2013	
4.	Procurement training organized by World Bank to EEPCo	One month		Completed in April 2012
5.	EEPCo has hired four Procurement Specialists			Completed in March 2012
6.	EEPCo has renewed contract with its Procurement Advisor	2 years		Completed in April 2012
7.	Project will engage a Supervision Consultant	2013-2018	2013	Recruitment underway

3. Environmental and Social (including Safeguards)

Project Location and Characteristics

Ethiopia

58. **Location**. The Project is located in the southern part of the country. The total length of the transmission line inside Ethiopia is 433 km. The transmission line passes through two regions: SNNPRS and Oromia. The total population of these two regions is about 1.3 million, covering 34 kebeles in eight woredas. Out of the total population impacted by the Project, 80 percent resides in SNNPR (1,099,828), the rest are in Oromia accounting for 20 percent of the project population (276,983).

59. **Population Characteristics**. Most woredas in SNNPRS have very high population densities and are affected by population pressure and lack of sufficient land for cultivation. People living in the project woredas are mainly from six ethnic groups who converted to protestant Christianity about 50 years ago. The houses are scattered family dwellings made up of mostly thatched roof and sometimes corrugated iron made of wood wall plastered with mud in most parts of the project area. There are also clustered "tukuls", which are compact houses built mostly on hills. The houses affected by the transmission line are typically thatched roof or corrugated iron houses without proper sanitary facilities and waters services. The settlements are isolated villages on varied terrain particularly without the provision of basic services. There are no groups that trigger the Bank's Indigenous Peoples policy (OP 4.10).

60. **Livelihood Characteristics**. The major types of livelihood activities in the project area are crop & livestock production, agro-pastorals and trade. Most of the households are farmers, agro-pastoralists and nomadic pastoralists. Agriculture is predominately carried out by small-holder farmers practicing traditional methods of oxen plough and hoe cultivation. Due to high population pressure and limited arable land in the project area, the average holding size in most woredas is below one hectare. Economic activities outside of farming and livestock keeping are limited. The vast arid and semi-arid region is conducive for production of livestock of different types such as cattle, camels and goats. The livestock by-products such as hides and skins and products such as milk and butter are sold in the central market. Other significant livelihood activities are trade and illegal production and sale of charcoal. Land is the major source of income and food for the population living in the project area. Income from other activities is low and does not allow all households to meet their basic needs. A large portion of the population in the country lives below the absolute poverty line. Since almost all PAPs are small-scale farmers who make their living through traditional method of farming, it is difficult to determine their income. Households mainly use the bulk of their production for household consumption, and only very little products are marketed.

61. **Environmental Characteristics**. The transmission line avoids going through forests and natural habitats including protected areas, swamps/wetlands and any fragile and sensitive aquatic habitats. However, it passes close to Lakes Abaya and Chamo and the Nechisar Natural Park in the Arba-Minch area. The line will pass outside of a portion of the eastern boundary of the

Konso Cultural Landscape, a UNESCO World Heritage Site, and pass between the Konso-Gardula paleontological and archaeological sites.

Kenya

62. **Location**. The transmission line traverses the country from North to South through Marsabit, Samburu, Laikipia, Nyandarua, and Nakuru counties and terminates in Suswa where there are high population densities. The project area lies mainly within the Rift Valley, Central and Eastern Provinces of Kenya. Land-use ranges from livestock rearing, nomadic pastoralism in the northern regions to intensive small and large-scale agriculture in the southern regions. The total length of the transmission line in Kenya is 612 km.

63. **Population Characteristics**. The total population in the Counties along the transmission route is 3.3 million.[52] The main ethnic groups distributed along the project area include the Gabbra, Rendille and Samburu, in Marsabit, Samburu and Laikipiaes; the Kikuyu in Laikipia, Nyandarua and Nakuru Counties and Maasai in Laikipia and Nakuru Counties. The Maasai, Samburu, Rendille and Gabbra are mainly nomadic pastoralists. The longest portion of line route lies within the sparsely populated land occupied by Gabbra, Rendille and Samburu (all pastoralists). The Kikuyu ethnic group may be the most affected by the existence of the line because they have a relatively higher population density and are mainly settled peasant farmers. Other ethnic groups that have migrated to the project area Meru, Kisii, Luyia, Luo, Turkana and Somali. The proposed transmission line route traverses mainly rural areas of the five counties. Most of the counties traversed are sparsely populated except the settlement areas of Nakuru and Nyandarua counties. Heavily populated areas have been avoided during route selection.

64. In the initial screening of the Project, the Indigenous Peoples policy (OP 4.10) was triggered to take account of the possible presence of groups in Kenya for whom the policy might be applicable. Based on subsequent further analysis, however, there are no groups in the area that meet the policy's applicability criteria as interpreted in the past by the Bank in the Kenya context. The Indigenous Peoples policy is therefore not triggered for the Project.

65. **Environmental Characteristics**. The Project traverses Important Bird Areas, Dida Galgalu Desert and Lake Ol Bolossat. The Marsabit National Park and Losai Natural Reserve are also traversed by the line. Dida Galgalu and Lake Ol Bollosat are important bird areas that are recognized as such by the Birdlife International. This implies that the two areas host avian diversity of significant conservation values. Marsabit National Park and Losai National Reserve are gazetted protected areas of importance to conservation. The Marsabit National Reserve is located 560 km to the north of Nairobi in the Marsabit County. The reserve covers an area of 1,600 km² in the middle of the desert wilderness, and includes a Forest Reserve on the forested Mount Marsabit, (although the Transmission line will not traverse the forested part off the reserve). The region surrounding the Marsabit Reserve is of dry and barren semi-desert character. The Marsabit Reserve is a protective area for large mammals such as buffalo, zebra, giraffe, cheetah, antelope, oryx, greater kudu, elephants, rhinoceroses, lions, leopard and numerous species of birds. The Losai National Reserve is located to the south-west of the Marsabit County, across the Kaisut Desert. The reserve is characterized by a semi-desert

[52] Kenya Population Census of 2009.

landscape with rugged terrains, seasonal rivers, a lava plateau with scattered volcanic plugs covered with thorn bushes, and a zone of impenetrable mountain forest on the north-eastern edge of the central highlands, and, while now significantly degraded, includes the Melako Conservancy within the Reserve, which is attempting to protect the habitats of the sand grouse. The Laikipia – Samburu ecosystem, also in the project area, cannot be considered a 'biodiversity hot-spot' in the sense of having a wide diversity of endemic and/or endangered species, although it is host to lions, wild dogs, Grevy's zebra, eland, elephants, reticulated giraffes and patas monkeys. The Longonot-Suswa area is prone to soil erosion and is currently under pressure from human activities. The Rift Valley region of Kenya is well-known as a locus for evidence of human evolution and early development. The area has not been systematically surveyed which suggests that important material is yet to be discovered. Sites of cultural significance to current inhabitants, including burial grounds, are located in the area and contained in an inventory compiled in 2006 by the NMK.

Social (including Safeguards)

Ethiopia

66. **Potential Social Impacts**. The design of the Project has minimized, to the extent possible, adverse social impacts from land acquisition by routing the transmission line around towns and villages with high population densities. As a result, only a portion of farmlands or irrigation structures will be affected, mostly in rural areas. A key impact will be loss of farmland used to grow cereal and perennial corps such as bananas and mangoes. Permanent land acquisition for the right-of-way (RoW) will likely involve footing areas for the towers and the site of the substation in Wolyta/Sodo, which will also affect people currently using the site for grazing purposes. Temporary land acquisition will be required for erection of the towers and stringing of conductors. The construction of access roads will also affect farmlands, perennial corps and tree located within the RoW. The construction of tower foundations will be located in areas where there are no existing buildings. Overall, the Project will affect about 341 hectares of farming and pasture land. About 20 hectares of communal grazing is needed for the construction of the substation at Wolyta Sodo. Based on a household survey of the eight woredas traversed by the transmission line of households who reside within the 65 meters of the RoW, current estimates indicate that the Project will affect approximately 5,743 people (1,156 households). It is also estimated that the Project will affect 256 housing structures and small number of public and community institutions that will lose different types of assets and property to construction works including one fence around the abattoir, a graveyard, one store, two commercial nurseries and four churches.

67. Social impacts will be contained within the 65-meter width of the RoW for the transmission line. Most houses and structures will be shifted back or "stepping back" from the alignment and within the existing village or farmland. People who lose part of their land will be able to continue farming activities in those areas where construction activities are not planned and once these activities are over, they will be able to continue to cultivate crops under the transmission line. However, there are some plots that are too small for relocation and some houses will need to be re-established at other sites, which have been identified within the same

village. Impacts on cereal and root crops are mainly temporary. Temporary effects include damage to crop fields during the 30-month construction period, soil bunds and structures, irrigation canals during construction activities in the area. Once the construction activities are over, the owners of these lands will be able to cultivate cereal, vegetable and root crop with a height below four meters.

68. **Management of Social Impacts.** The alignment of the transmission line corridor has been determined, however, the precise routing of the RoW has not yet been finalized nor has the final location of the substation. While GoE has taken a preliminary census of PAPs and their lands and assets, they will not finalize the specific compensation for land take and affected assets until shortly after they finalize the precise routing of the RoW. The final alignment will take into consideration measures to minimize impacts on land and structures. In view of which, a Resettlement Policy Framework (RPF) has been prepared to clarify land acquisition and resettlement principles. The RPF, consistent with OP 4.12, will serve as guide for the preparation of a Resettlement Action Plan when final location of the Project's components has been defined. The key objective of the RPF is to ensure that all affected people will be compensated for their losses at replacement cost and provided with rehabilitation measures to assist them to improve, or at least maintain their pre-project standard of living and income earning capacity. Although the Bank is financing only the converter substations, its policy on Involuntary Resettlement applies to all associated facilities, including the transmission line, that are necessary to achieve the objectives of the Project and carried out simultaneously with the Project. To ensure consistency in the application of the involuntary resettlement policies and guidelines, the AfDB and the World Bank have agreed to coordinate implementation of the resettlement instruments for the jointly financed converter substations. In addition, AfDB has agreed to take into consideration any environmental and social concerns raised by the World Bank in connection with AfDB financed contracts, thereby ensuring the Project is carried out in compliance with the environmental and resettlement instruments as approved by both the AfDB and the World Bank.

Kenya

69. **Potential Social Impacts**. The Project is expected to result in change in land use, land acquisition, loss of livelihood and impact assets such as water tanks, gates, animal sheds, toilets, fences and business structures. Temporary and permanent land acquisition will be required for the erection of the towers and stringing of conductors. People who lose part of their land will be able to continue to farm and use the land for grazing purposes in those areas where construction activities are not planned or once construction activities are over. The total land area the RoW will traverse in Kenya is 39.9 km^2. In addition, about 20 hectares of grazing land will also be required for the construction of the substation at Suswa. Loss of income in some cases, disruption of schools, and relocation of employment sites will affect living conditions in some cases.

70. **Project Affected People**. Based on a socio-economic and census survey, the total affected population is about 1,200 people (380 households), mainly residents of the Central and

Rift Valley Regions of Kenya, where the planned transmission line will traverse[53]. Of these, only nine households (45 people) will need to be relocated.

71. **Management of Social Impacts**. KETRACO has prepared a RAP for the Kenya portion of the Project. It has been prepared in full consultation with the project affected people, relevant stakeholders and institutions. The RAP details mitigation measures to address social impacts on people affected by change in land use, land acquisition, loss of livelihood and impact to assets such as water tanks, animal sheds, toilets, fences and business structures. The RAP has been designed to ensure that all project affected people have their livelihood improved or at a least restored to pre-project levels.

72. **Grievance Handling Mechanism.** The RAP describes the mechanism for handling disputes and grievances related to the project activities. Effective informal and formal grievance re-dress mechanisms will be in place as well as a system for monitoring the resolution of these grievances. Information on the grievance redress mechanisms will be widely disseminated to project affected people. The entities responsible for grievance redressal have been identified in the RAP as, KETRACO's PIU and County Resettlement Action Plan Committees (CRAPT). External entities might involve Land Compensation Tribunal as well as other formal judicial mechanisms.

Environment (Including safeguards)

Ethiopia

73. **Potential Environmental Impacts**. The potential environmental threats are likely to be manageable or mitigable in Ethiopia. To a larger extent, potential environmental, safety and health risks are foreseen during the construction phase as vegetation will be cleared using heavy machinery to pave way for erecting base/foundation and pylons for the lines, constructing camp sites, material storage facilities, substations and access roads (loss of vegetation and biodiversity; soil erosion and sedimentation of nearby aquatic/drainage systems; air pollution; soil and water contamination from both liquid and solid waste; hazardous chemical poisoning of biotic life from use of weedicides and herbicides; etc). Operational phase threats may result from use of chemicals to clear RoW, unprofessional handling of paint, fuel and oil, electric and magnet field emissions, transmission lines snapping, transmission line collapsing, theft and heavy rains causing flooding, etc. These could lead to on-site or near-site soil and water contamination from spillage; air pollution from dust; noise and corona effect from vehicles and machines; fires; and visual intrusion; etc. These should be manageable. There is also the potential for discovery of chance finds of fossil or archaeological material during construction and the need to report such discoveries to ARCCH authorities in accordance with Ethiopian law and provisions of the Bank's OP 4.11 – Physical Cultural Resources.

74. A visit to the Ethiopia side of the selected transmission line route in December 2011 had shown that there could be potential threats to the Konso Cultural Landscape and the Konso-Gardula (Borena Administrative Zone) paleontological and archaeological sites. In June 2011,

[53] The number of affected households has reduced from 433 people to 380 as a result of the rerouting of the RoW to avoid Matthews range.

the Konso Cultural Landscape was demarcated and declared a World Heritage Site by UNESCO. The ESIA consultants sought advice from the ARCCH and have carried out fieldwork in Konso Woreda with the view of studying whether the transmission line could impact these cultural sites. Additional surveys have identified culturally important traditional water wells and religious places currently in use, and burial places in the area of Dubluk within the Borena Zone.

75. **Mitigation**. The Project would remediate any potential threats during the construction and O & M phases. A key undertaking prior to starting the Project would be to ensure that an effective multi-stakeholder institutional and implementation framework/arrangement is put in place for the management (including safeguard management) of all aspects of the Project. This should include actions for capacity building, training and skills upgrade. Mitigation actions including the establishment of effective mechanisms for monitoring, capacity building, governance (collaboration and consultations, accountabilities and transparency), etc. are essential to cost-effectively and timely counteract any potential threats that are likely to occur during the construction and O & M phases of the Project. For specific mitigation measures please refer to Table 6 below.

76. Following the findings during a field investigation by staff of the ARCCH in December 2011, the line was rerouted so as not to traverse the disclosed Konso-Gardula paleontological and archaeological sites and to pass outside the eastern boundary of the Konso Cultural Landscape.

77. In anticipation of possible chance finds, the ESMP will include plans for orientation and training for relevant EEPCo staff, the Supervision Consultant, and construction contractors prior to the onset of construction. The training will be administered by the ARCCH in consultation with EEPCo, and will provide information on the characteristics of physical cultural resources in the area of the Project's impact as well as on the requirements of Ethiopian law regarding the reporting and management of such resources if discovered during construction works.

Kenya

78. **Potential Environmental Impacts**. The first key environmental concern specific to the routing of this Project is the impact on natural plant, animal habitats and bird migration routes as the selected route traverses the Marsabit National Reserve and the Losai National Reserve, and passes through an Important Bird Areas (IBA) - Lake Ol Bolossat.

79. The second is the need to limit encroachment on natural habitats, and avoid ecological hot spots and wildlife corridors that may be affected as a result of construction of the pylons 4-6 km from the main road. The mission was informed that routing closer to the road is not possible because of (a) resettlement costs and disturbance to the marginalized communities who depend on road traffic for their livelihoods, and (b) town planning. Vision 2030 calls for an expansion of towns and villages along the route, so the transmission line must be sited some distance outside the proposed expansion.

80. The third is the need to conserve water use, for construction and for workers as much of the project area traverses severely water-constrained areas, where scarcity of water is a potential source of conflict.

81. The fourth is the potential for discovery of chance finds of fossil or archaeological material during construction and the need to report such discoveries to NMK authorities in accordance with Kenyan law and provisions of the Bank's OP 4.11 – Physical Cultural Resources.

82. **Mitigation**. In consultation between KETRACO, the Kenya Wildlife Service (KWS), and Kenya Forest Service (KFS), the Project will implement measures to limit non-critical habitat loss and degradation, in particular during construction. Ecological hot spots (such as the habitats of the sand grouse within Losai Reserve) will be avoided, and construction scheduling will be planned to avoid wildlife migration sections along the three portions of the proposed route that traverse migratory corridors. Guards will be posted at construction and campsites to ensure that wildlife are not poached and that precious woods such as sandalwood are not chopped down for resale. KFS and KWS will continue to liaise with KETRACO in the implementation of the Environmental and Social Management Plan, periodically monitoring the impact on biodiversity attributed to construction and maintenance of the transmission line and substations. In response to these concerns, KETRACO has clarified that consultations have been held with KWS to avoid elephant and other wildlife corridors, and these have been detailed in the ESIA. Care will be taken to disguise the pylons to limit aesthetic damage to the landscape. KETRACO will clarify in the ESIA that no access roads will be constructed in this section as the T-line is sufficiently close to the existing highway and useable tracks to avoid the necessity to prepare additional tracks for the construction and maintenance phases.

83. In consultation between KETRACO, the Kenya Wildlife Service (KWS), and Kenya Forest Service (KFS), the Project will implement measures to limit non-critical habitat loss and degradation, in particular during construction. KFS and KWS will continue to liaise with KETRACO in the implementation of the Environmental and Social Management Plan, periodically monitoring the impact on biodiversity attributed to construction and maintenance of the transmission line and substations.

84. KWS officials have confirmed that there are no *critically* endangered species along the route, and that animals would not be impeded by the line due to its height. The threatened Grevy's Zebra is present in the project area, and such presence is mentioned in the routing selection report and has been confirmed by recent inventories and works carried out by the Grevy's Zebra Trust.

85. To minimize bird collisions KETRACO will take appropriate measures in the design and construction of the transmission lines to minimize the risk of electrocution of birds in Important Bird Areas. More information on any bird migratory routes that may pass the line has been provided in the ESIA, and appropriate bird warning devices (balls on the lines, platforms on the towers for raptors and nesting birds) will be used as necessary and will be budgeted for in project costs. Nature Kenya, the Ornithology Department of the Museums of Kenya and KWS will provide guidance on which specific actions are appropriate.

86. Water use management plans will be incorporated in the ESMP to ensure appropriate water use management practices are employed during construction and at worker camps or in areas where there will be a short-term significant increase in population. Guidance will be sought from the Water Resource Management Authority, as to whether permits for water use for construction purposes are required. Wherever possible, new boreholes should be developed for project use, which, if containing sweet water, could then be left available for community use after works are complete.

87. The ESMP will include plans for orientation and training for relevant KETRACO staff, the Supervision Consultant, and construction contractors prior to the onset of construction. NMK will administer the training in consultation with KETRACO, and will provide information on the characteristics of physical cultural resources in the area of the Project's impact as well as the requirements of Kenyan law regarding the reporting and management of such resources if discovered during construction works. The training will be preceded by a survey of the area of impact by NMK experts.

88. Capacity exists in KWS and KETRACO to implement these measures, as KWS has had prior experience in managing impacts on fauna and avifauna through identifying and maintaining wildlife corridors and KETRACO has had experience in installing bird-warning systems on transmission lines. The Project shall ensure that construction contracts include the appropriate clauses on wildlife protection and camp management, and will monitor compliance with the ESMP, with particular attention to water management plans, during the Project's construction phase.

89. The Bank is financing the construction of two converter substations at either end of the transmission line. Each substation requires a ground electrode, which is designed following international standards to protect equipment and people from impermissible or harmful electricity currents and voltages inside and outside of the substation. One peculiarity of AC/DC converter substations is that the electrode needs to be grounded away from the substation to avoid interference with advanced power electronics equipment inside the substation. The ground electrodes will be connected to the substation through a medium voltage ground electrode line. Each electrode line may extend up to 50 km from the planned substations to reach the corresponding ground electrode location. On the Kenya side, the electrode line will extend from the Suswa substation. The area of the electrode is scarcely populated by pastoralists, and the substation itself lies within the boundaries of Akira Farm. The area is not a critical natural habitat.

90. **Greenhouse Gas Emission Reduction/Carbon Finance**. Kenya's average combined grid emission factor is estimated at 0.321 ton of CO2/MWh (compared to an emission factor of close to 0 for Ethiopia[54]). When compared to a business as usual (BAU) scenario (in the absence of the Project) the Project will reduce GHG emission as a result of the replacement of fossil fuel energy in Kenya with imported low or zero General – carbon energy from Ethiopia (minus leakage from GHG emissions from power that might be supplied from Kenya to Ethiopia in

[54] This factor is generally close to 0.003 tons of CO2/MWh for Ethiopia since the bulk of power generation is based on hydropower plants. However, it temporarily increased to 0.094 during 2007-2009 due to drought and the need for use of temporary thermal generators.

drought years.) At present, there is no CDM methodology that allows for carbon credits resulting from the two-way transmission of power. Future carbon/climate finance regimes (and the development of an appropriate methodology under the CDM's Second Commitment Period) may allow for carbon revenues to be generated from the Project.

91. **Climate Change Resilience**. Hydropower is highly vulnerable to climate change and changing disaster risks. Changes in river flow, evaporation and dam safety are the main drivers through which climate change impacts hydrological processes. The potential to generate electricity correlates strongly with the changes in water discharge. Although increased precipitation and river flow eventually boosts energy production, excess flow may impact negatively. Small hydropower might be even more significantly impacted by climate change and changing disaster risks due to their dependency on small rivers, which are prone to seasonal variations and can dry up quickly with higher temperatures, increased droughts and decreased water flows.

92. Another consequence of climate change is that increased temperatures, lower precipitation levels, and an increase in the frequency and severity of droughts are likely to lead to water stress. This affects the output of thermal power plants, which need fresh water for cooling purposes. Lack of water is a risk, which can potentially lead to a decrease in electric output. Also, high temperatures reduce the thermal generation efficiency, which in return can decrease the power output.

93. By allowing for two-way transmission of power, these climate-related impacts can be alleviated leading to greater climate-resilience. For example, during drought conditions, Kenya can bring on line emergency diesel generation to address power shortages in Ethiopia.

94. The Table below summarizes the Project's potential environmental impacts and proposed mitigation measures.

Table 6. Potential Environmental Impacts and Proposed Mitigation Measures

Potential Impact	Mitigation Measures
Non-critical natural habitat and biodiversity loss The line traverses protected areas. Community conservancies and Important Bird Areas.	Liaise with wildlife and forestry officials and wildlife organizations, civil society, and community representatives to avoid ecological hot spots in line routing Schedule construction around migration season in areas of the line that traverses migratory corridors. Provide bird warning and, as necessary, raptor platforms on transmission lines. Protect against poaching and theft of precious woods at construction and camp sites.

Potential Impact	Mitigation Measures
Water scarcity Much of the line passes through a severely water-constrained area, with frequent conflict over access to water.	Implement water use management and conservation plans at construction and camp sites. Sink dedicated boreholes to avoid depleting local community resources. Preserve sweet water boreholes for community use. Avoid use or pollution of water from animal watering holes for construction activity.
Air Pollution Degradation of air quality due to dust generated by breaking hard ground during construction and chemical emissions from equipment.	Avoid excavation during periods of strong winds. Cover vehicles and reduce their speed to prevent leakage of materials into the air.
Water and Soil Pollution Siltation of soil during construction activities, **possibly** leading to ecological habitat damages. Excavations and the use of quarries and borrow pits could reduce soil cover.	(a) Minimize clearing and disruption to riparian vegetation. (b) Analyze water quality to ensure compliance with environmental regulations. (c) Ensure that all construction materials are stored and ultimately disposed of in an appropriate manner. (d) Use soils excavated for the erection of pylons to refill areas where removed. (e) Avoid the exposure of loose, dry, bare soil to wind or water for long periods.
Loss of Vegetation Land clearing could diminish indigenous species of vegetation and degrade soil quality.	Clear trees selectively and re-vegetate areas with indigenous grasses, shrubs and flora.
Waste Products and Disposal Solid wastes produced by construction activities could pollute the project area.	Issue guidelines for waste disposal, monitoring of compliance and rehabilitation of quarry sites/borrow pits.
Use of Herbicide for clearance of T-Line route Could lead to contamination of groundwater, loss of biodiversity, and impact on human health.	As certain if chemicals (herbicides) are used in significant number, or if most land clearing will be done manually with protective gear and repellents against pests provided to the workers. If a significant amount of herbicide is used, the storage and disposal of these chemicals must be prepared as part of the ESMP with regular monitoring. Disposal should be conducted per the Environmental Management and Coordination (Waste Management) Regulations of 2006 of NEMA (in Kenya).

Potential Impact	Mitigation Measures
Health and Safety People in the vicinity of transmission towers and substations risk electrocution from live power lines, and a higher risk of sexually transmitted diseases during construction.	Conduct an education campaign on health and safety aspects of transmission lines and substations and the prevention of HIV/AIDS and other sexually transmitted diseases to construction and maintenance staff.
Cultural Resources The line traverses a region of great importance for evidence of human evolution and early development, in both Ethiopia and Kenya. A lack of systematic surveys suggests that construction works may uncover additional cultural material. Sites of sacred, historic and cultural significance to contemporary inhabitants are located in the area. The line passes outside the eastern boundary of the Konso Cultural Landscape, a UNESCO World Heritage Site, and between the Konso-Gardula paleontological and archaeological sites in southern Ethiopia.	The Ethiopian Authority for Research and Conservation of Cultural Heritage (ARCCH) and the National Museums of Kenya (NMK) will be consulted regarding the final RoW of the Project. In each country, orientation and training will be provided for the Project's implementation agencies, the Supervision Consultant, and construction contractors. Chance finds procedure clauses will be contained in procurement bidding documents and construction contracts, with the Supervising Engineer retaining responsibility for the enforcement of such clauses and notification of cultural authorities in the event of archaeologically and/or culturally significant finds. In Ethiopia, archaeologists from the ARCCH will be on site during construction works in the sensitive areas of the Konso-Gardula sites and the Konso Cultural Landscape.

4. Monitoring & Evaluation

95. There are four levels to the Project's performance monitoring. The first is the monitoring of the Project's outcome and intermediate outcome by tracking progress in the implementation of the Project's two components and the achievement of key outcome indicators. The second level consists of financial performance indicators for the implementing entities. The third level is monitoring of the status of the Program development and EAPP's implementation of its Strategic Road Map for a progressive evolution from the status to a competitive regional market. The fourth level concerns the implementation of the environmental and social management plans.

96. **Project Performance**. The JPCU will review the Project's implementation progress and outcome indicators quarterly. JPCU will complete its quarterly progress reports no later than 30 days after the end of each quarter. Annex 1 lists all 11 indicators (four outcome indicators and seven intermediate outcome indicators) along with baseline values for the indicators in FY2012 and yearly targets from FY2013 through FY2020 along with the implementing entity agency responsible for gathering data and evaluating each indicator. A joint co-financiers' mid-term review will take place approximately 36 months after the effectiveness of the IDA credits for the Project.

97. **Financial Performance of the Implementing Entities**. The Project's performance places considerable emphasis on the continued financial viability of the key implementing entities – EEPCo, KETRACO, and KPLC. The Project will monitor the entities' financial performance annually.

98. **EAPP's Strategic Road Map.** Co-financiers' implementation support missions will review the status of EAPP Strategic Road Map annually.

99. **Monitoring of Environmental and Social Impacts**. The Ethiopian and Kenyan sides of the Project have separate environmental and social management plans. Data collection will be the responsibility of EEPCo's and KETRACO's respective PIU. Quarterly progress reports on ESMPs will be issued during construction. Consultations with KWS, KFS, the Northern Rangelands Trust, Nature Kenya, and local community conservation officials shall be documented in the progress reports. Upon completion of the Project, each country will prepare a completion report, which will include a socio-economic study to assess the welfare of PAPs after the resettlement process is complete.

5. Role of Partners (if applicable)

100. The Project's co-financiers will carry out joint implementation support missions when practical and will conduct a joint mid-term review.

101. Environmental safeguards management along the portion of the line traversing Marsabit can be undertaken in conjunction with the implementation of the AFD-financed "Northern Kenya Wildlife Conservation Project". The project focuses on ensuring the ecological integrity of: (a) the Marsabit forest (which will be gazetted as a National Park); (b) areas adjacent to the forest displaying a similar ecosystem on the lower slopes of the mountain (to include three community conservancies and the strengthening of the remaining area of Marsabit National Reserve); (c) corridors (through ensuring security and water-point connectivity); and (d) refuges to which Marsabit is connected through the corridors (by securing Mathews Forest through a management agreement).

Annex 4: Operational Risk Assessment Framework (ORAF)

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM

EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

Stage: Board

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1. Project Stakeholder Risks						
1.1 Stakeholder Risk	Rating: High					
Description: 1. Civil society and NGOs have voiced their concerns about perceived impacts of the Project.	**Risk Management:** 1. The Joint Project Coordination Unit (JPCU) will develop a communication strategy to raise awareness on the regional significance and the benefits of the Project as the anchor of the future integrated Eastern Africa power market. Regional integration of East Africa's power systems will facilitate development of the region's cost-effective and clean energy sources.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
	Risk Management: 2. Ethiopia is expected to continue its successful electricity access expansion program to maintain and increase access. The World Bank is supporting this program under the ongoing Electricity Access (Rural) Expansion Projects (EAREP I and II) and the Electricity Network Reinforcement and Access Project (ENREP). The Kenya interconnector may also be used to transfer power to Ethiopia during shortfalls to increase Ethiopia's supply security.					
2. The Ethiopian population without access to electricity may object to power being exported to Kenya.	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
2. Implementing Agency (IA) Risks (including Fiduciary Risks)						
2.1 Capacity	Rating: High					
Description: 3. KETRACO's limited experience with World Bank procurement and EEPCo's limited procurement capacity may lead to implementation delays.	**Risk Management:** 3 (a). An International Supervision Consultant will assist KETRACO and EEPCo to carry out procurement under the Project (financed by AfDB; shortlist and RPF are being prepared in May 2012). The Project will finalize a Project Implementation Manual, to be cleared by the Bank as an effectiveness condition, which will provide clear guidance on the procurement process and procedures to be followed. A procurement plan has been cleared by the Bank during negotiations. Procurement packages have been simplified to the maximum extent and now include only six turnkey contracts and one consultancy.					
	Resp: Client	Stage: Both	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
	Risk Management:					

	3 (b). The staffing of the KETRACO and EEPCo Project Implementation Units (PIU) with adequate technical, procurement, accounting and safeguards staff is a condition of effectiveness.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: Not Yet Due
	Risk Management:
	3 (c). The establishment of the Joint Steering Committee (comprising CEOs of EEPCo, KETRACO and KPLC and high level Government officials) to ensure timely project implementation and effective coordination between the countries, was a negotiation condition for the IDA Credit and was promptly met by both Ethiopia and Kenya.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: April 27, 2012 | Frequency: | Status: Completed
4. Due to the growth experienced in the past several years by EEPCo, the company's billing and accounting systems have come under a lot of stress. As a result, there has been a delay (of nearly 12 months in the past two financial years) in producing reconciled financial accounts as well as audited financial statements.	**Risk Management:**
	4 (a). EEPCo will carry out a "just-in-time study" to review the company's financial management arrangements. EEPCo will implement the findings of the study through the capacity building component of the ENREP project (P119893).
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: Not Yet Due
	Risk Management:
	4 (b). EEPCo will recruit or assign a qualified and experienced internal auditor to strengthen the monitoring of internal control systems for the Project six months after effectiveness.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: June 30, 2013 | Frequency: | Status: Not Yet Due
	Risk Management:
	4 (c). EEPCo will appoint, within three months of effectiveness, a Financial Specialist (consultant) to assist improving the company's overall financial management practices.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: March 31, 2013 | Frequency: | Status: Not Yet Due
	Risk Management:
5. Delays by EEPCo in submitting audit reports and responding to issues raised by the Bank may stall the Project. EEPCo faces capacity challenges in relation to internal audit and accounting due to limitations in staff capacity and problems with its accounting information system.	5 (a). EEPCo has prepared, before negotiations, a satisfactory action plan to address audit issues in its entity audit and management letter for years ended July 7, 2010 and July 7, 2011.
	Resp: Client | Stage: Preparation | Recurrent: ☐ | Due Date: April 16, 2012 | Frequency: | Status: Completed
	Risk Management:
	5 (b). EEPCo has agreed with the Bank on format for Interim Financial Management Reports (IFMR) and ToRs for auditing the Project's transactions.
	Resp: Client | Stage: Preparation | Recurrent: ☐ | Due Date: April 17, 2012 | Frequency: | Status: Completed
	Risk Management:
	5 (c). EEPCo will review and identify any existing problems in the interface between the company's current accounting software and its billing

	system and, within 24 months after effectiveness and on the basis of the conclusions of such review, implement the required improvements. The Bank will monitor improvements in EEPCo's internal control systems using a time bound action plan.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date: Dec. 31, 2014	Frequency:	Status: Not Yet Due
2.2 Governance	Rating: Substantial					
Description: 6. Shared accountability for project implementation may delay the Project.	**Risk Management:** 6 (a). The governance structure of the Project at ministerial level (the Joint Ministerial Commission) and at CEO and heads / accounting officer level (Joint Steering Committee) has been designed to ensure good coordination and accountability at EEPCo and KETRACO.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
	Risk Management: 6 (b). The establishment of the Joint Steering Committee (comprising CEOs of EEPCo, KETRACO and KPLC and high level Government officials) will help ensure timely project implementation and effective coordination between the countries. It was a negotiation condition for the IDA Credit.					
	Resp: Client	Stage: Preparation	Recurrent: ☐	Due Date: April 27, 2012	Frequency:	Status: Completed
	Resp: Client	Stage: Preparation	Recurrent: ☐	Due Date:	Frequency:	Status: Completed
3. Project Risks						
3.1 Design	Rating: High					
Description: 7. HVDC technology, although proven, is new to Ethiopia and Kenya. EEPCo and KETRACO appreciate the technical challenge of implementing the technology but may lack sufficient capacity in operating the line after it is commissioned. There is also a risk that the design of the HVDC line is flawed or mis-specified.	**Risk Management:** 7. The Project will transfer technology skills through a two-track strategy. First, international "turn-key" contractors will be responsible for design, construction, and commissioning. The contractors will train EEPCo, KETRACO and KPLC staff on construction and operation practices. Second, the substation contractor may be requested to provide maintenance services for a period of time after the one-year defects liability period following commissioning. In addition, KETRACO has entered into an agreement with Power Grid of India which includes capacity building on HVDC technology and operations. When commissioning nears, the EEPCo and KETRACO will assess if a specialized operator is additionally needed to assist with the first two years of operations.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Not Yet Due
8. The joint project implementation arrangements and specially those concerning joint implementation coordination and procurement are new for EEPCo and KETRACO and may therefore delay implementation.	**Risk Management:** 8. The Project's timely implementation depends critically on smooth and well functioning joint implementation arrangements between EEPCo and KETRACO, as well as expeditious decisions by the joint ministerial commission when called for. To ensure readiness of EEPCo and KETRACO for joint implementation of the Project, the establishment of the Joint Steering Committee was a condition of negotiations, while the appropriate staffing of the Joint Project Coordination Unit and the national Project Implementation Units are conditions for credit effectiveness.					
	Resp: Client	Stage: Both	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
9. Different procurement approval rules and processes in the two	**Risk Management:** 9. The Project Implementation Manual, to be finalized as a condition of effectiveness, will include clear guidance and lead-time recommendations					

countries may delay contract awards.	for various stages of the procurement approval process including a dispute resolution modality in case EEPCo and KETRACO disagree on procurement matters.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: Dec. 31, 2012 | Frequency: | Status: Not Yet Due
10. Uncertainty in market conditions for manufacturing capacity and materials prices may lead to bid prices higher or lower than cost estimates.	**Risk Management:** 10. Cost estimates are based on recommendations by independent consultants and include contingencies. However, since bidding documents will be issued only in 2013, it is not possible at this time to predict the impact on bid prices of global economic developments or manufacturing capacity. Risk management measures in case bid prices exceed budget estimates include revision of the scope of the Project to take advantage of scalability of HVDC technology and additional financing from co-financiers or other development partners.
	Resp: Both | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: Not Yet Due
11. Portions of the existing transmission network in Kenya may need reinforcement in order to handle the imported 400 MW from Ethiopia.	**Risk Management:** 11. The project design includes adequate funding for reinforcement of substations and other parts of the Kenya network based on analysis carried out by KPLC and independent consultants. These investments complement work undertaken under the AFD-financed "Nairobi Ring project". KPLC and KETRACO will provide the Bank with regular updates on the status of reinforcement works, electricity demand, and network expansion. If required, the Bank may provide financing for additional reinforcements under other planned projects in the pipeline.
	Resp: Bank | Stage: Both | Recurrent: ☐ | Due Date: | Frequency: | Status: In Progress
3.2 Social and Environmental	Rating: Substantial
Description:	**Risk Management:**
12. Project Affected Persons (PAPs) may raise concerns about the Project and compensation eligibility.	12. EEPCo and KETRACO have conducted and will continue to conduct consultations and dialogue with PAPs to ensure a successful Resettlement and/or compensation process. The process of consultations will continue until the implementation of the RAPs is completed.
	Resp: Client | Stage: Both | Recurrent: ☐ | Due Date: | Frequency: | Status: In Progress
13. Different policy requirements of the financiers' may hamper smooth implementation. In Ethiopia, AfDB has cleared and disclosed a RAP that did not meet the World Bank's requirements for a RAP. EEPCo has thus prepared an RPF to meet the Bank's policy and will prepare the required RAPs before construction works start.	**Risk Management:** 13. The co-financiers will undertake that notwithstanding any differences that may exist between the co-financiers' respective policies, practices, and procedures on safeguards matters with those of the World Bank, the RAPs for all components of the Project (regardless of the source of financing) will take into account the World Bank's requirements to ensure the Project is carried out in full compliance with them.
	Resp: Bank | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: In Progress
14. In Ethiopia, EEPCo will have to implement RAPs for the Project investments before construction works start. Given that "woredas" (counties) will be involved in the assessment and valuation of affected property, this may delay the start-up of construction works.	**Risk Management:** 14. No disbursement will be made for component A.2 (b) in Ethiopia, until and unless EEPCo has adopted, consulted upon and disclosed the RAP for the converter station as approved by IDA and the Displaced Persons have been compensated in accordance with the provisions of the RAP. The disclosure and implementation of the Ethiopia RAPs is a condition of disbursement for component A.2 (b) in Ethiopia.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: Not Yet Due
	Risk Management:

15. In Kenya, the wildlife migration patterns may be adversely affected if construction schedules are not properly designed and implemented.	15. Construction schedules will be designed in consultation with the Kenya Wildlife Service to avoid construction activities during periods of wildlife migration.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Not Yet Due
16. Chance finds of paleontological and archaeological material during construction may delay implementation.	**Risk Management:** 16. KETRACO and EEPCo will consult with the national and regional cultural heritage authorities and ensure compliance with chance find procedure requirements and chance find clauses will be included in procurement bidding documents and construction contracts. The Ethiopian Authority for Research and Conservation of Cultural Heritage (ARCCH) and the National Museums of Kenya (NMK) will be consulted regarding the final ROW of the Project. Orientation and training will be provided for EEPCo and KETRACO, the Supervision Consultant, and construction contractors. Chance finds procedure clauses will be contained in procurement bidding documents and construction contracts, with the Supervising Engineer retaining responsibility for the enforcement of such clauses and notification of cultural authorities in the event of archaeologically and/or culturally significant finds. In Ethiopia, archaeologists from the ARCCH will be on site during construction works in the sensitive areas of the Konso-Gardula sites and the Konso Cultural Landscape.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Not Yet Due
3.3 Program and Donor	Rating: Substantial					
Description: 17. Coordination challenges among the Project's co-financiers may delay implementation.	**Risk Management:** 17 (a). The three co-financiers have worked together to prepare the Project and have resolved their differences in approach to the extent possible. The procurement packages have been clearly defined and divided among the co-financiers. There is only one jointly financed contract for which the AfDB and WB have agreed to follow the WB's procurement guidelines. The processing schedules of the co-financiers are in line with the Project's implementation schedule. The co-financiers will carry out joint supervision missions to the extent practicable and will conduct a joint mid-term review.					
	Resp: Bank	Stage: Both	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
	Risk Management: 17 (b). The execution of each of the Co-financing Agreements and the meeting of all conditions precedent to their effectiveness or to the right of EEPCo and KETRACO to make withdrawals under them is an effectiveness condition for the IDA Credit.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date: Dec. 31, 2012	Frequency:	Status: Not Yet Due
	Risk Management: 17 (c). The co-financiers are discussing a MOU or similar arrangements between them to cooperate in all matters of common interest relating to the procurement and implementation of certain contracts to be co-financed under the Project and to harmonize safeguards to the extent possible.					
	Resp: Bank	Stage: Both	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
3.4 Delivery Monitoring and Sustainability	Rating: High					
Description:	**Risk Management:**					

18. Ethiopia's ability to successfully continue its hydropower expansion program and expected production is critical to ensuring sustainability of the Project in the short-run. To this extent, Ethiopia's ability to raise the finances required for the generation expansion program is also an associated risk that can affect the commissioning of upcoming power stations.	18 (a). The on-time commissioning schedule of planned power stations in Ethiopia will substantially reduce the supply shortfall risk the first few years of operation of the interconnector. The mitigation measures for this risk include: (i) effective management and monitoring of the generation expansion programs such that the commissioning dates are realized as planned, and (ii) technical assistance and capacity building support designed to assist the GOE in the modernization of the energy sector as the country embarks on a massive program for growth - as part of ENREP. ENREP will include specific programs to strengthen sector institutions in key areas, such as investment planning, fiduciary management, procurement and contract management, human resource development, project management, and effective portfolio management. It should be noted that while the ENREP support covers the entire Bank-funded portfolio, there is no agreement to use these funds for managing/monitoring non-Bank funded projects.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: | Frequency: | Status: In Progress
	Risk Management:
	18 (b). GoE will submit to the Bank a detailed program of actions to ensure financial viability of EEPCo, including the financing plan for EEPCo for FY 2013, as an effectiveness condition for the IDA Credit.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: Dec. 31,2012 | Frequency: | Status: Not Yet Due
	Risk Management:
	18 (c). Beginning with May 2013, GoE will annually review with the Bank the financing plan of EEPCo for the upcoming fiscal year including actions to ensure financial viability of EEPCo.
	Resp: Client | Stage: Implementation | Recurrent: ☐ | Due Date: May 15, 2013 | Frequency: | Status: Not Yet Due
19. Ethiopia is subject to cyclical droughts, which may impact hydro production, reduce available export supply and result in the interconnector being temporarily underutilized supplies.	**Risk Management:** 19. The risk mitigation measures include: (i) EEPCo's strategy for hydropower development includes mitigation of hydropower output variability by developing most of the hydropower stations with large water storage capacity to ensure availability of water for electricity generation at least at partial capacity throughout the year; (ii) planning and developing more than 29 hydropower resources in such a way that they are dispersed among different river basins in climatically different areas of the country. Since most droughts in Ethiopia are regional, the above approach of establishing hydrologic complementarity reduces the impact of potential regional droughts on the overall average firm energy generation across the system; and (iii) ensuring that proper hydrological studies, geological analysis and operational analysis are carried in the design phase to ensure smooth implementation of the power stations. An assessment of the potential impact of deteriorated hydrology conditions in Ethiopia was carried out by the team by performing a sensitivity analysis based on a 15 percent reduction in the energy output of all new hydropower stations. The analysis concluded that based on current plans, EEPCo will still be able to fulfill its overall export commitments and shortages would materialize only if the national demand grew at an extremely optimistic 32 percent annually.
	Resp: Client | Stage: Both | Recurrent: ☐ | Due Date: | Frequency: | Status: In Progress
20. Financial sustainability and technical maintenance of the Project may be at risk unless there are legally binding agreements between project entities.	**Risk Management:** 20 (a). EEPCo and KPLC have signed a long-term Power Purchase Agreement (PPA) before negotiations for the IDA Credit. It was approved by the Kenya Energy Regulatory Commission on March 1, 2012.
	Resp: Client | Stage: Preparation | Recurrent: ☐ | Due Date: March 1, 2012 | Frequency: | Status: Completed
	Risk Management: 20 (b). KPLC and KETRACO have drafted a wheeling agreement before negotiations. Its finalization and approval by relevant regulatory authorities is a remedy under the IDA Credit (event of suspension).

	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Not Yet Due
21. The line is over 1,000 km long, traversing difficult and conflict-prone terrains (in Kenya), which may delay construction and make supervision more costly and difficult.	**Risk Management:** 21. KETRACO has allocated US$4 million for project management and supervision. These funds will support any special needs for security and special transport for supervision purposes. The Bank supervision budget may require augmentation to address any special security and transportation needs that may arise as a result of these challenges.					
	Resp: Both	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: In Progress
22. The implementing entities may not regularly monitor and report project progress. While KPLC and KETRACO, because of their reporting requirements under Kenya law, have good capabilities, reporting from EEPCo has been limited on other projects.	**Risk Management:** 22. Monitoring arrangements will be spelled out in the Project Implementation Manual and discussed and agreed before effectiveness. Monitoring will be the responsibility of the Joint Project Coordination Unit. Supervision missions by the Bank and other co-financiers will review status of monitoring activities.					
	Resp: Client	Stage: Implementation	Recurrent: ☐	Due Date:	Frequency:	Status: Not Yet Due

4. Overall Risk

Implementation Risk Rating:	**High**
Description: A High risk rating was selected for implementation because of the high country, implementing entity, and stakeholder risks; high risks posed by the complex multi-layered implementation structures, the introduction of new transmission line technology and the challenges of coordinated implementation, and operation of the Project.	

Annex 5: Implementation Support Plan

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

1. For a high-risk project such as the proposed Project, Bank preparation and supervision teams need to be adequately resourced and staffed. Successful implementation and realization of the Project's development objective will require intensive supervision. The implementation support plan below responds to the complexity of the Project, the significant technical and co-ordination issues (two countries, three co-financiers) that are critical to its success, and the challenging governance environment in which the Project will be implemented. Adequate World Bank resources and staffing to assure this level of supervision will need to be made available throughout the project implementation cycle. Project supervision will be undertaken by an inter-disciplinary team of field- and headquarter-based World Bank experts, with strong support from senior management in the Africa Sustainable Development Department as well as from country and regional management.

Strategy and Approach for Implementation Support

2. The objective of the implementation support strategy is to provide technically relevant and cost-effective support tailored to the needs of the Project at the two stages of its implementation. Stage one includes the first two years and entails carrying out procurement activities with close co-ordination with co-financiers, starting the construction activities and mitigation activities associated with the ESMPs and resettlement. Stage two covers the subsequent four years with intensive construction activities and continued Program development.

3. There will be at least two full joint supervision missions with the co-financiers each year.

Implementation Support Plan by Focus Area

Technical (Risk Rating High)

4. During Stage One, technical implementation support will focus on ensuring timely procurement processes, functioning implementation and coordination arrangements between the countries, and appropriate technical design of project components. Particular attention will be paid to monitoring the capacity and working arrangements of the implementing entities and the JPCU, bid prices and potential issues arising of the bidding process for the EPC contracts, coordination of construction schedules for the EPC contracts and coordination among co-financiers. Activities will also include furthering the development of the Regional Eastern Africa Power Pool Program through dialogue with the EAPP Secretariat, EAPP member countries, other regional organizations involved in regional power and potential co-financiers. The Team will also support implementation of EAPP's Strategic Roadmap through technical advice as required. The Bank team will include head quarters and country office-based staff and consultants. Specialized expertise in HVDC design and developing power pool operations will be mobilized as required. Resource requirements will be higher than the Bank's average project supervision coefficients because implementation support activities must be carried out in two countries, specialized technical expert in HVDC technology may need to be engaged for review

of technical specifications in bidding documents, and Program development requires coordination with several EAPP member countries.

5. During Stage Two, focus will shift to monitoring construction process, contracts management, disbursements, and effectiveness of capacity building and technical assistance activities. During this Stage, the Bank will also monitor closely Ethiopia's power plant construction program, Kenya's power development plan, and support development of operating arrangements for the interconnector. Monitoring of overall energy sector developments in Ethiopia and Kenya and review of EEPCo's, KETRACO's and KPLC's financial performance will be coordinated with other ongoing power projects in Ethiopia and Kenya. The Bank team will include HQ and CO-based staff and consultants, complemented with specialized expertise as required. Resource requirements will be higher than the Bank's average project supervision coefficients during the Project's construction phase because activities must be carried out in two countries and field visits to the transmission construction sites in remote and conflict prone areas will require additional resources for helicopter transportation and ensuring the security of staff. The cost of field visits may be shared between the co-financiers. Visits may also be required to power plant construction sites in Ethiopia to confirm progress. The joint co-financiers' mid-term review will be carried out about 24 months after credit effectiveness.

Financial Management (Risk Rating Substantial)

6. FM field supervision is guided by the risk assessment of the Project. For EEPCo, which has substantial residual FM risk, supervision on field will take place at least twice a year while KETRACO with a moderate FM residual risk will be supervised once a year. However, the FM team will also do continuous FM supervision through reviewing quarterly interim financial reports and following-up on any action plans e.g., in the case of EEPCo, which will have an extensive FM action plan to address a number of issues. Supervision will also include the review of audit reports.

7. In terms of resources, we expect to use mainly the country based FMSs for 4-6 weeks in Ethiopia mainly because of the issues that require follow-up while for Kenya staff time requirement is between 2-3 weeks per year.

Procurement (Risk Rating High)

Ethiopia

8. The procurement implementation support will include: (a) provision of procurement clinics; (b) support in updating the Procurement Plan; (c) support in preparation of procurement manuals; (d) support in preparation of draft Bidding Documents, RFPs, ToRs, Pre Qualification documents; (e) review of the procurement submissions; (f) follow-up on agreed actions and other similar support.

9. During Stage one, more frequent supervision will include Bank missions every four months. But the hand holding and provision of technical advice necessary to facilitate preparation of acceptable procurement document will need continuous support of the Procurement Specialist designated to the Project. In terms of staff weeks, during the first two years, staff requirements are about five staff weeks of the Addis-based Procurement Specialist

and three weeks of the Senior Procurement Specialist (including the time of the Procurement Hub Coordinator). If necessary, a short-term procurement consultant will be engaged. During Stage two, staff time requirement will be half of the first years. In addition, staff in the Africa Region's Procurement Manager's office will provide support for review of procurement documents for high value contracts.

Kenya

10. Following effectiveness, the team's procurement specialists will conduct an orientation session for the staff of KETRACO engaged in procurement. Continuous procurement support would mainly involve updating the procurement plan; advice on procurement processes; preparation of procurement documents (Goods, Works and Selection of Consultants), records management, use of PROCYS, targeted clinics etc. Supervision will take place every four months or three times during the first year. From second year onwards supervision will be two times a year.

11. Effective procurement support will require about five weeks of the Nairobi-based Procurement Specialist's time and three weeks of Hub Coordinator's time during the first year and half of that in subsequent years. In addition, staff in the Africa Region's Procurement Manager's office will provide support for review of procurement documents for high value contracts.

Environmental and Social (Risk Rating Substantial)

12. Environmental safeguards support for implementation of the Project include visits to project areas of key ecological importance, in addition to the Important Bird Areas located along the line, to observe mitigation measures are being adequately implemented and to hold consultations with local conservation and forestry officials, local community leaders, and civil society. It is recommended that these groups be included in periodic meetings with the contractors and KETRACO, as they are best placed to rapidly report on compliance with the ESMP. The safeguard specialists will also follow up with these groups during supervision. During construction, monitoring is necessary to ensure the ESMPs and occupational health and safety measures are adhered to, and appropriate site rehabilitation is undertaken post-construction. The estimated time requirement is eight weeks per year (four weeks for each country).

13. Support for physical cultural resources during implementation of the Project includes consultation with the National Museums of Kenya (NMK) and the Authority for Research and Conservation of the Cultural Heritage (ARCCH) in Ethiopia to confirm their participation in the field and in training as stipulated in the PIM, and to monitor provisions for the management of chance finds during construction. In Ethiopia, special attention is warranted for protection of the Gardula paleontological sites and the Konso Cultural Landscape. This support will be provided by the Environmental Specialist and/or a designated cultural heritage specialist. The estimated time required is two weeks per year (one week for each country) and should include visits to the field as required for adequate supervision.

14. Social safeguards support for the implementation of the Project will focus on ensuring the effective implementation of the RAPs and the maximization of development opportunities. The elements of the RAPs that require particularly close supervision are livelihood restoration activities, ongoing consultations with project affected people and other key stakeholders including local community leaders and civil society groups, and the grievance redress process. Supervision of the RAPs, through field based reviews and close interaction with EEPCo and KETRACO, will be carried out by a combination of headquarters based and country office based social safeguard specialists. The estimated time requirement is eight weeks per year (four weeks for each country).

Focus Areas, Skills Needed, Resource Estimates, Partner Roles

Time	***Focus***	***Skills Needed***	***Resource Estimate***	***Partner Role***
First eighteen months	Effectiveness, procurement, safeguards, FM, political development in Kenya	Legal, engineering, procurement, financial management, power pool development, environmental and social/resettlement/cultural heritage, especially archaeology, stakeholder engagement and communications, country economist, HVDC technology specifications verification and review.		The Project's Joint Steering Committee will facilitate implementation. AfDB and AFD will supervise their components of the Project and contribute to joint supervision.
18-72 months	Review of progress in construction and capacity building; review of sector technical and financial performance; procurement; M & E; safeguards; FM; EAPP development; Program development, Ethiopia's and Kenya's generation expansion plans, financial performance of EEPCo, KETRACO and KPLC.	Engineering, sector specialist, sector regulatory specialist, M & E specialist, financial analyst, economist, environmental and social/resettlement/physical cultural heritage, legal.		AfDB and AFD will supervise their components of the Project and contribute to joint supervision.
Mid-term review		Engineering, sector specialist, sector regulatory specialist, M & E specialist, financial analyst, economist, environmental and social/resettlement, cultural heritage, especially archaeology, legal.		Participate in joint mid-term review.
Completion report		Engineering, sector specialist, sector regulatory specialist, M & E specialist, financial analyst, economist, environmental and social/resettlement cultural heritage, especially archaeology, legal.		Participate in joint completion review and reporting.

Skills Mix Required

Skills Needed	***Number of Staff Weeks***	***Number of Trips per year***	***Comments***
Team leader	16	2	
Sector leader (2)	2	0	
Power engineer	8	2	
HVDC technology engineer	3	1	Specialized consultant to help in an as-needed basis as advisor to Bank staff on bidding process and supervision.
Energy sector specialist (2)	4	2	One will cover Ethiopia and the other Kenya.
Power trading/regulatory specialist	3	1	
Specialized technical experts	4	As required	
Regional integration specialist	2	As required	
Financial analyst (2)	4	1	
Energy economist	4	1	
Country economist (2)	2	0	For Ethiopia and Kenya to cover macroeconomic developments.
M & E expert	2	1	
Communication Specialist	2	1	
Legal	2	0	
Administrative support	20	0	
Disbursement specialist	4	As required	
Environmental specialist (2)	8	2	Category A projects require two supervision missions per annum, to be combined with other supervision missions if possible.
Social/resettlement specialist (2)	8	2	Both headquarters based and country office based staff.
Physical cultural heritage specialist	2	1	May be combined with Environmental Specialist.
Procurement specialists (4)	12	0	Staff are based on country offices. Time requirement is higher during the first two years.
FM specialist (2)	8	0	Staff are based in country offices.
TOTALs	**120**	**17**	

Partners

Name	***Institution/Country***	***Role***
Mr. Patrick Nyoike	Ministry of Energy, Kenya	Member of Joint Steering Committee
Mr. Miheret Debebe	Chief Executive Officer, EEPCo	Member of Joint Steering Committee
Eng. Thierno Bah	African Development Bank	Co-financier
Ms. Mathilde Bord-Laurans	French Development Agency	Co-financier

Annex 6: Ethiopia Electricity Demand and Supply Balance Analysis

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

Power System Interconnection of the EAPP Countries

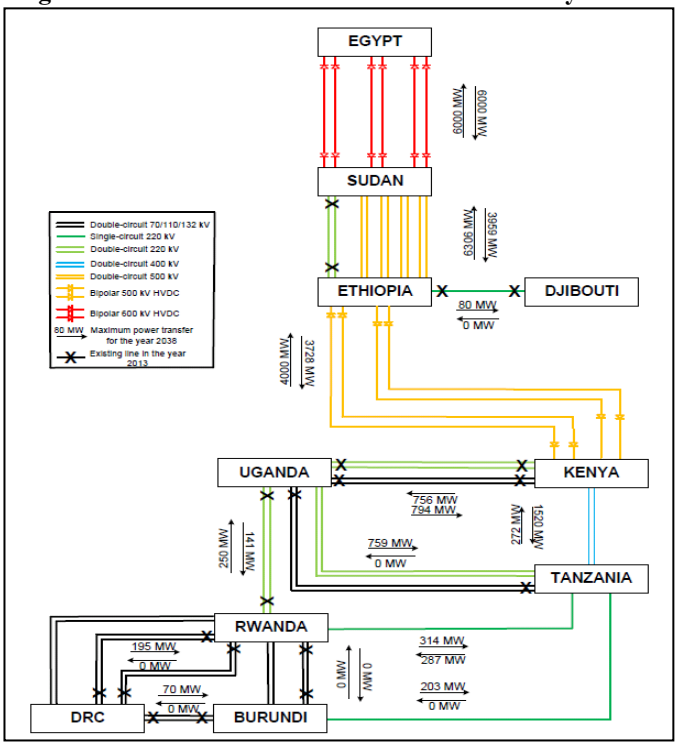
1. **The East Africa Power Pool Secretariat has led the effort to produce the first Regional Power System Master Plan and Grid Code Study (EAPP Master Plan) for the East African region.**[55] This was endorsed by the Conference of Ministers responsible for electricity in the EAPP member countries in May 2011. The Plan identifies the least-cost generation and transmission projects that ensure electricity supply to the region between 2013 and 2038 under common long-term sufficiency and reliability requirements, as set out by the EAPP Grid Code. The Plan builds on an array of demand forecast scenarios and an extensive catalogue of generation and transmission projects, including existing, under construction, and candidate projects, compiled for each country in the region. Also, common planning criteria and basic unit costs have been developed for the candidate generation and interconnection projects. Eight planning scenarios have been performed to identify the generation and transmission investments required to accommodate electricity demand in the region at different levels of coordination among countries, including: (a) national generation investments planned independently and only on-going interconnections included in the plan; (b) regional transmission investments planned in coordination while generation investments are independently planned by the various countries, (c) both national generation investments and regional interconnections planned in a coordinated fashion.

2. **The EAPP Master Plan has demonstrated the need for pooling energy resources at regional level by completing key interconnections.** Given the different load profiles and energy resource endowments across the region, pooling energy resources at regional level is the most cost efficient way to supply East Africa's fast growing electricity demand. This implies expanding cross-border transmission infrastructure to allow energy resources to be shared among countries through power trade. Costs savings can be large, despite the required up-front investments in transmission. Investments needs for generation and transmission expansion fully coordinated at regional level have been estimated to total US$322.5 billion (in 2009 dollar terms) as opposed to the US$354.9 billion needed if all countries individually expand generation capacity and no new interconnections are developed. Savings mainly derive from substituting expensive thermal generation with the more cost-efficient renewable resources available to the region. Net annual savings – after the cost of interconnections have been deducted – can be as high as US$1.24 billion.

[55] The region covered by the Plan spans beyond the commonly defined East Africa Region and includes Burundi, Djibouti, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda.

3. **The Ethiopia-Kenya interconnection is part of the least-cost expansion plan identified by the EAPP Master Plan.** Using advanced optimization and simulation models, including OPTGEN and Stochastic Dual Dynamic Programming (SDDP),[56] the Plan has selected the generation and transmission projects that allow accommodating the regional demand for electricity at the lowest total cost. Major interconnectors have been identified as part of the least-cost expansion plan (Figure 1). Altogether, they constitute the regional transmission network that is a pre-requisite for regional power integration in East Africa. Among these, the Ethiopia-Kenya interconnection with 2,000 MW of HVDC transmission capacity constitutes a key component of the plan across all scenarios considered. The line is a system-to-system interconnection and as such is not linked to any particular generation plant. Initially, it will be linking the national grids of Ethiopia and Kenya. In the medium- to long-term, it will serve the other East African countries that will interconnect to the regional transmission network.

Figure 1. EAPP Master Plan Interconnections by 2038



Source: Regional Power System Plan and Grid Code Study, EAPP and EAC, 2010.

The line is a critical link of the regional transmission network for East Africa connecting the southern and northern parts of the region, enabling power transfers in a northerly or a southerly direction. The interconnection between Ethiopia and Kenya is the Electricity highway connecting the southern and northern parts of the region. Depending on the pace of demand growth and the expansion of generation and transmission capacity across the region, the interconnection is able to transfer power from north to south and from south to north. Power traded on the line will initially be sourced from Ethiopia and serve demand in Kenya, Uganda and Tanzania. However, the direction of power flow may reverse during certain seasons depending on the availability of generation in these countries and the differences in supply cost resulting from differences in demand and generation profiles among the countries. In the long-term and under a scenario of full integration of all countries in the region, the regional least-cost supply option is to transfer power from lower-cost generation sources from countries south of Kenya to countries north of Kenya to meet demand in Sudan and Egypt where the cost of domestic generation is higher. In this scenario, power will be sourced from a multitude of generation plants in Ethiopia, Kenya, Uganda, and Tanzania, flowing in a northerly direction most of the year.

[56] OPTGEN is a computational tool for determining the least-cost expansion plan of a multi-regional hydro-thermal system; SDDP is a probabilistic multi-area hydro-thermal production costing model.

The EAPP Master Plan estimates that in 2028 the Ethiopia-Kenya interconnector should be transporting 614 GWh from Ethiopia towards Kenya and 11,144 GWh through Kenya all the way to Egypt, leading to a net transfer of power from the south to the north of 10,530 GWh. Similarly, in 2038 the Ethiopia-Kenya line should be transporting 4,242 GWh towards Kenya and 7,231 GWh towards Ethiopia, resulting in a net of supply to the countries north of Kenya of 2,989 GWh.

4. **The technical and economic viability of the 2000 MW interconnection between Ethiopia and Kenya has been extensively tested and confirmed by a Robustness Study.** Following the completion of the Master Plan, the EAPP Secretariat commissioned a further Robustness Study – *Verification of the Regional Economic Robustness of the Ethiopia-Kenya Transmission Interconnection Options*[57] – with the specific objective to verify the feasibility of the Ethiopia-Kenya interconnection under a wider range of assumptions and scenarios. The analysis has considered five alternatives to interconnect the two countries and tested each of them under eleven scenarios entailing less favorable conditions that may affect the viability of the interconnection. In particular, alternatives for the interconnection include: (1) no interconnection; (2) 2000 MW capacity, but with only half of the converter capacity installed by the earliest available date (2016); (3) 2000 MW capacity installed in full already by 2016; (4) 4000 MW capacity, of which 2000 MW available by 2016 and 2000 MW added four or five years later; and (5) 4000 MW installed in full by 2016. Scenarios are based on a combination of the following conditions: (a) less than optimal regional trade within the EAPP (30 or 60 percent below the levels identified by the EAPP Master Plan); (b) limited generation expansion in the southern part of the region, including hydro power and thermal sources; and (c) suboptimal development of other interconnections, drastically reducing transmission capacity to the north of the region and markedly to Sudan and Egypt. A regret analysis, also called mini-max procedure, has been used to determine the optimal interconnection alternative under each scenario. Results from the analysis confirm that the single 500 kV HVDC bipole transmission line with 2,000 MW of capacity presents the highest net benefits in nine out of eleven scenarios and is therefore the most economically robust option.

Power Supply Potential of Ethiopia

5. **Ethiopia is well positioned to become a major supplier of electricity to the region, in line with the EAPP Master Plan.** Ethiopia has already established an interconnection with Djibouti (FY2011) and is finalizing an interconnection with Sudan (FY2012). Current estimates indicate that the overall volume of power exported by Ethiopia should reach 1,300 MW by FY2022, including 100 MW through the Ethiopia-Djibouti interconnection, 200 MW through the Ethiopia-Sudan interconnection and 1,000 MW through the Ethiopia-Kenya interconnection. These are significant amounts if compared to the export contracts secured by other countries. For example, power exports from the Democratic Republic of Congo – the only Sub-Saharan country ranking higher than Ethiopia in terms of hydropower potential – do not exceed 150 MW. Overall, by FY2022, Ethiopia is expected to export nearly 7,500 GWh of electricity per year through these three connections alone.

[57] Regional Power System Master Plan and Grid Code Study, Verification of the Regional Economic Robustness of the Ethiopia-Kenya Transmission Interconnection Options, EAPP and EAC, 2011.

6. **The Ethiopian energy sector is expanding at a very rapid pace to increase access to energy for its population.** Consistent with the Government's goal of ensuring universal access to modern energy services (UEAP), EEPCo has connected 41 percent of rural towns and villages to the electricity grid in the past five years. This has resulted in rapid increase in the number of customers, from 800,000 in FY2005 to over 2 million in FY2010, equal to 14 percent of the total population of Ethiopia. During this period, the domestic peak load demand has increased from 780 MW to 1,100 MW. Given the expansion in grid coverage and a projected GDP growth rate of 10-12 per year, demand for electricity is expected to grow at a rate no lower than 10-11 percent per year until 2018. Going forward, the Government has ambitions of connecting 75 percent of Ethiopia's rural towns and villages to the electricity grid by FY2015, which would double the number of consumers to 4 million. As result, demand for electricity would grow by 24-26 percent per annum. In particular, the Government's plans for electricity access expansion envisage a 'moderate' growth rate of 24 percent and a target rate of 26 percent. Assuming the 'moderate' growth rate of 24 percent indentified by the Government, domestic peak load demand will reach 10,100 MW by 2027. Overall, domestic consumption will total over 38,000 GWh in 2027.

7. **Ethiopia is rapidly increasing its generation capacity to fulfill targets for expansion in domestic and regional demand**. Based on the above, by FY2022 Ethiopia is likely to face a peak load demand of nearly 7,500 MW and an overall consumption close to 32,000 GWh, including both domestic demand (assuming an annual growth rate of 24 percent) and export demand. By FY2027 peak load demand and total consumption are expected to reach 11,500 MW and 45,800 GWh respectively. The GoE is strongly committed to expand generation capacity in an efficient and sustainable manner to meet this projected major growth in domestic and regional demand. The country is endowed with a vast renewable energy potential, including 45,000 MW of hydropower, 10,000 MW of wind power, and 5,000 MW of geothermal power Hydropower remains the main focus for generation expansion, followed by wind and geothermal. Three new hydropower plants (Tekeze 300 MW, Gibe II 420 MW and Beles 460 MW) have been commissioned in FY2010, raising the total installed capacity from 850 MW to over 2,000 MW. Going forward, generation expansion plans include.

(a) **Hydro Power.** Plants with a total installed capacity of 8,800 MW producing over 29,000 GWh are in various stages of construction. Also, feasibility studies are underway for new hydropower projects totaling 13,500 MW of installed capacity. Major hydro power plants are in advanced or initial stage of construction, including: Ganale Dawa III (252 MW), Gibe III (1,870 MW), Chemoga Yeda I (162 MW), Chemoga Yeda II (118 MW), Grand Renaissance (5,250 MW). Also, there are various power plants at initial stages of development.

(b) **Wind Power.** Plants with a total installed capacity of 170 MW are under construction. These include the Ashegoda (120 MW) and the Adama Wind farms (50 MW). Also, feasibility studies are underway for new wind projects totaling 695 MW of capacity, including Ayisha (300 MW), Debre Birhan (100 MW), Assela (100 MW), Adama II (153 MW) and Messebo (42 MW). Further, various wind plants are at initial stages of development.

(c) **Geothermal Power.** A 75 MW plant (Aluto) is currently under construction. Also, various plants with a total capacity of 400 MW are being considered.

8. Based on these planned capacity additions, Ethiopia's total installed capacity is expected to reach above 19,500 MW by FY2022 and to grow further to 26,600 MW by FY2027. As result, overall electricity production capacity should be 73,500 GWh by FY2022 and reach above 104,300 by FY2027.

Demand – Supply Balance Analysis for Ethiopia

9. **Ethiopia is highly likely to meet all internal and export obligations in the short-term, even in the face of ambitious targets for domestic demand growth and delays in the development of major generation projects currently in pipeline.** An analysis of the energy demand-supply balance for Ethiopia has been conducted by the World Bank team as part of the preparation of the Ethiopia-Kenya Interconnector to assess Ethiopia's ability to meet the fast growing domestic demand as well as its export commitments. The analysis has focused on the first five years of the commissioning of the interconnection and has assessed Ethiopia's supply capacity under various scenarios entailing different growth rates for domestic demand and adverse conditions that may affect the implementation of the generation expansion projects currently under construction. In particular, on the demand side, the analysis has considered a 'moderate growth' and a 'target growth' scenario, respectively assuming 24 percent and 26 percent annual growth in the coming years reducing thereafter, consistently with the Government's aggressive targets for electricity access expansion. On the supply side, the analysis has considered the following scenarios: (a) no delays in commissioning of major projects prior to FY2017 ('planned commissioning'); (b) 24 months delays in all plants under construction ('moderate delays in commissioning'); and (c) 36 months delays in all plants under construction ('further delays in commissioning'). Results of the analysis (Figure 2) clearly show that Ethiopia is able to accommodate all internal and export obligations with a reasonable reserve margin. Both domestic and regional demand would be met even in the event of a two- or a three-year delay in the commissioning of all power plants under construction, with only a low likelihood of momentary shortfalls few years after commissioning of the line (Figures 2b and 2c).

Figure 2. Energy Supply-Demand Balance Analysis for Ethiopia

Figure 2a: Energy reserve (or shortfall) assuming no delays in commissioning

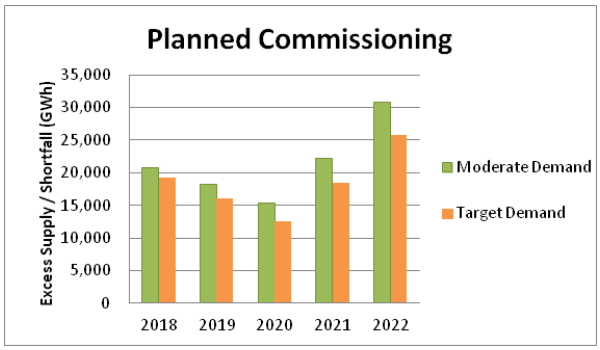


Figure 2b: Energy reserve (or shortfall) assuming two-year delays in commissioning

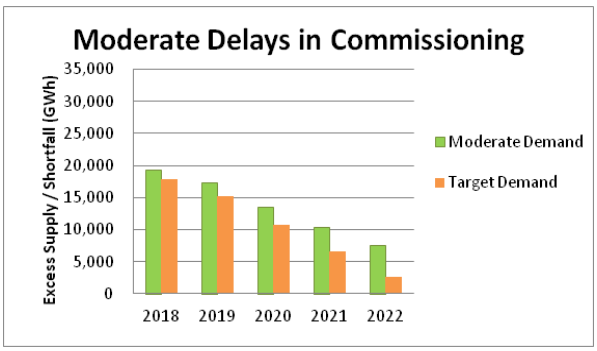
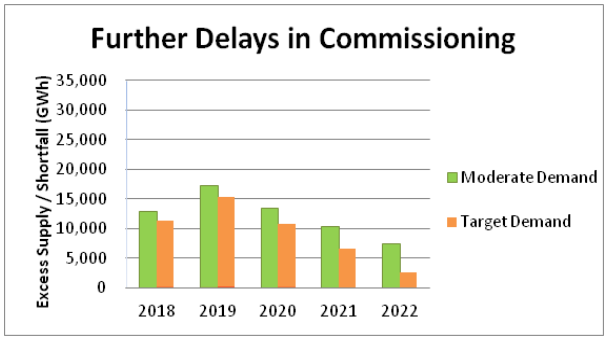


Figure 2c: Energy reserve (or shortfall) assuming three-year delays in commissioning



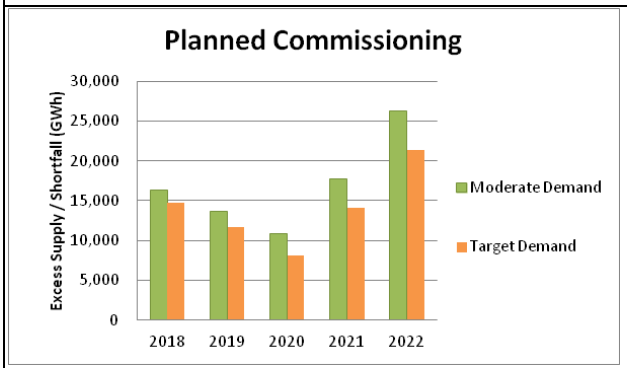
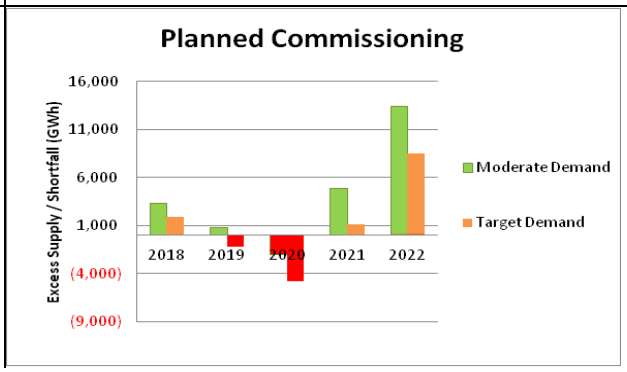
Note: Years indicate 'fiscal years'.
Source: Prepared by World Bank with information from EEPCo Planning Department.

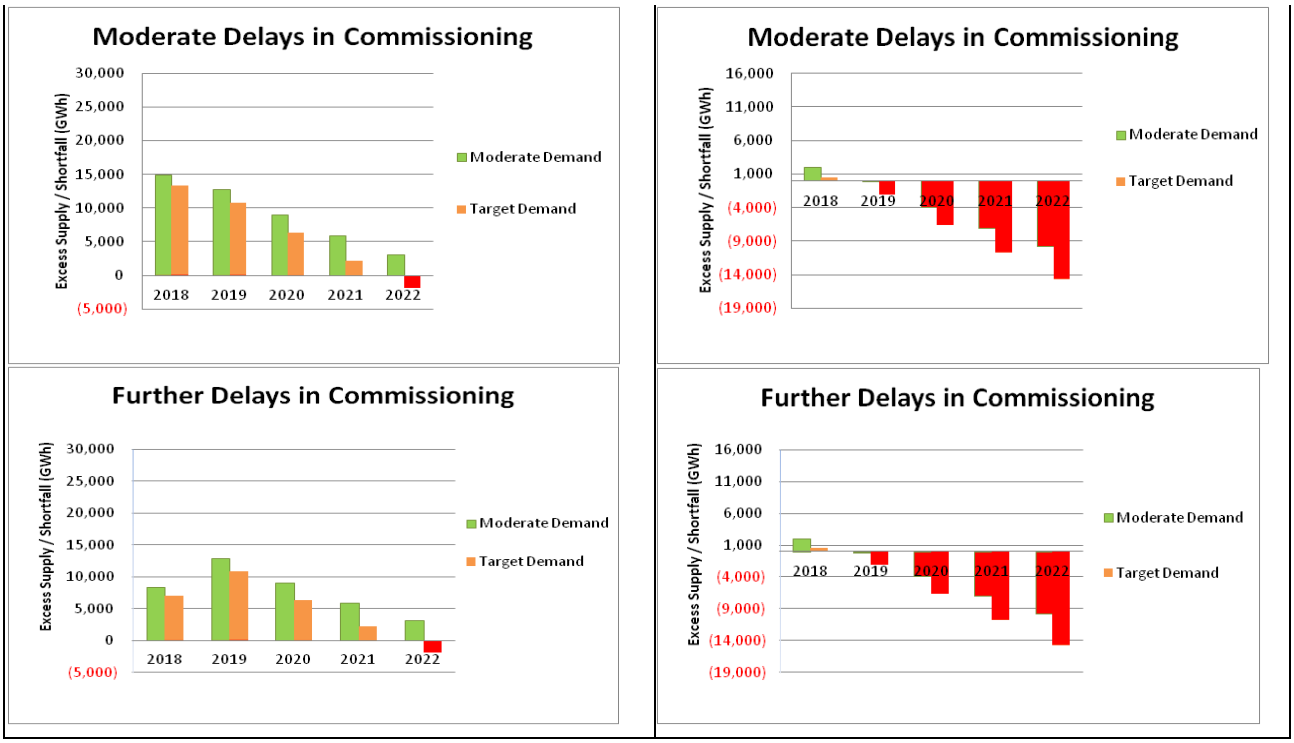
10. **Ethiopia's ability to accommodate the regional demand does not depend on the development of any specific hydropower plant, such as Gibe III.** The EAPP Master Plan and the Robustness study have demonstrated that in the long-term the Ethiopia-Kenya interconnection will be utilized by most of the EAPP member countries, with power flowing in any direction. In the short-term, while the EAPP transmission backbone is yet to be completed, the interconnection will be only utilized to transfer power from Ethiopia to Kenya. The analysis above has indicated that Ethiopia's supply capacity is largely adequate to accommodate import demand from Kenya as well as from Djibouti and Sudan in addition to fast growing domestic demand even under adverse circumstances affecting the implementation of the generation expansion projects currently in pipeline. Sensitivity analysis reveals that Ethiopia will be able to accommodate both domestic and export demand even without Gibe III (Figure 3; left column), assuming that all other planned generation capacity additions come on stream as planned. In the first two years after commissioning (2014-2015), the Gibe III plant will account for 20 percent of the overall power supplied to Ethiopian's customers as well as to the EAPP (Table 1), progressively decreasing to less than 10 percent by FY2021 as other major new generation plants come into service. However, Ethiopia's ambitious generation expansion plans encompasses over 40 new power plants, including geothermal and wind plants (Table 2). Geothermal and wind

resources are expected to account for 20 percent of Ethiopia's energy mix in 2018 when the Ethiopia-Kenya interconnector is commissioned. On the demand side, the growth in domestic demand assumed here is extremely optimistic and may be far from reality. Also, overall exports, including through the Ethiopia-Djibouti and the Ethiopia-Sudan interconnections, will reach 1,300 MW only in ten years from now. If Gibe III is not commissioned, delays in the other generation projects will increase chances of shortfalls. In particular, the number of years during which there could be a shortage increases from one to two years in the 'moderate delays' scenario and from two to three in the 'further delays' scenario.

11. **Ethiopia may face challenges in meeting both domestic and regional demand only in the case that multiple major generation plants including the Grand Renaissance are no longer commissioned.** The sensitivity analysis has further assessed Ethiopia's supply capacity in the event that other generation plants, in addition to Gibe III are no longer commissioned. In particular, the analysis has focused on the Grand Renaissance, the most important hydropower plant under construction in Ethiopia, which is expected to account for nearly 40 percent of the overall power supply in 2016, the first year after its commissioning, and for at least 30 percent during the following four years until FY2020. Results from the analysis indicate that the supply-demand balance is severely impaired when the Grand Renaissance power plant, is excluded for the supply options in addition to Gibe III. In this case, the available supply capacity would not be adequate to accommodate both domestic demand targets and export commitments (Figure 3, right column), unless demand growth remains below Government's targets and all other generation expansion projects are implemented without delays.

Figure 3. Energy Supply-Demand Balance for Ethiopia; Sensitivity Analysis

Energy reserve (or shortfall) without Gibe III	***Energy reserve (or shortfall) without Gibe III and Grand Renaissance***
	



Note: Years indicate 'fiscal years'.
Source: Prepared by World Bank with information from EEPCo Planning Department.

12. **Ethiopia will dispatch its generation capacity based on the principle of least cost, while ensuring supply reliability.** A review of Ethiopia's generation expansions plans suggests that hydropower generation will continue to dominate Ethiopia's energy mix (Table 2). Nonetheless, it is not possible to anticipate or control from which generation plants in Ethiopia power will be injected into the network to meet domestic or regional demand. Gibe III constitutes a primary source of power supply in Ethiopia and it cannot be excluded that part of its output will be used for exports in addition to domestic demand. However, it is not possible to establish how much of the power exported through the Ethiopia-Kenya Interconnection or any other regional line will be supplied from Gibe III because electricity entering the interconnection cannot be traced back to its source. Ethiopia is expected to dispatch its generation capacity based on the principle of least cost, while ensuring reliability and sufficiency requirements. Cheaper generation sources such as hydropower are likely to be dispatched first. However, generation costs vary by the hour of the day and depending on several factors including prevailing fuel prices in the case of thermal generation or availability of primary resources in the case of generation based on renewable sources such as hydro and wind power. Temporary outages on a transmission line or at a generation plant can also radically change the dispatch order so as to ensure that the line or the plants are not overloaded and that the overall system can be securely operated. In the long-term, regional power trade will allow to efficiently use supply from 221 power generation stations (thermal, hydro, geothermal, wind, and other) in all EAPP countries as identified by the EAPP Master Plan. Dispatching choices by the various EAPP members cannot be predicted; the generation capacity of the various countries will be mobilized to take advantage of seasonal variation in resources and different load profiles across the EAPP region.

Table 1. Energy Supply-Demand Balance for Ethiopia (Moderate Demand, Planned Supply)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ASSUMPTIONS																	
Domest Demand Growth Rate							24%	24%	24%	24%	16%	16%	16%	16%	12%	12%	12%
System Losses	18%	19%	20%	20%	20%	20%	20%	19%	18%	17%	16%	15%	15%	15%	15%	15%	15%
DEMAND																	
1. Domestic Demand																	
Peak Load (MW)	780	840	890	1,000	1,050	1,100	1,200	1,488	1,845	2,288	2,837	3,291	3,818	4,428	5,137	5,753	6,444
Energy Sales (GWh)	2,260	2,715	2,920	3,042	3,203	4,035	4,525	5,611	6,958	8,627	10,698	12,410	14,395	16,699	19,370	21,695	24,298
2. Regional Trade Demand																	
Djibouti																	
Peak Load (MW)						10	30	50	50	100	100	100	100	100	100	100	100
Energy Export (GWh)						33	131	150	318	788	788	788	788	788	788	788	788
Sudan																	
Peak Load (MW)							50	100	200	200	200	200	200	200	200	200	200
Energy Export (GWh)							197	788	1,577	1,577	1,577	1,577	1,577	1,577	1,577	1,577	1,577
Kenya																	
Peak Load (MW)													300	300	400	700	1,000
Energy Export (GWh)													1,117	2,234	2,978	4,030	5,081
Total Peak Load (MW)	780	840	890	1,000	1,050	1,110	1,280	1,638	2,095	2,588	3,137	3,591	4,418	5,028	5,837	6,753	7,744
Total Energy Sold/Needed (GWh)	2,260	2,715	2,920	3,042	3,203	4,068	4,853	6,549	8,853	10,992	13,063	14,775	17,877	21,297	24,714	28,089	31,744
SUPPLY																	
Installed Capacity (MW)	935	1,050	1,070	1,100	1,315	1,820	2,442	2,712	4,675	7,160	11,906	12,177	13,107	13,305	13,425	16,221	19,657
System Reserve Margin (%)	20	25	20	10	25	64	91	66	123	177	280	239	197	165	130	140	154
Energy Production Capacity (GWh)	2,800	3,465	3,580	3,754	4,035	6,028	8,231	9,203	15,633	23,891	39,149	40,826	45,408	46,418	47,112	59,188	73,537
Energy Losses (GWh)	504	658	716	751	807	1,206	1,646	1,749	2,814	4,062	6,264	6,124	6,811	6,963	7,067	8,878	11,031
Remaining Energy Potential (Shortfall)	**36**	**91**	**(56)**	**(39)**	**25**	**754**	**1,731**	**905**	**3,967**	**8,837**	**19,822**	**19,927**	**20,720**	**18,158**	**15,332**	**22,220**	**30,762**
Total Hydropower Energy (GWh)	2,308	2,308	2,308	2,308	4,035	6,028	7,841	7,841	10,462	17,669	31,085	32,790	35,898	36,417	36,417	48,203	62,552
Gibe III Contribution (GWh)									2,621	5,242	5,242	5,242	5,242	5,242	5,242	5,242	5,242
Gibe III (% of Total)									17%	22%	13%	13%	12%	11%	11%	9%	7%
Grand Renaissance Contribution (GWh)										3,324	15,177	15,177	15,177	15,177	15,177	15,177	15,177
Grand Renaissance (% of Total)										14%	39%	37%	33%	33%	32%	26%	21%
Total Windpower Energy (GWh)							390	718	1,758	1,758	1,758	1,758	1,758	1,758	1,758	1,758	1,758
Total Geothermal and Other Thermal (GWh)	491	1,156	1,272	1,445				644	3,414	4,465	6,307	6,278	7,753	8,244	8,938	9,227	9,227

Notes:

- Years indicate 'fiscal years'.
- The total supply projection is based on a review of the planned power projects as indicated by the Government of Ethiopia.
- The generation additions finally commissioned (and the corresponding output) may be different.
- The table does not consider future potential exports of Ethiopia beyond current commitments.
- Remaining energy would meet additional suppressed demand, reserve needs (not accounted in the balance), and future export commitments.
- 'Other' generation sources include: co-generation, bio-mass based generation, etc.

Source: Prepared by World Bank with information from EEPCo Planning Department.

Table 2. EEPCo's Generation Expansion Plan

Generation Source *year*		2019	2023	2027
No.	**Hydropower**		***MW***	
	Existing Plants (commissioned prior to 2010)	850	850	850
1	Tekeze (commissioned in 2010)	300	300	300
2	Gibe II (commissioned in 2010)	420	420	420
3	Beles (commissioned in 2010)	460	460	460
4	FAN	100	100	100
5	Amerti Neshi	100	100	100
6	Gibe III	1,870	1,870	1,870
7	Genale III	258	258	258
8	Chemoga Yeda	278	278	278
9	Geba I and II	366	366	366
10	Halele Werabesa	422	422	422
11	Genale VI	256	256	256
12	Grand Renaissance	5,250	5,250	5,250
13	Sor II	5	5	5
14	Tekeze II	0	450	450
15	Baro I and II	0	0	645
16	Beko Abo	0	800	1,600
17	Border	0	600	1,200
18	Karadobi	0	1,600	1,600
19	Mendeya	0	2,000	2,000
20	Gibe IV	0	1,472	1,472
21	Gibe V	0	0	660
22	Gojeb	0	0	150
23	Aletu East and West	0	0	455
24	Wabi Shebele	0	0	87
25	Birbir	0	0	467
26	Lower Dedessa	0	0	613
27	Dabus	0	0	425
28	Tams	0	0	1,000
29	Beshilo	0	0	700
30	Genale V	0	0	100
	Total Hydropower (MW)	**10,935**	**17,857**	**24,559**
	Wind			
31	Adama	50	50	50
32	Ashegoda	120	120	120
33	Messobo	42	42	42
34	Ayisha	300	300	300
35	Debre Birhan	100	100	100
36	Assela	100	100	100
37	Adama II	153	153	153
	Total Wind (MW)	**865**	**865**	**865**
	Geothermal and Other			
38	Aluto Langano	70	70	70
39	Multifuel Gas Turbine	800	800	800
40	Tendaho	100	100	100
41	Corbetti	75	75	75
42	Abaya	0	100	100
43	Tulu Moya	0	40	40
44	Dofan	0	60	60
	Total Geothermal and other (MW)	**1,045**	**1,245**	**1,245**

Annex 7: Financial Analysis

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

Project Financial Rate of Return Analysis

1. A financial analysis of the Project was carried out to estimate the financial internal rate of return (FIRR) and the net present value (NPV) of the Project. To evaluate if the Project is financially viable on its own, it is assumed that power purchase and wheeling through the interconnector line would cover the investment costs, operation and maintenance expenses, and electricity generation costs in Ethiopia. The volume of electricity sales in Kenya is in accordance with the demand-supply balance described in Annex 6. It is assumed that the average cost of electricity generation in Ethiopia is US$0.042 and the base load power purchase cost in Kenya is US$0.07 per kWh for 400 MW. The peak load power purchase cost in Kenya is assumed to be US$0.08 per kWh for 600 MW. The electricity wheeling for third parties is assumed to start in FY2022, four years after the commissioning of the interconnector, at US$0.02 per kWh using the remaining capacity. A threshold discount rate for this analysis is assumed to be 10 percent, which is a conservative figure given that over 90 percent of funding for the Project comes from concessional lending. Key assumptions adopted in this analysis are summarized below.

Table 1. Key Assumptions in the Financial Analysis

Parameters	Values
CAPEX	US$1,176 million
OPEX	2% of CAPEX
Construction	FY2014-2018 (5 years)
Economic Life	30 years
Load Factor (Base Load)	85%
Load Factor (Peak Load)	40%
Transmission Losses	5%
Average Electricity Generation Cost in Ethiopia	US 4.2 cents/kWh
Power Purchase Cost in Kenya (Base Load)	US 7.0 cents/kWh
Base Load Capacity	Increase to 400 MW in FY2020
Power Purchase Cost in Kenya (Peak Load)	US 8.0 cents/kWh
Peak Load Capacity	Increase to 600 MW in FY2022
Wheeling Charge	US 2.0 cent/kWh
Wheeling Capacity	Increase to 1,000 MW in FY2022
Discount Rate	10.0%

2. A summary of the results, including NPV and FIRR under different risk scenarios, is presented below. Under the base case scenario, the Project is financially viable with FIRR of 13.8 percent and NPV (at 10 percent discount) of US$448.0 million.

Table 2. Sensitivity Scenarios

Changes	CAPEX (US$ mil.)	Generation Cost (US$/kWh)	PPA (Base) (US$/kWh)	PPA (Peak) (US$/kWh)	Wheeling Charge (US$/kWh)	Base Capacity (MW)	Peak Capacity (MW)
-25%	882.0	0.032	0.053	0.060	0.015	300	450
-20%	940.8	0.034	0.056	0.064	0.016	320	480
-15%	999.6	0.036	0.060	0.068	0.017	340	510
-10%	1,058.4	0.038	0.063	0.072	0.018	360	540
-5%	1,117.2	0.040	0.067	0.076	0.019	380	570
Base Case	**1,176.0**	**0.042**	**0.070**	**0.080**	**0.020**	**400**	**600**
5%	1,234.8	0.044	0.074	0.084	0.021	420	630
10%	1,293.6	0.046	0.077	0.088	0.022	440	660
15%	1,352.4	0.048	0.081	0.092	0.023	460	690
20%	1,411.2	0.050	0.084	0.096	0.024	480	720
25%	1,470.0	0.053	0.088	0.100	0.025	500	750

3. Sensitivity scenarios were constructed where the following key parameters are assumed to increase or decrease by up to 25 percent of the base case levels: CAPEX; average generation cost in Ethiopia; base load PPA; peak load PPA; wheeling charge; base load capacity; and peak load capacity (Table 2). As shown in Figures 1 and 2, financial viability of the Project is particularly sensitive to fluctuations in the project cost, the average generation cost in Ethiopia as well as the level of base load PPA between the two countries. Nonetheless, FIRRs remain above 11.3 percent in all of the sensitivity scenarios (Table 3) and NPV above US$155.4 million (Table 4). Therefore, the results suggest that the financial viability of the Project is robust against all of the key risks identified.

Figure 1. Summary of Sensitivity Analysis: FIRR (%)

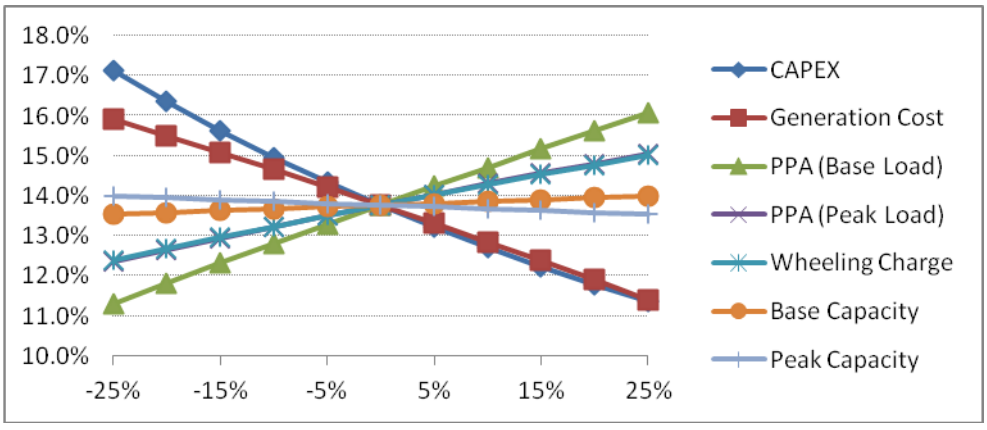


Table 3. Summary of Sensitivity Analysis: FIRR (%)

Changes	CAPEX	Generation Cost	PPA (Base)	PPA (Peak)	Wheeling Charge	Base Capacity	Peak Capacity
-25%	17.1%	15.9%	11.3%	12.4%	12.4%	13.5%	14.0%
-20%	16.4%	15.5%	11.8%	12.7%	12.7%	13.6%	13.9%
-15%	15.6%	15.1%	12.3%	12.9%	13.0%	13.6%	13.9%
-10%	15.0%	14.7%	12.8%	13.2%	13.2%	13.7%	13.9%
-5%	14.3%	14.2%	13.3%	13.5%	13.5%	13.7%	13.8%
Base Case	**13.8%**	**13.8%**	**13.8%**	**13.8%**	**13.8%**	**13.8%**	**13.8%**
5%	13.2%	13.3%	14.2%	14.0%	14.0%	13.8%	13.7%
10%	12.7%	12.9%	14.7%	14.3%	14.3%	13.9%	13.7%
15%	12.2%	12.4%	15.2%	14.6%	14.5%	13.9%	13.6%
20%	11.8%	11.9%	15.6%	14.8%	14.8%	14.0%	13.6%
25%	11.4%	11.4%	16.1%	15.1%	15.0%	14.0%	13.5%

Figure 2. Summary of Sensitivity Analysis: NPV (US$ million)

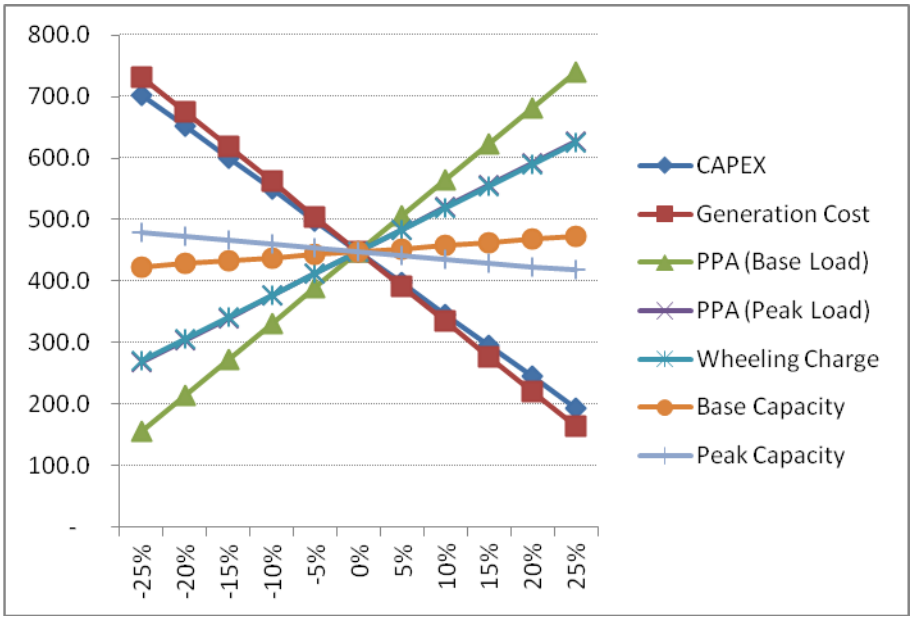


Table 4. Summary of Sensitivity Analysis: NPV (US$ million)

Changes	CAPEX	Generation Cost	PPA (Base)	PPA (Peak)	Wheeling Charge	Base Capacity	Peak Capacity
-25%	702.2	732.3	155.4	268.0	270.2	423.3	478.3
-20%	651.3	675.4	213.9	304.0	305.7	428.2	472.3
-15%	600.5	618.6	272.4	340.0	341.3	433.2	466.2
-10%	549.7	561.7	331.0	376.0	376.9	438.1	460.1
-5%	498.8	504.9	389.5	412.0	412.4	443.1	454.1
Base Case	**448.0**	**448.0**	**448.0**	**448.0**	**448.0**	**448.0**	**448.0**
5%	397.2	391.1	506.5	484.0	483.6	452.9	441.9
10%	346.3	334.3	565.0	520.0	519.1	457.9	435.9
15%	295.5	277.4	623.6	556.0	554.7	462.8	429.8
20%	244.7	220.6	682.1	592.0	590.3	467.8	423.7
25%	193.8	163.7	740.6	628.0	625.8	472.7	417.7

Financial Analysis of Ethiopian Electric Power Corporation (EEPCo)

I. Sector Background

4. The key institution in the Ethiopian power sector is the Ethiopian Electric Power Corporation, EEPCo. EEPCo is a vertically integrated, government-owned utility with the responsibility for electricity generation, transmission and distribution. EEPCo reports to the Ministry of Water and Energy, which has the overall responsibility for the energy sector.

5. As part of the GTP, EEPCo is responsible for implementing the GoE's two major public policy goals related to the energy sector: (a) provide universal access to electricity: a major focus of the GoE is to increase the coverage of population under the electricity grid (UEAP). In 2005, there were 800,000 customers connected to the grid covering about 20 percent of towns and villages in Ethiopia. EEPCo has been able to increase the number of customers connected to the grid to over 2 million (about 12 million people or 14 percent of population), connecting 41 percent of towns and villages. In the GTP period, the goal is to increase the number of customers to 4 million and cover 75 percent of towns and villages; and (b) generate export revenues: another major goal for the GoE is to become a regional power hub and generate export revenues by means of exploiting its vast natural (mainly hydropower) resources. In order to achieve this, EEPCo has invested in ambitious generation programs and has already erected transmission lines to Djibouti (commissioned in 2011) and Sudan (to be commissioned in 2012).

6. Along with these major goals, GoE also has many short- to mid-term goals, such as: to modernize the energy sector by investing in operational efficiency of its systems and organization, increase reliability and become a modern energy producing and consuming nation. To fulfill these goals, EEPCo has been investing heavily in the sector, which has resulted in the ongoing hyper growth of the energy sector and has had financial consequences on EEPCo and other sector institutions.

EEPCo Financial Analysis

7. The section below provides an analysis of the operational financial performance (revenue and expenses) as well as the investment program performance (borrowing). A discussion of future projections is also included along with highlights of some of the major challenges affecting financial performance of the sector.

Operational Performance – Sales and Revenue

8. In the past few years, EEPCo has done very well in terms of connecting many new towns and villages as well as connecting new customers to the grid. In fact, due to the success of the expansion program, the demand for electricity surpassed the supply capacity. As a result, in FY2008 to FY2010 there was a partial moratorium placed on new connections. During the period of moratorium, the acceleration in the number of new connections and villages connected slowed down; as a consequence, the energy sales were stagnant. The energy sales improved once the moratorium was lifted and in FY2011 were over 4,000 GWh with over 2 million customers.

9. However, despite the impressive increase in the customer base and energy sales, EEPCo's operating revenue has not improved much. In fact, operating revenue in FY2011 was US$130 million, which was far below the FY2006 operating revenue of US$166 million. Moreover, the average operating revenue per customer fell from US$156 per year in FY2006 to US$73 per year in FY2011 (Table 5). There were a few reasons for this:

(a) **The tariff rates** (average of US$0.03/kWh) in Ethiopia have not changed since 2006 and this has affected revenue growth (more discussion on the tariff structure in the sections below).

(b) **The devaluation in Ethiopia Birr** as compared to US Dollar from 8.3 Birr/US$ in FY2006 to 17.1 Birr/US$ in FY2011 has contributed to lower operating revenues.

Table 5. Historical Operating Revenue, Energy Sales and New Connections

	FY2006	*FY2007*	*FY2008*	*FY2009*	*FY2010*	*FY2011*
Operating Revenue (US$ million)	166	208	202	164	132	130
Growth Rate (Year to Year)		25%	-3%	-19%	-20%	12%
Energy Sales (GWh)	2,408	2,799	2,966	3,132	3,264	4,218
Growth Rate (Year to Year)		16%	6%	6%	4%	29%
Customers	1,064,268	1,337,557	1,611,735	1,740,964	1,808,008	2,030,000
Growth Rate (Year to Year)		26%	20%	8%	4%	12%
Villages Connected	899	1,757	3,363	3,763	5,163	6,000
Growth Rate (Year to Year)		95%	91%	12%	37%	16%
Revenue per Customer (US$)	156.0	155.5	125.3	94.2	73.0	72.9
Energy Consumed per Customer (kWh)	2262.6	2092.6	1840.3	1799.0	1805.3	2077.8
US$ to Birr Conversion	8.3	8.7	9.3	9.9	13.5	17.1

Future Growth in Demand

10. As EEPCo continues to expand its access program and connect more customers from newer parts of the country, the domestic demand for electricity is expected to remain strong. The domestic demand is expected to reach 19,000 GWh by the end of this decade using EEPCo's moderate growth forecast (24 percent annual growth rate). However, for the purpose of this analysis a much more conservative growth rate has been assumed (approx. 10%), which would result in overall domestic sales equal to just above 9,000 GWh by 2020. A large part of the future growth will also come from energy exports to neighboring countries. The Djibouti interconnector has already started power trading (as of 2011) and the Sudan interconnector is expected to start power trade in 2012. Kenya interconnector is expected to being trading in 2018. The combined electricity export is expected to reach above 5,000 GWh by the end of this decade, growing further to nearly 7,500 GWh by 2022 – bulk of which would come from the Kenya interconnector (see Table 6). The international sale of power is expected to be at competitive prices (approx. US$0.06-0.07 /kWh) which will bring significant foreign exchange revenue. Overall, it is anticipated that EEPCo's operating revenue will grow around 8-10 percent to US$200 million a year (on average) from FY2012-2017, growing to US$600 million FY2018-2021.

Table 6. Energy Sales Forecast

	FY 2012	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*
Conservative Growth (GWh)	4,035	4,466	4,927	5,441	5,999	6,600	7,214	7,840	8,491	9,163
Export to Djibouti Forecast (GWh)	33	131	150	318	788	788	788	788	788	788
Export to Sudan Forecast (GWh)		197	788	1,577	1,577	1,577	1,577	1,577	1,577	1,577
Export to Kenya Forecast (GWh)							1,117	2,234	2,978	4,030
Total Energy Sold (GWh)	4,068	4,794	5,865	7,336	8,364	8,965	10,696	12,439	13,834	15,558

Tariff Structure

11. In a large part, EEPCo's future revenue potential would be influenced by the domestic tariff regime, but supported by export revenues. As mentioned before, due to GoE's policy of universal subsidy to the electricity sector, the tariff rates in Ethiopia have been highly suppressed. The tariff structure has not been updated since 2006. When it was last updated, the average tariff was set at Birr equivalent of US$0.06/kWh, however, due to currency depreciation over time, as of 2011 the effective average electricity tariff rate in Ethiopia stands at US$0.03/kWh which makes it largely out of sync with the global competitive tariff rates.

12. When compared to global trends of electricity tariffs of net energy importing and exporting nations (both low and high income), Ethiopia has fallen far below international trends. Even when compared to the regional countries, Ethiopia's tariff rates are some of the lowest (Table 7).

Table 7. Average Electricity Tariffs in Selected African Countries

Country	*Residential Tariff US cents/kWh*	*Industrial Tariff US cents/kWh*	*Commercial Tariff US cents/kWh*
Ethiopia	3	3	4
Botswana	5.9	6.7	3.1
Cameroon	8.6~12	9.9~11.3	8.5~8.7
Kenya*)	15~35	17	21
Senegal	23.8~26.2	14.4~20.8	13~18.7
Tanzania	4.1~13	5.3	4.9
Uganda	3.4~23.3	21.8	16.7
Zambia	3.2~8.5	3.7	5.6

*) Before Government levies and taxes. Includes a fuel surcharge of about 9 US cents/kWh.

13. EEPCo's operating expenses (mostly based on hydropower) are low and it can even sustain an operating profit in most years of normal rainfall (more details in sections below). However, for long-term financial feasibility, especially in the wake of huge existing and even larger future debt obligations, EEPCo must revisit its tariff structure in order to bring it to competitive levels. The combined effect of tariff under-pricing and the system losses (discussed below) mean significant loss of revenue for EEPCo and the GoE.

Operational Performance – Expenses

14. The increase in EEPCo's operating expenses has been much higher than the increase in revenues during the past five years, mainly due to high generation costs. The generation cost increased by 73 percent in FY2008, by 72 percent in FY2009 and by 48 percent in FY2010.

15. The main drivers for the increased operating expenses have been:

(a) Delayed commissioning of major hydropower plants. The planned capacity increase via three new hydropower plans (Tekeze 300 MW, Gilgel Gibe II 420 MW, Beles 460 MW) suffered many months of construction delays due to unexpected geological conditions and were commissioned in 2011.

(b) There was also a two-year period of low rainfall conditions which limited hydropower production from existing plants.

(c) EEPCo had to rent expensive thermal power generation to meet the demand shortfalls, which increase their production costs significantly.

(d) Also, the increase in international fuel prices, combined with the fact that EEPCo's expenses were denominated in foreign currency while the Birr was devaluating against the US Dollar.

16. As a result of these predominately generation related issues, EEPCo's operating expenses during this period were much higher than anticipated and EEPCo suffered operating losses

during this period. However, as of FY2011, the per unit generation costs, due to heavy hydropower usage, were very moderate and stood at below US$0.02 /kWh.

17. In terms of the operational and maintenance expenses, mostly related to the day-to-day management of the transmission and distribution network and related expenses, EEPCo has suffered from lack of efficiency due to its high growth rate. As a utility company designed to handle a few hundred thousand customers and few hundred MW of installed capacity, EEPCo is today managing over two million customers, over 2,000 MW of installed capacity with over 10,000 km of transmission lines and 125,000 km of distribution lines. There are massive technical bottlenecks in the existing infrastructure as well as other day-to-day operational issues such as lack of proper staffing and capacity at various levels. As a result, EEPCo lacks overall efficiency and suffers from higher than industry average system losses of nearly 20 percent.

18. However, when compared to the overall operating expenses, the lack of efficiency has a relatively small effect to EEPCo's bottom line. Based on FY2011 estimates, a 5 percent reduction in losses (from 20 percent to 15 percent, which is closer to the industry average) would result in a US$1-2 million saving. Furthermore, transmission and distribution expenses have reduced over the last several years with a shift towards greater use of hydropower generation and in FY2011 per unit costs related to operations and maintenance stood at less than US$0.01 /kWh. Overall, it is estimated that EEPCo's operating expenses would grow at around 2 percent to US$100 million a year (on average) in FY2012-2017 growing to US$150 million in FY2018-2021.

Investment Program and Financing Expenses

19. As EEPCo ramps up its investment in generation, transmission and distribution, access expansion, sector modernization and other related projects, there is an associated large investment program which can have significant current and future financial implications.

20. Overall, GoE's GTP related sector investments call for US$11 billion worth of new projects. The financing plan for these public sector projects includes a mix of funding sources, part of it coming from GoE's self-financing and customer contributions, but most of it coming from new loans. Borrowing is sought from multilateral and bilateral partners, international donor agencies, commercial banks as well as domestic and Diaspora bonds issued directly by EEPCo. It is important to note that as of yet, there is no private financing included in the investments.

21. Of the total investment program, nearly US$3.5 billion has already been raised and the expectation is that an additional US$4 billion will be raised and invested in the remainder of the GTP period (through FY2015) with the remainder to the program investments coming before the end of the decade (FY2020).

22. The current loan portfolio (US$3.5 billion) which sits on EEPCo's balance sheets can be summarized in the following categories (Table 8).

Table 8. EEPCo's Current Estimated Loan Portfolio

Borrowing Source	*Loan Amount US$ million*	*Repayment Period Years*	*Grace Period years*	*Interest Rate %*
IFIs / Government On-Lending	800	20	5	5.00%
Commercial Banks	500	10	3	6.00%
EEPCo Bonds	2,000	7	0	5.00%
Supplier's Credits	210	4	1	5.00%
Total Current Estimate	**3,510**		[averages of categories used]	

Debt Servicing

23. As many of these loans were taken on in the recent past, the repayments have not significantly affected EEPCo's financial performance. However, many of the loans are now starting to become due and the repayment will significantly ramp up in FY2011 and beyond. EEPCo has already been feeling the burden of the repayments as some of the past loans (mostly on-lending by the government) were not fully serviced in the past financial years, including 67 percent of debt service shortfall in FY2010. Table 9 summarizes debt servicing by EEPCo:

Table 9. EEPCo's Historical Debt Servicing

US$ million	*FY2007*	*FY2008*	*FY2009*	*FY2010*
Total Debt Service Amount: Payable	25.4	29.6	38.9	88.0
Long-term Loans: Payable	0.0	3.0	1.8	14.0
Bonds: Payable	0.0	0.2	10.3	44.5
Suppliers' Credits: Payable	0.8	0.0	0.3	0.1
Total Debt Service Amount: Paid				
Repayment (Principal): Paid	4.4	5.0	2.4	2.7
Interest: Paid	20.3	21.4	24.1	26.8
Loan Amount Transferred to Current Asset: Not Paid	0.8	3.2	12.4	58.6
Ratio of Payable/Paid	3%	11%	32%	67%

24. In the coming years, it is estimated that the maturing loans would amount to a yearly debt service obligation of US$300 million (on average, FY2012-2017) for EEPCo including around US$240 million of principal and US$60 million of interest payments, growing to US$700 million a year in the latter half of the decade (FY2018-2021).

Table 10. EEPCo's Future Debt Servicing

US$ million\FY	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
Estimated Debt Service Amount										
Repayment (Principal)	45	58	222	268	309	300	514	492	464	364
Interest	42	47	71	81	86	68	289	255	224	196
Total Debt Service	87	105	293	349	395	368	804	747	688	559

Financial Projections

25. Based on the details provided in the preceding sections, the overall assessment is that EEPCo is an operationally sound entity in terms of current and future financial performance. EEPCo will benefit from strong domestic demand growth and the revenues will increase at around 8-10 percent per year in the coming decade. The prospects of bilateral trade are even more lucrative with potential for huge financial returns in the latter half of the decade. On average the operating revenues are expected to be around US$200 million in FY2012-2017 and around US$600 million in FY2018-2021.

26. In terms of expenses, barring unforeseen circumstances, such as massive reduction in rainfall levels, the need for rental thermal generation, etc., EEPCo's expenses should nominally grow at around 2 percent per year in the coming decade. It is estimated to around US$100 million in FY2012-2017 and around US$150 million in FY2018-2021. It is important to point out that the consumer price inflation rate in Ethiopia is rather high (approximately 40 percent in November 2011); however, most of EEPCo's expenses are not related to these fluctuations, such as wages, administration and sales expenses, etc.

27. Major risks to financial viability of EEPCo stem from two factors:

(a) **Debt Service Obligations.** As described before, the debt service obligation for EEPCo's investment program would be in the order of US$300 million a year in the coming years. With operational cash flow of US$100 million, this amount to a US$200 million shortfall for servicing debt obligations in FY2012-2017.

(b) **Outdated Tariff Structure.** Current average tariff of US$0.03/kWh means that the full potential of revenue growth cannot be realized. Positive operational cash flow would be maintained due to low generation costs however, tariff regime should be updated to keep pace with investment program priorities.

28. The summarized projections based on the discussion and assumptions are provided in Table 11, which highlights the major risk to the financial health of the sector. It is to be noted that the major jump in the operating revenues comes from the regional trade in the second half of the decade, which is why the analysis has been split in two halves. However, despite the upswing in revenues from regional trade, and without any other changes such as tariff structure revision or debt restructuring, the shortfall for servicing debt obligations would remain.

Table 11. EEPCo's Summarized Financial Risk Projections

(US$ million)	*FY2012-2017*	*FY2018-2021*
Business As Usual (Current Situation)		
Average Annual Debt Service Obligation	314	713
Average Annual Operating Revenue	216	616
Average Annual Operating Expenses	112	167
Average Annual Operating Cash Flow	104	449
Debt Service Shortfall (based on operating cash flow)	**210**	**264**
Average Domestic Sales (GWh)	5,487	8,177
Average Debt Service Burden (US cents/kWh)	3.83	3.23

Sensitivity Analysis

29. Sensitivity analyses of the financial viability risks identified were evaluated based on two main criteria. It was assumed that the investment program will proceed as planned and would not be included as a variable for analysis. The main variables chosen for sensitivity analyses were:

(a) **Efficiency** (reducing transmission losses) – analysis determined the effects of reducing the transmission losses by 5 percent on the financial projections.

(b) **Tariff Scenarios** – analysis determined the effects of increasing the average tariff rates from the current US$0.03/kWh in one cent increment on the projections.

30. If the transmission losses are reduced by 5 percent (from 20 percent to 15 percent) starting in FY2012, the anticipated change would be a US$2 million reduction in operating expenses. However, overall, the financial projection would not show any major change than current scenario.

Tariff Scenarios

31. The analysis conducted included increasing tariff rates from the current US$0.03/kWh in one cent increment. The scenario was split in two parts – averages of FY2012-2017 and averages of FY2018-2021 (when the Ethiopia-Kenya interconnector is commissioned). The various scenarios presented demonstrate the average debt service shortfall or surplus (using operating cash flow as the basis).

32. It should be noted that based on operating cash flow and debt service obligation, the shortfall is maintained even if the domestic tariff rate is doubled to US$0.06/kWh (surplus at US$0.07/kWh). Moreover, it should also be noted that as the current debt level increases, the obligation would increase further, making it harder for EEPCo to meet all its obligations.

Table 12. Tariff Scenarios

Average of FY2012-2017	*0.03*	*0.04*	*0.05*	*0.06*	*0.07*	*0.08*
	US$/kWh (current rate)	US$/kWh	US$/kWh	US$/kWh	US$/kWh	US$/kWh
Domestic Sales (GWh)	5,487	5,487	5,487	5,487	5,487	5,487
Foreign Sales (GWh)	1,578	1,578	1,578	1,578	1,578	1,578
Total Sales (GWh)	7,065	7,065	7,065	7,065	7,065	7,065
Operating Revenue - Domestic (US$ M)	137	219	274	329	384	439
Operating Revenue - Foreign (US$ M)	79	79	79	79	79	79
Operating Revenue - Total (US$ M)	216	298	353	408	463	518
Operating Expenses - Total (US$ M)	112	112	112	112	112	112
Operating Cash Flow (US$ M)	104	186	241	296	351	406
Debt Service - Interest (US$ M)	69	69	69	69	69	69
Debt Service - Principal (US$ M)	245	245	245	245	245	245
Debt Service - Total (US$ M)	314	314	314	314	314	314
Debt Service (Shortfall)/Surplus (US$ M)	**(210)**	**(128)**	**(73)**	**(18)**	**37**	**92**

Average of FY2018-21	*0.03*	*0.04*	*0.05*	*0.06*	*0.07*	*0.08*
	US$/kWh (current rate)	US$/kWh	US$/kWh	US$/kWh	US$/kWh	US$/kWh
Domestic Sales (GWh)	8,177	8,177	8,177	8,177	8,177	8,177
Foreign Sales (GWh)	6,553	6,553	6,553	6,553	6,553	6,553
Total Sales (GWh)	14,730	14,730	14,730	14,730	14,730	14,730
Operating Revenue - Domestic (US$ M)	255	327	409	491	572	654
Operating Revenue - Foreign (US$ M)	360	360	360	360	360	360
Operating Revenue - Total (US$ M)	616	687	769	851	933	1,015
Operating Expenses - Total (US$ M)	167	167	167	167	167	167
Operating Cash Flow (US$ M)	449	520	602	684	766	848
Debt Service - Interest (US$ M)	246	246	246	246	246	246
Debt Service - Principal (US$ M)	467	467	467	467	467	467
Debt Service - Total (US$ M)	713	713	713	713	713	713
Debt Service (Shortfall)/Surplus (US$ M)	**(264)**	**(193)**	**(111)**	**(29)**	**53**	**135**

33. Hence, we can conclude that for long-term health of the sector, it would be necessary to increase the tariff rates to about US$0.06/kWh to sustain the operating costs as well as the current investment program costs. Reducing the transmission losses, however important, would not create financial stability in the sector related to the high investment program costs. There are also other ways to possibly increase the financial health of the sector, some of which are discussed in the section below. It is also important to note that rural population in Ethiopia spends less than 0.02 percent of their consumption on electricity, compared to 2.2 and 1.3 percent, respectively, among urban non-poor and the urban poor. The above-mentioned 100 percent increase in tariff (from US$0.03/kWh to US$0.06/kWh) will not have a significant

impact to the poverty index or the consumer price index (CPI) in Ethiopia. A 100 percent increase in tariff would entail only a 0.23 percent increase in poverty incidence (from 35.16 percent to 35.39 percent) and 0.43 percent increase in CPI.

34. The above assessment bodes well with the fact that in 2006, EEPCo tariff was equivalent to US$0.06/kWh, which was analyzed as the long run marginal cost. As the tariff has been kept fixed (in Birr) and has not been adjusted for inflation and foreign currency devaluation, EEPCo's tariff in real terms has actually reduced over the period. If EEPCo's tariff is corrected for devaluation and inflation and is retained at 2006 level, then EEPCo will be able to operate in a sustainable manner. This will further increase EEPCo's ability to implement the Energy Sector Strategy as defined in the GTP.

Fiscal Impact Analysis

35. There could be significant fiscal challenges to the GoE ahead in terms of sector wide financial issues (which are not essentially project related). To a lesser significant level, there may be loss of revenue to the government if EEPCo appropriates all proceeds from the exports as part of the Project and is not required to pay taxes or dividends to the government based on the benefits from the Project.

36. On the other hand, the government budget could benefit from the differential between the concessional terms upon which the IDA credit will be extended to the government and the near-commercial terms on which the credit will be on-lent to EEPCo. However, the key issues to be dealt with are the issue of ballooning debt that EEPCo is taking on due to the capital investment required for government's public policy related projects. Policy makers in the government would have to enact a sector wide approach in order to tackle the issue of US$200 million a year in immediate debt service obligation shortfall that EEPCo faces in the immediate future. The discussion below offers some suggestions on how these changes could be incorporated to meet the financial challenges of the sector.

Tariff Structure Revision

37. Increasing the average tariff rate to be able to recover costs would be the most financially prudent way to balance the investment program needs with the operational reality of the sector. This would ensure that there is adequate coverage for servicing the debt obligations. However, it is recognized that there are several socio-political challenges associated with tariff structure revisions, especially for a country where significant portion of the population lives below the poverty line.

38. The solution could lie in achieving the desired average tariff level using a tiered tariff structure that represents the economic reality of the various segments of the population. For instance, the residential tariff rates could still be subsidized to a certain level where lower income households pay a reduced rate and higher income households pay a higher rate. Also, the commercial/industrial tariffs could be raised enough to increase EEPCo's revenues and make the tariff structure reflective of the true costs of production.

39. Studies have shown that the economic loss to the country due to cost of un-served energy is nearly US$450 million. This leads to captive power generation, which pushes up production costs for the industrial and commercial sectors. It is estimated that the willingness to pay for electricity in these sectors is over US$0.05/kWh. Examples of tiered tariff rates from the countries in the region are included below.

Table 13. Examples of Tariff Structure from Regional Countries

Country	*Residential Tariff (US cents/kWh)*	*Industrial Tariff (US cents/kWh)*	*Commercial Tariff (US cents/kWh)*
Uganda	3.4~23.3	21.8	16.7
Kenya	15~35	17	21

Other Options

40. At present, EEPCo is directly responsible for implementation of government's public policy goals for the sector. The financial health of the sector would be better served with assistance from the government in term of bearing the burden of some of the capital costs of the investment program.

41. This could be achieved by restructuring of EEPCo's current debt portfolio by the line ministries. A large portion of EEPCo's debt is on-lent by the government on near commercial terms to EEPCo. Further, EEPCo is also taking on a lot of direct loans from other means including commercial banks and bond issuances.

42. Government could assist the sector by restructuring the debt by means of a debt for equity swap, or changing of the lending terms that EEPCo is charged for these loans. Such restructuring programs can be then financed by government's budget using the broader taxpayer revenue stream in order to subsidize large-scale infrastructure investments of the energy sector. These types of arrangements have been used in many countries including Ethiopia's neighboring country Kenya, where the government has established a separate entity for equity based investments in the energy infrastructure and a separate entity for overseeing the operational and management portion of the utility functions.

43. If the government were to fund the US$200 million a year in debt service shortfall from the taxpayers (FY2012-2016), it would mean a per capita increase of US$3 per taxpayer per year or an increase of 3 percent of government budget expenditure.[58] From a fiscal standpoint, this should be affordable as Ethiopia has a low tax to GDP ratio of 10 percent when compared to the Sub-Saharan African average of 18 percent.

Combination of Tariff Revision and Other Options

44. Another possible alternative could be to enact a policy, which includes a combination of tariff revision and partial debt restructuring. This can be a viable way to reduce the government's (and taxpayer's) burden for energy infrastructure investments and can share the burden with the consumers of the utility. A possible scenario could be increasing the tariff rate

[58] GoE budget expenditure for FY2011 of US$7 billion assumed.

from US$ 0.03 /kWh to a level, which is economically and socially feasible (perhaps not as high at US$ 0.07/kWh) and restructuring the remaining debt.

Conclusion

45. EEPCo is an operationally sound entity based on the financial analysis. It is able to control and meet its expenses and will experience significant growth in the coming years. The financial challenges in the sector are more structural in nature and not directly related to this Project. Some fundamental reforms need to be carried out by the policy makers in order to ensure financial health of the sector.

46. In terms of the structural changes needed in the sector related to sharing of the capital investment costs by the government and the utility as well as for reforming the tariff structure, dialogue is already undergoing between various stakeholders in the government to enact policy level changes. It is hoped that some sort of arrangement in the short-term (such as debt to equity swaps) would be made to better serve the sector as a whole.

Table 14. EEPCo's Financial Projections 2011-2020 (Key Accounts)*

	2011	*2012*	*2013*	*2014*	*2015*	*2016*
Income Items						
Revenue (US$ million)	130	151	191	251	289	301
Cost of Sales (US$ million)	32	62	71	83	90	92
Gross Margin (percent of Sales)	75%	59%	63%	67%	69%	69%
Other Operating Expenses (US$ million)	78	66	79	113	171	230
Operating Income (US$ million)	20	22	40	53	28	-22
Net Income/Loss before Income Tax (US$ million)	0.5	-27	-96	-115	-167	-224
Average Tariff (US$ /kWh)	0.032	0.032	0.033	0.034	0.034	0.034
Balance Sheet Items						
Total Assets (US$ million)	4,864	5,600	6,895	8,197	9,036	9,429
Total Liabilities (US$ million)	2,937	3,595	4,819	6,061	6,948	7,497
Total Equity (US$ million)	1,926	2,004	2,075	2,135	2,088	1,931
Cost of Service Study						
Sales (GWh)	4,035	4,795	5,866	7,336	8,364	8,965
Generation Required (GWh)	5,044	5,919	7,153	8,838	9,957	10,622
System Loss	20%	19%	18%	17%	16%	16%
Generation (US$ million)	21	50	60	72	79	82
Hydro (US$ million)	16	22	26	30	33	34
Portion of Hydropower (GWh)	4,176	5,618	6,684	8,120	9,108	9,749
Per Unit Hydro Generation Cost (US$/kWh)	0.0039	0.0040	0.0039	0.0038	0.0036	0.0035
Diesel (US$ million)	4	22	23	25	26	28
Portion of Diesel Power (GWh)	26	110	120	131	143	156
Per Unit Diesel Generation Cost (US$/kWh)	0.1670	0.1999	0.1941	0.1884	0.1829	0.1776
Geothermal (US$ million)	1	6	11	17	20	20
Portion of Geothermal Power (GWh)	15	191	349	588	706	717
Per Unit Geothermal Generation Cost (US$/kWh)	0.0422	0.0312	0.0303	0.0294	0.0286	0.0277
Transmission (US$ million)	3	7	7	6	6	6
Distribution (US$ million)	8	5	5	5	5	4
Per Unit Generation Cost (US$/kWh)	0.0053	0.011	0.010	0.0099	0.0095	0.0092
Per Unit Sales Cost (US$/kWh)	0.0081	0.013	0.012	0.011	0.011	0.010
Per Unit Total Cost (US$/kWh)	0.037	0.038	0.050	0.051	0.055	0.059

** Only first five years of analysis are included as a sample – full analysis extends to FY2021.*

Recent Performance of KPLC

47. **Performance Summary**. Over an eight-year period (FY2004 to FY2011), KPLC has been able to increase its profitability, improve its operational performance, expand its customer base and maintain a healthy financial position as shown in Table 15. Since its financial restructuring FY2004 (KPLC incurred losses from 1999 until 2003 due in large part to the impact of drought conditions that reduced its sales and increased its costs at a time when its losses were also quite high), KPLC has not defaulted on its PPAs.

Table 15. KPLC Income Statement and Balance Sheet Summary, FY2004-2011

US$ million\FY	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement Summary								
Revenues	239	291	351	386	420	666	750	714
Operating Expenses	231	273	328	362	385	609	690	643
Operating Income	9	18	22	24	35	57	60	71
Net Income	5	13	16	17	18	32	37	42
Balance Sheet Summary								
Current Assets	97	136	160	191	208	204	197	353
Non-current Assets	227	224	229	284	392	505	608	850
Total Assets	324	359	388	475	600	709	805	1,202
Current Liabilities	86	106	122	179	186	234	188	305
Non-current Liabilities	63	64	61	72	175	205	329	499
Equity and Reserves	175	190	206	223	240	269	288	399
Total Equity and Liabilities	324	359	388	475	600	709	805	1,202

48. **IDA Monitoring of KPLC Financial Performance**. In the Electricity Expansion Project (KEEP) approved in May 2010 and Energy Sector Recovery Project (ESRP) approved in July 2004, the Bank has financial covenants as terms of their Credits. KPLC is required to maintain (a) debt service coverage ratio over 1.2; (b) current ratio over 1.0; (c) self-financing ratio over 25 percent; and (d) number of days in accounts receivables less than 50 days. In addition, KPLC is required to submit regular progress report, furnish the Bank with certified copies of audited financial statements including the auditor's opinion as well as Financial Management Reports (FMRs). KPLC has been in compliance with these financial covenants except for the Accounts Receivable index in FY2011, which exceeded the target by three days. This was mainly attributable to the accumulation of outstanding bills for some of government ministries and local authorities that is being addressed by KPLC with support of MOE and MOF.

Table 16. KPLC's Financial Performance Compared to Targets Agreed with IDA

Financial Ratios	Target Values	FY2007	FY2008	FY2009	FY2010	FY2011
Debt Service Coverage	≥ 1.2	6.8	4.1	5.3	2.3	4.8
Current Ratio	≥ 1.0	1.1	1.2	0.9	1.0	1.2
Self Financing Ratio	≥ 25%	23%	54%	161%	29%	49%
Accounts Receivables	≤ 50 days		50	45	43	53

Source: KPLC.

49. **Corporate Governance.** KPLC is a public company, incorporated under the Companies Act, listed on the Nairobi Stock Exchange since 1954. Following the recent capital restructuring (described below in para. 53), the Government of Kenya holds 50.1 percent of its shares. The company is under policy guidance by the Ministry of Energy as well as the Treasury under the State Corporations Act. It is also under the regulatory oversight of the ERC under the Energy Act of 2006 and the Capital Market Authority under the Capital Markets Act. KPLC produces regular financial reports in accordance with the requirements stipulated in these legislations. The company is led and managed by the Board of Directors, several Board Committees as well as the Executive Management Team. Between July 2006 and June 2008, supported by the Bank, the company had a management services contract with Manitoba Hydro, which helped to strengthen and turn around the company's technical and financial capabilities as well as management practices.

50. **Customer Base.** Between FY2004 and FY2011, the number of KPLC's customers has doubled from less than 0.6 million to over 1.4 million; a rapid growth in number is taking place in the domestic customer category (15.5 percent). In terms of revenue per customer, however, KPLC earns from an average commercial and industrial customer (above KSh 13 million) over 800 times an average domestic customer (less than KSh 17,000). This suggests that faster growth in KPLC's customer base is taking place in relatively lower-revenue generating segments.

51. **Recent Performance.** Despite the increase in the number of lower-revenue generating **segments** and the drought that affected the country's hydro power generation, KPLC has nonetheless been able to improve its financial positions. The company's return on total assets has increased from 1.4 percent in FY2004 to 4.2 percent in FY2011, a level higher than some electric utilities (e.g., ESKOM in South Africa: 2.2 percent in 2010; and Meralco in the Philippines: 3.7 percent in FY2009). This improvement consists of the larger share of profit component in revenues (i.e., return on sales) from 2.0 percent to 6.1 percent, which suggests a stronger contribution made from the company's improved operational performance. In the same period, KPLC's net income has grown at a CAGR of 37 percent and its operating profit at 35 percent. This remarkable performance is attributable to the following factors: (a) the volume of sales has steadily increased by a CAGR of 5.7 percent in the same period; (b) the average tariff yield has continued to improve, especially after the tariff review of 2008, increasing by 2.3 times; (c) the increase in power purchase costs was kept relatively low compared to the average tariff yield; and (d) system losses have been constantly reduced until FY2010 (Table 16).

Table 17. Key Financial Ratios of KPLC

FY	2004	2005	2006	2007	2008	2009	2010	2011
Operating Indicators								
Return on Total Assets	1.4%	3.7%	4.4%	4.0%	3.3%	4.9%	4.9%	4.2%
Return on Equity	5.1%	7.0%	8.3%	8.0%	7.7%	12.7%	13.4%	12.3%
Return on Sales (Profit element of revenues)	2.0%	4.5%	4.8%	4.5%	4.3%	4.9%	5.1%	6.1%
Gross Profit Margin	-10.8%	3.6%	6.3%	6.3%	6.2%	8.4%	8.6%	8.0%
Asset Turnover	0.74	0.83	0.91	0.88	0.76	1.00	0.97	0.70
Return on Net Fixed Assets	1.4%	5.2%	5.4%	7.4%	7.6%	10.1%	7.8%	7.8%
Capital Adequacy Indicators								
Debt Service Coverage Ratio	1.22	9.24	4.64	9.30	1.23	6.10	2.27	4.80
Debt to Equity	0.8	0.9	0.9	1.1	1.5	1.6	1.8	2.0
Debt to Assets	0.46	0.47	0.47	0.53	0.60	0.62	0.64	0.67
Liquidity Ratios								
Current Ratio	1.1	1.3	1.3	1.1	1.1	0.9	1.0	1.2
Average Days' Electricity Receivables	-	67	65	70	50	45	43	53
Average Days' Payables	-	93	78	109	145	79	78	137

52. **Revenue Collection.** Following the tariff review in 2008, which resulted in a general increase of tariffs, the impairment of electricity receivables more than doubled in FY2009. However, KPLC has been putting extra effort in improving its revenue collection from customers, and its average electricity receivables collection days improved from 50 days in FY2008 to 43 days in FY2010, before it deteriorated to 53 days in FY2011. As mentioned above, this was mainly due to the accumulation of outstanding bills for some of government ministries and local authorities that is being addressed by KPLC with support of MOE and MOF. The revenue collection rates in recent years are over 100 percent, indicating some outstanding payments from the past are collected. The company disconnects customers in arrears over three months after attempting several channels of notifications. It also takes enhanced measures such as prepaid metering (also supported by the Bank), enhanced bill payment service in partnership with telecommunication companies mobile phone-based money transfer mechanisms, and direct debit service mode of payment with commercial banks. Moreover, in the on-going project, development partners, including the Bank and EIB, are supporting the upgrading of KPLC's Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS) solutions to optimize the management of its distribution systems, which are expected to further reduce the system losses. More than half of electricity receivables are provided for and KPLC writes off the assets, in accordance with its policy, when the cost of recovery actions exceeds the benefits to be derived.

Table 18. Key Operational Indicators of KPLC

	Units	2005	2006	2007	2008	2009	2010	2011
Electricity sold	GWh	4,215	4,444	4,818	5,082	5,182	5,345	5,816
Average Tariff Yield	KSh/kWh	6.72	7.64	7.88	8.05	12.58	13.69	11.99
	US$/kWh	0.07	0.08	0.08	0.08	0.13	0.14	0.12
Electricity Purchased	GWh	5,334	5,472	5,838	6,045	6,149	6,315	6,895
Average Costs	KSh/kWh	3.57	4.45	5.10	4.83	7.66	8.53	6.72
	US$/kWh	0.04	0.04	0.05	0.05	0.08	0.09	0.07
(power purchase)	KSh/kWh	2.27	2.19	2.63	1.98	3.05	3.25	2.93
	US$/kWh	0.02	0.02	0.03	0.02	0.03	0.03	0.03
(fuel)	KSh/kWh	1.30	2.26	2.47	2.85	4.61	5.28	3.79
	US$/kWh	0.01	0.02	0.02	0.03	0.05	0.05	0.04
Losses	%	18.1%	19.6%	17.9%	16.6%	16.3%	16.0%	16.2%
Number of Customers	persons	633,351	691,525	791,282	899,029	1,061,911	1,212,584	1,444,061
Customer-employee ratio	Ratio	103	112	124	135	151	167	169

53. **Capital Restructuring.** KPLC restructured its capital in November-December 2010 to reduce its financial leverage and support its further expansion plan. In the process, the following steps were taken: (a) KPLC's authorized share capital was increased from KSh 18 billion to KSh 20.8 billion; (b) 794,962,500 redeemable non-cumulative preference shares held by the Government was converted into 76,622,891 ordinary shares; (c) the ordinary shares of KSh 20 were split into eight shares of Ksh 2.5 each; and (d) rights offering of 488,630,245 ordinary shares (20 ordinary shares for every 51 existing ordinary shares), in which the Government renounced all its rights to dilute its shareholding. Consequently, the company's ordinary share (book value) has increased by a multiple of 2.7, giving more room for the company's expansion plans, and the Government's share has become 50.1 percent of the company. While the steps (a)-(c) above do not affect tariffs per se, as they are basically reallocation within shareholders' equity, the rights issue would theoretically put upward pressure on the retail tariffs. However, the impact is relatively small, preliminarily estimated to be about Ksh 0.1/kWh.

Financial Projection of KPLC

54. Financial projection has been prepared for a base case as well as for scenarios incorporating risks of drought.

55. **Base Case Assumptions.** Some of the key assumptions for the base case financial projection are briefly discussed below.

- As in the economic analysis section, base case GDP growth rates assumed for the electricity demand projection are: 6.3 percent in FY2012, 6.5 percent in FY2013, 7.4 percent in 2014, 8.1 percent in FY2015 through FY2017, and 9 percent from FY2018 onwards. Income elasticity of electricity demand is assumed to be 1.4. The capacity installation plan is aligned to the energy supply projections in the same section.

- The number of customers is assumed to increase by 200,000 per year in accordance with KPLC's strategic plan.

- The existing retail tariff levels are assumed to be adjusted annually to new levels, in accordance with the basic tariff formula (i.e. Allowed Rate of Return on Regulatory Asset Base + O & M Expenditures + Depreciation Expenses + Taxes) to meet KPLC's revenue requirement, in accordance with the Bank's interpretation of the tariff review arrangements communicated by the ERC.

- Power purchase costs are assumed at the PPA rates as of September 2010 with allowance for escalation for existing power plants and estimated rates for new power plants.

- Fuel price is assumed to be at the level as of October 2011 (US$81.43/bbl). Fuel expenses were calculated using the specific fuel consumption factors for each power plant that runs on fuels.

- Indicative levels of average tariff yields assumed in this analysis are shown in Table 19. The combined average tariff yield has a range of US$12.53 cents per kWh and US$17.13 cents per kWh. Applying the retail tariff formula, the combined total level is assumed to peak in FY2013 and gradually decrease thereafter.

Table 19. Average Tariff Yield Assumptions (US cents/kWh)

	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Electricity	8.15	8.13	9.46	10.24	11.91	12.02	12.25	12.58	12.80	12.80	12.80
Fuel	6.91	4.22	6.35	6.71	4.97	4.48	4.50	3.41	2.88	2.74	2.52
Forex	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Total	15.24	12.53	15.99	17.13	17.06	16.68	16.92	16.17	15.86	15.72	15.50

- Given the deterioration of average number of receivable days and payable days in FY2011, which is not in line with the overall trend, they are assumed to improve at accelerated rates. The number of days in receivables is assumed to improve by 6 percent per year in FY2012 and FY2013, 4 percent in FY2013, 2 percent in FY2014 and 1 percent thereafter. Similarly, the number of days in payables is assumed to improve by 20 percent per year in FY2012 and FY2013, by 10 percent per year in FY2014, and by 5 percent per year thereafter.

- Investment in plant, property and equipment is assumed to take place in proportion to the growth in revenues.

- Investment is assumed to be financed by loans with increasingly commercial terms, with the average interest rate gradually increasing from 5 percent in FY2011 to 12 percent in FY2018. Long-term loans are used as a plug to balance the projected balance sheets.

- Corporate tax rate is assumed to be 30 percent.

56. Table 20 summarizes the base case projection of key financial ratios of KPLC between FY2012 and FY2020. The impacts of this Project are incorporated in the projection of electricity generation.

Table 20. Projection of Key Financial Ratios (Base Case)

Financial Ratios\FY	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Indicators									
Return on Total Assets	1.9%	1.7%	1.0%	2.0%	1.5%	3.3%	1.1%	1.9%	1.8%
Return on Equity	5.5%	5.0%	3.3%	7.1%	5.6%	12.8%	4.4%	7.5%	7.6%
Cost of kWh purchased (US cents/kWh)	13.1	14.3	13.9	13.0	13.3	11.8	12.2	11.8	11.7
Revenue per unit sold (US cents/kWh)	16.0	17.1	17.1	16.7	16.9	16.2	15.9	15.7	15.5
Return on Sales (Profit element of revenues)	2.3%	1.8%	1.1%	2.2%	1.6%	3.8%	1.3%	2.1%	2.0%
Gross Profit Margin	4.0%	3.4%	3.4%	5.3%	4.9%	9.0%	5.2%	6.9%	6.7%
Asset Turnover	0.81	0.92	0.88	0.90	0.91	0.88	0.91	0.90	0.92
Return on Net Fixed Assets	4.1%	4.0%	3.7%	6.3%	5.8%	10.6%	6.3%	8.2%	8.2%
Capital Adequacy Indicators									
Debt Service Coverage Ratio	2.37	1.90	1.51	1.77	1.51	1.94	1.36	1.49	1.45
Debt to Equity	1.8	2.3	2.5	2.7	3.0	2.7	3.0	3.0	3.2
Debt to Assets	0.64	0.69	0.72	0.73	0.75	0.73	0.75	0.75	0.76
Liquidity Ratios									
Current Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Average Days' Electricity Receivables	50	47	45	44	44	43	43	42	42
Average Days' Payables	123	99	89	84	80	76	72	69	65

57. The base case financial forecast shows that KPLC's operations, capital adequacy, and liquidity are expected to be sustained. In the absence of the Project, the increased demand will have to be met by alternative energy sources such as geothermal and coal power. To assess the impact of the Project on retail tariffs, the Bank team constructed an alternative scenario in which increasing demand is met not by the imported electricity from Ethiopia but by increased generation from geothermal and coal power plants. Under this alternative scenario, there will be an estimated upward pressure of 0.46-1.48 US cents per kWh on retail tariffs during the period FY2018 to FY2025.

58. KPLC will remain profitable despite taking on increased debt to finance power system expansion. Profitability ratios are lower in some years but they are still expected to maintain levels comparable to utilities in higher income countries. Even though the company will be leveraged with the increased proportion of debt, its debt service coverage ratio is expected to stay above 1.3, even when assuming KPLC's borrowing will increasingly become commercial terms.

59. **Risk Scenarios**. Some risks that may impact the financial performance of the sector in the future are: the roles and responsibilities for electricity supply under the new Constitution; hydrological risks of severe drought affecting hydroelectric power generation; uncovered portion of inflation risks; and issues related to crude oil price fluctuations and the acceptability and affordability of gradually increasing tariff levels. For several of these risks, some mitigation measures are already identified or implemented. For example, the Ministry of Energy has established an Energy Sector Committee on the New Constitution to review the potential impacts of the devolved system under the New Constitution to the sector. The findings are periodically shared at quarterly Donor Coordination Meetings. To assess the impacts of major potential risks, this section analyzes the risks of fuel cost inflation, currency depreciation, and droughts

60. **Fuel Price Risk**. The base case scenario assumed the fuel price at the level as of October 2011 (US$81.43/bbl), which was used to calculate fuel costs for thermal power generation based on different fuel conversion factors by power plants. To assess the potential impacts of increase in the crude oil price, three sensitivity scenarios were constructed: +25 percent (US$109.25/bbl), +50 percent (US$131.10/bbl), and +100 percent (US$174.80/bbl). The last case is above the highest crude price recorded in July 2008 (slightly over US$145/bbl).

Table 21. Sensitivity of Average Retail Tariff to Crude Price (US cents/kWh)

Crude Oil Price (US$/bbl)	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
87.40 (base case)	6.35	6.71	4.97	4.48	4.50	3.41	2.88	2.74	2.52
109.25 (+25%)	8.12	8.55	6.36	5.71	5.72	4.35	3.67	3.50	3.21
131.10 (+50%)	13.00	13.54	10.18	9.09	9.07	6.98	5.89	5.62	5.12
174.80 (+100%)	31.39	31.82	24.65	21.91	21.56	17.13	14.59	13.92	12.59

61. If the crude price would reach the highest case under consideration, its impact on tariff would be enormous that the affordability will become a serious concern (for example, + US$31.82 cents on average in FY2013). Even under other risk scenarios, the impacts in FY2012 and FY2013 could be quite severe as the levels go beyond the highest fuel cost pass-through level that occurred in FY2010 when it marked US$5.29 cents per kWh. It would therefore be necessary to monitor the impact of fuel price volatility on people's affordability of electricity, especially in the short-run. In the long-run, however, with diversification of energy sources, including further development of geothermal and wind power as well as import of electricity in particular from Ethiopia, the impact is expected to become less and manageable.

62. **Currency Depreciation Risk.** The base case scenario assumed that the Kenya Shillings will be stable against major convertible currencies (e.g. KSh 89.825/US$). If the Kenya Shillings were to be depreciated, the higher levels of foreign currency-denominated expenditures will be passed through to consumers. To assess the potential impact of currency depreciation on retail tariffs, five sensitivity scenarios were prepared: (a) 5 percent depreciation (KSh 94.316/US$); (b) 10 percent depreciation (KSh 98.808/US$); (c) 20 percent depreciation (KSh 107.790/US$); (d) 50 percent depreciation (KSh 134.738/US$); and (e) 100 percent depreciation (KSh 179.650/US$).

Table 22. Currency Depreciation Sensitivity (US cents/kWh)

US$/KSh	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
-5%	0.31	0.33	0.38	0.38	0.39	0.40	0.41	0.41	0.41
-10%	0.61	0.66	0.76	0.77	0.78	0.80	0.81	0.81	0.81
-20%	1.23	1.32	1.51	1.53	1.56	1.60	1.62	1.63	1.62
-50%	3.07	3.30	3.78	3.83	3.90	4.00	4.05	4.07	4.06
-100%	6.13	6.60	7.55	7.65	7.80	8.00	8.11	8.13	8.12

63. For depreciation below 10 percent, the expected impacts on retail tariffs will be within the magnitude of approximately US$0.08 cents per kWh. In an extreme case, if Kenya Shillings were to depreciate by 100 percent, the foreign currency pass through elements could be higher than US$8.0 cents per kWh.

64. **Drought Risk**. As described earlier, drought could challenge the sector performance by (a) making the system unreliable; (b) reducing revenues particularly for KenGen; (c) imposing some burden of capacity payment subsidy for the Government and taxpayers; and (d) raising electricity cost for consumers. To assess the potential impact of such a drought, a scenario was constructed that assumes a drought of similar magnitude as in FY2010 to occur, as an illustration, in FY2013. Approximately 25 percent reduction in hydropower generation is assumed, which is compensated for by increased production in emergency power plants. To stress-test the resilience against the shock, no additional compensatory price adjustment is assumed.

65. Table 23 summarizes the projection of key financial ratios of KPLC between FY2011 and FY2020 under the drought risk scenario.

Table 23. Projection of Key Financial Ratios (Drought in 2013)

Financial Ratios\FY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Indicators										
Return on Total Assets	4.2%	1.9%	1.0%	0.5%	1.9%	1.4%	3.3%	1.1%	1.8%	1.8%
Return on Equity	12.3%	5.5%	3.3%	1.9%	7.1%	5.6%	13.0%	4.3%	7.4%	7.6%
Cost of kWh purchased (US cents/kWh)	8.9	13.1	16.3	13.9	13.0	13.3	11.8	12.2	11.8	11.7
Revenue per unit sold (US cents/kWh)	12.5	16.0	18.7	17.1	16.7	16.9	16.2	15.9	15.7	15.5
Return on Sales (Profit element of revenues)	6.1%	2.3%	1.1%	0.6%	2.1%	1.5%	3.7%	1.2%	2.0%	1.9%
Gross Profit Margin	10.0%	4.0%	2.3%	3.4%	5.3%	4.9%	9.0%	5.2%	6.9%	6.7%
Asset Turnover	0.70	0.81	0.96	0.84	0.90	0.91	0.88	0.91	0.90	0.92
Return on Net Fixed Assets	7.9%	4.1%	2.6%	3.6%	6.3%	5.8%	10.6%	6.3%	8.2%	8.2%
Capital Adequacy Indicators										
Debt Service Coverage Ratio	3.54	2.37	1.50	1.30	1.71	1.47	1.88	1.32	1.45	1.42
Debt to Equity	2.0	1.8	2.6	2.6	2.8	3.1	2.8	3.2	3.2	3.4
Debt to Assets	0.67	0.64	0.72	0.72	0.74	0.76	0.74	0.76	0.76	0.77
Liquidity Ratios										
Current Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Average Days' Electricity Receivables	53	50	47	45	44	44	43	43	42	42
Average Days' Payables	154	123	99	89	84	80	76	72	69	65

66. The results of the drought risk in FY2013 scenario show that it pushes up the cost of electricity, including the fuel costs for increased thermal power generation, by US$0.02 cents per kWh from the base case scenario in FY2013. Most (95 percent) of the increase in the cost of supply is due to the effect of fuel switching cost from hydroelectric to emergency power plants. The return on total assets deteriorates from 1.7 percent to 1.0 percent. Many other ratios are also negatively impacted: return on equity decreases from 5.0 percent to 3.3 percent; the debt service coverage ratio decreases from 1.90 to 1.50; and debt to equity ratio jumps from 2.3 to 2.6. However, as the country increases the share of geothermal power in the grid or the electricity imported from Ethiopia, the impacts of drought are expected to become smaller in proportion.

Recent Performance of KETRACO

67. **Background.** The energy policy (Sessional Paper No. 4 of 2004) stipulates that the Government provide financial support for transmission capacity expansion because the transmission grid is expected to remain in the public domain. Reflecting this policy, a fully government-owned state corporation KETRACO was incorporated in December 2008 to design, construct, operate and maintain new high voltage electricity transmission infrastructure that forms the backbone of the national grid. Fully funded by the Government, the company has been gradually building up its portfolio of newly-constructed high voltage transmission lines, owning

286 km of new transmission lines with a capacity of over 132 kV,[59] out of 3,674 km in the entire country as of August 2011. Besides the regional interconnectors under plan, there are 17 on-going projects that include 400 kV lines. To fulfill its mandate, the company has been setting up its corporate strategy and required organizational structure; investing in ICT infrastructure; training its staff; and has entered into a Performance Contract with the Government as well as a Technical and a Service Agreement with KPLC to supplement and augment its technical and managerial capacity.

Table 24. KETRACO's Income Statement and Balance Sheet Summary (FY2010-2011)

(KSh million)	FY2010	FY2011
Income Statement Summary		
Operating Revenues	528	680
(of which GoK funding)	266	400
Operating Expenses	223	461
Operating Income	305	220
Net Income	389	422
Balance Sheet Summary		
Non-current Assets	5,192	12,326
Current Assets	3,568	6,660
Total Assets	8,761	18,986
Equity	8,263	16,780
(of which GoK funding)	3,773	7,694
Current Liabilities	498	2,206
Total Equity and Liabilities	8,761	18,986

68. **KETRACO's Financial Performance.** The Government's commitment to finance extension of the national grid is reflected in KETRACO's financial performance. In FY2011, Government's recurrent funding accounts for close to 60 percent of KETRACO's operating revenues. Although the remaining 40 percent is computed on an assumption that a KSh 0.77/kWh wheeling tariff would be charged to KPLC, the two parties are in the process of finalizing the wheeling arrangements. For this reason, the number of days in receivables is high but is expected to come down once the arrangements will be in place and wheeling charges will be collected from KPLC. The company's investment is funded through Government's development budget expenditures as well as through on-granting of loans that the Government receives from development partners. Hence, most of the debts that the company incurs are operational in nature, and the proportion of debt in its financial structure is minimal. Return on Assets was 2.2 percent, and current ratio was over 3 – this level is high because of the lead time between funding from GoK and actual investment in transmission lines but has come down since FY2011 because of the progress the company is making with projects. Asset turnover is low due

[59] They are: Sondu Miriu-Kisumu (132 kV, 50 km); Kamburu-Meru (132 kV, 122 km); Chemosit-Kisii (132 kV, 62 km); and Rabai-Galu (132 kV, 48 km).

to a large portion of its fixed capital under construction. The high average number of days' payables (374 days) is due to the process of handing over assets from KPLC to KETRACO.

Table 25. Key Financial Ratios of KETRACO (FY2010-FY2011)

	FY2010	FY2011
Return on Total Assets	4.4%	2.2%
Return on Sales (Profit element of revenues)	73.6%	62.0%
Cost Recovery Ratio	237.0%	147.7%
Asset Turnover	0.06	0.04
Return on Net Fixed Assets	5.9%	1.8%
Current Ratio	7.2	3.0
Average Days' Receivables	365	791
Average Days' Payables	763	374

69. **KETRACO's Financial Outlook.** During negotiations GoK confirmed that it will on-grant the IDA credit to KETRACO for project implementation. The funding plan for the Project is included in the Government's Medium-Term Expenditure Framework as well as the annual budget for FY2012. GoK and KETRACO plan to reduce and eventually graduate from subsidies for operational expenditures, while subsidies on capital expenditures are expected to continue at least over a medium-term horizon.

70. **Base Case Assumptions.** Some of the key assumptions for the base case financial projection are briefly discussed below.

- Inflation rate is assumed to be 9.6 percent, based on five-year average between 2007 and 2011.

- KETRACO's investment plan is adopted from the country's Least Cost Power Development Plan (LCPDP 2011-2031).

- Government is expected to finance the capital expenditures through both development expenditure budget and on-granting of loans from development partners. In accordance with the company's accounting practice, depreciation of assets is computed on the basis of 2.5 percent of the assets. The Government's capital grant is assumed to be amortized and matched to the depreciation expenses in income statement.

- KETRACO's revenue is computed based on expected electricity transmitted through the transmission lines held by the company multiplied by an indicative level of wheeling charge. The assumption on the volume of electricity transmitted in the grid is harmonized with the demand-supply projection in Annex 9. KETRACO's share of electricity transmission is conservatively expected to increase from current level of 7 percent to 85 percent in FY2031. In the absence of a benchmark, indicative wheeling

charge is derived from the provisional rate of Ksh 0.77/kWh used by KPLC and KETRACO. Inflation adjustment is assumed to apply to the rate.

- The portion of KETRACO's revenue requirement that cannot be met by the formula above is initially supported by the Government.

- O & M cost of transmission lines, excluding staff costs, is assumed to be 1 percent of investment costs.

- Staff costs are derived from the expected number of staff multiplied by expected costs per staff. Provisional information on the expected number of staff is obtained from the KETRACO HR Department, in which the number is expected to increase from 110 in FY2011 to about 2,400 in FY2031. The expected costs per staff is taken from the actual in FY2010 (about KSh 1.4 million), adjusted for annual inflation.

- Administration and other expenses are assumed to grow by the annual rate of inflation.

- Equity is assumed to be constant at the current level of KSh 2 million.

- In discussion with KETRACO, average number of days in receivables and payables are assumed to improve from 45 days to 30 days (receivables) and 60 days to 45 days (payables) respectively.

71. Based on the set of conservative assumptions above, it is expected that KETRACO's financial ratios will improve over time and it will graduate from Government support for operating expenses in three years. The company's return on assets is low at 0.2 – 0.4 percent during this initial expansionary stage; this is the time when rapid investment in transmission lines is expected to take place and operations and maintenance costs and staff costs are expected to increase above the average trend. However, once the investment in transmission assets stabilizes and is back along long-term trend as described in the LCPDP, the company's cost recovery and overall performance will improve. The company is expected to be financially sustainable in operational terms.

72. On the capital expenditures, while the company does not increase financial leverage as its sources of financing are expected to be in grant, there is a risk as to what extent the Government will continue to support expansion of the national grid. This is partly mitigated by the sound track record of implementing the energy policy since 2004 where the Government has established transparent regulatory environment and has provided resources to expand the national grids. Key transmission lines projects are included in the Medium-Term Expenditure Framework, which is a medium-term commitment of fiscal resources. Its strong policy commitment to the long-term viability of KETRACO provides reasonable assurance for the sustainability of the Project.

73. **Sensitivity Cases**. To see the potential impact of different levels of wheeling charge, five down-side scenarios were constructed, assuming 10 to 50 percent lower levels than the base case. The impacts of different wheeling tariff levels on the amount of government support

required to sustain KETRACO's finance as well as the number of years it would take for KETRACO to graduate from the operational subsidies are compared. The results are presented in Table 26. The results suggest that setting the wheeling tariff level that allows KETRACO to recover its operational expenses and appropriate returns would be important not only for KETRACO's financial viability but also for controlling government's fiscal burdens.

Table 26. Sensitivity of KETRACO's Finance to Wheeling Charge Levels

Scenarios	Wheeling Charge in FY2012 (KSh/kWh)	Government Support (undiscounted simple sum in KSh million)	Number of Years Required for Graduating from Operational Subsidies (years)
Base Case	0.77	300	3
-10%	0.69	500	3
-20%	0.62	1,100	7
-30%	0.54	1,400	7
-40%	0.46	2,500	8
-50%	0.39	4,350	10

Table 27. KETRACO's Projected Income Statement and Balance Sheet Summary (FY2012-2025)

(KSh million) \ FY	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Income Statement Summary														
Operating Revenues	1,595	2,370	3,216	4,256	5,419	6,741	8,280	10,086	12,853	15,921	19,849	24,861	31,237	39,325
(of which GoK funding)	200	100	-	-	-	-	-	-	-	-	-	-	-	-
Operating Expenses	1,558	2,321	3,132	4,020	5,031	6,031	6,949	7,932	9,228	10,032	10,961	12,042	13,305	15,441
Operating Income	37	49	84	236	388	710	1,331	2,154	3,626	5,889	8,887	12,819	17,933	23,884
Net Income	84	100	140	300	465	808	1,465	2,346	3,911	6,327	9,555	13,818	19,398	25,973
Balance Sheet Summary														
Non-current Assets	36,589	60,246	83,310	105,799	127,725	149,103	169,946	190,269	210,083	214,991	219,776	224,442	228,991	233,426
Current Assets	460	560	700	1,004	1,473	2,285	3,754	6,105	10,022	16,385	25,949	39,778	59,188	85,174
Total Assets	37,050	60,806	84,011	106,803	129,198	151,387	173,700	196,374	220,104	231,375	245,725	264,220	288,179	318,601
Equity	36,998	60,755	83,960	106,749	129,139	151,325	173,633	196,301	220,026	231,262	245,602	264,086	288,033	318,442
(of which GoK funding)	36,121	59,778	82,842	105,331	127,257	148,635	169,478	189,800	209,615	214,523	219,308	223,974	228,523	232,958
Current Liabilities	51	51	51	54	58	63	67	73	78	114	123	134	146	158
Total Equity and Liabilities	37,050	60,806	84,011	106,803	129,198	151,387	173,700	196,374	220,104	231,375	245,725	264,220	288,179	318,601

Table 28. Projected Financial Ratios of KETRACO (FY2012-2025)

FY / Ratio	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Return on Total Assets	0.2%	0.2%	0.2%	0.3%	0.4%	0.5%	0.8%	1.2%	1.8%	2.7%	3.9%	5.2%	6.7%	8.2%
Return on Sales (Profit element of revenues)	5.03%	4.2%	4.4%	7.1%	8.6%	12.0%	17.7%	23.3%	30.4%	39.7%	48.1%	55.6%	62.1%	66.0%
Cost Recovery Ratio	102.4%	102.1%	102.7%	105.9%	107.7%	111.8%	119.2%	127.2%	139.3%	158.7%	181.1%	206.4%	234.8%	254.7%
Asset Turnover	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.17
Return on Net Fixed Assets	0.1%	0.1%	0.1%	0.2%	0.3%	0.5%	0.8%	1.1%	1.7%	2.7%	4.0%	5.7%	7.8%	10.2%
Current Ratio	9.0	10.9	13.8	18.5	25.3	36.5	55.7	84.2	128.1	144.0	210.2	296.7	406.4	537.8
Average Days' Receivables	40	35	30	30	30	30	30	30	30	30	30	30	30	30
Average Days' Payables	50	46	41	41	41	41	41	41	29	41	41	41	41	27

Annex 8: Economic Analysis

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

1. The economic justification for the proposed interconnection investment rests on two conditions: (1) The selected configuration is the least-cost alternative to construct an interconnection and enable power trade between Ethiopia and Kenya; and (2) the proposed investment is economically viable and remains so under less favorable conditions affecting its implementation.

2. The first condition has been demonstrated by least cost analyses derived from two studies: (1) The East Africa Power Pool (EAPP) Regional Power System Master Plan Study commissioned by the EAPP Secretariat and the East Africa Community (EAC) and completed by SNC Lavalin (a Canadian consulting firm) in 2010; and (2) a further Robustness Study – *Verification of the Regional Economic Robustness of the Ethiopia-Kenya Transmission Interconnection Options* – commissioned by the EAPP Secretariat in 2011. Findings of both studies have been presented in detail in Annex 6 and are summarized thereafter.

3. The second condition has been assessed through two cost-benefit analyses. A preliminary analysis was conducted as part of the Project's Feasibility Study completed by the consulting firm Fichtner in 2009 (Fichtner Report), which demonstrated that the Project is viable from the viewpoint of the regional economy. A new cost-benefit analysis has been carried out by the World Bank as part of its standard due diligence to assess the economic viability of the Project from the specific viewpoint of the economies of the two sponsoring nations, Ethiopia and Kenya. This analysis is presented thereafter.

Least-cost Analysis

4. The Regional Power System Master Plan and Grid Code Study (EAPP Master Plan) for the East African region has selected the generation and transmission projects that allow accommodating the regional demand for electricity between 2013 and 2038 at the lowest total cost. Eleven major interconnectors have been identified as part of the least-cost expansion plan (Table 1). Among these, the Ethiopia-Kenya Interconnection with 2,000 MW of HVDC transmission capacity constitutes a key component of the plan for the year 2016 across all scenarios considered. For the same year, the least-cost expansion plan also includes the Kenya-Tanzania interconnection and the Ethiopia-Sudan-Egypt interconnection.

Table 1. List of Major Interconnectors Identified under the EAPP Master Plan

No.	Connection	Voltage (kV)	Capacity (MW)	Year
1.	Tanzania-Kenya	400	1,520	2015
2.	Tanzania-Uganda	220	700	2023
3.	Uganda-Kenya	220	440	2023
4.	Ethiopia-Kenya	500 (DC)	2,000	2016
5.	Ethiopia-Sudan	500	2 x 1,600	2016
6.	Egypt-Sudan	600 (DC)	2,000	2016
7.	Ethiopia-Kenya	500 (DC)	2,000	2020
8.	Ethiopia-Sudan	500	1,600	2020
9.	Egypt-Sudan	600 (DC)	2,000	2020
10.	Ethiopia-Sudan	500	1,600	2025
11.	Egypt-Sudan	600 (DC)	2,000	2025

5. The Robustness Study further commissioned by the EAPP Secretariat has confirmed that the selected configuration of the Ethiopia-Kenya Interconnection is the least-cost option and remains viable under a wide range of risks and scenarios. As presented in detail in Annex 6, the Study has considered five technical alternatives and tested them under eleven scenarios. The single 500 kV HVDC bipole transmission line with 2,000 MW of capacity to be commissioned in 2016 presents the highest net benefits under nearly all scenarios and therefore is the most economically robust option. Benefits/cost ratios remain always above 1 and even reach a maximum of 10. Further in-depth analysis has assessed that whatever is the advancement of other interconnections or generation additions in the region and the direction of the flow along the line, the interconnection will yield significant economic benefits to Ethiopia and Kenya, which will spread to the rest of the region as the line is utilized by other EAPP member countries. Overall, it is estimated that 60 to 80 percent of the line's capacity will be utilized. Kenya alone may utilize up to 50 percent, as estimated by the electricity demand-supply balance analysis for Kenya prepared by the Project's appraisal team and presented in Annex 9. Finally, the analysis confirms that the Ethiopia-Kenya interconnection is a critical link between EAPP southern and northern sections under all the scenarios and that it will lead to drastic reduction in energy supply costs across the East Africa region.

Cost-benefit Analysis

6. The objective of the economic analysis carried out by the Project's team is to assess the overall impact of the Project on the welfare of the citizens of Ethiopia and Kenya. The analysis identifies and compares economic costs and benefits in two cases, one 'with project' and the other 'without project'. The estimation of economic benefits considers that the line is utilized only for bilateral trade between the two countries with power flowing in one direction, from Ethiopia to Kenya.

7. Although a range of economic benefits will accrue from the Project to both countries, this analysis has focused on those more quantifiable. The interconnection will allow Kenya to access less expensive power supply from Ethiopia; therefore economic benefits to Kenya mainly consist of the avoided costs of alternative domestic generation. For Ethiopia, the main benefit is the hard currency revenue that the country will earn from exports. Project costs comprise all costs associated with energy exports along the interconnection, including the costs of constructing and

operating the transmission line, the costs of generating energy for exports, and environmental and social management costs.

Assumptions and Methodology

8. Assumptions concerning the terms of electricity trade between the two countries are derived from the Power Purchase Agreement (PPA) recently negotiated between EEPCo and KPLC, with KETRACO as the transmission intermediary. This establishes that Ethiopia and Kenya will trade 400 MW of firm energy with a load factor of 85 percent for a period of 25 years. The PPA also mandates that Ethiopia shall ensure a minimum export capacity of 300 MW. The price of the electricity traded up to 400 MW has been fixed at 7 US cents/kWh for the whole duration of the contract with no indexation. Additional electricity may be traded above the firm committed capacity at a price to be negotiated.

9. Volumes of electricity traded over the life of the Project above the committed amount are derived from Kenya's electricity supply-demand balance analysis completed by the Project's team. This incorporates assumptions and findings from the Least Cost Power Development Plan (LCPDP 2011) prepared by the Kenya's Ministry of Energy and the Regulator in cooperation with power utilities. The base-case scenario of the analysis predicts electricity demand in Kenya based on the historical relationship between GDP and electricity sales growth. In the past three years, electricity consumption as measured by KPLC sales has increased at an annual rate of 1.4 times GDP growth. Assuming that this elasticity remains constant and that GDP growth will average 6 percent per annum, electricity demand in Kenya is forecasted to increase at an annual rate of 9 percent, reaching 15.7 TWh by FY2022 and 37 TWh by FY2032. As result, import needs are expected to grow from 300 MW in the first year after the line is commissioned, to 400MW in the following year, to 700 MW by FY2021 and up to 1,000MW by FY2022. Therefore, in addition to the firm committed amount of 400 MW agreed as part of the PPA, Kenya will be importing a variable amount of electricity from Ethiopia, increasing up to 600 MW over the lifetime of the Project. Based on these forecasts, by FY2022 Kenya will be utilizing 50 percent of the line's total capacity, leaving 1,000 MW available for other EAPP members. A fixed charge of 8 US cents/kWh and a load factor of 40 percent are assumed for this variable amount.

10. The electricity demand-supply balance analysis for Ethiopia also completed by the Project's appraisal team and presented in Annex 6 confirms that Ethiopia will be able to accommodate Kenya's import needs as well as domestic demand with a reasonable reserve margin.

11. The economic evaluation of the Project spans over the period up to FY2047, assuming that the interconnection is commissioned at the beginning of 2018 (FY2018) and has an economic life of thirty years. Both costs and benefits are set up as cash flows over the economic lifetime of the line, including the construction and the operation period. A discount rate of 12 percent is used. Also, transmission losses are assumed to be equal to 3 percent.

Economic Benefits

12. Installed generation capacity in Kenya is inadequate to meet the fast growing electricity demand. Load shedding in recent years has forced the country to resort to "emergency" generation capacity that can be installed quickly but is very expensive. Not only has the LCPDP 2011 recognized that imports from Ethiopia can significantly contribute to ensuring adequate electricity supply in the country. A comparative life-cycle cost analysis[60] used to rank all the generation alternatives considered for inclusion into the LCPDP 2011 has also indicated that imports constitute one of the least-cost options for provision of base load capacity.

13. For the purpose of the economic analysis, imports are assumed to provide additional mid-load capacity, which will allow Kenya to avoid or defer investments in expensive thermal generation. In particular, it is assumed that imports may substitute for electricity generated from coal and geothermal power, which are among the more suitable sources of mid-load capacity available domestically. Therefore, the economic value of each unit imported by Kenya is equal to the weighted average cost of these alternatives less the cost of imports from Ethiopia. Life-cycle costs of coal- and geothermal-based generation in Kenya have been estimated by the LCPDP 2011 at about 15 US cents/kWh and 9 US cents/kWh respectively. Assuming that without imports from Ethiopia the corresponding volume would be supplied in equal amounts through coal and geothermal power, the weighted average cost per kilowatt-hour of the two alternatives is equal to about 12 US cents/kWh. Therefore, Kenya will save 5 US cents on each kilowatt-hour of imports up to 400 MW and 4 US cents/kWh for imports above 400 MW compared to what it would cost to produce the same amount of electricity domestically.

14. Economic benefits to Ethiopia are equal to the revenues earned from exports. It should be noted that the PPA price allows Ethiopia to fully recover the cost of producing electricity, which is estimated at 4.2 US cents/kWh.[61]. Conversely, domestic electricity retail tariffs (averaging 3.2 US cents/kWh) remain well below cost recovery level.

15. The Project also entails a range of less quantifiable benefits, which for simplicity have not been estimated. Large environmental benefits in the form of avoided greenhouse gas emissions will accrue to Kenya from the displacement of thermal-based generation with hydropower imported from Ethiopia. Export revenues will provide a steady source of foreign exchange to Ethiopia and improve its macro-economic situation**.** Ethiopia may use the revenues from power export for investments in network expansion and rural electrification, which is generally seen as a stimulus for economic growth. Similarly, imports will reduce overall power costs in Kenya and leave more resources available for investments in the energy sector. Overall, the interconnection may stimulate economic growth and encourage economic cooperation between Ethiopia and Kenya.

[60] The analysis is based on a screening curve method, which expresses the total annualized cost of producing electricity in a given generation unit, including all capital and operating expenses, as a function of the unit capacity factor. Screening curves were constructed for all candidate generation plants and technologies considered for inclusion in the LCPDP 2011 to facilitate ranking of these alternatives based on their costs.

[61] Fichtner Report, 2009. The value refers to the average generation costs in Ethiopia adjusted for transmission losses.

Economic costs

16. The investment costs of the Project are assumed to be incurred over five years, based on the following schedule: 4 percent in FY2014, reflecting the first tranche of investments in the reinforcement of Kenya's transmission capacity that need to be completed well ahead of commissioning of the interconnection; 20 percent in FY2015; 16 percent in FY2016; 30 percent in FY2017; 20 percent in FY2018; and 10 percent in FY2019, after the line has been commissioned for retention purposes. Investment costs used in the economic analysis exclude by definition price contingencies and interest during construction. Ongoing operational and maintenance (O & M) costs are assumed to equal 2 percent of total investment costs annually. Project costs also include the costs of environmental monitoring, compensation and resettlement and the overall cost of generating electricity for exports.

Results

17. The economic viability of the Project is high - the EIRR is 24.1 percent and the NPV is US$1,059 million calculated based on the framework above (Table 4). When the results are disaggregated at the national level, the analysis shows that the Project is slightly more beneficial for Kenya. This is explained by the fact that avoided energy costs in Kenya account for a larger part of the Project's overall economic benefits. EIRR and NPV to Kenya stand at 25.5 percent and US$739 million respectively. EIRR to Ethiopia is 21.8 percent; NPV reaches US$320 million. In summary, the Project is highly profitable from the viewpoint of both economies.

Table 2. Summary of Economic Analysis

	Ethiopia	Kenya	Ethiopia + Kenya
EIRR (%)	21.8%	25.5%	24.1%
NPV (USD million)	320	739	1,059

Sensitivity Analysis

18. A sensitivity analysis has tested the robustness of the Project to unfavorable changes in the values of the main variables. The analysis has first assessed the impact of various levels of utilization of the line – as expressed by the volume of energy traded between Ethiopia and Kenya – on the Project's EIRR and NPV. If annual power imports are limited to the firm committed amount of 400 MW, the EIRR drops to 15.9 percent and the NPV to US$246 for the Project as a whole (Table 3). This is still a satisfactory outcome but underscores the importance of the rate of utilization of the line on its economic viability.

Table 3. Sensitivity Analysis

EIRR (%)	Ethiopia	Kenya	Ethiopia + Kenya
Base Case	***21.8%***	***25.5%***	***24.1%***
Export volumes = Max 400 MW	14.3%	16.7%	15.9%
Project cost overruns = + 15 percent	19.6%	23.1%	21.8%
Project cost overruns = + 20 percent	18.9%	22.4%	21.1%
Price of surplus energy (>400 MW) = 7 cents/kWh	20.2%	26.4%	24.1%
NPV (USD million)			
Base Case	***320***	***739***	***1,059***
Export volumes = Max 400 MW	57	189	246
Project cost overruns = + 15 percent	272	666	938
Project cost overruns = + 20 percent	256	642	898
Price of surplus energy (>400 MW) = 7 cents/kWh	251	808	1,059

19. A further analysis shows that if the traded volume is equal to or less than 325 MW, which is close to the minimum capacity that must be ensured by Ethiopia according to the PPA, the EIRR for Ethiopia drops below the 12 percent hurdle rate and the NPV turns negative. Under such a scenario, the Project becomes uneconomic. However, several factors mitigate the risk that such a scenario may materialize. First, as anticipated above and addressed in detail in Annex 6, Ethiopia's electricity supply-demand balance analysis indicates that Ethiopia will have enough export capability during the life of the line. Second, as discussed above, a review of Kenya's electricity demand and supply balance suggested that its import needs in the long period will not be less than 1000 MW. In addition, other countries in the region are making plans to interconnect their systems and eventually will be trading electricity through this line.

20. A further sensitivity analysis has been carried out to examine the effects of adverse conditions including: (a) a 15 and 20 percent increase in investment costs; and (b) the price of the electricity traded above the firm committed amount set at 7 US cents/kWh, same as the price set by the PPA for the first 400 MW. Investment cost overruns by 15 and 20 percent decrease the EIRR by just a few percent points, to 21.8 and 21.1 percent respectively. A lower price for the electricity traded above the firm committed amount does not influence the EIRR of the Project as a whole, but rather reallocates economic value between Ethiopia and Kenya. A lower price means less export revenues to Ethiopia and more savings to Kenya. As a result, EIRR to Kenya increases from 25.5 to 26.4 percent, while EIRR to Ethiopia decreases from 21.8 to 20.2 percent.

21. In summary, the volume of energy traded on the line is the variable that has the strongest impact on the economic viability of the Project. Conversely, changes in the investment costs have little impact while different prices for the electricity traded along the line simply redistribute economic value between the two participating countries. A level of utilization of the line below 325 MW, or only 16 percent of the line's total transmission capacity, would make the Project economically unfeasible. Conversely, under all other circumstances considered, the Project remains viable from the viewpoint of the economies of both Kenya and Ethiopia.

Annex 9: Kenya's Least-Cost Power Generation Expansion Plan

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

1. The revised long-term least-cost power generation expansion plan that is part of the March 2011 LCPDP (transmission investments and rural electrification are also treated in the LCPDP) was prepared by the MoE and ERC in collaboration with the power utilities. The candidate generating plants and technologies considered for the inclusion in the plan were: (a) oil-fired thermal – medium and high-speed diesels; (b) geothermal; (c) hydro power; (d) wind; (e) co-generation – combined heat and power; and (f) coal-fired steam. Computer planning models using long-term dynamic optimization methodology were applied to establish the long-term generating expansion program.

2. Comparative life-cycle cost analysis, based on the data used in the LCPDP to ensure consistency, shows the relative merits of the various feasible candidates considered for the LCPDP as shown in Table 1.

Table 1. Results of Screening Curve Analysis of Candidate Technologies in the LCPDP

Candidate Plant and Technology	Levelized cost of Energy (US cents/kWh) at 12% discount rate	Load Factor assumptions of the LCPDP
Base Load Candidates		
Geothermal	9.2	93%
Wind	12.2	40%
Hydro (Low Grand Falls)	14.1	60%
Coal	14.9	55%
Imports (Ethiopia-Kenya Interconnector)	6.8	70%
Peak Load Candidates		
Gas Turbine Natural Gas	17.0	20%
Medium-Speed Diesel (Reciprocating diesel engine technology using Heavy Fuel Oil – the three proposed thermal IPPs)	24.1	28%
Emergency High Speed Diesel	32.1	20%

3. The above comparison confirms that construction of the Ethiopia-Kenya interconnector for imports of electricity, the construction of 280 MW at the Olkaria I and Olkaria IV power stations, and the expansion of the Olkaria III station are priority projects for provision of base load capacity in the LCPDP. In the case of the proposed thermal IPPs (i.e. medium-speed diesel) they are the lowest cost option for peaking duty. When and if natural gas would become available enabling their conversion from fuel oil, their cost would fall. It is important to note however, than in the forecast period, there are periods when base load supply is constrained so that the medium-speed diesel plants will perform a base load role during these periods.

Electricity Generating Capacity Additions through FY2027

4. Additions to the generating system to meet projected electricity demand and to provide for adequate reserve margin are at various stages of implementation. Projects for which financing has been secured or for which feasibility studies have been prepared were included through FY2027. These include Olkaria I (140 MW) and Olkaria IV (140 MW), Olkaria III expansion (36MW) for which construction has commenced and Lake Turkana Wind Phase 1 (50 MW) that will be commissioned in FY2015, and Turkana Wind Phase 2 (250 MW) to be commissioned in FY2016. KenGen are likely to commission additional capacity (the Ngong wind plant at 22 MW) in FY2013 before decommissioning 60 MW of costly gas turbine units in FY2015.

5. The timing of projects due to be commissioned between FY2017 and FY2025 is more uncertain than those in earlier years. The Geothermal Development Corporation commenced geothermal resource development at Menengai in 2011 with a view to procuring 400 MW as four separate IPPs (4 x 100 MW) by 2017. In addition, KenGen and GDC both intend to install wellhead generators in the geothermal fields of Olkaria and Menengai respectively beginning with 30 MW in 2012. Olkaria III additional 16 MW will be commissioned in FY2018 s and decommissioning of Mumias (26 MW) and Tsavo (7.4 MW) will be in FY2019 and FY2021 respectively. A number of large wind projects – Aeolus Kingangop 60 MW – Aeolus Ngong Hills 80 MW, GE Ngong Hills 100 MW, and KenGen Marasbit 80 MW are at an early stage of development.

Electricity Demand Growth

6. The base case electricity demand forecast in the LCPDP assumes 14.5 percent growth from 2010 to 2020 and 12.2 percent from 2020 to 2031. For the purpose of the supply demand balance below more moderate demand growth of 9 percent per annum was assumed. The analysis confirms that 400 MW of firm power imports from Ethiopia can be absorbed once the Ethiopia-Kenya Interconnection is commissioned, growing to 700 MW by FY2021 up to 1,000 MW by FY2022.

Table 2. Kenya's Energy Supply-Demand Balance

Energy Supply and Demand Balance FY11 to FY27									
	2010/11	FY13	FY15	FY17	FY19	FY21	FY23	FY25	FY27
Net Energy Generation (TWh)	*Actual*				*Forecast*				
KenGen-Total (TWh)	5.0	5.4	7.1	7.7	7.9	7.9			
IPPs-Total (TWh)	1.9	2.9	3.0	4.3	4.1	5.0			
Emergency Power Producers (TWh)	0.3	0.4							
Domestic supply (TWh)	7.3	8.6	10.1	12.0	12.0	12.9	14.9	18.8	23.2
Imports from Ethiopia (TWh)					2.2	4.0	5.1	5.1	5.1
Domestic demand incl losses (TWh)	7.3	8.6	10.1	12.0	14.2	16.9	20.1	23.9	28.3
Total Losses (TWh)[2]	1.2	1.4	1.5	1.7	2.1	2.5	2.9	3.5	4.1
Net Available Reliable Capacity (MW)	1447	2010	2303	3059	3418	4214	4314	5200	6000
System Peak Demand (Recorded) MW	1194								
Est. Unconstrained Demand (MW)	1341	1586	1884	2238	2659	3159	3754	4460	5299
System Reserve Margin (%)	7.9	26.8	22.3	36.7	28.5	33.4	14.9	16.6	13.2
System Load factor	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Source: LCPDP and World Bank estimates									

Annex 10: Assessment of Governance Risk in Kenyan Power Sector

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT APL 1

1. This section reviews some indicators that can be used to assess the level and risk of poor governance and corruption in the Power sector as recommended in the Sourcebook for Deterring Corruption and Improving Governance in the Electricity Sector, issued to staff in April 2009. This assessment relates to the following issues.

- Regulatory environment.
- Sector performance.
- Sector operations.
- Disclosure of information and social accountability.

2. The specific indicators for each item, their status, and risk ratings are shown in Table 1. INT has advised the Bank team that prepared the Electricity Expansion Project approved by the Board in May 2010 in the preparation of this assessment. Some details of the assessment have been updated to highlight issues that are more relevant to the Project and to take account of events since May 2010 but the overall assessment is unchanged.

Table 1. Assessment of Electricity Sector Regulatory and Institutional Framework

Indicator	Status	Risk Assessment
Regulatory Environment:		**Medium**
Institutional framework for regulatory decisions	**The institutional and legal framework for regulatory decision making in the electricity sector is adequate.** The Energy Act, 2006 defined the functions of the Energy Regulatory Commission (ERC). These include: regulation: (i) importation, exportation, generation, transmission, distribution, supply and use of electrical energy; prepare indicative national energy plan; and protect the interests of consumer, investor and other stakeholder interests. T he track record of the Commission is excellent. Its jurisdiction with regard to setting KenGen's generation prices was challenged by KenGen in mid-2008 in the Energy Tribunal when it made its first tariff ruling. Following an initial ruling by the Tribunal, the matter was resolved amicably and KenGen and KPLC negotiated Power Purchase Agreements, with subsequent approval by ERC. **The ERC has adequate technical capacity.** ERC's technical staff are professionally qualified. The required qualifications of the Chairman and the General Manager are stated in the Energy Act 2006. The Chairman: (a) must be a holder of a university degree in engineering, energy, economics, law, finance or physical sciences; and (b) must have at least seven years of experience, five of which at a senior managerial level.	

Indicator	Status	Risk Assessment
	ERC's performance is monitored through a performance contract with the Government. ERC carries out annual satisfaction surveys of its clients, the regulated entities. **The ERC is operationally independent**. ERC finances its activities from a levy in electricity tariffs, license fees, the petroleum levy and appropriations by Parliament. The President appoints the Commission's Chairman for four years with a possibility of reappointment for another four years. The President may terminate the appointment on the advice of the Commission for specific reasons stated in the Energy Act 2006.	
Mechanism of appeal	**Interested parties can appeal regulatory decisions.** Any interested party can – according to paragraph 26 of the Energy Act, 2006 – appeal the decision of ERC to the Energy Tribunal, which comprises High Court Judges and Technical Specialists. The Tribunal has only been involved in one case, see above.	
Tariff policy	**The tariff policy allows for cost recovery**. **Subsidies are few and targeted.** No constituency, except slum dwellers and low-income households, are given tariff subsidies. **The tariff review policy is public and has been supported by the Bank.** The Tariff Review Policy is available for inspection at ERC's website and explains the principles of formation of the tariff. The Commission carries out a Tariff Review every three years. The 2011 review has not yet been concluded due to outstanding technical issues (e.g. on time of day metering).	
Licensing (for generation, importation or exportation, transmission or distribution of electrical energy and supply of electrical energy to consumers)	**Requirements for private sector entry into the sector are transparent**. The Draft Energy (Electricity Licensing) Regulations, 2009 set out requirements to be fulfilled by any person desiring a license or permit authorizing him to carry out any undertaking in the generation, transmission, distribution or supply of electrical energy in Kenya. The Regulation is available at ERC's website. ERC approves each Power Purchase Agreement (PPA) between KPLC and generators. Even though the PPAs are not available to the general public (as is the case in most countries), the media generally reports widely on their contents and the pass-through fuel cost element of each is available on KPLC's website and the Kenya Gazette on a monthly basis.	
Dissemination of decisions	**ERC decisions, fuel price adjustments and other key decisions are made public.** Regulatory instruments, ERC's decision, and Gazette notices are posted on ERC's website. ERC advertizes requests for stakeholder feedback on its proposed decisions in local newspapers. Changes in fuel price adjustments in the electricity tariff are published in the Kenya Gazette monthly and are available on KPLC's website. Changes in inflation and foreign exchange adjustments are published in the Kenya Gazette semi annually.	
Electricity coverage	**Electricity coverage is lower than in countries with similar GDP. The 2009 census reported that** about 25% of Kenyan households have electricity in their homes (23% from grid sources and 2% from off-grid sources. KPLC estimate that electricity coverage is about 30% of households in 2012 due to its accelerated electrification program.	

Indicator	Status	Risk Assessment
	KPLC is making it more affordable to get connected. Following management changes in KPLC, the company has focused more on its commercial operations since 2006 and has increased electricity connections rapidly. Since the relatively high connection charge can deter lower income households from obtaining a connection, KPLC has introduced two initiatives to reduce the burden: it has teamed up with a commercial bank to offer loans for the connection charge and it has recently introduced an installment payment mechanism for lower income customers who would not be able to obtain the commercial loans. Furthermore, in slum areas, KPLC has set a reduced connection fee of US$15 equivalent in place of the standard connection fee of US$460 equivalent. **Rural connections have increased** after the creation of the Rural Electrification Authority (REA) in 2007.	
System losses	**System losses are lower than in comparator countries.** Losses for the annual reporting period FY2011 were about 16.2% (physical and commercial transmission and distribution losses combined). Losses are lower than in comparator countries such as Ghana 26%, Nigeria 34%, Ethiopia 19%, Madagascar 24%, Benin 17%, Tanzania 24%, Uganda 30%, and Rwanda 22% though higher than in South Africa (10%) and Vietnam (11% in 2006). **KPLC has taken steps to address increasing power theft.** KPLC has begun replacing credit meters with pre-payment meters, installing feeder and transformer meters to identify high loss areas, installing security seals in meters for large power consumers and it has initiated a program to convert illegal connections in slums into legal connections through specific technical solutions and lowering both the connections fee and the energy charge. It has also intensified media coverage for raids and arrests as deterrent. **Investments under the ongoing IDA financed ESRP and KEEP projects will help reduce technical losses.** Under these projects the Bank is financing new substations, rehabilitation of old substations, upgrading of distribution lines, and the automation of the monitoring and control of networks.	
Collection ratio	**KPLC's collection ratio is better than in comparator countries.** KPLC collects about 99% of all billed energy, compared to 92% in Tanzania, 93% in Uganda, and 98% in Rwanda. **KPLC has taken steps to increase collections.** KPLC has automated its meter reading, billing, and collection processes. Meter readings are recorded on hand held computers instead of paper. Consumers can pay their bills at supermarket check-outs, branch offices of commercial banks, at post offices and by using their mobile phones. In 2011, KPLC has also started to roll-out debit metering technology (i.e. pre-paid metering). This technology allows customers to pay for their electricity use in advance and in smaller installments in a similar manner they pay for the "pre-paid" mobile phone service.	
Financial viability of KenGen and KPLC	In FY2011 KPLC's and KenGen's profits before taxation were KSh 3.7 billion (US$44 million) and KSh 6.3 billion (US$75 million), respectively.	

Indicator	Status	Risk Assessment
Number of customers per one staff **Proportion of utility operating costs spent on salaries**	**KPLC's staffing is higher than in comparator countries.** KPLC's number of customers per staff was 205 in FY2011. In comparison e.g. Uganda's private distribution company, UMEME has 264 customers per staff and has been improving steadily (in FY2009 it was 181). Tanzania and Ethiopia rank below Kenya with 167 and 166 customers per staff respectively. However, because of differences in the customer base and the configuration of the distribution networks, caution should be exercised in making country comparisons. **The proportion of operating costs spent on salaries is higher** for KPLC (13.7%) than for Uganda's UMEME (5%). However, as was the case for the previous indicator, one should be cautious in drawing conclusions of cross-country comparisons.	
Financial management and budgeting	KPLC has in place satisfactory FM and budgeting systems and arrangements. KPLC uses SAP for transaction processing and accounting. For KPLC, all major elements of internal control are in place including segregation of duties and internal audit committee. KPLC has an anti-corruption policy.	
Audit reports	**KPLC uses credible private sector auditing firms (**Ernst &Young that audits the company's financial statement. The auditors are not allowed to sell consulting services. KPLC makes its annual audited financial statements and semi-annual management reports available to the public as per the Capital Market Authority's rules. KPLC distributes its annual report and accounts to their shareholders. All shareholders are allowed to attend the company's Annual General Meeting for which notice is posted 21 days before the meeting.	
Procurement **Mechanism of appeal**	All bid invitations are advertized in local newspapers and in KPLC's websites. Donor financed procurements are advertized also in UNDB. All bids are opened in public. KPLC's Tender Committee (TC) is by law responsible for review and approval of bid evaluation reports and contract awards. The company's Board, through its Procurement Oversight Committee (POC) endorses the TC approval for contracts over KSh 50 million (US$650,000). The TC invites representatives from professional bodies as observers during its deliberations. There is a National Procurement Appeals Board. Losing bidders frequently refer to the Appeals Board to challenge contract awards by KPLC. Appeals usually are from losing bidders contesting contract awards.	

Disclosure and social accountability:		Medium
Disclosure of performance data	**There is a general availability of information on the agency web sites.** Information of sector performance is available for investors and the public that is able to access the Internet. KPLC publishes key performance data in its semi-annual management reports and annual reports. The website of KPLC provides general information about the entity and its development strategy, its audited financial statement, technical performance data, energy saving tips, press releases, tendering opportunities, and accepts reader feedback. Complaint statistics are not published. KPLC has published its service standards in local newspapers with clear timelines for how long it takes to deliver various services, e.g. connecting to the grid and rectifying a service disruption.	
Media coverage	**Media coverage – TV and press – on energy sector issues is extensive**. It appears unbiased though may contain technical errors.	
Consumer and staff satisfaction surveys	**KPLC carries out annual customer and staff satisfaction surveys** through independent auditors. KPLC uses the results to develop corporate strategies to improve its customer service.	
Performance monitoring	**KPLC has an annual performance contract with Government that sets targets for its performance over the coming year**. The Inspectorate of State Corporations, which is part of the Prime Minister's Office, monitors achievement of the targets quarterly. The performance contracts are not public but the entities are ranked each year based on their achievement of the targets in the contracts.	
Third-party oversight	KPLC is quoted in the Nairobi Stock exchange and therefore subject to high levels of surveillance by market regulators in terms of corporate governance and financial reporting. KPLC provides data on its financial performance to the Stock Exchange.	
Transparency of donor engagement	Draft feasibility studies and other technical assistance documents are shared by KPLC with key private and public sector stakeholders in workshops which help ensure that their views are considered in the final recommendations.	
Consultations for environmental and social assessments	**Public consultations are mandatory part of Environmental Impact Assessments as per the Kenya Environmental Management and Co-ordination Act 1999**. The National Environmental Management Authority makes available all draft EAs and provides the public 40 days for feedback. The addressing of the feedback by the project proponent is generally included as a condition for approval of the EA. The government has prepared a Strategic Environmental Assessment for the electricity sector, which included consultations with stakeholders.	

Annex 11: Governance and Accountability Action Plan

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT (APL 1)

1. Due to the complex governance challenges and risks the implementation of the Project is likely to face, project design includes a Governance and Accountability Action Plan to address such challenges in a systematic way. The Plan aims to help minimize potential project overruns, prevent corruptive practices, and allow the Project to achieve its overall development objectives. The design of the Project's governance measures has benefited from discussions with the Bank's Integrity Vice Presidency and Office of Policy and Country Services, and takes account of the Bank's 2006 Anti-Corruption Guidelines.[62] Details of the GAC Action Plan are presented below.

Uncovering any fraud and corrupt practices and ensuring that project resources are used as intended.

2. Specific areas of concern and mitigating measures are:

- *Unwarranted technical specifications in Bidding Documents intended to discriminate against some potential contractors:* Engineers in the Project Implementation Units (PIUs) will carry out due diligence on the specifications prepared by the Consultant who will prepare Bidding Documents. KETRACO intends to retain technical specialists to assist it. The World Bank supervision team will include a specialist engineer with expertise to ensure that technical specifications are fair and warranted. The Project will finance (through the AfDB loan) an independent Supervision Consultant to supervise implementation in both countries (including certification of contractor payments). The Consultant will report to both KETRACO and EEPCo. The Project's progress reports will include key issues presented in the reports of the Supervision Consultant, which will be shared with all financing partners.

- *Fraudulent Claims of Work and Goods:* To limit the risk of overbilling through reduced or substandard delivery of goods and works, the Project shall ensure that the Supervision Consultant has adequate field presence in both countries for on-site supervision. The Consultant will be instructed to be in the field periodically and to include random inspections without prior notice given. Since the physical, geographical and security characteristics of the construction sites for the HVDC line may be a major constraint in monitoring the quality and type of work performed by contractors, the transmission line Contractors will be requested to provide visual documentation (video or pictures) indicating the work performed at critical steps such as RoW clearing, foundation and tower erection, line stringing, etc. World Bank supervision will receive the regular

[62] "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD and IDA Credits and Grants," dated October 15, 2006 and revised January 2011.

reports of the Supervision Consultant and care will be taken to verify that the Consultant undertakes adequate inspection.

- *The financing partners will conduct regular meetings to reconcile information.*

- *Undertaking annual audits of the Project's financial accounts*. An auditor acceptable to IDA and cleared by the Financial Management Unit of the Bank will conduct the project audits. The audits will follow International Standards on Auditing and the audit report together with the management letter will be submitted to the Bank within six months after the end of the FY. The audit report will be disclosed in accordance with the Bank's disclosure policy. EEPCo will submit audited accounts for the Project while KETRACO will submit entity-audited accounts with sufficient disclosures of the Project's sources and uses of funds in the notes to the audited entity accounts. The Project shall be audited annually at the end of each financial year. The terms of reference for the audit, prepared by each of the entities, have been agreed with the Bank.

- *Following the World Bank's procurement guidelines*. World Bank staff will review and approve all key stages of the procurement process for the converter stations and the Kenya system reinforcement and will be alert to "red flags" of collusion/bid steering and other behavior leading to mis-procurement. The Bank will closely monitor the action plans of the implementing entities in response to financial management issues raised in the Auditor's Management Letters. The Box below outlines the main Fraud Indicators or Red Flags.

- *Undertaking regular supervision*. The Bank's Project supervision team will have Nairobi and Addis Ababa based members, which will facilitate frequent dialogue with government, EEPCo, and KETRACO counterpart teams. The Bank will conduct at least two formal missions per year jointly with development partners, with a full complement of experts, including the Bank's financial management and procurement staff.

Strengthening Accountability to Citizens

3. The Project will need to ensure that citizens in both countries are kept adequately informed of progress in implementation of the Project including in implementation of the Project's Environmental and Social Management Plans (ESMPs). The Bank supervision team will include a communications specialist who will be the focal point for communications with civil society and for facilitating citizen accountability approaches.

- *Supporting a multi-faceted learning and communications program*. A central element of the learning and communications activities will be the creation and maintenance of a project website. This will serve as a repository of key documents (such as summaries of progress reports, the safeguard documents (ESMPs, RAP, RPF) and information (such as contracts awarded).

- *Citizen accountability approaches*. In Kenya there may be opportunity to promote accountability through citizen voice such as has occurred during construction of the Thika-Nairobi Highway.

Fraud Indicators or Red Flags

Fraud indicators are best described as clues or hints that a closer look should be made at an area or activity. Although poor management decisions or negligence may give rise to possible indications of fraud, the difference between fraud and negligence is a fine line called intent. All that indicators can do is to point the way for further detailed inquiry.

PRE-SOLICITATION PHASE

- Release of information by firms participating in project design to contractors competing for the contract.
- Designing "pre-qualification" standards or specifications to exclude otherwise qualified contractors.
- Splitting up requirements to get under small purchase requirements or to avoid prescribed levels of review or approval.
- Information leaks to contractors or their representatives by technical or contracting personnel.
- Justifications for sole source or negotiated procurement signed by officials without authority or by passing required levels of review.

SOLICITATION PHASE

(1) Preparation of Bidding Documents:

- Rigged specifications to meet the qualifications of one particular contractor.
- Placing any restrictions in the solicitation documents to restrict competition.
- Restricting procurements to exclude or hamper any qualified contractor.
- Limiting the time for submission of bids so that only those with advance information have adequate time to prepare bids.
- Revealing any information about procurement to one contractor, which is not revealed to all (from either technical or contracting personnel).
- Conducting bidders' conference in a way which invites bid rigging or price fixing, or permits improper communications between contractors.
- Failure to assure that a sufficient number of potential competitors is aware of the solicitation.
- Improper communication with contractors, or improper social contact with contractor representatives.
- Government personnel or their families acquiring a financial interest or employment in a contractor or subcontractor.
- Special assistance to a contractor in preparing bid.
- Referring a contractor to a specific subcontractor.

(2) Proposal Submission

- Improper acceptance of late bid.
- Falsification of documents or receipts to get a late bid accepted.
- Withdrawal of the low bidder (who may become a subcontractor to the higher bidder who gets the contract).
- Collusion or bid rigging between bidders (Indicators of bid rigging: (i) identical bids are received; (ii) a number of bids are received that are much higher than published costs of previous contracts of the same type, or of previous bids by the same firms for similar contracts; (iii) fewer firms bid than would normally be expected from that industry; (iv) there is an inexplicably large gap between the winning bid and all other bids; (v) apparent recurring patterns of low bids, such as corporations always winning a bid in a certain geographical area, or other patters indicating collusive division of territory, or in a particular rotational sequence vis-à-vis other bidders; (vi) the successful bidder subcontracts work to companies that submitted higher bids on the same project; (vii) bids are very close on non-standard items with no suggested retail price; (viii) correlation between contractor that win the bids and the size of the contracts; (ix) certain contractors always bid against each other or conversely certain contractors do not bid against one another; (x) competing contractors regularly socialize, or contractors and government procurement personnel socialize.
- False certifications/information of contractor (size of business certification; certification of independent price determination; financial capabilities; performance; companies conducting business under several names; etc.).
- Change in bid after other bidders' prices are known.

(3) Bid Evaluation

- Improperly disqualifying or discarding the bid or proposal of a contractor.
- Accepting non-responsive bids from preferred contractors.
- Unnecessary contacts with contractor personnel by persons other than the contracting officer during solicitation, evaluation and negotiation processes.
- Any unauthorized release of information to a contractor or other person.
- Any exercise of favoritism toward a particular contractor during the evaluation process.
- Use of biased evaluation criteria or biased individuals on the evaluation panel.
- Documents from competing firms contain similar or identical: (i) company names; (ii) handwriting/signatures; (iii) company stationary; (iv) invoice numbers (in sequence); (v) telephone numbers.

POST-SOLICITATION PHASE

(4) Contract Attribution and Signature

- Award of a contract to a contractor who is not the lowest responsible, responsive bidder.
- Disqualification of any qualified bidder.
- Allowing a bidder to withdraw without justification.
- Failure to forfeit bid bonds when a contractor withdraws improperly.
- Material changes in the contract shortly after award.
- Awards made to contractors with an apparent history of poor performance.
- Awards made to the lowest of a very few bidders without re-advertising considerations or without adequate publicity.

- Awards made that include items other than those contained in bid specifications.
- Awards made without adequate documentation of all pre-award and post-award actions including all understandings or oral agreements.
- "Back-dated" or after-the-fact justifications may appear in the contract file or may be signed by persons without the authority to approve noncompetitive procurement.
- Contractor misrepresentation as to costs during negotiations.
- Failure of government personnel to obtain and rely upon pricing data.

(5) Execution, Supervision and Control

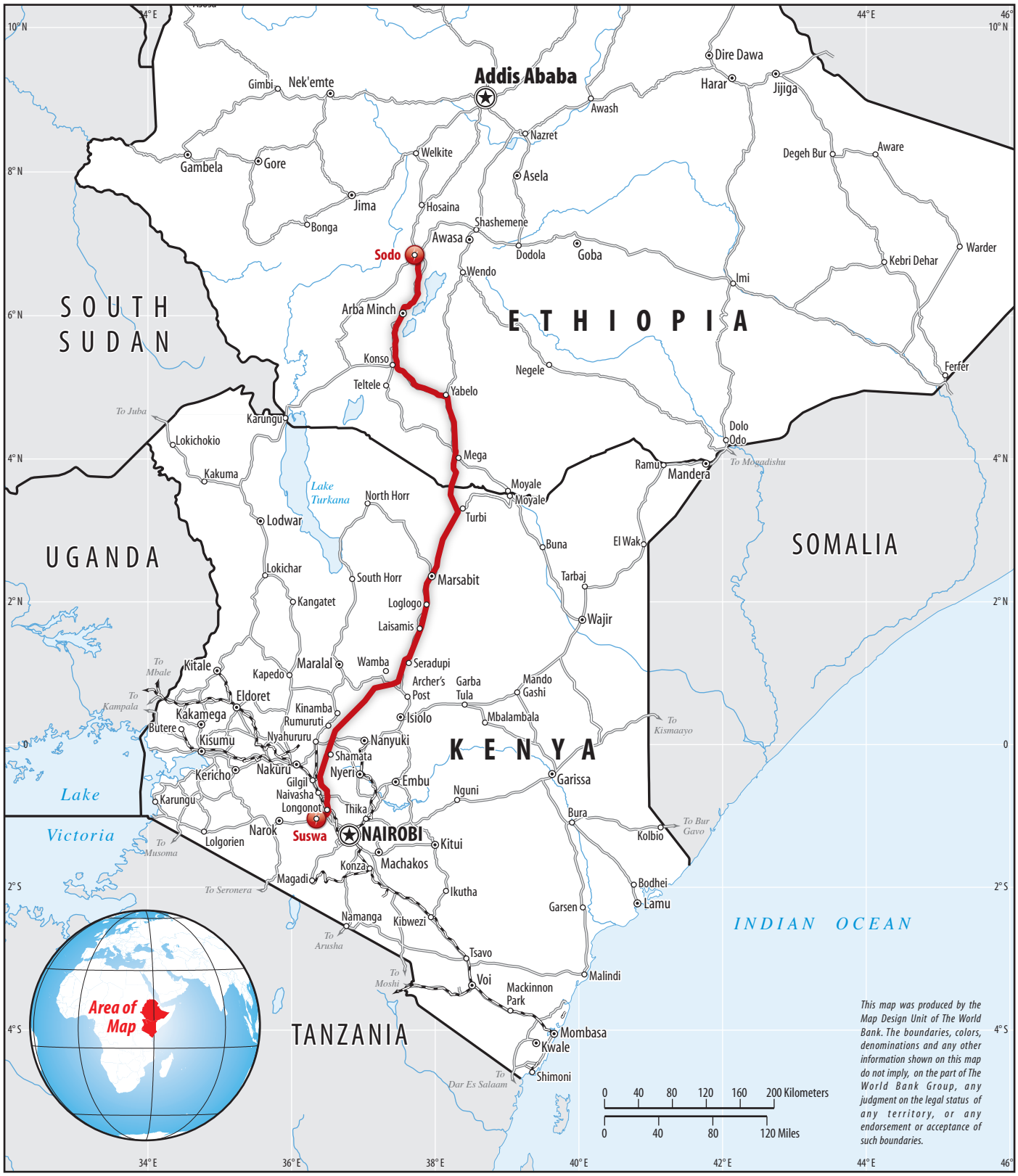
- Receipt of works and services is certified even though physical inspections have not been performed.
- Contractors fail to meet the contract terms but nothing is done to force compliance.
- Unsuccessful bidders become subcontractors after the contract is awarded.
- The labor of government employees is used to perform parts of contracted work.
- Contract files are either incomplete or missing required documents.
- Contract documents are altered, backdated, or modified to cover deficiencies.
- Fictitious or inordinate time frames and dates are entered on contractor records (e.g. maintenance; inspection; receipt of reports).
- Contract deviations by means of changes requested and granted immediately after contract award.
- Used or inferior products are substituted for the product actually ordered.
- Defective pricing, which might include: (i) persistent defective pricing; (ii) repeated defective pricing involving similar patterns or conditions; (iii) failure to correct known system deficiencies; (iii) indications of falsification or alteration of supporting data; (iv) protracted delay in release of data to government to preclude possible price reductions; (v) identical or nearly identical high salary history data on employees or consultants.
- Employment of people known to have previously perpetrated fraud against the government.

(6) Payments

- Contractors are overpaid or paid twice for the same items/services and there is no attempt to recoup the overpayments.
- Accounting reconciliation is not performed regularly relative to (i) contract payments; (ii) daily transactions; (iii) inventory.
- Cost proposal data that is incorrect or less than current or complete.
- Billings (including progress payments) not adequately supported by project status or reliable cost data (including duplicate or altered invoices; double billing; etc.).
- Significant increase in price without corresponding increase in work.
- Substantial subcontracting without the knowledge and approval of contracting officer.
- Failure to meet specifications.
- Source: Fraud Indicators: Office of the Inspector General Investigations; USAID.

EAST AFRICA

REGIONAL EASTERN AFRICA POWER INTEGRATION PROGRAM
EASTERN ELECTRICITY HIGHWAY PROJECT



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