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INTERNATIONAL DEVELOPMENT ASSOCIATION
PROJECT APPRAISAL DOCUMENT
FOR THE AFCC2/RI-3A TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR PROJECT
CONSISTING OF
A PROPOSED CREDIT
IN THE AMOUNT OF SDR 316.4 MILLION (US\$455 MILLION EQUIVALENT)
TO
THE UNITED REPUBLIC OF TANZANIA
FOR THE
TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR
AND
A PROPOSED GRANT
IN THE AMOUNT OF SDR 6.9 MILLION (US\$10 MILLION EQUIVALENT)
TO
THE EASTERN AFRICA POWER POOL
FOR
TECHNICAL ASSISTANCE TO THE POWER POOL

May 25, 2018

Energy & Extractives Global Practice
Africa Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2018 for the Credit)

(Exchange Rate Effective March 31, 2018 for the Grant)

Currency Unit = Tanzania Shillings (TSh)

US\$1 = TSh 2,283.99

US\$1 = SDR 0.69538128 for the Credit

US\$1 = SDR 0.68782414 for the Grant

FISCAL YEAR

Government of Republic of Tanzania: July 1 – June 30

Eastern Africa Power Pool: April 1 – March 31

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ABBREVIATIONS AND ACRONYMS

AFD	French Development Agency (<i>Agence Française de Développement</i>)
AfDB	African Development Bank
AWPB	Annual Work Plan and Budget
BTIP	Backbone Transmission Investment Project
COD	Commercial Operation Date
COMESA	Common Market for Eastern and Southern Africa
CPF	Country Partnership Framework
CV	Curriculum Vitae
DA	Designated Account
DAM	Day-Ahead Market
DG	Director General
DISCO	Distribution Company (Electricity)
DL	Disbursement Letter
DMDI	Deputy Managing Director Investments
DSCR	Debt Service Coverage Ratio
EAC	East African Community
EAPP	Eastern Africa Power Pool
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EKTZ	Ethiopia-Kenya-Tanzania-Zambia
EMS	Energy Management System
ENPV	Economic Net Present Value
EPP	Emergency Power Plant
ERP	Enterprise Resource Planning
ESAP	Environmental and Social Action Plan
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
EWURA	Energy and Water Utilities Regulatory Authority
FHRA	Finance, Human resources, and Administration
FI	Financial Intermediary
FIRR	Financial Internal Rate of Return
FM	Financial Management
FNPV	Financial Net Present Value
FY	Fiscal Year
FYDP II	Second Five-year Development Plan
GBV	Gender-based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GoT	Government of Tanzania
GRM	Grievance Redress Mechanism

GRS	Grievance Redress Service
GW	Gigawatt
HR	Human Resources
HSE	Health, Safety, and Environmental
IBA	Important Bird Areas
ICB	International Competitive Bidding
IFC	International Finance Corporation
IFR	Interim Financial Report
IGMoU	Inter-Governmental Memorandum of Understanding
IMF	International Monetary Fund
IPF	Investment Project Financing
IPP	Independent Power Producer
IRB	Independent Regulatory Board (for the Eastern Africa Power Pool)
ISP	Implementation Support Plan
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
kV	Kilovolt
NPV	Net Present Value
M&E	Monitoring and Evaluation
MDTF	Multi-Donor Trust Fund
MKGR	Mpanga/Kipengere Game Reserve
MoE	Ministry of Energy
MTF	Multi-tier Framework
MV	Medium Voltage
MW	Megawatt
MWh	Megawatt Hour
NCB	National Competitive Bidding
NEP	National Energy Policy
NES	National Electrification Strategy
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NEMC	National Environment Management Council
NGO	Non-governmental Organization
NOCP	National Open Competitive Procurement
NPP	National Procurement Procedures
O&M	Operation and Maintenance
OMVG	Organisation pour la Mise en Valeur du Fleuve Gambie
OP/BP	Operational Policy/Bank Policy
OPM	Overall Project Manager
PAD	Project Appraisal Document
PAP	Project Affected Persons
PDO	Project Development Objective
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PMC	Project Management Consultant
PPA	Power Purchase Agreement
PPSD	Project Procurement Strategy for Development

PSMP	Power System Master Plan
PV	Photovoltaic
RAP	Resettlement Action Plan
REA	Rural Energy Agency
ReAP	Remedial Action Plan
RFQ	Request for Quotation
RISC	Regional Interconnection Steering Committee
RoW	Right of Way
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SAPP	Southern African Power Pool
SCADA	Supervisory Control and Data Acquisition
SCD	Systematic Country Diagnostic
SDR	Special Drawing Rights
SEP	Stakeholder Engagement Plan
SOP	Series of Projects
STEM	Short-term Energy Market
STEP	Systematic Tracking of Exchanges in Procurement
TANESCO	Tanzania Electric Supply Company Limited
TAZA	Tanzania-Zambia Transmission Interconnector
TEDAP	Tanzania Energy Development and Access Expansion Project
ToR	Terms of Reference
TSh	Tanzania Shillings
TWh	Terawatt Hour
USAID	United States Agency for International Development
VAT	Value Added Tax
WACC	Weighted Average Cost of Capital
WAPP	West African Power Pool
WBG	World Bank Group
WTP	Willingness to Pay
ZTK	Zambia-Tanzania-Kenya

**BASIC INFORMATION**

Country(ies)	Project Name	
Africa, Tanzania, Zambia	AFCC2/RI-3A Tanzania-Zambia Transmission Interconnector	
Project ID	Financing Instrument	Environmental Assessment Category
P163752	Investment Project Financing	A-Full Assessment

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input checked="" type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
18-Jun-2018	28-Jun-2024
Bank/IFC Collaboration	
No	

Proposed Development Objective(s)

The Development Objective for the Series of Projects is to establish cross-border transmission capacity between the Southern African Power Pool and the Eastern Africa Power Pool to enable regional power trade.

The Project Development Objective is to (i) increase power transmission capacity to southern regions of Tanzania and (ii) strengthen institutional capacity in Tanzania and of the Eastern Africa Power Pool for regional power trade.

Components



Component Name	Cost (US\$, millions)
Transmission Infrastructure Extension	465.00
TANESCO Transmission System Readiness for Interconnection, and Corporate Commercial Management Improvements	99.00
Project Implementation Support and Capacity Building	21.00
Technical Assistance to EAPP	10.00

Organizations

Borrower:	Ministry of Finance and Planning (on behalf of the Government of the United Republic of Tanz Eastern Africa Power Pool
Implementing Agency:	Tanzania Electric Supply Company Ltd.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	605.00
Total Financing	605.00
of which IBRD/IDA	465.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	465.00
IDA Credit	455.00
IDA Grant	10.00

Non-World Bank Group Financing

Counterpart Funding	10.00
Borrowing Agency	10.00
Other Sources	130.00



EC: European Commission	30.00
FRANCE: French Agency for Development	100.00

IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	Total Amount
Tanzania			
National PBA	227.50	0.00	227.50
Regional	227.50	0.00	227.50
Africa			
Regional	0.00	10.00	10.00
Total	455.00	10.00	465.00

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2018	2019	2020	2021	2022	2023	2024
Annual	0.00	27.55	60.27	80.28	88.77	97.26	110.88
Cumulative	0.00	27.55	87.82	168.09	256.86	354.12	465.00

INSTITUTIONAL DATA**Practice Area (Lead)**

Energy & Extractives

Contributing Practice Areas**Climate Change and Disaster Screening**

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag**Does the project plan to undertake any of the following?**

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes



b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● Moderate
2. Macroeconomic	● Moderate
3. Sector Strategies and Policies	● Substantial
4. Technical Design of Project or Program	● Substantial
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● Substantial
8. Stakeholders	● Substantial
9. Other	
10. Overall	● Substantial

COMPLIANCE**Policy**

Does the project depart from the CPF in content or in other significant respects?

☐ Yes ☒ No

Does the project require any waivers of Bank policies?

☐ Yes ☒ No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓



Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Schedule 2, Section I, A, 2 of the Financing Agreement with Tanzanian Government.

The Recipient shall establish the RISC no later than one (1) year after the Effective Date and shall thereafter maintain the RISC throughout Project implementation, with functions, mandate, composition, terms of reference, resources and staffing satisfactory to the Association; the RISC shall be responsible for, inter alia, providing strategic guidance and monitoring overall Project implementation progress and addressing key issues related to sector and institutional readiness for interconnected grid operations, all as further set forth in the PIM.

Sections and Description

Section I, D, 1 of the Project Agreement with TANESCO.

TANESCO shall prepare and furnish to the Recipient, not later than July 15 in each year during the implementation of its Respective Part of the Project, for forwarding to the Association for the latter's approval, a proposed annual work plan and related budget containing all activities proposed to be carried out under its Respective Part of the Project in the following Fiscal Year.

Conditions

Type Effectiveness	Description For Tanzania: The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity.
Type Effectiveness	Description For Tanzania: The Project Implementing Entity has adopted the Project Implementation Manual in form and substance acceptable to the Association.



Type Effectiveness	Description For EAPP: The Recipient has adopted the EAPP Project Implementation Manual in form and substance acceptable to the Association.
Type Effectiveness	Description For EAPP: The EAPP PIU has been established within the Recipient's General Secretariat with terms of reference, mandate and staffing satisfactory to the Association and is fully functional.



AFRICA

AFCC2/RI-3A TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR

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I. STRATEGIC CONTEXT

1. **The proposed project is the first of two in a series of projects (SOP) to interconnect the Zambian and Tanzanian power systems** to allow for regional power trade between Southern African Power Pool (SAPP) and Eastern Africa Power Pool (EAPP) countries and to increase availability of reliable power to underserved areas in both countries. The SOP will finance the final segment of the Ethiopia-Kenya-Tanzania-Zambia (EKTZ) regional transmission corridor that is being developed in a phased manner. Linking of the EAPP and SAPP networks through the Tanzania-Zambia interconnection is a critical element to provide an expanded market for diversifying the energy sources and leveling the cost of electricity supply across the region. Once the EAPP and SAPP are interconnected and synchronized, it will create the largest geographic energy market in the world—from Cape to Cairo.
2. The proposed project, SOP1, will extend the transmission backbone within Tanzania, enhance Tanzania Electric Supply Company Limited (TANESCO) institutional and technical capacity for regional power trade, and support the EAPP's ability to set up a power market platform to scale up power trade opportunities within the Eastern Africa region.
3. **Tanzania will benefit from extension of the transmission infrastructure to underserved areas in the southwest of the country.** Increased availability of reliable power supply will enable expansion of electricity access in the project areas for households and businesses. The interconnection with Zambia will also improve Tanzania's energy security, allow generation reserve sharing and help lower costs of supply from regional trade.

Regional Context

4. **Regional trade can play a vital role in weathering the recent economic downturn, as well as boosting growth and shared prosperity in Eastern and Southern Africa.** In 2016, growth slowed to an estimated 1.5 percent in about two-thirds of the countries in Sub-Saharan Africa, accounting for 83 percent of the regional gross domestic product (GDP). This marked the region's worst performance in more than two decades.¹ The East Africa sub-region endured the economic downturn relatively well and maintained growth slightly above 5 percent.² However, the vulnerability to economic shocks remains high as all the countries in the sub-region are low income with per capita GDP below US\$1,500 (2016) and

¹ International Monetary Fund (IMF). 2016. Regional Economic Outlook for Sub-Saharan Africa.

² For this project, the East Africa sub region is defined as the group of countries that comprise the EAC (Kenya, Tanzania, Uganda, Rwanda, and Burundi) as well as Ethiopia, given the central role of the Nile Basin in determining hydropower potential for the region. These six countries are members of the EAPP, which also includes the Democratic Republic of Congo, Egypt, and Libya. Africa Economic Outlook, 2017. African Development Bank.



prevailing high poverty rates.³ Regional trade integration is a key to a sustained reduction in poverty in the region through two overarching pathways. First, lower production costs, facilitated by economies of scale from access to regional markets and leveraging of countries' comparative advantages and complementary resource endowments, and second, ability to sustain shocks by strengthening the resilience of economies to unfavorable global market conditions and climatic variability.

5. **Regional integration remains a political priority in Eastern and Southern Africa**, where the regional integration agenda is being driven by several regional economic cooperation and trade initiatives and blocs established in the 1990s. The Southern African Development Community (SADC), founded in 1992; the Common Market for Eastern and Southern Africa (COMESA), founded in 1994; and the East African Community (EAC), founded in 1999, have been set up with the objective of promoting mutually beneficial trade and increased social and economic cooperation across all sectors with the emphasis on improved regional infrastructure, greater regional and sub-regional trade, agricultural development, and industrialization. The regional economic cooperation blocs share the common strategic vision of moving the sub-region toward a common market, customs union, and monetary union.

6. **Regional energy trade in Eastern and Southern Africa has evolved since the mid-1990s.** The growing need to address national electricity supply-demand imbalances in the most cost-effective manner boosted interest in cross-border electricity trade and resulted in the establishment of the SAPP in 1995 and the EAPP in 2005 under the umbrellas of SADC and COMESA, respectively.⁴ The objective of the SAPP and EAPP is to coordinate power pool operations and implement regional power trade. Members of the SAPP include 16 operating and non-operating members from electricity utilities and independent power producers (IPPs) and transmission companies operating in member countries. Similarly, the EAPP constitutes of all public utilities in the 11 countries, though no IPP is currently a member of the EAPP. The SAPP covers 12 countries with a population of 280 million people, with an installed capacity of 56 gigawatt (GW) and annual energy consumption of 400 terawatt hours (TWh).⁵ The EAPP covers 11 countries with a population of 430 million, with an installed capacity of 51 GW and annual energy consumption of 315 TWh (2015).

7. **The abundant, diverse, and renewable energy resources in Eastern and Southern Africa underlie the significant potential benefits from regional energy sector integration.** Significant hydropower potential in Ethiopia, Democratic Republic of Congo, Tanzania, Zambia, Zimbabwe, and Uganda; geothermal in Kenya and Ethiopia; wind power along the coastal areas; solar photovoltaic (PV) in most countries; and solar thermal power in Namibia's Kalahari deserts and South Africa's Western Cape,

³ World Bank World Development Indicators 2017.

⁴ The EAPP was established in 2005 by seven Eastern African countries (Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, and Sudan) and later joined by Tanzania, Libya, Uganda, and Djibouti in 2010, 2011, 2012, and 2016, respectively. The SAPP was created at the SADC summit in 1995 through an IGMoU of the 12 SADC member countries (excluding Mauritius), and later joined by the Democratic Republic of Congo.

⁵ Ricardo. 2016. *Complementary Study on Power Trade Volumes, Wheeling Arrangements, and Impact on the interconnected networks for ZTK.*



together represent a vast energy potential for the region. Complementary to the rich renewable energy potential are natural gas resources in Mozambique and Tanzania and coal in South Africa, Mozambique, Botswana, and Zambia. Regional power system integration can deliver significant benefits by harnessing and interlinking these diverse resources to increase supply security, lower average generation costs, and reduce the recurrent financial and economic burden imposed by droughts and seasonal fluctuation on many hydropower dependent energy sectors in the region (including Tanzania and Zambia, which experienced recent drought events).⁶

8. **The SAPP is now the most advanced power pool on the continent while the EAPP remains nascent.** The SAPP was initially envisioned as a cooperative pool but transitioned to a competitive pool with the introduction of the short-term energy market (STEM) in 2001 for daily and hourly contracts and post-STEM balancing market in 2002. Currently, the trading in SAPP is based largely on bilateral contracts (80 percent market share) with the portion of short-term markets growing steadily. The current short-term trading platforms are the day-ahead market (DAM) introduced in 2009, the post-DAM, intraday market, and the recently introduced forward physical monthly and weekly markets. Compared to the SAPP, the EAPP is in the initial stages of development and implementation of various commercial, operational, and regulatory mechanisms to create a similar trading platform.

9. **Increasing interconnections among the EAPP countries and establishing the link to SAPP will create a large subcontinental market that could pave the way for greater regional integration in other sectors.** With the planned interconnection of the EAPP and SAPP, both power pools are working on the harmonization of rules and procedures to enable mutually beneficial trade across potentially the largest interconnected geography in the world. Increased power trade between countries will work to deepen regional integration and build trust among countries. The experience of a mutually beneficial exchange, adherence to fair and transparent market rules, and successful trade contract enforcement could ease skepticism toward trade and the perceived trade-off between national self-sufficiency and dependence on trade.

A. Country Context

10. **Tanzania is a low-income country located in Eastern Africa, with a population of 56 million (2016), projected to increase to 100 million by 2040.** Tanzania's economy depends on agriculture, which accounts for more than 25 percent of GDP, provides 85 percent of exports, and employs about 65 percent of the work force. Tanzania has experienced a strong and steady GDP growth rate of 6.7 percent per year between 2006 and 2016, higher than the average growth for Sub-Saharan Africa of 4.8 percent during the same period.⁷ The poverty level declined

⁶ During the years of good hydrology, up to 40 percent and 90 percent of electricity generation comes from hydropower in Tanzania and Zambia, respectively. Tanzania experienced a substantial power shortage in 2012–2013, and Zambia suffered a similar large power crisis in 2015–2016.

⁷ World Bank CPF for Tanzania for the period FY2018–2022.



significantly, from 60 percent (2007) to an estimated 47 percent (2016).⁸ The reduction in poverty have been driven by financial transfers under the social safety net program, greater engagement in agriculture and rural economies, increased ownership of communication and transport equipment, and improved rural infrastructure such as access to roads and markets.⁹ Yet, 12 million Tanzanians still live in extreme poverty, of which 10 million live in rural areas.¹⁰ Productive job creation was slow to absorb the 800,000 new entrants to the job market each year with most of the population engaged in low-productivity subsistence farming.¹¹

11. **Tanzania aspires to become a middle-income country by 2025, as outlined in the Tanzania Development Vision 2025 and the Second Five-year Development Plan (FYDP II) 2016/17–2020/21.**¹² The Government of Tanzania (GoT) emphasizes ‘competence and competitiveness’ as one of the driving forces for realizing the vision, based on sound macroeconomic management, infrastructure development, promotion of information and communication technology, and utilization of domestic resources. Tanzania is aiming to realize its potential by (a) strengthening institutional capacity; (b) creating an open and competitive policy environment; (c) promoting public-private partnerships to raise investment levels to fill the large infrastructure gaps, particularly in transport and energy; (d) raising human capital levels; and (e) coordinating across government agencies to manage Tanzania’s rich natural resources for equitable growth.

12. **Increasing infrastructure links to regional markets is critical for Tanzania’s continued growth.**¹³ Tanzania is geographically well-positioned to harness its potential. With a rich endowment of natural resources, a long coast line, port infrastructure and shared boundary with eight other countries – five of which are land locked – increased infrastructure linkages are critical to help Tanzania establish itself as a regional trade hub. Improved and expanded infrastructure in the border areas, which also happen to be amongst the poorest and most underserved regions of the country, would also bolster economic growth and reduce regional disparities within the country.

⁸ World Bank Tanzania Economic Update, 2017; based on the US\$1.90 per day global poverty line.

⁹ World Bank. 2017. *Tanzania - Systematic country diagnostic*. Washington, D.C.: WBG.

¹⁰ World Bank Tanzania Economic Update, 2017.

¹¹ World Bank CPF for Tanzania for the period FY2018–2022.

¹² The Second National Five-Year Development Plan (NFYDP II) 2016/17–2020/21 integrates two themes—growth and transformation and poverty reduction from the National Strategy for Growth and Reduction of Poverty (National Strategy for Growth and Reduction of Poverty /MKUKUTA) planning frameworks.

¹³ World Bank CPF for Tanzania for the period FY2018–2022.



13. **Tanzania has a large infrastructure gap in energy, a sector that is critical to industrialization and improvement of the welfare of the poor.** Greater economic diversification and poverty reduction relies on availability of reliable and affordable electricity services. The expansion in public service delivery – health, education, water – also depends on electricity. A large investment effort is needed, across the electricity value chain, to expand electricity infrastructure to meet the needs of the growing population and the diversifying economy.

B. Sectoral and Institutional Context

14. **The power sector is organized around the Ministry of Energy (MoE), a national operator and a regulator.** Tanzania's power sector is dependent on a state-owned, vertically integrated electric utility for generation, transmission, and distribution. Private investment in the sector began in the early 2000s, with the first large IPP starting its operation in 2002, but so far the IPP presence has not been significant. The Electricity Act was adopted in 2008 to establish a stronger separation of ownership, policy, and regulatory functions. The act created a clearer framework for sector governance, licensing, and tariff regulation. Key actors in the Tanzania's power sector include:

- **The MoE**, which is responsible for developing and reviewing Government policies related to electricity supply and distribution, including electrification of rural areas;
- **TANESCO**, which is a state-owned, vertically integrated electric utility responsible for electricity generation, distribution, transmission, and sale of electricity in the Tanzanian mainland and bulk power supply to Zanzibar;
- **Energy and Water Utilities Regulatory Authority (EWURA)**, which is responsible for the regulation of four sectors, electricity, water, and the transportation and distribution of petroleum and natural gas; and
- **Rural Energy Agency (REA)**, which is responsible for implementing grid extension in rural areas and supporting private sector small-scale rural power generation projects (both grid and off-grid).

15. **The GoT has been making steady albeit rather slow progress in reforming the energy sector.** The National Energy Policy (NEP), updated in 2015, laid out the mission to provide “reliable, affordable, safe, efficient, and environment friendly modern energy services to all while ensuring effective participation of Tanzanians in the sector.” For the electricity sector, the NEP set out the following objectives: (a) improving security of supply through effective use of energy resources and cross-border trading; (b) enhancing power reliability and coverage of transmission and distribution networks; (c) enhancing utilization of renewable energy resources; (d) accelerating rural electrification to foster socio-economic transformations; and (e) increasing



private sector participation in electricity supply industry. The 2014 GoT's Energy Supply Industry Reform Road Map also laid out essential steps in reforming the sector and creating a competitive and financially viable electricity service market. However, the progress in the implementation of the Energy Supply Industry Reform Road Map has been rather limited, to a large extent due to TANESCO's persisting financial problems.

16. Tanzania is targeting an ambitious expansion in electricity supply in the coming years.

The 2016 Power System Master Plan (PSMP) has an ambitious objective to increase electricity generation capacity from 1,352 MW (2016) to 4,915 MW by 2020, through harnessing Tanzania's significant gas and renewable energy resources. Meeting the ambitious targets will depend critically on the availability of timely financing of generation projects and transmission network expansion. The main transmission corridors are in the northern and central regions, including the 400 kV double circuit backbone transmission line, financed by the World Bank, African Development Bank (AfDB), and the European Investment Bank (EIB) under the Backbone Transmission Investment Project (BTIP) (P111598) completed in 2017. At the same time, the western and southern parts of the country have almost no transmission infrastructure. The planned increase of Tanzanian power generation and cross border power exchange will thus require critical reinforcement and extension of transmission networks in various parts of the country, and specifically in the southern and western corridors.

17. Electricity access has increased significantly in recent years, yet a significant proportion of the population remains without access.

Tanzania has made an impressive improvement in terms of electricity access rate, which increased from 7 percent (2011) to 33 percent (2016) because of grid densification.¹⁴ This was driven by (a) the acceleration of public investment in urban and rural electrification, implemented under the Government's Big Results Now Initiative and the National Rural Electrification Program; (b) the introduction of a petroleum levy to finance the National Rural Electrification Program; and (c) reductions in connection fees and service charges, introduced in 2013 and again in 2016, which were made possible by improved technologies and an increase in Government subsidies. However, two-thirds of the population remain without access and a large disparity exists between electricity access rates in urban (65 percent) and rural areas (17 percent).¹⁵ The GoT aims to increase the country's overall electricity connectivity level to 50 percent by 2025 and at least to 75 percent by 2033.

18. Energy security is threatened by recurrent droughts.

As of March 2018, the total installed electricity generation capacity in Tanzania is 1,406 MW (1,324 MW connected to the grid, and 82 MW

¹⁴ The GoT defines this as "connectivity". The GoT defines 'Access' to electricity as the total population residing in the vicinity of electricity distribution infrastructure, irrespective of the population being connected to electricity. According to this definition, the rate of access was 67.5 percent in 2016.

¹⁵ These figures are for Tanzania Mainland, as reported in the *Energy Access Situation Report, 2016 Tanzania Mainland*, published by the REA.



connected to isolated grids), compared to the peak demand of 1,051 MW in 2017. The capacity mix is largely based on natural gas (43 percent), hydropower (43 percent), and heavy fuel oil (12 percent). In 2011–2013, seasonal droughts severely cut hydropower production, resulting in the need to procure expensive emergency power plants (EPPs) that left the sector financials precarious. Gas-to-power generation is viewed as one of the long-term solution to increasing security of supply, using significant domestic untapped natural gas reserves. However, the development of new gas power plants has been progressing slower than planned, thus leaving Tanzania's electricity supply exposed to potential new disruptions related to seasonal variability of hydropower resources. TANESCO's transmission networks are still limited to connecting the main cities and facing capacity constraints resulting in major bottlenecks to adding and connecting new sources of generation, as well as to new connections of households and businesses. Losses from transmission and distribution stand at about 17 percent, some of which are caused by transmission congestion in certain regions in Tanzania, particularly during peak hours.¹⁶

19. **Financial performance of TANESCO has improved in recent years, but further efforts are needed to ensure long term operational and financial sustainability.** TANESCO has recovered from its drought-triggered supply shortages of 2011–2013, phased out 300 MW of EPPs, and returned to positive operating cash flow. However, the cash flow surplus is not enough to meet its infrastructure investment needs. Arrears accumulated through FY2015/16 (after an initial drop in FY2014), due to the devaluation of the Tanzanian shilling and now stand at around US\$312 million. If unresolved, this situation would continue threatening the sector financially and undermining the environment for potential private sector investment. Going forward, while TANESCO is expected to continue generating positive operating cash flows from its operations, the cash will fall substantially short of funding needs for the planned capital investment, with an estimated gap between the approved grants and loans and the level of required financing of TSh 5.3 trillion during FY2017/18–FY2021/22. Potential future drought years could put the utility back into an alerting financial situation, posing macroeconomic risk. Funding TANESCO's capital investment through grants and/or soft loans and providing electricity supply diversification, including through the proposed Tanzania-Zambia Transmission Interconnector (TAZA) Project, will contribute to restoring the long term operational and financial sustainability of Tanzania's power sector. A detailed description of the TANESCO financial analysis is included in Annex 5.

For Tanzania, the proposed project presents multi-dimensional benefits:

20. **First, Tanzania's transmission backbone will be extended to enable increased access to affordable and reliable power in the unserved parts of the southern and western regions.** The communities living along the border of Tanzania with Mozambique, Zambia, and Burundi are among the poorest in the country. These southwestern areas are largely dependent on rain-fed agriculture with limited access to infrastructure services, credit, and improved technologies, keeping yields and earnings low.¹⁷ Several districts in the south and the west rely on 33 kV lines stretching over long distances, limited

¹⁶ 5.5 percent in transmission and 11.5 percent in distribution, according to TANESCO's tariff application of February 2016.

¹⁷ Tanzania's main crops include maize, rice, wheat, which are rain-fed crops. A substantial portion of maize is produced in four southwestern regions (Iringa, Mbeya, Ruvuma, and Rukwa). (World Bank CPF for Tanzania for the period FY2018–2022).



cross-border power connections (for example, a 66 kV line connecting Sumbawanga with Zambia), supplied by expensive diesel-fueled generation plants, feeding isolated grids. The existing grid infrastructure in the area is inadequate to support the scale-up of rural electrification and the development of productive loads in agriculture, mining, tourism, and other economic activities. The proposed Project will enable the expansion of electricity access in these areas (with future investments in distribution network and consumer connections) and the supply of reliable power to anchor consumers such as agribusinesses and farmers in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT), which is on the line route. Complementary investments in rural electrification, funded by various development partners, including under the World Bank supported Tanzania Rural Electrification Expansion Program (P153781) will be able to leverage the upstream infrastructure under the proposed project. The transmission infrastructure could also help the future development of electricity generation resources in the southern and western regions of the country.

21. **Second, the interconnection with SAPP would enable Tanzania to access a large competitive power market and meet energy security needs in a cost-effective manner.** The ability to engage in short-term trade, either bilateral or through existing market mechanisms in SAPP, would enable Tanzania to diversify its energy mix, eliminate the need for expensive emergency power during supply shocks, and improve conditions for the development of scale-efficient generation infrastructure selling to regional power markets. Integration into regional power pools is expected to positively impact energy security and sector finances. Tanzania is actively looking to enhance its role in regional electricity trade by (a) realizing transmission projects such as the interconnections with Kenya (ongoing), Rwanda (ongoing), Zambia (proposed), and Uganda (planned); (b) strengthening the transmission backbone infrastructure to reliably transfer regional power; and (c) expanding the generation capacity to enable export to regional markets. The planned expansion of gas-based power generation in Tanzania will create an opportunity for electricity exports/imports to/from hydro-dependent systems of the EAPP or SAPP member countries. The import of firm thermal-generated power from Tanzania could improve supply security of other EAPP and SAPP countries and generate revenues for Tanzania.

22. **Third, with the EAPP to its North and the SAPP to its South, Tanzania is in the unique position of being at the boundary of two power pools.** Tanzania, along with the Democratic Republic of Congo, is a member of both the SAPP and EAPP. As interconnection with the EAPP (through the ongoing Kenya-Tanzania Interconnector Project) and with the SAPP (through the proposed project) are likely to be in close succession, Tanzania needs to make strategic decisions on how to sequence synchronization of operations to the two power pools. Tanzania could accrue substantial benefits from the diversification of power supply and lower cost power generation, when harmonization and synchronization between the EAPP and SAPP is achieved.

For Eastern and Southern Africa, the proposed project presents region-wide benefits:

23. **First, the proposed project is part of a planned effort to create a geographically contiguous transmission corridor in the EAPP linking Ethiopia-Kenya-Tanzania to the SAPP through Zambia.** Once in place, this will allow large hydropower in Ethiopia to compete with the SAPP and eventually with the



Democratic Republic of the Congo hydropower, thereby reducing market power of any one supplier. Though distance will be a constraint, the eventual northward link with Egypt and Libya will be a strong counterbalance to the dominance of the South African system—further increasing market competition and stability. Planned interconnection of other EAPP countries—Uganda, Rwanda, and Burundi—will improve the integration of the EAPP and increase trade opportunities with the SAPP.

24. **Second, the proposed project contributes to EAPP’s multi-phased approach to establish a regional power market by 2025.** Power trade in the EAPP is currently limited to a few long-term bilateral power purchase agreements (PPAs) and cross-border electrification arrangements. Power trade based on long-term purchase agreements is limited to Ethiopia-Sudan and Ethiopia-Djibouti. A long-term PPA also has been signed between Ethiopia and Kenya, with projected effectiveness in 2019, when the Ethiopia-Kenya Interconnector becomes operational. The main regional backbone, linking Ethiopia, Kenya, and Tanzania, is expected to be completed by 2021. The EAPP’s road map for power system integration (2015–2025) takes a three-phase approach involving both physical interconnections and strengthening the enabling environment for facilitating trade.

25. Analyses of the regional and national master plans for the EAPP and SAPP countries show increasing surplus capacity in the medium term, according to which the EAPP may have a surplus of 24 TWh in 2023 to trade with the SAPP, while the SAPP may have a surplus of 147 TWh to trade with EAPP.¹⁸ All countries in the region aspire to industrialize, grow electricity demand, and expand generation capacity rapidly. However, they also experience recurrent economic downturns and delays in generation expansion—many projects scheduled for commission as part of various master plans are already significantly delayed. In this context, forecasting demand-supply balance at the regional level is very difficult, if not impossible. Countries are thus increasingly looking toward short-term bilateral and market trade mechanisms. Even in this scenario, integration of power systems can secure reliable and cost competitive energy supply, lowering the average supply costs. Greater supply security and reserve capacity sharing would help meet national peak demand while avoiding and deferring hefty investments in new generation and greatly reducing the internal fiscal burden.

Rationale for World Bank Involvement

26. **The World Bank is one of the key partners supporting the GoT in its efforts toward reliable energy provision for economic growth and poverty alleviation.** The World Bank’s historical engagement with the GoT has focused on efforts across the sector value chain. Between FY2014 and FY2017, the World Bank supported the preparation and implementation of various operations, addressing power and gas sector policy development and reform (First and Second Gas and Power Development Policy Operations (P143645 and P145254, respectively); increasing domestic transmission capacity (BTIP [P111598]), reinforcing transmission and distribution capacity (Tanzania Energy Development and Access Expansion Project [TEDAP, P101645]); building capacity (Energy Sector Capacity Building Project [ESCBP, P126875]); and expanding access (Tanzania Rural Electrification Expansion Program [TREET, P153781]). By increasing the availability and reliability of electricity in the southern and western parts of the country and creating conditions for interconnection between Zambia and Tanzania, the proposed project will not only support

¹⁸ Ricardo. 2016. *Complementary Study on Power Trade Volumes, Wheeling Arrangements, and Impact on the Interconnected Networks for ZTK.*



the Government's growth and poverty alleviation efforts through access to electricity but will also facilitate economic growth through increased commercial activity in both countries. A list of sector support operations financed by the World Bank is provided in Table 1.

Table 1. Recently Closed and Ongoing Energy Sector Projects, Supported by the World Bank in Tanzania

Name of Project	Implementation Status	Sector Area Focus
First Power and Gas Development Policy Operation (P143645)	Closed in FY2014	Power and Gas Sector Policy Development
Second Power and Gas Development Policy Operation (P145254)	Closed in FY2015	Power and Gas Sector Policy Development
Tanzania Energy Development and Access Expansion Project (TEDAP) (P101645)	Closed in FY2018	Transmission and Distribution Network Expansion and Reinforcement
Tanzania BTIP (P111598)	Closed in FY2017	High-voltage Transmission Expansion
Tanzania Energy Sector Capacity Building Project (ESCBP) (P126875)	Ongoing	Capacity Building of Sector institutions
Tanzania Rural Electrification Expansion Project (TREEP) (P153781)	Ongoing	Rural Electrification

27. **The World Bank FY2018–2023 Africa Regional Integration and Cooperation Assistance Strategy¹⁹ (Strategy) identifies the energy sector as one of the four priority areas** where opportunities for deepening integration exist, building on the World Bank Group (WBG)'s ongoing support and the priorities for regional economic integration. The proposed project supports the realization of the following objectives of the Strategy: Objective 2.1: Support priority regional generation and transmission links and Objective 2.2: Transform sub-regional power pools into effective commercially run entities actively enhancing power trade between countries.

28. **The proposed project is a flagship of TANESCO's five-year investment plan** that focuses on availability of power in the energy-starved south and southwestern provinces of the country, complemented by measures aimed at improving TANESCO's goals to undertake generation projects. It is expected that the successful implementation of this proposed project will contribute to the security and reliability of grid-based power supply and create conditions for power trade between Eastern and Southern Africa. The World Bank will therefore continue to engage in alleviating some of the constraints in the Tanzanian power system while maintaining its support for regional integration to provide access to the least cost reliable power for the countries in the region to advance and sustain their economic growth.

29. **The proposed project is one of the priority projects in both the EAPP and SAPP Master Plans.** It is designed as the key link for the interconnection of Tanzania to Kenya and Zambia, thus supporting the regional integration efforts in Eastern and Southern Africa. More specifically, regional approaches to energy, such as this project, will help utilize the existing supply and production capacities in different

¹⁹ Supporting Africa's Transformation: Regional Integration and Cooperation Assistance Strategy for the Period FY2018–2023. May 2018.



countries to optimize new generation investments across the two sub-regions. The project will not only construct the physical infrastructure in Tanzania to increase power trade in the region but will also help rationalize and coordinate the multiple and sometimes conflicting power trade initiatives being discussed in the region by helping the countries prioritize key generation and transmission investments.

30. **The proposed project builds upon long-term experience of the World Bank in supporting capacity building and construction of physical infrastructure in the SAPP and West African Power Pool (WAPP).** The involvement of the World Bank in financing transmission interconnections in the WAPP countries allows achieving the completion of all planned cross-border interconnections by 2021. In the SAPP, the World Bank-supported Project Preparation Facility provides a basis for preparation of large regional infrastructure projects and facilitates commercial arrangements.

31. **The proposed project is a continuation of the World Bank's commitment to the regional energy agenda that began with the Eastern Africa Integration Program in 2012 that aims to connect power grids of Ethiopia, Kenya, Tanzania, Uganda, and Rwanda in three phases.** Phase 1 of the program, connecting Ethiopia and Kenya, is under implementation, financed by the Eastern Electricity Highway Project (P126579) (financed by World Bank, AfDB, and the French Development Agency [*l'Agence Française de Développement*, AFD]). The proposed TAZA Project constitutes part of Phase 2 of the program (with the other part – the Kenya-Tanzania transmission line under construction, financed by the AfDB and Japan International Cooperation Agency [JICA]), enabling the connection of the EAPP power system to the SAPP (already integrated). Further, since 2016, the World Bank provides technical assistance to the EAPP through the World Bank-managed Multi-Donor Trust Fund (MDTF). The MDTF has been providing technical support to the EAPP through key regional analyses and knowledge sharing, such as the Operational Readiness and Power Balance Statement Study. The United States Agency for International Development (USAID), as part of the Power Africa Initiative, assisted in the Phase 1 assessment and planning of the EAPP Interconnection Code Compliance Program for governing the operations of the regional, interconnected electricity network(s). However, the ongoing efforts need to be coupled with instructional strengthening of the EAPP Secretariat in terms of its technical capacity and considerable investment in transmission infrastructure in the region before a regional power market can fully materialize.

C. Higher Level Objective to which the Project Contributes

32. **The proposed project is fully aligned with Tanzania's Country Partnership Framework (CPF) Focus Area 1 'Enhance productivity and accelerate equitable and sustainable growth' and its Objective 1.4: 'Increase access to energy services' and Objective 1.6: 'Enhance transport, energy and digital connectivity for improved services to rural areas'.**²⁰ The proposed project will increase access to reliable energy to enhance productivity in the region, improve connectivity in rural areas, and expand energy access to unserved and underserved areas, specifically, in the relatively poor southwestern regions of the country. The proposed project is also aligned with the 2017 Systematic Country Diagnostic (SCD) and its

²⁰ World Bank. 2018. *Tanzania - Country partnership framework for the period FY18-FY22*. Washington, D.C.: WBG. Report No. 121790-TZ.



priority area 2 to improve the performance of the power sector.²¹

33. **The proposed project will contribute to the objectives of the ‘Nurturing Industrialization for Economic Transformation and Human Development’²² (NFYDP II),** which articulates the strategy to implement the Tanzania Development Vision 2025. The NFYDP II has a dual focus: accelerating growth by transforming Tanzania into a middle-income semi-industrialized economy and accelerating poverty reduction, thus promoting human development, by expanding access to social services and enhancing income security, social protection, and responsive governance. The proposed project will directly contribute to achieving several NFYDP II objectives, including (a) building a base for transforming Tanzania into a semi-industrialized nation by 2025; (b) accelerating poverty-reducing economic growth that is broad based and inclusive; (c) improving quality of life and human well-being; (d) fostering development of domestic productive and exporting capacities; and (e) consolidating Tanzania’s strategic geographical location to position itself as a regional trade and logistics hub.

34. **The proposed project contributes to achieving the EAC Vision 2050 and strategic priority goals in the electricity sector,²³ set out in the SADC Regional Infrastructure Strategic Development Master Plan,²⁴** including (a) adequate generation and transmission capacity; (b) improved energy access; and (c) harmonized cross-border policy and regulatory frameworks.

35. **The proposed project is consistent with the WBG approach to Maximizing Finance for Development (MFD).** First, the TAZA will provide private IPPs access to large regional power markets in Southern Africa and Eastern Africa, enabling economies of scale and ability to sell to diverse consumers across the two sub-regions. Second, regional interconnection and the availability of high capacity transmission infrastructure will reduce technical barriers to penetration of intermittent renewable energy projects, such as solar PV and wind. The fall in prices of renewable energy technologies, especially PV, creates favorable conditions for financing of generation of low cost electricity by IPPs from renewable energy resources since its dispatch would not be curtailed due to unavailability of transmission capacity. Finally, the revenues from regional trade strengthen the off-take abilities of state utilities, in this case TANESCO, which is one of the most vital enabling conditions for private sector participation.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

²¹ World Bank. 2017. *Tanzania - Systematic country diagnostic*. Washington, D.C.: WBG. Report No: 110894-TZ.

²² https://extranet.who.int/nutrition/gina/sites/default/files/FYDP2_II__April%201.pdf.

²³ http://www.africa-platform.org/sites/default/files/resources/eac_vision_2050_february_2016.pdf.

²⁴

http://www.sadc.int/files/5413/5293/3528/Regional_Infrastructure_Development_Master_Plan_Energy_Sector_Plan.pdf.



36. The Development Objective for the SOP is to establish cross-border transmission capacity between the SAPP and the EAPP to enable regional power trade.

37. The Project Development Objective (PDO) is to (i) increase power transmission capacity to southern regions of Tanzania and (ii) strengthen institutional capacity in Tanzania and of the EAPP for regional power trade.

B. Project Beneficiaries

38. The direct project beneficiaries are the consumers of electricity provided by TANESCO. With construction of new transmission lines in previously grid-absent rural regions and expanding capacity of the existing transmission lines, households will have new or more reliable access to electricity, and farmers and businesses will improve productivity and competitiveness in the domestic and regional markets, create jobs, and spur economic growth.

39. The EAPP, TANESCO, and other sector stakeholders in Tanzania (such as EWURA and MoE) are also direct project beneficiaries. TANESCO will benefit from improved operational efficiency due to better corporate management systems and capacity strengthening. Financial benefits will also accrue from a reduction in operating costs due to improved infrastructure and ability to engage in regional power trade. The EAPP and TANESCO (and other sector entities in Tanzania) will benefit from capacity strengthening and technical assistance to carry out their mandates to implement regional power trade.

40. Indirect project beneficiaries include regional electricity sector stakeholders—consumers, utilities, sector agencies, and national governments—that will benefit from the interconnection of the EAPP and SAPP power pools and increased opportunity for mutually beneficial power trade.

C. PDO-Level Results Indicators

41. The PDO-level results indicators are the following:

- (a) Increased power transmission capacity along the Iringa-Kisada-Mbeya-Tunduma-Sumbawanga corridor (MW)
- (b) TANESCO's cross-border infrastructure for interconnection with SAPP completed (Yes/No)
- (c) Compliance with minimum operational requirements for regional power trade achieved (Yes/No)
- (d) TANESCO's Enterprise Resource Planning (ERP) software installed and operational (Yes/No)
- (e) EAPP market rules adopted by the EAPP Steering Committee (Yes/No)



III. SERIES OF PROJECTS

42. **The Tanzania-Zambia interconnection has been conceptualized as a series of two projects.** The World Bank has received separate requests for financing from both Tanzania and Zambia for their respective portions of the transmission interconnection infrastructure. The scope of the first of the proposed SOP, SOP1 includes a 620 km 400 kV double circuit transmission line extending the Tanzanian transmission backbone from Iringa to the border with Zambia (see the next section for a detailed project description). The second project, SOP2, will finance transmission infrastructure in Zambia. This will include the second circuit along the 330 kV central back bone between Pensulo and Kasama and a double circuit line from Kasama to Nakonde (near the Tanzania border) and further to the border to interconnect with Tanzania.²⁵

43. **The overall objective of the proposed SOP is the interconnection of the Zambian and Tanzanian power systems to allow for regional power trade between the SAPP and EAPP countries.** A substantial portion of the inter-pool trade volumes in the foreseeable future will be traded through the infrastructure financed under the proposed SOP. The interconnection will immediately benefit Tanzania and Zambia by diversifying generation sources and thereby helping optimize electricity supply mix and costs. The EAPP and SAPP member countries will benefit from cost-effective alternatives to access affordable and reliable power supply during droughts, maintenance downtimes, and other supply-related disruptions. The interconnector will give the EAPP countries with surplus energy potential access to the SAPP DAM. Linking of the EAPP and SAPP networks through the Tanzania-Zambia high voltage interconnection is a critical element in providing an expanded market for diversifying the supply sources and leveling the cost of electricity supply across the region.

44. **The proposed SOP is the final segment of the EKTZ regional transmission corridor that is being developed in a phased manner.** In 2014, energy ministers from the three states signed a tripartite Inter Governmental Memorandum of Understanding (IGMoU) to build the ZTK Interconnector in two phases. The IGMoU required each country to build the necessary transmission infrastructure within the boundaries of their own countries. The ZTK is also linked in the north to the Ethiopia-Kenya transmission interconnector, thereby creating the EKTZ corridor from the EAPP into SAPP. The phases of the EKTZ corridor development include the following: (a) the 500 kV high-voltage direct current Ethiopia-Kenya double-circuit interconnector (co-financed by the World Bank under the Eastern Electricity Highway Project, P126579), under construction, scheduled for completion by June 2019; (b) the 400 kV Kenya-Tanzania double-circuit interconnector (funded by the AfDB and JICA), under construction, scheduled for completion by 2021; and (c) the 400 kV double-circuit Tanzania backbone line (funded by AfDB, JICA, EIB, South Korea Economic Development Cooperation Fund, and the World Bank) under the Tanzania BTIP (P111598) completed in December 2016; and (d) the proposed TAZA SOP. Completion of this regional power corridor is critical for materializing the potential for power trade between the SAPP and EAPP and improving energy security and quality of supply in the region.

²⁵ The exact scope of the SOP2 will be finalized during project preparation of SOP2.



Table 2. Regional Transmission Corridor Development in the EAPP to Link to the SAPP

Regional Transmission Corridor Segment	Borrowing Countries	Status	Financing
Ethiopia-Kenya	Ethiopia, Kenya	Construction ongoing, expected completion 2019	World Bank. Eastern Electricity Highway Project (APL-1) (P126579)
Kenya-Tanzania	Kenya, Tanzania	Construction ongoing, expected completion 2021	AfDB and JICA
Tanzania-Zambia (SOP1) (Tanzania)	Tanzania, EAPP	Preparation, expected completion 2024	World Bank, AFD. Expected approval in FY2018 (P163752).
Tanzania-Zambia (SOP2) (Zambia)	Zambia	Proposed, expected completion 2024	World Bank. Expected approval in FY2019. Zambia-Tanzania Interconnector (P166099)

45. **The preparation of the SOP2 by the World Bank is expected during FY2019.** ZESCO Limited, formerly known as Zambia Electricity Supply Corporation, has already extended the transmission backbone towards the Tanzanian border. The first circuit of the 330 kV transmission backbone between Kabwe and Kasama is already under construction. The second circuit, along this corridor, and extension of the double circuit from Kasama to the border with Tanzania, will provide the necessary capacity and reliability for national and regional power flows. The Government of Zambia (GRZ) has requested World Bank financing for a subsequent project to construct the second circuit of the 330 kV line between Pensulo and Nakonde, which will be financed under SOP2.²⁶ The World Bank has re-affirmed its commitment to fund the project. Other financing institutions have expressed interest in co-financing the project as well. It is expected that SOP2 will be prepared for financing by the World Bank in FY2019 at an estimated financing requirement of US\$350 million. The exact scope and financing envelope of the project will be confirmed during the preparation of SOP2.

IV. PROJECT DESCRIPTION

²⁶ An identification mission by the World Bank along with the EIB and EU, was carried out in October 2017.



46. **The proposed SOP1, the TAZA, rests on two intertwined pillars:** first, the transmission infrastructure expansion, and, second, the institutional strengthening of TANESCO and the EAPP to engage in and coordinate power trade, respectively. TANESCO's transmission network will operate as a critical link between EAPP and SAPP. The proposed project will finance (a) the transmission grid expansion and increase of grid capacity in Southern Tanzania to enable the completion of the ZTK interconnection, concluding the 'last mile' of the first high-voltage link between the EAPP and SAPP for bidirectional regional power trade; (b) the upgrade of TANESCO's transmission system's operational capacity and corporate management system to meet the prerequisite technical requirements to operate in power pools; and (c) building capacity in the EAPP to enable market operations.

47. **On the infrastructure pillar, the proposed TAZA covers the construction of transmission lines of Tanzania's part of the regional corridor,** extending the 400 kV transmission backbone from Iringa to Tunduma (located at the border with Zambia), with an additional spur into Tanzania's northwest.

48. **On the enabling environment for regional trade pillar, TAZA will finance both TANESCO and EAPP's capacity building,** specifically in the preparation of TANESCO's grid and corporate commercial management for carrying out bidirectional trade without compromising stability and reliability of transmission systems and market-based trading in the EAPP and SAPP countries. The capacity of the EAPP will be advanced by the proposed project to implement bilateral, intra- and inter-power pool trade.

A. Project Components

49. The project consists of two financing streams.

Financing Stream 1: to the Government of Tanzania

Component 1: Transmission Infrastructure Extension (Estimated cost: US\$465 million: IDA Credit - US\$335 million equivalent; AFD - US\$100 million; and European Union [EU] grant [expected, to be provided through AFD] - US\$30 million)

50. This component includes construction of approximately 620 km of 400 kV double circuit transmission lines, starting in Iringa through Kisada and Mbeya to Tunduma and continuing from Tunduma to Sumbawanga to link the Tanzanian North-West Grid to the interconnector with Zambia. The Tunduma-Sumbawanga section of the transmission grid will be designed for double circuits, with only one circuit to be strung in the beginning due to expected lower loads in the Sumbawanga area during the short to medium terms. With respect to connection with Zambia, TAZA will terminate the 400 kV transmission line at the Tunduma substation, which is 4 km away from the Zambian border. The Tunduma substation will be equipped with switchgear for voltage conversion from 400 kV (high-voltage transmission standard in Tanzania) to 330 kV (high-voltage transmission standard in Zambia). The AFD applied for a US\$30 million grant co-financing from the EU to finance the installation of the 400 kV/330 kV switchgear at the Tunduma substation and construction of 4 km of the 330 kV transmission line from Tunduma to the Zambian border, completing the connection with the Zambian grid. IDA and AFD financing of Component 1 will cover the electrical and civil works, switchgear, control-protection-communication, supervisory control and data acquisition (SCADA), and auxiliary system equipment along the entire transmission route and in all substations, including required spares for transmission lines and substations.



Component 2: TANESCO Transmission System Readiness for Interconnection and Corporate Commercial Management Improvements (Estimated cost: IDA Credit - US\$99 million equivalent)

51. This component will have the following scope:

- (a) **TANESCO transmission system readiness for interconnection (US\$34 million equivalent).** This includes (i) a technical assessment of TANESCO's transmission system to identify the operational, planning, and technical gaps in meeting the requirements for operational integration in the SAPP and the EAPP to comply with the requirements for power system stability, operational ancillary enabling services, frequency synchronization, tie-line control, protection, metering, and other technical standards, and (ii) procurement and installation of necessary additional equipment (such as protection controls, automated generation controls, protection relays) and reinforcements of the generation/transmission system infrastructure to ensure that the Tanzanian grid meets all operating requirements of the interconnected networks, can synchronize with the EAPP and SAPP systems, and can engage reliably and efficiently in power trade with Zambia and Kenya and in the SAPP and EAPP markets (see Annex 1 for more detailed description).
- (b) **Corporate commercial management improvements (US\$65 million equivalent).** This will support the integration of business systems as part of the Corporate Management System. The subcomponent specifically includes procurement, installation, and implementation support for the ERP to establish a unified system for managing core business processes, including automated financial reporting and billing (required within the power pool space), asset management, materials management, fleet control and management, centralized geographic information system (GIS) planning systems, integrated distribution SCADA to accurately forecast demand, and other services that are key for carrying out not only domestic energy service operations but, more importantly, commercial power pool trading transactions.

Component 3: Project Implementation Support and Capacity Building (Estimated cost: IDA Credit - US\$21 million equivalent)

52. This component will support supervision and management of Component 1 by an owner's engineer and build TANESCO's technical, operational, and market trading capacity to participate in regional power trade. The proposed technical assistance to TANESCO includes financing of a contract for an owner's engineer for Component 1, training, and other capacity-building activities to prepare TANESCO for operating in and trading with the SAPP and EAPP. It also includes a TANESCO Technical Assistance Facility to facilitate the preparation of pipeline projects, both national and regional, and provide technical experts' support. Technical assistance to the MoE and EWURA will also be provided, based on the completed needs assessments, and procured through the TANESCO Technical Assistance Facility. Finally, capacity building of TANESCO's safeguards functions and gender mainstreaming will be supported through relevant training and a gender action plan.



Financing Stream 2: to the EAPP

Component 4: Technical Assistance to EAPP (IDA grant - US\$10 million equivalent)

This component will provide institutional strengthening and capacity building to the EAPP to establish market operating rules and platforms and set up technical requirements for operation of the EAPP member utilities (including TANESCO) in a synchronized fashion. The Component 4 financing will cover (a) institutional strengthening and capacity building to EAPP to ensure synchronized operation of grids in the power pool and for Project management; (b) support for the operationalization of centralized short-term markets to complement long-term bilateral contracts; (c) strengthening EAPP's Independent Regulatory Board (IRB) and capacity building and knowledge sharing among the region's regulatory boards, and (d) the establishment of a regional technical assistance facility for feasibility studies and capacity building and knowledge sharing between the region's utilities.

B. Project Cost and Financing

53. **The lending instrument is Investment Project Financing (IPF).** IDA will sign Financing Agreements with (a) the GoT for the IDA Credit and (b) the EAPP for the IDA grant. The construction of the 400 kV transmission lines and associated substations along the Iringa—Kisada – Mbeya – Tunduma -- Sumbawanga corridor under Component 1 will be co-financed by the AFD on a blended financing basis with IDA. The AFD has also applied for grant financing from the EU Africa Investment Facility for installation of conversion switchgear at the Tunduma substation (400 kV to 330 kV) and construction of a 4 km 330 kV double circuit transmission line to the Zambia border. The Borrower will be responsible for all resettlement compensation costs. Table 3 presents a summary of the project costs and financing by source of financing.

54. **The proposed project will benefit from both IDA18 national and regional windows.** Fifty percent of funding for Components 1, 2, and 3 will come from the Tanzania national IDA18 allocation, and the remaining 50 percent will be provided through the regional IDA18 window.



Table 3. Cost Estimates Per Component for Financing Stream 1 – Government of Tanzania

TAZA Components	IDA Credit (US\$, millions) ²⁷	AFD/EU (US\$, millions)	Borrower (US\$, millions)	Total (US\$, millions)
Component 1: Transmission Infrastructure Extension	335	130	0	465
Component 2: TANESCO Transmission System Readiness for Interconnection and Corporate Commercial Management Improvements	99	0	0	99
Component 3: Project Implementation Support and Capacity Building	21	0	0	21
Resettlement compensation			10	10
TOTAL	455	130	10	595
<i>Notes: (1) Component 1 costs are based on unit costs of US\$350,000/km plus allocation for all incurred tax liabilities, contingencies and spares. (2) Total IDA credit amount for the project is sourced from national and regional IDA in equal proportion. (3) EU is providing US\$30 million grant funding sourced through AFD.</i>				

55. **Component 4 will be supported through a regional IDA grant directly to EAPP.** The Component 4 will be financed through the regional grant window under IDA18.

Table 4. Cost Estimate for Financing Stream 2 –EAPP

Component Cost	IDA Grant (US\$, millions)
Component 4: Technical Assistance to EAPP	10
<i>(*) IDA grant is sourced from regional IDA allocation.</i>	

C. Lessons Learned and Reflected in the Project Design

56. The following relevant lessons from World Bank wide regional power network interconnector projects and reviews have informed the design of the proposed TAZA project:²⁸

- **Maximizing national benefits from investments.** The current state of power generation and

²⁷ IDA credit is provided from two IDA windows: 50 percent is from the Tanzania national IDA window; and 50 percent is allocated from the Regional IDA window.

²⁸ These projects include the Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000, P145054); OMVG Interconnection Project (P146830); the WAPP - Côte d'Ivoire, Liberia, Sierra Leone, and Guinea Power System Re-development (P113266); The Ethiopia-Sudan Interconnector (P074011); and the Energy Sector Management Assistance Program Regional Power Sector Integration Lessons from Global Case Studies and a Literature Review, 2010.



cross-border trade developments in the sub-region is such that domestic power demand continues to grow in several countries (including Kenya, Tanzania, and Zambia). These and several other countries in Eastern and Southern Africa are developing new power plants and expect to be exporting power soon. As a result, very few utilities (if any) are willing to sign long-term PPAs with any other producers. Therefore, near-term power trade activities will most likely be based on short-term market trades driven by the economics of cost-of-supply reduction. Conventional business models requiring signed PPAs before construction of interconnections therefore need to be adapted to recognize the dual benefits of transmission at both the national and regional trade levels, as proposed in TAZA.

- **Regional trade within and among electricity markets requires well-developed institutional and regulatory capacity.** The development of the currently operating power pools, which carry out trading on market platforms, such as, the SAPP, South East Europe Regional Power Markets, and so on, occurred over a relatively prolonged period and required substantial support and concerted efforts of multiple stakeholders and the donor community, before actual trade commenced. The lesson applied to the proposed TAZA project is to substantially enhance capacity-building activities and expertise development in the EAPP to accelerate institutional market operation readiness, allowing for potential realization of short-term market trading within the project implementation period.
- **Grant support for dedicated infrastructure to avoid disagreements on cost-sharing.** Financing of a short 4 km 330 kV transmission line to the Zambian border and the 400 kV/330 kV switchgear at the Tunduma substation are supported through grant financing. This avoids potential disagreements on cost sharing for the assets that will be used solely for the interconnection of the two grids.
- **Consideration for national modalities.** The Energy Sector Management Assistance Program review of regional power integration projects across multiple regions suggested that design, approach, and phasing of regional integration efforts must adapt to local realities, with considerable room for flexibility and adjustment as conditions and attitudes change. No unique regional power institutions or processes and no hard and fast rules about issues related to ownership, financing, and pricing, and so on will ensure the success of regional integration efforts. The lessons also include allowing participating countries to develop their domestic power system at their own pace while agreeing on regional trade (the Central American Electrical Interconnection System). Gradual development of the SAPP also provides relevant lessons for the development of the EAPP. While in the long term, there is a need for harmonization of the SAPP and EAPP processes, the EAPP development will not necessarily follow that of SAPP in the beginning. Guided by these findings, the development of the Tanzania-Zambia Interconnector was designed in such a way that the two countries can develop their respective power transmission infrastructure in a coordinated manner but at their own pace under an SOP arrangement.
- **Infrastructure design based on long-term vision.** Experience from other interconnection projects has demonstrated the need for building line capacity with long-term load development and growth in mind. Many interconnections have been built to meet short-term demand and have quickly become congested, resulting in the need for expensive



expansion in the future that can also pose difficult right-of-way and other challenges. TAZA's interconnection capacity (400 kV double circuit) is designed with a view for long-term domestic development in Tanzania and growing power trade among the EAPP and SAPP countries. Excess capacity is built into the design to allow for growth in supply volumes along the line both through increased domestic electricity generation and use and power trade through the ZTK corridor.

- **Simple co-financing arrangement.** Another lesson relates to simplification of project implementation, involving multiple financiers, by clarifying the applicable guidelines, processes, and timing well in advance. In TAZA, IDA and AFD have agreed to co-finance the project through a proportional contribution arrangement, where all disbursement under Component 1 of the project will be shared in proportion to the total contribution of each donor in the component. The arrangement for the co-financing will be in accordance with the AFD-World Bank Framework Co-Financing Agreement (2014).
- **Advanced preparation for procurement.** Lessons learned from the recently implemented energy sector projects in Tanzania have demonstrated the need to accelerate procurement activities. It was suggested that advanced preparation of bidding documents for major works and consultancies would ensure that the procurement proceeds on time. This is particularly important to avoid the long lead times required for International Competitive Bidding (ICB) contracts and two-stage bidding process. In TAZA, the task for preparing bidding documents for main contracts and support for the selection of project implementation consultants is included in the scope of the currently ongoing update of the feasibility studies as Phase 2 activities need to be carried out immediately upon completion of the update.

V. IMPLEMENTATION

A. Institutional and Implementation Arrangements

Project Implementation Arrangements

57. The project will be implemented over a six-year period. TANESCO (responsible for Components 1, 2, and 3) and the EAPP (responsible for Component 4) will be the implementing agencies for the project activities and will each be supported by dedicated technical assistance. TANESCO and ZESCO will coordinate on the trans-boundary infrastructure through a Joint Coordination Committee (JCC) which has already started to meet formally.

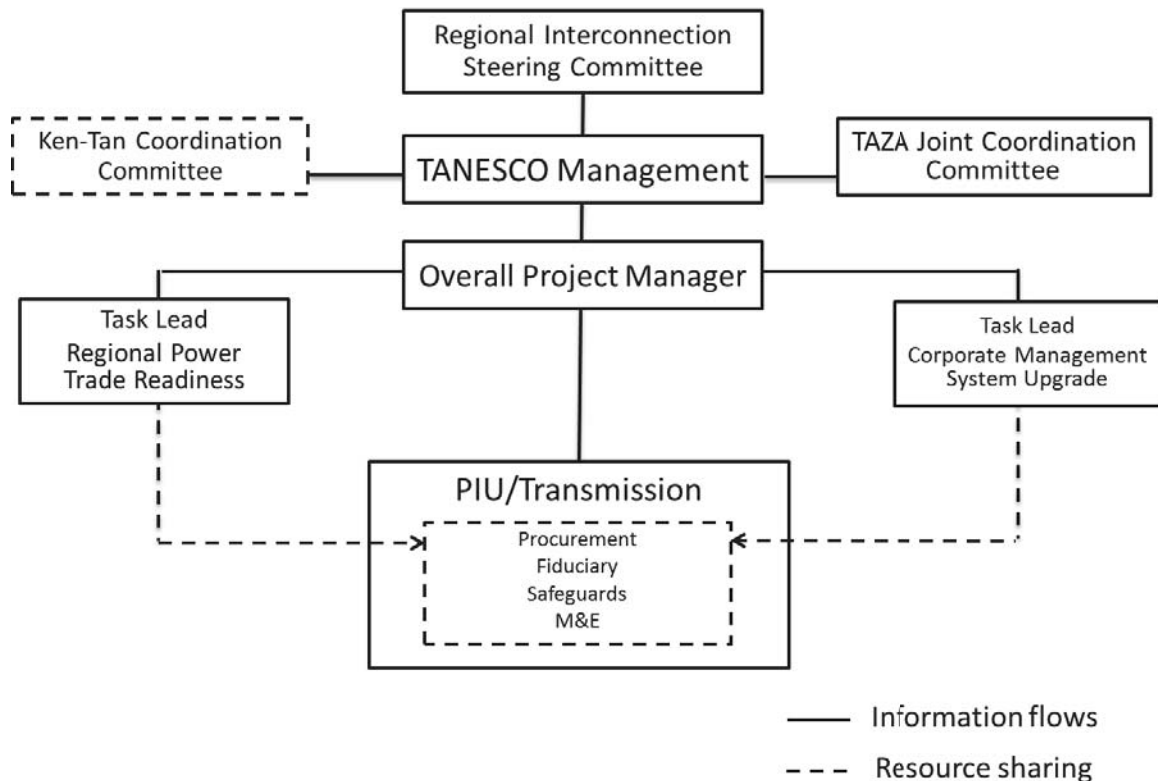
58. TANESCO has extensive experience in implementing World Bank projects over the past several years. Most recently, TANESCO has successfully implemented the BTIP (which was similar to the proposed project in terms of transmission infrastructure development) and TEDAP (an urban transmission and distribution project). TANESCO has implemented an IDA portfolio of



about US\$230 million in the recent past. In addition, TANESCO is also implementing its allocation under the ongoing capacity building project - ESCBP. The implementation arrangements under the proposed project will build on this extensive implementation experience, including lessons learned. The detailed implementation arrangements will be described in the project implementation manual (PIM).

59. The project implementation arrangement in TANESCO will consist of a core Project Implementation Unit (PIU), headed by an overall project manager (OPM), and with staffing acceptable to the World Bank (details below). Specialized activities under Component 2 of the project will be carried out by specialized technical task teams (infrastructure regional power trade readiness and corporate management system upgrade and readiness). The overall project governance will be headed by a Regional Interconnection Steering Committee (RISC). Figure 2 describes the proposed implementation arrangements.

Figure 1. TANESCO Implementation Arrangement under the Project



60. The RISC will monitor the overall project implementation progress and address key issues related to sector and institutional readiness for interconnected grid operations—both with respect to the EAPP and SAPP. The RISC will be chaired by the Permanent Secretary of the MoE or his/her designee. Members of the RISC will also include representatives from the Ministry of Finance and Planning –TANESCO’s Managing Director and EWURA’s Director General (DG), or their respective designees. The RISC is expected to meet at least once every six months after the



project effectiveness to ascertain TANESCO's progress on achieving readiness for interconnection and provide guidance on strategic issues related to the interconnection of Tanzania to regional power pools.

61. A dedicated PIU, of a similar structure to what was used under the BTIP and ongoing Kenya-Tanzania Interconnector Project, will be responsible for project implementation in TANESCO (to be placed within the existing project implementation department, supporting execution of projects). The PIU will be responsible for procurement, fiduciary support, monitoring and evaluation (M&E), quality assurance, and safeguards oversight. TANESCO will appoint an OPM to head the PIU. The OPM will have the overall responsibility of the implementation of the project. The OPM will be assisted by a Project Manager – Transmission, who will be assisted by four transmission engineers and two substation engineers, each of whom will be responsible for a specific construction lot of the project. In addition, (a) a dedicated project accountant; (b) a dedicated safeguards and social risk team, including at least one environmental specialist, one social specialist, and one grievance redress mechanism (GRM) specialist; (c) an M&E specialist; and (d) a procurement team, will assist the OPM. The PIU, especially the safeguards and social risk team, will be trained in issues related to gender-based violence (GBV) risks, prevention and response. The OPM will report to TANESCO's management (Deputy Managing Director Investments – DMDI). In keeping with the normal reporting structures of TANESCO, the project accountant will report to the chief financial officer, who will report directly to the Managing Director; the environmental group will report to the Senior Manager of Research and Environment (who reports to DMDI) and the procurement unit will report to the Senior Manager, Procurement. Additional supervisors' counterpart staff to the supervision engineer will be assigned by TANESCO, as required. This arrangement with TANESCO has worked well with previous World Bank energy projects (BTIP and TEDAP).

62. Specialized activities under Component 2 will have their dedicated task leads. The task leads for the regional power trade readiness task team/unit (Subcomponent 2.1) and the corporate management systems upgrade task team (Subcomponent 2.2) will report on activity progress to the OPM. Each task lead will be assisted by a technical team as required, but will use procurement, fiduciary, M&E, and safeguard capacity within the PIU established for Component 1.

63. Effective implementation of the Zambia-Tanzania-Kenya (ZTK) interconnector, which includes the proposed TAZA project, will rely on two JCCs—one comprising TANESCO and ZESCO for the TAZA under this project and another comprising TANESCO and KETRACO for the ongoing interconnection with Kenya. The TAZA JCC will ensure smooth coordination on project issues common to both countries. The role of the TAZA JCC will be coordination on design, procurement, and implementation. TANESCO and ZESCO have already been coordinating on planning and design issues as part of the joint feasibility study funded by Nile Equatorial Lakes Subsidiary Action Program (NELSAP). This coordination arrangement is being formalized. Going forward the role of the committee will be the sharing of regular updates on implementation progress in both



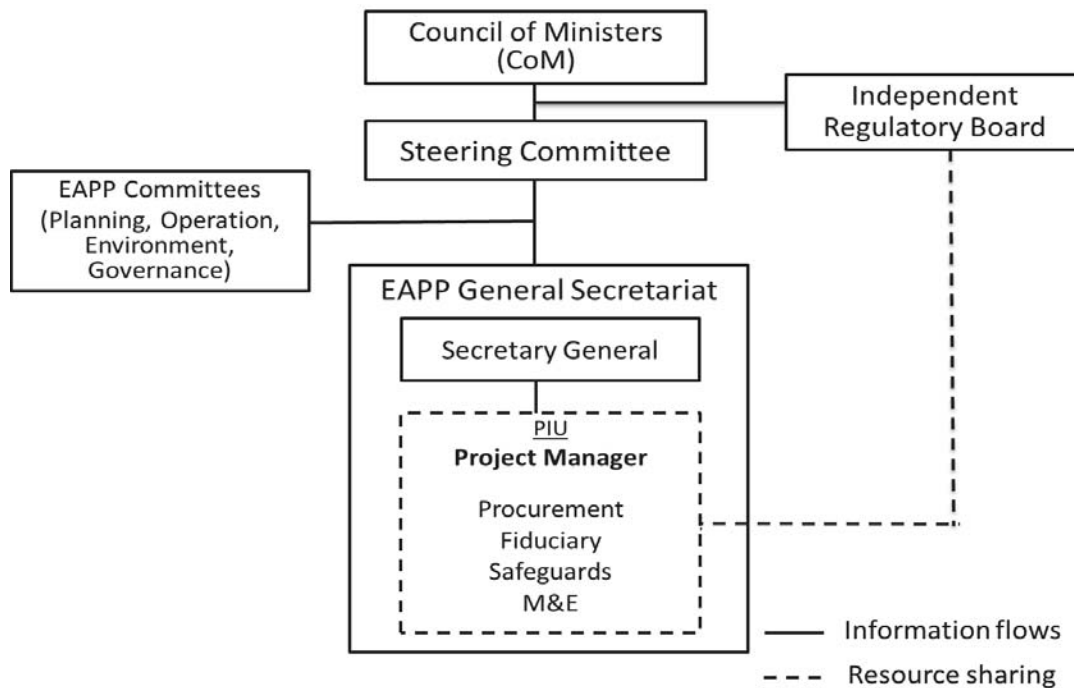
countries, discussion on any issues regarding coordination in implementation and subsequent operations. Coordination in procurement may be required for the short 4 km interconnection and associated 400 kV/330 kV auto-transformation equipment for the Tunduma substation. These arrangements will be discussed during the committee meetings. The JCC shall also be responsible for the compilation and circulation of consolidated quarterly progress reports to the management of the two utilities and the respective governments. Reports of JCC meetings and agreements will be made available to the World Bank by the OPM.

64. The EAPP Secretariat will be responsible for the implementation of Component 4. The EAPP will establish a PIU, headed by a project manager, and with a dedicated procurement specialist, a financial management (FM) specialist, and required technical experts. The PIU will report directly to the Secretary General of EAPP. Technical assistance support for the IRB will be managed by the head of the IRB and will leverage procurement and FM resources residing in the PIU. The implementation arrangement within the EAPP will be in accordance with normal reporting and governance structure of the EAPP. Thus, overall governance of activities carried out by the EAPP lies with the Steering Committee of the EAPP that is constituted by the chief executive officers or managing directors of member utilities.²⁹ The Council of Ministers, comprising the Ministers of Energy of member countries, is the overall governing body of the EAPP that decides on and resolves any matters of strategic regional importance. The Steering Committee typically meets twice a year and the Council of Ministers meets once a year.

²⁹ During the Council of Ministers meeting held in February 2018, the Council adopted a resolution to expand the membership of the Steering Committee to include Permanent Secretaries of the respective ministries.



Figure 2. EAPP Implementation Arrangements Under the Project



65. As the EAPP does not have prior experience in implementing World Bank-financed projects, detailed fiduciary assessments, including procurement, FM, safeguards, and fraud and corruption, were carried out during the project preparation. Results of these assessments and a subsequent capacity strengthening plan are presented in Annex 2. Ongoing support under the World Bank-executed MDTF will also put in place technical and fiduciary capacity building to enable the EAPP to meet the requirements of an implementing agency under the project and execute its activities with efficiency and efficacy.

B. Results Monitoring and Evaluation

66. The M&E of Components 1, 2, and 3 will be performed by TANESCO. The OPM, through the PIU, will be responsible for providing the required quarterly implementation progress status reports and elaborating an M&E manual as part of the PIM, which will guide the overall M&E activities. Activities to be monitored include the timely and efficient construction and commissioning of the transmission line and associated substations, quality control, and processing of payments to contractors approved by the owner's engineer. The PIU will also closely monitor the effective implementation of all safeguards instruments (Environmental and Social Management Plan (ESMP), Resettlement Action Plans (RAPs), Resettlement Audit and Corrective Action Plan for the Mbeya substation), citizen engagement activities and the GRM designed under of the project, as well as the successful completion of studies and training activities.



67. Project-specific data on the agreed monitoring indicators will be collected by TANESCO. Section VII presents the project's Results Framework that defines specific outcomes and results to be monitored. In addition, the World Bank will carry out the normal review procedures for procurement, regular supervision missions, financial monitoring reports, quarterly reports provided by TANESCO, independent annual financial audits of the project, and financial statements of TANESCO. The AFD and the World Bank have agreed on a single report format that they will all use to monitor environmental and social impacts and track the implementation of the ESMP and RAPs.

68. The monitoring of and reporting on Component 4 will be the responsibility of the EAPP. The project manager for the EAPP will, through the PIU, be responsible for monitoring and reporting on the implementation progress of various technical assistance activities and outcomes achieved. Monitoring and reporting procedures will be guided by the M&E framework detailed in the EAPP's PIM.

C. Sustainability

69. The project's sustainability depends on (a) TANESCO's financial and technical capacity to operate and maintain project infrastructure and effectively engage in regional power trade and (b) the EAPP's technical and legal ability to put in place enabling conditions for regional power trade and a strong recognition of the mutual benefits of regional power trade by the EAPP member states.

70. First, TANESCO's continued mandate to operate the power grid in Tanzania is the key factor for sustainability of project benefits. While certain challenges exist, TANESCO has been effectively maintaining and operating the electricity network and is expected to continue to do so. TANESCO's financial health could be a key constraint and is being analyzed and discussed as a part of ongoing sector dialogue between the World Bank and GoT. The utility's financial health can also affect whether it will be considered a credible off-taker in regional power markets. This will affect its ability to maximize gains from trade. Finally, in-house development of requisite technical capacity and planning and analytical tools are necessary for TANESCO to be an active and effective participant in regional power markets. The regulatory and policy environment in Tanzania could be another key constraint to enabling optimal participation in regional markets. Clear and transparent regulatory mechanisms and policy will give assurance to regional power pool stakeholders looking to engage with Tanzania in cross-border trade.

71. Second, the EAPP draws its legitimacy from its member countries, which represent the entire region, and its assigned role within COMESA as the entity in charge of regional power integration in the sub-region. This project will serve to operationalize and develop the EAPP's role in fulfilling its mandate in facilitation of the integration of regional system planning and



operations and implementing regional electricity trade. The EAPP's ability to deliver its mandate will require strong backing of member states and regional stakeholders. Market participants must recognize power trade not as a zero-sum game, but rather as a mutually beneficial exchange. Development of various market instruments for short-term trading will help bolster this by allowing member countries to benefit from exports and imports at times of need. Trust in market and sector institutions is key to participants' engagement in benefit maximizing trade. Development of regional trust and buy-in for market rules, regulatory mechanisms, and regional institutions will be supported both as a part of this project and through ongoing technical assistance under the MDTF and other development partner initiatives.

D. Role of Partners

72. The project will have two co-financing development partners: IDA and AFD. In addition, financing will include an EU grant sourced by the AFD for Component 1. IDA will finance all four project components. AFD will provide co-financing in the amount of US\$100 million for Component 1, to be disbursed in proportion to the overall contribution of each co-financier for the Component. An additional US\$30 million EU grant is sourced by the AFD (and to be included into a financing agreement between GoT and AFD for AFD's own co-financing) for the installation of an auto-transformation switchgear (from 400 kV to 330 kV) in Tunduma, and the 4 km of 330 kV double circuit line from Tunduma to the Zambian border.

73. For successful implementation of the project components related to capacity building for regional integration and trade, the engagement and support from the SAPP experts and specialist from other operational power pools will be required. A potential twinning arrangement will be set up with utilities that participate in power pools and implement short-term trading. In addition, to strengthen the capacity of the EAPP-IRB, twinning arrangement and knowledge exchange will be organized with similar regional regulatory bodies from Southern Africa and Asia.

74. The proposed support for the EAPP under Component 4 builds on the engagement with the EAPP Secretariat developed through the World Bank-executed MDTF with financing from Swedish International Development Cooperation Agency. Under the MDTF, the World Bank is providing the EAPP with requisite capacity-strengthening and technical support for implementing its immediate priorities under the Strategic Plan (2016–2026). Ongoing and prior engagements from other development partners, including USAID/Power Africa, Norway, and AfDB have laid the foundation for the current EAPP arrangement under the MDTF and the proposed TAZA. USAID/Power Africa helped develop the EAPP road map and is assisting the EAPP in the preparation of the first phase of the Interconnection Grid Code Study for governing the operations of the regional interconnected electricity networks.



VI. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

Project Risks

Table 4. Systematic Operations Risk-rating Tool (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Substantial
5. Institutional capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
Overall	Substantial

75. **Sector strategies and policies - Substantial.** The power sector in Tanzania is facing a number of challenges which need to be addressed, including (a) preparing a financial recovery plan to restore and sustain financial viability of TANESCO; (b) continuing and sustaining the efforts to reduce the cost of power generation through (i) completing the construction of gas-fired power generation plants (Kinyerezi I expansion and Kinyerezi II) and (ii) carrying out competitive procurement of new power generation capacity; (c) preparing a sector investment plan and realization of timely investments; and (d) implementing the National Electrification Plan to reach the Government's target of 75 percent electrification rate by 2025. The risks to effectively addressing these challenges are intensified by the GoT's recent decision to replace the DG of EWURA (the sector regulator) before the expiration of his term in January 2018. The position of the DG of EWURA is still not filled in (Acting DG has been in place during the last year). Mitigation: The proposed mitigation measures include the continuous policy dialogue with the MoE, support by the World Bank on TANESCO's assessment of strategies to address the utility and sector financial sustainability and strengthening EWURA through the on-going ESCBP and the technical assistance under the proposed project.

76. **Technical design of the project - Substantial.** For Component 1, the technical design of the 400 kV transmission line and the corresponding substations is based on industry standards and proven technologies. TANESCO has gained adequate technical know-how in handling the 400 kV lines and equipment from the completed BTIP and the ongoing Kenya-Tanzania Interconnector Project. Therefore, the risks associated with the construction and operation of the transmission lines and substations under Component 1 are moderate. The activities under Component 2 for transmission system readiness for interconnection are also designed based on well-established industry practices and, therefore, pose minimal risks. Nevertheless, the overall risk rating for the



technical design of the project is significantly affected by the proposed activities under Subcomponent 3.3 (Readiness for regional Power Trade) and Component 4 (Technical assistance to EAPP). Component 4 aims at operationalizing a short-term power trading market and setting up a power market unit at the EAPP Secretariat. Given the lack of adequate capacity and the required technical and operational experience with power trade at the EAPP, the adopted multipronged approach for strengthening of the EAPP Secretariat and establishment of a well-functioning coordination center and market operator and synchronization of transmission systems among operating members of the EAPP all in parallel, will pose significant risks. Despite the high risks associated with the potential lag between completion of the various interconnectors and the readiness of EAPP for facilitating the operation of power trade activities, the parallel track approach appears to be the preferred alternative for maximizing the chance of timely operationalization of power trade between the EAPP and SAPP member countries. Mitigation: Since the substantial risk rating for the technical design of the project relates to sub-Component 3.3 and Component 4, technical assistance will be provided in parallel through the World Bank executed MDTF for Component 4, and the provision of internationally recognized technical expertise through the TANESCO's Technical Advisory Facility under sub-Component 3.2.

77. Institutional capacity for implementation and sustainability - Substantial. TANESCO has adequate institutional capacity to design, prepare, and implement the construction of transmission lines and substations. However, the EAPP will be an implementing entity for the first time in World Bank financed projects. Mitigation: Therefore, an Action Plan on EAPP capacity building was developed in March 2017 through the engagement between the EAPP Secretariat and the AfDB, World Bank, and Power Africa and endorsed by the members of the Steering Committee during the Extraordinary Council of Ministers meeting held on April 24, 2017 in Arusha, Tanzania. Furthermore, several capacity-building activities have been envisaged under Component 4 of the project to address the EAPP's institutional deficiencies as needed (further details in Annexes 1 and 2) in addition to the ongoing activities financed by the World Bank executed MDTF.

78. Fiduciary - Substantial. The Substantial rating for the fiduciary risk is determined predominantly by the relatively weak procurement and FM systems of the EAPP; and certain deficiencies in TANESCO's procurement system. The capacity assessment of TANESCO to implement the project procurement activities determined the following: (a) inadequate experience of staff dealing with procurement of works, goods and consultancy services through International Competitive Procurement procedures under the New Procurement Framework; (b) inefficiencies in processing, approving, and managing procurement activities; (c) shortage of space for office and keeping of records; and (d) lack of basic equipment for efficiency in the discharge of its duties. The procurement capacity assessment of the EAPP revealed (a) absence of a unit with a head and a procurement officer for managing procurement activities; (b) deficiencies in the Internal Procurement Manual in that it lacks procedures for handling complaints, procurement auditing, and preparation of Procurement Plans; (c) inadequate number and experience of staff deployed for carrying out procurement activities under the



project; and (d) lack of training for staff in procurement under World Bank procedures and contract management. Mitigation: The proposed procurement mitigation measures include training on the World Bank procurement procedures, recruitment of a procurement management consultant to work with the PIU and project team to build capacity, revision of the Procurement Manual to address the deficiencies identified during the assessment, and so on. For the EAPP, the mitigation measures include the establishment of a separate procurement unit, recruitment of procurement staff, training on procurement and contract management, recruitment of consultants to assist and coordinate the procurement activities of the project and provide procurement capacity building, and other measures, which are outlined in detail in Annex 2.

79. Both TANESCO and EAPP have well established FM functions, though there are capacity constraints. FM challenges related to the project are: (a) inadequate accounting system in TANESCO (iSCALA software) which doesn't produce accounting/financial reports thus forcing the use of spreadsheets, and (b) EAPP's lack of familiarity with World Bank requirements, lack of internal audit function, and some internal control weaknesses identified in previous audits. As the project includes co-financiers, the lack of adequate software at TANESCO may impact the preparation and timely submission of interim financial reports (IFR) and end of year financial statements might be delayed, which would also affect disbursements. Specific mitigating measures have been discussed and agreed, including the financing of an automated accounting module for TANESCO, staff training for both agencies, and follow up on strengthening of the control environment. Details are presented in Annex 2.

Environmental and Social – Substantial

80. **Environment.** The primary reason for the Substantial rating is the potential impact on biodiversity. In a stretch of approximately 100 km to the east of Mbeya, the corridor in parallel with an existing 220 kV line variously traverses a wildlife migration corridor between a game reserve and a national park, abuts that game reserve and two forest reserves, and passes between two important bird areas (IBA). Two known migration routes for bats and four for birds cross the transmission line corridor. Component 1 will apply the World Bank safeguard policies, triggering OP/BP 4.01 (Environmental Assessment), OP/BP 4.04 (Natural Habitats), OP/BP 4.11 (Physical Cultural Resources), and OP/BP 4.12 (Involuntary Resettlement). Component 2 is not expected to trigger any safeguards policies. Mitigation: Feasibility studies supported in Subcomponent 3.2 and Component 4 will be required, by their terms of references (ToRs), to incorporate applicable World Bank safeguards policies. The ToRs for feasibility studies under Subcomponent 3.2 and Component will be reviewed and approved by the World Bank. The original Environmental and Social Impact Assessments (ESIAs) for all sections of the transmission line routes and substations have been reviewed by the World Bank and disclosed in-country and on the World Bank's website on January 31, 2018. The updated ESIA was disclosed on April 11, 2018.



81. The ESIA spell out the responsibilities with regard to the preparation and implementation of the ESMP and the Health and Safety Plan. These are to be prepared and implemented by the contractors, and the supervising responsibilities with regard to the preparation and implementation of the ESMP will be carried out by the supervision consultant. The ESIA include commitments by TANESCO to engage specialists for preparation of a Wildlife Corridor Management Plan, additional studies of bird and bat movements along the corridor, and cumulative assessment of potential impacts on the protected areas and wildlife corridor, all to be completed and reviewed by the World Bank before construction and to be considered in final design.

82. **Social.** The substantial risk rating for social safeguards is due to the scale of resettlement impact, potential for labor influx and associated social risks in the project corridor and the client's capacity to implement safeguards requirements in line with the World Bank safeguards policies. Economic and physical resettlement impacts will occur as a result of project activities under Component 1. Prior to Project Appraisal, TANESCO has prepared a RAP for the Iringa-Mbeya section of the transmission line that details the type and scale of impact on people's economic activities, assets and land. The RAP estimates that in the 292 km section of the transmission line between Iringa and Mbeya, 1,747 Project Affected Persons (PAPs) will be impacted. Most of these PAPs will sustain economic impact due to the loss of agricultural land and 48 households will have to be physically relocated. Additionally, there will be impact on burial sites. The RAP sets forth measures to address these impacts. A Resettlement Policy Framework (RPF) for the Mbeya-Sumbawanga, including a 4 km stretch from Tunduma sub-station to the Tanzania- Zambia border, where the exact alignment is not yet finalized and, consequently, the impact is not yet determined, has also been prepared. The RPF sets policies and procedures to prepare RAP(s) and Remedial Action Plan (ReAP), once the relevant studies are finalized. A Resettlement Audit and Corrective Action Plan for the Mbeya substation, where TANESCO had already acquired 17.4 ha of land prior to the World Bank's involvement, has verified that 139 PAPs are impacted and has highlighted the gaps between the way the land acquisition has been carried out and the World Bank policy requirements on resettlement per the OP 4.12. A full remedial action plan will be prepared in line with the findings and recommendations of the Resettlement Audit and Corrective Action Plan and the RPF to address gaps between legacy land acquisition process and the requirements of the World Bank OP 4.12. The ReAP will be implemented in full to the satisfaction of the World Bank and ahead of the start of any civil works on the Mbeya substation. The ESIA that includes an ESMP, deals with a range of environmental and social issues, including labor influx and gender based violence. Contractors must follow strict criteria outlined in the ESMP, when selecting worker camp locations and encourage employment of local residents where feasible and necessary skills are available. All contractor employees will need to sign a Code of Conduct and go through a gender and cultural training. There will be an information campaign on project activities, including on gender and GBV issues in the project area during the implementation. Contractors in coordination with TANESCO will prepare a Labor Influx Plan that will be reviewed and cleared by the World Bank as part of the ESMP. Contractors will be responsible for ensuring compliance with the Code of Conduct and report any misconduct to the



World Bank and local law enforcement agencies. Contractors will need to have sufficient insurance for workers in case of disability or potential fatal accidents. The contractors will be requested in their bids to provide a specific budget line for the ESMP preparation and implementation. The supervision consultant will oversee the contractors' compliance with the Environmental, Social, Health and Safety (ESHS) Management Plan as well as the code of conduct. A project-level comprehensive GRM will be put in place to capture emerging grievances from project affected people and stakeholders and address them in timely manner. TANESCO safeguards staff will be trained to properly recognize, report and follow up on any issues or grievances related to gender and GBV. TANESCO will have a designated gender specialist and GRM operator.

83. Capacity of TANESCO's environmental and social unit. TANESCO has an 18 people safeguards unit in place that includes an acting manager, six environmental officers/technicians, six surveyors, one surveyor technician, and four social scientists. It also has prior experience of implementing World Bank-funded projects. At the same time, the frequent turnaround of staff and management of the team, a large volume of ongoing and planned activities carried out by TANESCO, along with poor record keeping practices and documented insufficiencies in meeting World Bank requirements contribute to the risks of project implementation. For mitigation measures, TANESCO plans to assign dedicated safeguards and social risk team to the project – at least one environmental specialist, one social specialist, and one GRM specialist. In addition, the owner's engineer will be required to assign environmental experts to provide real-time field supervision of ESMP implementation.

84. Stakeholders - Substantial. The multi-institutional nature of the project requires strong collaboration across a variety of organizations and the two implementing agencies (TANESCO and EAPP). Coordination of project co-financing and implementation supervision between the World Bank and AFD could also pose occasional challenges in terms of proper timing. Different mandates that cut across the project scope, together with unclear roles and responsibilities because of weak coordination, could undermine the success of project activities. Mitigation: Project implementation arrangements will draw upon participatory processes, including through the creation of committees that comprise representatives of key stakeholder groups as appropriate. TANESCO will establish a coordination committee responsible for working with ZESCO (Zambia) and KETRACO (Kenya) on technical aspects of cross-border grid links. EWURA and TANESCO will be responsible for working closely with the SAPP and EAPP on harmonization of the national and regional grid codes and technical readiness of the Tanzania grid for inter-linking with the EAPP and SAPP networks. The World Bank and AFD project teams will share all key project documents and related communications and will strive to conduct joint supervision missions to ensure harmonized implementation support.

85. Other - Sustainability - Substantial. Delays in new generation plants coming on line among the ZTK group of countries is a major risk to the project, which could result in a high wheeling tariff and more expensive power from other sources. In the short term, only limited surplus



energy is expected to be available for trade which could result in higher transmission tariffs. With a strong pipeline of regional projects, volumes are sufficiently high in the medium to long term to generate lower transmission tariffs. This risk is mitigated to some extent by the fact that, even in a low growth scenario, energy cost is still expected to be lower than cost of alternative energy sources in each country. The potential risk of non-realization of SOP-2 to complete the interconnection line on the Zambia side of the border can be rated low. Mitigation: Currently, the transmission line (single circuit) is being constructed up to the town of Nakonda, which is 20 km away from the Tanzanian border. The completion of 4 km on the Tanzanian side and 20 km of a transmission line in Zambia would not present a substantial investment or technical barrier either for TANESCO or for ZESCO. In addition to the World Bank, a number of other donors have expressed interest to support the completion of the interconnection transmission infrastructure in Zambia. From the Tanzanian side, in case the completion of the interconnection is delayed, the benefits generated by the project inside Tanzania, are substantial, economically justifying the investment.

VII. APPRAISAL SUMMARY

A. Economic and Financial (if applicable) Analysis

86. **The rationale for public investment.** The potential benefits from power trade between Tanzania, and other members of the EAPP, with Zambia, and other members of the SAPP, are substantial. However, the timing and extent of their realization depends upon the successful completion of the physical interconnection-related facilities, and commercial and administrative arrangements between the trading countries. These are prerequisites to allow the use of the transmission interconnector ranging from Ethiopia to Zambia. The links are Ethiopia-Kenya, Kenya-Tanzania, and Tanzania-Zambia. The timing and volume of power trade would depend upon the satisfactory establishment of these links. Until the Tanzania-Zambia interconnection is fully established and operational on both sides, the benefits of the TAZA project for Tanzania would be stemming from the use of the transmission investments to increase/improve availability and extension of access to power within Tanzania itself.

87. **The value added of World Bank support.** The proposed project builds upon long-term experience of the World Bank in supporting capacity building and construction of physical infrastructure in regional power pools in Africa. The World Bank's ongoing engagements with the SAPP and WAPP will help leverage global and regional expertise to support the development of the EAPP and ensure the optimal utilization of the physical infrastructure being developed. The involvement of the World Bank in financing transmission interconnections in the WAPP countries allows achieving the completion of all planned cross-border interconnections by 2021. In the SAPP, the World Bank-supported Project Preparation Facility provides a basis for preparation of large regional infrastructure projects and facilitates commercial arrangements.



88. Economic benefits from the interconnection would stem from the ability of Zambia or Tanzania to source power from each other (or the wider EAPP and SAPP markets) in times of supply shortage or excess demand. According to each country's PSMP, both countries are expecting surplus generation in the medium term with additional capacity coming online. However, there are periods of deficit in both countries while generation facilities are being developed, or during plant maintenance periods, or due to seasonal fluctuations of hydropower capacity in either country (cyclical wet and dry seasons). The ability to source power from the combined SAPP and EAPP markets will increase the security of supply due to diversity of generation mix (thermal, hydro, and so on) and as the river basins feeding the member countries of the regional power pools are expected to have distinct hydrological patterns, and the availability of water in the various basins is less likely to be highly correlated. In addition, excess hydropower capacity in Ethiopia may, most likely, be a cost-effective supply option for Zambia and Tanzania.

89. **Project economic analysis.** The economic case for the proposed project has been analyzed for a 30-year period. A range of economic benefits will accrue from the project for Tanzania: benefits from trade with member countries of the SAPP and domestic benefits. The justification of the transmission line relies on the extension of the Tanzania transmission backbone to the southwest and the ability to source power from Zambia and the SAPP region on a short-term basis—through SAPP's DAM. The analysis focuses on trade with the SAPP as the physical interconnection being financed under the project will provide access to the SAPP market. Thus, the evaluated benefits are those that arise from power flows on the TAZA project interconnector.

90. The interconnection with Kenya (and EAPP) will happen before the completion of this project and will have an impact on Tanzania's power system. In fact, Tanzania is finalizing a PPA with Ethiopia for 400 MW. Thus, the analysis considers 400 MW being injected from the EAPP, as a given, and an additional 200 MW from the EAPP (Ethiopia) to SAPP, being wheeled through Tanzania. Other potential benefits may arise from the interconnection with the EAPP too. The EAPP will operationalize a short-term market during the period of analysis, and Tanzania could also benefit from trading on that market. This could mean additional benefits for Tanzania from exporting to and importing from the EAPP. How the market in the EAPP develops and what the price mechanisms will be, are yet to be determined. Given the limited information available and the uncertainties involved in trading within the EAPP, this analysis adopts a conservative approach by only considering the immediate and known possibility of short-term trading on the SAPP DAM.

91. The economic case is underpinned by three scenarios (in the absence of a PPA between Tanzania and Zambia, or other SAPP member countries): a base case (Tanzania trading with SAPP) and two alternative scenarios. The base case is predicated on two-way flows of energy through the transmission interconnection—Tanzania importing energy from the SAPP and exporting energy to the SAPP—plus benefits arising from the expansion of the grid to the southwest of Tanzania. The other two scenarios analyzed are (a) no interconnection with the SAPP (the



transmission line serving domestic users only) and (b) Tanzania trading with the SAPP countries subject to a supply shock. The latter scenario is similar to the base case scenario but includes a constraint on supply: a shock affecting hydrology in Tanzania. The shock simulated in this scenario is one where a drought occurs every five years and lasts for two years—based on a more pessimistic hydrological scenario. Currently, when Tanzania faces droughts it needs to use emergency power. If interconnected to the SAPP, Tanzania would have access to the SAPP short-term market. Thus, this scenario analyzes the additional benefits for Tanzania in years when it experiences low hydrology.

92. In the base case, the net economic benefits from the project are estimated at US\$1,718 million (in net present value [NPV] terms, using a 10 percent discount rate), and the economic internal rate of return (EIRR) will be approximately 26.4 percent. These results are robust in a range of scenarios. Table 5 includes a summary of the EIRR and NPV for each of the three scenarios. The principal assumptions underlying the economic cost-benefit analysis of the project are set out in Annex 4.

Table 5. Project ENPV and EIRR

Scenarios	EIRR (%)	ENPV (US\$, millions)
No interconnection with SAPP	14.3	580
Interconnection with SAPP (base case)	26.4	1,718
Interconnection with SAPP and hydrological shock	31.0	2,207

Note: ENPV = Economic NPV.

93. **Benefits.** Benefits are divided between those related to the interconnector's ability to trade power and those derived from the development of transmission infrastructure within Tanzania (see Table 4.1 in Annex 4 for a full list of benefits divided by scenario). The benefits from trade consist of (a) the difference in capital expenses and fixed Operation and Maintenance (O&M) costs between the least cost expansion plan with and without trade; (b) the difference in the costs of fuels and variable O&M costs between the least-cost expansion plan with and without trade; and (c) the revenues from exporting to Zambia.³⁰ The first two benefits represent the savings from the ability to optimize the generation mix by importing from the SAPP.

94. The local benefits for Tanzania are several: increasing access to electricity in the Southwestern parts of the country; existing users enjoying more reliable electricity; replacing an existing 5 MW diesel-fired mini-grid installed near Sumbawanga, and imports from a 33 kV line from Zambia, with cheaper power from the grid; reducing line losses of the current 220 kV line from Iringa to Mbeya due to lower congestion; improving the reliability of power supply to the SAGCOT, which is on the line route; and enabling evacuation of power from future plants located

³⁰ Trade flows were based on a least-cost analysis prepared by the World Bank, using an 8 percent annual demand growth, hourly SAPP DAM clearing prices of 2017, and average hydrology conditions.



in the south of Tanzania.

95. **Costs.** Economic costs include investment in capital costs, recurring costs of O&M, inferred generation costs for underserved customers (where grid-supplied electricity substitutes current off-grid or unreliable sources), and inferred costs of generation and distribution for new customers.

96. **GHG emissions.** The project also generates savings in greenhouse gas (GHG) emissions. A total of 116,443 tCO₂ are avoided during the project lifetime. The sources of GHG emission reductions are displacement of the 5 MW diesel-fired mini-grid and new customers accessing the grid (which has a lower emission factor than that of off-grid traditional sources). Technical losses under the new line and land clearing needed to build the transmission line increases GHG emissions, though this has a lower negative impact on the environment.³¹ When GHG savings are included, the Economic Net Present Value (ENPV) and EIRR remain practically the same.

97. **Sensitivity analysis.** A sensitivity analysis has tested the robustness of the project to unfavorable changes in the values of six variables for the base case scenario. The analysis assessed the impact of an early construction of Stiegler Gorge (where the first and second stage of the hydro plant become operational in 2025 and 2027, respectively, instead of 2035 and 2037); a two-year delay in the date of commercial operation of the interconnection project; a five-year delay in the construction of the hydro plants that will evacuate power from the southwest to the rest of the country; an increase in electricity domestic demand from 8 percent to 10 percent; an increase in the SAPP DAM hourly prices from 2028 onwards; and a reduction of the interconnector's import capacity.³² The results are shown in Table 6.

Table 6. Sensitivity Analysis - Base Case Scenario

	EIRR (%)	ENPV (US\$, millions)
Values of base case scenario	26.4	1,718

³¹ For land clearing, the analysis assumes that (a) there is a first clearing event when the entire wayleave area is cleared and (b) the regrowth that occurs in the interval between the original clearing and the first maintenance cutting will sequester more carbon than what will be emitted by the decay of the biomass removed in the maintenance cutting. The analysis estimates 6 percent (of the original land clearing emissions) for annual regrowth and 5 percent for the maintenance cut.

³² The base case scenario assumes that hourly prices in the SAPP DAM match those in 2017. The sensitivity on SAPP prices assumes that hourly prices in the SAPP DAM match those of year 2017 between 2024 and 2027, and those of year 2016 from 2028 onwards. This is a simplifying assumption. SAPP prices are driven largely by the demand-supply balance in South Africa. Currently, excess supply in SA has depressed prices in the SAPP DAM. There is an expectation that the situation in SA will reverse somewhere between 2025 and 2030, depending on growth. Thus, the sensitivity assumes that the SAPP DAM stay as those from year 2017 until 2027, and go back up in 2028 (to match prices from year 2016).



Early construction of Stiegler Gorge (2025/2027)	25.7	1,602
Project COD delayed by 2 years	20.9	1,234
COD of generation plants in SW delayed by 5 years	23.4	1,100
Increase in domestic demand	17.8	1,076
Increase in SAPP prices, 5 years after interconnection	26.0	1,524
Interconnector's import capacity reduced to 125 MW	23.6	1,427

Note: COD = Commercial Operation Date.

98. **Switching values.** The analysis has also tested switching values for two variables: the project's capital costs and import prices from the SAPP. The values that would result in an ENPV of 0 are an increase in capital investments costs by above five times (from US\$447 million to US\$2.4 billion, excluding taxes) and quadrupling import prices from the SAPP's DAM (from US\$46 per MWh to US\$191 per MWh).

99. **Project financial analysis.** To assess the financial viability of the project, only those monetary costs and benefits that directly affect the financial situation of the implementing entity (TANESCO) have been considered in the analysis. Taxes and duties are included in the costs and benefits. The viability indicators used are the financial internal rate of return (FIRR) and the financial net present value (FNPV) estimated at a discount rate of 13 percent, equal to TANESCO's weighted average cost of capital (WACC).

100. The results indicate that, under the base case scenario, the project is financially viable with an FIRR of 23.5 percent and an FNPV of US\$808 million. The project is also financially viable under scenario 3, with an FIRR of 27.7 percent. The FNPV is negative when there is no interconnection and the transmission line serves domestic users only (scenario 1). Nevertheless, the FNPV is calculated using a relatively high discount rate and is expected to contribute to TANESCO, given that the interest rate of the project's concessional financing is considerably lower than the entity WACC.

Table 7. Project FNPV and FIRR

Scenarios	FIRR (%)	FNPV (US\$, millions)
No interconnection with SAPP	11.6	-142
Interconnection with SAPP (base case)	23.5	808
Interconnection with SAPP and hydrological shock	27.7	1,160

101. The base case FIRR and FNPV remain robust for substantial adverse variations in the same six variables as those described in the economic analysis and shown in Table 8.

Table 8. Sensitivity Analysis - Base Case: Interconnection with SAPP

	FIRR (%)	FNPV (US\$,
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		millions)
Values of base case scenario	23.5	808
Early construction of Stiegler Gorge (2025/2027)	22.8	733
Project COD delayed by 2 years	19.0	488
COD of generation plants in SW delayed by 5 years	20.7	438
Increase in domestic demand	16.3	345
Increase in SAPP prices 5 years after interconnection	23.2	690
Interconnector's import capacity reduced to 125 MW	21.0	607

102. **Switching values.** The financial analysis has also tested switching values for the same two variables as the economic analysis: the project's capital costs and import prices from the SAPP. The values that would result in an FNPV of 0 are a 75 percent increase in capital investments costs (from US\$592 million to US\$1,040 million, including taxes) and doubling of import prices from the SAPP's DAM (from US\$46 per MWh to US\$98 per MWh).

103. The principal assumptions underlying the financial analysis of the project are set out in Annex 4.

Financial Assessment of TANESCO

104. **In mid-2012, TANESCO's financial shortfall was more than US\$40 million per month.** This was driven by the below average hydrological conditions and increasing electricity demand requiring continued reliance on expensive EPPs. As a result, TANESCO accumulated arrears to the EPPs, IPPs, and fuel and other suppliers, as tariffs and Government transfers to the sector did not keep up with the rising cost of supply.

105. **TANESCO's profitability has since recovered and the company reported an operating surplus in FY2016/17.** Favorable GDP growth, tariff increases, improved hydrology, and the phase-out of EPPs have improved company revenues and lowered operating costs. Because of the measures taken after the crisis, supported in part by the World Bank Development Policy Operation series, average tariff per unit sold increased from TSh 136 per kWh in FY2011 to TSh 238 per kWh in FY2017. Between FY2011 and FY2015/16, the cash collected per year by TANESCO more than doubled and revenues per kWh increased by 82 percent. Measures to improve transparency and accountability on TANESCO's operational performance contributed to reducing system losses and improving bill collection. Technical and nontechnical losses in transmission and distribution fell from 22.4 percent in FY2011 to 17 percent in FY2017.

106. **Despite improvement in recent years, TANESCO's cash flow is still not sufficient to meet its investment targets.** This has resulted in an accumulation of arrears (around US\$312 million) which threatens the overall financial viability of the sector and undermines private investment in the sector. Going forward, TANESCO is expected to continue generating positive operating cash flows from operations, but the cash will fall substantially short of the funding gap between planned capital investment and approved grants and loans, estimated at TSh 5.3 trillion during



FY2017/18–FY2021/22. TANESCO's supply will also continue being exposed to hydrological risks and another drought year might significantly worsen the company's already precarious financial situation. Funding TANESCO's capital investment through grants and/or soft loans and providing electricity supply diversification, including through the Tanzania-Zambia Interconnector, will contribute to restoring the long-term operational and financial sustainability of Tanzania's power sector.

107. **The proposed TAZA is expected to have a revenue positive impact on TANESCO.** The interconnection with the SAPP will reduce exposure to hydrological fluctuations and consequently to expensive emergency power by providing access to a reliable power pool uncorrelated with Tanzania's hydrological cycle. The proposed project has positive financial impact for TANESCO, as shown in the analysis in the previous section.

108. A detailed assessment of TANESCO's finances is presented in Annex 5.

B. Technical

109. **Component 1: Transmission Infrastructure Extension.** Equipment and the technologies involved in construction and operation of 400 kV transmission lines, 400/220 kV substations and associated communication and SCADA systems are well-known and proven technologies. The design, including technical parameters and estimated project costs for the transmission lines, and substations have been established by feasibility and conceptual design studies prepared by international consultants approved by TANESCO. Based on the results of these studies, the consultants will prepare prequalification and bid documentation and evaluation reports and will assist TANESCO in contract negotiation. The transmission lines and substations will be designed under the N-1 criteria to improve the operational reliability of the networks. Advance procurement will be undertaken by an international consultant so that contracts can be signed by the time the Credit becomes effective.

110. **TANESCO will engage contractors for the detailed design, supply, and installation of the transmission line packages and substations, respectively.** Prequalification will be carried out to identify and select a list of prequalified bidders. During the phase of construction, an international consulting firm will be contracted for the supervision and management of the project. The IDA-financed contracts will be awarded according the World Bank procurement framework. The project would be implemented according to internationally accepted technical criteria and standards.

111. **Component 2.1: TANESCO Transmission System Readiness for Interconnection** (for example, control systems and telecommunications, protection, metering, and so on) will be determined as part of a technical assessment of TANESCO's transmission system to identify the operational, planning, and technical gaps in meeting the requirements for operational



integration in the SAPP and the EAPP for power system stability, operational ancillary enabling services, frequency synchronization, tie-line control, protection, metering and other technical requirements. The required technical equipment will comply with the technical standards set by the SAPP and already implemented in the SAPP member utilities. Therefore, the technical risk can be mitigated through application of lessons and expertise of the SAPP utilities.

112. **Component 2.2: Corporate Commercial Management Improvements.** The design of the Corporate Management System upgrade is well advanced, as TANESCO has been working on preparation of the technical specifications (with support from an international technology consultant) during the last year. The proposed upgrade will follow design architecture and system communication settings, which have already been implemented in other utilities that participate in regional trade.

113. **Component 3: Project Implementation Support and Capacity Building.** The Component activities concentrate on technical assistance that will target various aspects of the TANESCO, MoE and EWURA preparation for regional power trade. In addition, Component 3 will support strengthening TANESCO's safeguards unit and supervision of Component 1 (through an owner's engineer). The design of Component 3 includes a Technical Advisory Facility to provide the necessary technical and expert support to TANESCO in various aspects of its preparation for regional power trade and development of future investment project pipeline.

114. **Component 4: Technical Assistance to EAPP.** The technical design is based on recommendations of various technical studies conducted with support of partner organizations (for example, USAID, Norway, and the current World Bank-administered MDTF). Within the ongoing activities financed by the MDTF, a number of technical experts and advisers are being provided to the EAPP to build and strengthen its capacity to carry out activities under the proposed project.

C. Financial Management

115. **The World Bank carried out an FM assessment of TANESCO and the General Secretariat of the EAPP.** The objective of the assessment was to determine whether (a) TANESCO and the EAPP have adequate FM arrangements to ensure that project funds will be used for the purposes intended, in an efficient and economical way; (b) project financial reports will be prepared in accurately, reliably, and on time; and (c) the project assets will be safeguarded.³³

³³ The assessment was carried out in accordance with the World Bank Directive: FM Manual for World Bank IPF Operations issued February 4, 2015, and effective from March 1, 2010, and the World Bank Guidance: FM in World Bank IPF Operations, issued and effective November 10, 2017.



116. Both TANESCO and the EAPP are well-established entities with adequate FM capacity, including qualified and experienced accounting staff, good FM policies and procedures for planning, budget management, and sound internal control arrangements. TANESCO has experience in managing World Bank-funded projects and has a good performance track record. Overall, the project design is straightforward and, while it involves co-financing and large contracts, it does not necessarily require complex FM arrangements. Two key challenges identified are (a) an inadequate accounting system in TANESCO (iSCALA software) which does not produce financial reports and necessitates the use of spreadsheets, leading to delays in the submission of IFRs and impacting disbursements; and (b) the EAPP's lack of familiarity with World Bank requirements and lack of internal audit function.

117. **Mitigation measures have been agreed,** These include (a) staff training on World Bank FM and disbursement requirements; (b) designation of additional FM staff as need arises; (c) confirmation of the format and content of IFRs for TANESCO, considering all sources of financing; and (d) procurement of a robust accounting system that will address the financial reporting challenges. To address the identified gap in the inadequate accounting system in TANESCO, the iSCALA software will be replaced with an automated and integrated accounting system as part of the ERP implementation under Subcomponent 2.2.

118. Based on the assessment, and subject to the successful implementation of the above-mentioned mitigating measures, the proposed FM arrangements can be considered adequate to support project implementation.

D. Procurement

119. **Procurement procedures.** Procurement activities under the proposed project will be carried out in accordance with the World Bank's 'Procurement Regulations for IPF Borrowers' (Procurement Regulations), dated July 2016 and revised in November 2017, under the 'New Procurement Framework'; the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016; and the provisions stipulated in the Financing Agreement.

120. The Borrower has prepared the Project Procurement Strategy for Development (PPSD) identifying optimum procurement strategies for meeting the development objectives of the project, based on which the Procurement Plan for the first 18 months has been prepared, setting the selection methods to be used by the Borrower in the procurement of goods, works, non-consulting services, and consulting services under the project. The Procurement Plan will be updated at least every 12 months, or as required, to reflect the actual project implementation needs. Each update shall require World Bank approval and will be publicly disclosed in accordance with the World Bank disclosure policy.



121. **National procurement procedures (NPP).** National procedures may be used while approaching the national market under National Open Competitive Procurement (NOCP). NOCP will observe the requirements stipulated in the Procurement Regulations for IPF Borrowers on NPP. Other national procurement arrangements (other than NOCP) that may be applied by the Borrower (such as limited/restricted competitive bidding, request for quotations (RFQs)/shopping, direct selection) shall be consistent with the World Bank's Core Procurement Principles and ensure that the World Bank's Anticorruption Guidelines and Sanctions Framework and contractual remedies set out in its Legal Agreement apply.

122. **Procurement arrangements.** Implementation of the project will be carried out by TANESCO, and EAPP Secretariat who will be responsible for the procurement activities under the project. TANESCO will be responsible for the implementation of the works and related services contracts for the transmission line and substations from Iringa through Kisada, Mbeya, and Tunduma to Sumbawanga and the extension to Zambia border. The EAPP Secretariat will be responsible for the procurement of consultancy services and office equipment (including computers and software) to facilitate knowledge sharing between the SAPP and EAPP (South-South exchange) and to host a market operator in the EAPP power trade.

123. **Procurement capacity.** Procurement capacity assessment for the agencies to implement the project was carried out in November 2017 for the EAPP Secretariat and in February 2018 for TANESCO. The assessment for TANESCO revealed that most of the staff dealing with procurement have adequate experience, but limited capacity, in procurement of works and goods through ICB procedures and in selection of large-value consultancy contracts including using World Bank procedures. Some of the mitigation measures include training of its staff in advanced procurement of works and high-value consultancy services. In addition, TANESCO is facing shortage of office space to keep records and basic equipment for efficiency in the discharge of its duties. TANESCO will also need to hire additional qualified procurement experts to support TANESCO in the implementation of the project procurement activities.

124. The capacity assessment for the EAPP revealed (a) absence of a unit with a head and a procurement officer for managing procurement activities; (b) deficiencies in the Internal Procurement Manual in that it lacks procedures for handling complaints, procurement auditing, and preparation of Procurement Plans; (c) inadequate number and experience of staff deployed for carrying out procurement activities under the project; and (d) lack of training for staff in procurement under World Bank procedures and in contract management. The proposed mitigation measures for the EAPP include:

- (a) EAPP establishing a separate procurement subunit consisting of at least a procurement head and procurement officer;
- (b) Finalizing the procurement manual considering also the aspects of procurement complaint handling, procurement auditing, and procurement plan preparation. The



manual should also recognize open competitive bidding as the default procurement method for high-value and complex procurements; and

- (c) Providing training in procurement under World Bank procedures for procurement staff and engaging a procurement consultant to assist in procurement activities of the project and providing capacity building EAPP procurement staff.

125. The overall project risk before mitigation is Substantial and is expected to be reduced to Moderate after implementation of the mitigation measures.

E. Social (including Safeguards)

126. **The project is expected to have positive direct and indirect social impacts on the communities in the project area and more broadly in areas where electricity supply will be provided.** The rate of electrification remains low in Tanzania, particularly in rural areas. The transmission line traverses largely through rural areas, where the rate of poverty may reach up to 70 percent (World Bank SCD 2017). Provision of electricity can help move the population out of poverty, encourage economic growth, advance shared prosperity, and address the persistent geographic inequalities in the country. Access to reliable and cost-effective electricity by users will not only improve the quality of life at the individual and household levels but will also encourage economic development in the medium and long term in the areas that will be provided with electricity under the project. Construction of the transmission line will create opportunities for employment in the short and medium terms. The contractors will work closely with TANESCO and community leaders to encourage recruitment of local labor from the communities in the immediate vicinity of the transmission line corridor. In line with the previous experience of TANESCO, most of the unskilled and low skilled labor force would be recruited from the local communities.

127. **Safeguards.** Under Component 1, construction of the transmission line and associated four substations will have negative impact on residents within the right-of-way, who will experience physical and economic resettlement. For the construction of the transmission line and the identified substations, according to the national land requirements, TANESCO will purchase the right-of-way of 52 meter along the transmission line corridor from Iringa to Mbeya to Tunduma to Sumbawanga (except where the right of way [RoW] overlaps with the RoW of other transmission lines, thus reducing the area of impact). Since the exact alignment for the section of Iringa-Mbeya has been known during project preparation, a RAP has been prepared prior to Project Appraisal. The RAP for this section of the transmission line (292.2 km of the total 613 km), indicates that most of the impact is on the agricultural land: 1,747 PAPs who conduct farming within the RoW will be affected, out of these 48 PAPs will be physically resettled. Additionally, 315 graves will need to be reburied. The RAP details mitigation measures to address land



acquisition, resettlement and reburial of graveyards in this section of the transmission line. The RAP includes special provisions for vulnerable groups. The RAP was disclosed in-country and on the World Bank website on April 13, 2018. A detailed design, feasibility studies and the alignment for the Mbeya -Sumbawanga section of the transmission line and for the 4 km spur from Tunduma substation to the Tanzania-Zambia border are less advanced. For that reason, a Resettlement Policy Framework (RPF) has been prepared for that section ahead of appraisal to address potential resettlement impact and to set principles for any resettlement as a result of civil works in this area. The RPF was disclosed in-country and on the World Bank website on April 14, 2018. RAP(s) for Mbeya-Sumbawanga segment, as well as for the 4 km spur from Sumbawanga substation to the Zambia border will be prepared immediately after the siting of the line is finalized.

128. Prior to the World Bank's involvement, TANESCO had acquired a land lot for Mbeya substation without a RAP in place. To assess the way the land acquisition had occurred, a Resettlement Audit and Corrective Action Plan has been prepared. It has confirmed that 139 PAPs stand to be affected, including two households that need to be physically relocated in the Mbeya substation land plot. Additionally, 117 graves need to be reburied. All but one PAPs received compensations in April 2017, but most of them have not yet relocated and continued use of the land, as TANESCO has not enforced clearance of the lot. A Resettlement Audit determined that the land acquisition process was done according to the national laws and there are a number of identified gaps between national requirements on resettlement and the World Bank policies. A ReAP will be prepared in line with the Audit's Corrective Action Plan and the RPF, to address the gaps between legacy land acquisition and the World Bank requirements per OP 4.12. The ReAP will be implemented in full before any further impact on PAPs' land and assets, and ahead of the start of any civil works on the substation. The Resettlement Audit and Corrective Action Plan was disclosed in-country and the World Bank website on April 17, 2018.

129. A due diligence review was carried out in July 2017 for the Iringa-Mbeya transmission line section and in December 2017 for the Mbeya-Tunduma-Sumbawanga section as part of project preparation. The review confirmed that there are no indigenous peoples, according to the policy criteria, along the transmission line corridor. Because the project benefits of reliable energy provision extend beyond the direct area of influence, TANESCO has agreed to provide additional benefits to the project-affected communities. These benefits include reduced cost of connection to distribution lines coming to the communities in the future.

130. Safeguards policies will apply to feasibility studies prepared under Subcomponent 3.2 and Component 4. The World Bank will review the ToR prepared under these components to ensure that the safeguards requirements are adequately addressed.

131. **Gender.** The project will address gender related issues at TANESCO and in project implementation. A gender action plan will be formulated for TANESCO to address the identified barriers to the professional development of female staff. Identification and mitigation of risks to



female community members from labor influx will also be included as a part of project implementation and monitoring.

132. In Tanzania, while overall labor force participation is high for both women and men (labor force participation rate is 89.4 percent for men and 84.2 percent for women), disparities can be seen when the overall labor market statistics is disaggregated by areas of specialization and levels of hierarchy in job titles. The data show that women hold only 17.4 percent of leadership and decision-making positions in government, large enterprises, and institutions. The science, technology, engineering, and mathematics fields constitute the second highest paid profession in Tanzania; women hold 25.4 percent of professional, scientific, and technical jobs but they earn less than their male counterparts.³⁴ Moreover, only 9.6 percent of female university students compared to 24.7 percent of male university students graduated from science, technology, engineering, and mathematics programs in 2016 (World Economic Forum 2017 Global Gender Gap Report). This is also true in the energy sector, where certain job streams and management-level positions do not have many women. There are structural factors driving this, including cultural and social norms, which are beyond the scope of the project to address.

133. Under the proposed TAZA, TANESCO will undertake a gender gap assessment to (a) identify specializations and departments where women are underrepresented; (b) identify main barriers women face once recruited (especially in progressing to roles with greater responsibilities); (c) recommend ways to reduce the barriers; and (d) design a recruitment, mentoring, and leadership program targeting women in TANESCO. The activity will be included under capacity building in Component 3 and will especially target technical fields (such as engineering, technology, finance, and economics). The recruitment program also will include leadership development training and mentoring by experienced women employees to equip and ensure that the women who are recruited become leaders in the sector.

134. Experience in the region also has shown that in infrastructure projects, the influx of temporary outside workers can increase risk of sexual exploitation of local communities, especially of women and girls. This can also increase risks of human trafficking and transmission of sexually transmitted diseases including HIV/AIDS. There is also an increased risk of GBV in such situations. It is important to note that in Tanzania, four in 10 women have experienced physical violence since the age of 15 and about 17 percent of women have experienced sexual violence (Tanzania Demographic and Health Survey 2015–2016). TANESCO has prepared ESIA for Iringa-Mbeya and Mbeya-Sumbawanga sections of the transmission line that include ESMPs (the ESIA was disclosed on the World Bank website on January 31, 2018). These safeguards documents identify potential risks associated with labor influx and GBV and introduce mitigation measures to address these risks. The measures include but are not limited to following clear criteria for worker camp set up and location, as well as relevant gender and HIV/STI trainings and information campaign both for workers and local communities. Contractors will be required to

³⁴ Tanzania Integrated Labour Force Survey 2015.



prepare a Labor Influx Plan as part of the ESMP that has to be cleared by the World Bank, to foster positive impact on employment generation in the communities and mitigate potential social risks. The supervision consultant will oversee the contractors' compliance with the ESHS Management Plan as well as the code of conduct. TANESCO, in close coordination with the supervision consultant, contractors and local communities, will monitor labor influx, encourage local recruitment and relations between the workers and local communities. Contractors will be required to enforce an Honor Code, particularly for those residing in construction camps, and monitor interactions with the local population. Any inappropriate relations between the workers and local population will be reported to the local law enforcement agencies and to TANESCO. TANESCO's safeguards staff will be trained to recognize, properly record and follow up on sensitive issues such as community relations and GBV. TANESCO will also have a designated gender specialist, who will work specifically on gender issues and GBV within the scope of the project. A GRM will be available to PAPs and local communities to submit any inquiries and concerns, and TANESCO will regularly follow up and report on operation of the GRM and resolution of grievances received under the Project.

135. **Citizen engagement.** As part of the project preparation, extensive consultations were held with representatives of various stakeholder groups and residents of communities along the transmission line to inform them about the project designs and discuss potential project impacts, including involuntary resettlement. During preparation of the Iringa-Mbeya ESIA in 2012, consultations were conducted in 53 villages along the proposed transmission line corridor, and in Dar es Salaam with National Environment Management Council (NEMC), TANROADS, Ministry of Natural Resources and Tourism (Forestry and Beekeeping Division, Wildlife Division, Division of Antiquities), and non-governmental organizations (NGOs). Additional consultations were conducted in communities in January 2018 by TANESCO. On September 12, 2017, a large public/government agency meeting was held in Dar es Salaam to discuss both ESIA's and the ToR for the revision of the Mbeya-Sumbawanga ESIA. Public consultations for the revision of that ESIA took place at 18 locations between Mbeya and Sumbawanga during November 13-17, 2017, and TANESCO conducted additional consultations on the draft ESIA January 13-21, 2018. There were also consultations with the PAPs along the Iringa-Mbeya section of the proposed transmission line during the RAP preparation in March 2018. The consultative process will continue throughout the project implementation. TANESCO has committed to develop a Stakeholder Engagement Plan (SEP) before the contractors are recruited. The SEP will be approved by the World Bank and implemented throughout the project. The regular discussions with stakeholders and community groups can provide feedback regarding the construction process and associated activities and impacts. Meetings with various community groups within the right-of-way, including women, youth, and vulnerable populations, can signal of emerging issues related to the project's impact and address them on time. It will also offer an avenue for the communities to ask questions and receive answers related to project implementation. The community feedback will be reviewed on a quarterly basis and help moderate activities and mitigation measures in the communities.



136. The regular consultations will be complemented by a comprehensive GRM that will be administered by TANESCO, which will have designated staff responsible for implementation of the SEP and operation of the GRM. The GRM will address inquiries and grievances related to various aspects of project implementation, including environmental and social safeguards. The PIM will detail the structure, processes for uptake, registering, and following up on the inquiries received through the mechanism. TANESCO will regularly report on complaints received and responded to. It will publish an annual report on grievance redress and how the issues were resolved. Relevant indicators are included in the Results Matrix.

F. Environment (including Safeguards)

137. The project was originally classified as Category A for environmental assessment because of the length of the transmission line in Component 1, the line's proximity to protected areas and other important habitats, its passage through a wildlife migration corridor, and the amount of land to be acquired for its wayleave. Environmental assessment identified loss of vegetation cover and wildlife habitat, disturbance of wildlife migration, bird and bat collisions with conductors, land acquisition, and interactions of up to 800 workers in at least three workers' camps with the environment and local communities as potential impacts that confirm the appropriateness of the Category A classification. There are two ESIAs for the project. The first ESIA was prepared by an international consultant and issued in 2012 for the Iringa-Mbeya segment of the line under the NELSAP of the Nile Basin Initiative and reviewed and approved by NELSAP and the NEMC. The World Bank safeguards policies were considered in its preparation. The ESIA was updated by TANESCO in 2017 to reflect changes in baseline conditions since 2012. A second ESIA was prepared in 2017 for the Mbeya-Sumbawanga segment of Component 1 by a different international consultant. The two ESIAs are being kept as separate documents, but one consolidated Executive Summary covering both has been prepared. The World Bank safeguards policies triggered for the project and taken into account in the ESIAs are OP 4.01 (Environmental Assessment), OP 4.04 (Natural Habitats), OP 4.11 (Physical Cultural Resources), and OP 4.12 (Involuntary Resettlement). The ESIAs and applicable safeguards policies will apply equally to portions of Component 1 being financed by AFD and EU.

138. Apart from temporary impacts during construction, such as noise, dust, and pollution from oil and fuel spills and construction camp wastes, and potential social conflict between 'foreign' workers and local communities, the ESIAs list the main adverse impacts of Component 1 as bird and bat collisions with conductors, loss of vegetation cover that is habitat for small animals, fragmentation of habitat, disturbance of migrating animals, transmission of HIV/AIDS, and impairment of agriculture-based livelihoods. Feasibility studies prepared under Subcomponent 3.2 and Component 4, for possible projects that could have adverse impacts, will need to take the World Bank safeguards policies into account. Components 2 and Subcomponent 3.1 will have no impacts. The two ESIAs were disclosed in-country on the TANESCO website on January 31, 2018, and on the World Bank's external website on January 31, 2018.



139. The project is not expected to cause conversion or degradation of any critical natural habitat, and much of the land that will be acquired for the wayleave is modified habitat. Direct impacts on natural habitat (mostly bush, scrub, shrubland and grassland) can be mitigated through selective clearing. The proposed alignment does not pass through any protected areas, but the line from Iringa to Mbeya runs along or near the boundaries of the Mpanga/Kipengere Game Reserve (MKGR) and the Chimala Scarp Forest Reserve. It passes between two IBA, one 13 km to the south and the other 10 km to the north. It traverses the Igambo-Igawa Wildlife Corridor that links the MKGR and Ruaha National Park, which is 26 km north of the line. Indirect impacts on the MKGR and Chimala Scarp Forest Reserve could include hunting by workers and improved access for poachers. Cumulative impacts on the protected areas are possible and will be assessed in parallel with the final design. Mitigation measures are required in the ESMPs for those impacts and for potential loss of biodiversity caused by bird collisions and disturbance of wildlife movement, particularly in the Igambo-Igawa Wildlife Corridor. The ESIA includes commitments by TANESCO to engage specialists for preparation of a Wildlife Corridor Management Plan, additional studies of bird and bat movements along the corridor, and cumulative assessment of potential impacts on the wildlife corridor and protected areas along the transmission line, all to be completed and reviewed by the World Bank prior to construction and to be considered in final design. The ESIA for the Mbeya-Sumbawanga segment includes a chapter describing a proposed 4 km addition to the transmission line from the Tunduma substation to the border with Zambia, the alignment of which will be determined once the location of the corresponding infrastructure in Zambia is finalized. TANESCO will make a complete impact assessment of this new segment and amend the ESIA with the results. TANESCO will update both ESIA and their respective ESMPs based on the above-mentioned additional studies and will submit them to the World Bank for review and clearance prior to beginning of construction in the respective segment of transmission line. The bidding document will clearly state that no construction works will begin prior to the clearance of updated ESIA/ESMPs. Village graveyards are present within the proposed transmission line corridor and those that cannot be avoided will need to be relocated in accordance with OP 4.12 and the applicable Tanzanian law. The proposed alignment avoids the one known archaeological site at Isimila near Iringa. A chance-finds procedure is included in the ESIA and in construction contracts in case other physical cultural resources are discovered during line or substation construction.

140. The international project implementation consultant to be engaged by TANESCO for supervision and management of the project will review the contractors' ESMPs and Health and Safety Plans and advise TANESCO regarding their approval. The consultant will be responsible for field supervision of the ESMP and Health and Safety Plan implementation and will include a qualified specialist in its team for this purpose.

G. Other Safeguard Policies (if applicable)



141. The proposed TAZA was screened through the World Bank 'Climate and Disaster Risk Screening Tool'. This exercise showed that potential flooding and the existence of volcanoes in the Mbeya region are climate and geophysical hazards that are likely to be relevant to the project location in present and in the future. Nevertheless, the overall potential impact on the project's physical infrastructure and assets is low because (a) there has not been any volcanic activity in the area during the last three hundred years and (b) it is not expected that floods will affect the transmission lines (except potentially the substations), and projected floods are not as probable in the route of the transmission line.

142. **Mitigation.** The feasibility and conceptual design studies prepared by international consultants approved by TANESCO have considered the risk of flooding for a substation and proposed to raise the substation plot level by 0.5 m in relation to the surrounding ground level, 'to reduce the risk of water entering from outside of the substation area which may flood the station and the cable trenches'.

H. World Bank Grievance Redress

143. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, because of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.



VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

Project Development Objective(s)

The Development Objective for the Series of Projects is to establish cross-border transmission capacity between the Southern African Power Pool and the Eastern Africa Power Pool to enable regional power trade.

The Project Development Objective is to (i) increase power transmission capacity to southern regions of Tanzania and (ii) strengthen institutional capacity in Tanzania and of the Eastern Africa Power Pool for regional power trade.

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
(i) increase power transmission capacity to southern regions of Tanzania					
Increased power transmission capacity along the Iringa - Kisada - Mbeya - Tunduma - Sumbawanga corridor			Text	0.00	Iringa – Kisada - Tunduma: 1,700MW; Tunduma-Sumbawanga: 850MW
Strengthen institutional capacity in Tanzania and of the EAPP for regional power trade					
TANESCO's cross-border infrastructure for interconnection with SAPP completed			Yes/No	N	Y
Compliance with minimum operational requirements for regional power trade achieved			Yes/No	N	Y
TANESCO's Enterprise Resource Planning (ERP) software installed			Yes/No	N	Y



PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
and operational					
EAPP market rules adopted by the EAPP Steering Committee			Text	N	Y
Intermediate Results Indicators by Components	DLI	CRI	Unit of Measure	Baseline	End Target
Component 1: Transmission Infrastructure Extension					
1. Tanzania Transmission Extension and Associated Substations completed			Percentage	0.00	100.00
1.1 Iringa substation upgraded (2-line bays and associated shunt reactors installed)			Percentage	0.00	100.00
1.2 Construction of Kisada, Mbeya, Tunduma, and Sumbawanga Substations completed			Percentage	0.00	100.00
1.3 400 kV lines constructed from Iringa – Kisada – Mbeya – Tunduma – Sumbawanga			Percentage	0.00	100.00
2. Kilometers of transmission lines constructed			Kilometers	0.00	620.00
3. Grievances responded and/or resolved within the stipulated service standards for response times (%)			Percentage	0.00	100.00
Component 2: Transmission System Readiness for Interconnection, and Corporate Improvements					
4. Technical assessment of TANESCO's readiness for regional interoperations completed			Yes/No	N	Y



5. Recommendations from technical needs assesment implemented for readiness for regional interconnection		Percentage	0.00	100.00
Componenet 3: Project Implementation Support and Capacity Building				
6. Number of female recruits hired as part of the recruitment/leadership/mentoring program		Text	0.00	TBD
7. Trading Unit in TANESCO established and staffed		Yes/No	N	Y
8. TANESCO staff certified to trade in the SAPP market		Number	0.00	5.00
Number of women certified to trade in SAPP market		Number	0.00	1.00
9. Atleast two feasibility studies for new generation and/or transmission projects completed		Number	0.00	2.00
10. Number of TANESCO engineers provided live line maintenance training		Number	0.00	10.00
Component 4: Technical Assistance to EAPP				
11. EAPP Market Committee established		Yes/No	N	Y
12. Independent Regulatory Body (IRB) strategic plan drafted		Yes/No	N	Y
13. Market Platform installed and training completed		Yes/No	N	Y



Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Increased power transmission capacity along the Iringa - Kisada - Mbeya - Tunduma - Sumbawanga corridor
Definition/Description	Increased power transmission capacity along the Iringa - Kisada - Mbeya - Tunduma - Sumbawanga corridor
Frequency	Semi-Annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	TANESCO's cross-border infrastructure for interconnection with SAPP completed
Definition/Description	Completion of cross-border infrastructure is defined as the installation of all necessary infrastructure between Tunduma substation and Tanzania's border with Zambia: Auto-transformation switchgear 400 to 330 kV and short transmission line between Tunduma substation and the border.
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	Compliance with minimum operational requirements for regional power trade achieved
Definition/Description	Minimum standards in terms of protection gear and meters are set by EAPP and SAPP interconnection code and operating guidelines, respectively.
Frequency	Semi-Annual
Data Source	TANESCO progress reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	TANESCO's Enterprise Resource Planning (ERP) software installed and operational
Definition/Description	TANESCO's Enterprise Resource Planning (ERP) software installed and operational
Frequency	
Data Source	
Methodology for Data Collection	
Responsibility for Data Collection	



Indicator Name	EAPP market rules adopted by the EAPP Steering Committee
Definition/Description	EAPP market rules adopted by the EAPP Steering Committee
Frequency	Quarterly
Data Source	EAPP Quarterly progress report
Methodology for Data Collection	
Responsibility for Data Collection	EAPP Project Coordinator

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	1. Tanzania Transmission Extension and Associated Substations completed
Definition/Description	Related to Component 1 of the project
Frequency	Semi-annual
Data Source	Supervision Consultant Reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	1.1 Iringa substation upgraded (2-line bays and associated shunt reactors installed)
Definition/Description	Iringa substation upgraded (2-line bays and associated shunt reactors installed)
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	1.2 Construction of Kisada, Mbeya, Tunduma, and Sumbawanga Substations completed
Definition/Description	Construction of Kisada, Mbeya, Tunduma, and Sumbawanga Substations completed
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	1.3 400 kV lines constructed from Iringa – Kisada – Mbeya – Tunduma – Sumbawanga
Definition/Description	400 kV lines constructed from Iringa – Kisada – Mbeya – Tunduma – Sumbawanga
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU

Indicator Name	2. Kilometers of transmission lines constructed
Definition/Description	Kilometers of transmission lines constructed
Frequency	semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	3. Grievances responded and/or resolved within the stipulated service standards for response times (%)
Definition/Description	Grievances responded and/or resolved within the stipulated service standards for response times (%)
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU

Indicator Name	4. Technical assessment of TANESCO's readiness for regional interoperations completed
Definition/Description	Technical assessment of TANESCO's readiness for regional interoperations completed
Frequency	Semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	5. Recommendations from technical needs assesment implemented for readiness for regional interconnection
Definition/Description	This includes additional equipment and reinforcements needed on the grid - e.g. telecommunications, control equipment, protection equipment and metering.
Frequency	semi-annual
Data Source	Supervision consultant reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	6. Number of female recruits hired as part of the recruitment/leadership/mentoring program
Definition/Description	Number of female recruits hired as part of the recruitment/leadership/mentoring program
Frequency	semi-annual
Data Source	TANESCO Progress reports
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	7. Trading Unit in TANESCO established and staffed
Definition/Description	Trading Unit in TANESCO established and staffed
Frequency	semi-annual
Data Source	TANESCO progress report
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	8. TANESCO staff certified to trade in the SAPP market
Definition/Description	TANESCO staff certified to trade in the SAPP market
Frequency	semi-annual
Data Source	TANESCO progress report
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	Number of women certified to trade in SAPP market
Definition/Description	Number of women certified to trade in SAPP market
Frequency	semi-annual
Data Source	TANESCO progress report
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	9. Atleast two feasibility studies for new generation and/or transmission projects completed
Definition/Description	Feasibility studies including environmental and social assessments
Frequency	semi-annual
Data Source	TANESCO progress report
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU



Indicator Name	10. Number of TANESCO engineers provided live line maintenance training
Definition/Description	Number of TANESCO engineers provided live line maintenance training
Frequency	semi-annual
Data Source	TANESCO progress report
Methodology for Data Collection	
Responsibility for Data Collection	TANESCO PIU
Indicator Name	11. EAPP Market Committee established
Definition/Description	EAPP Market Committee established
Frequency	semi-annual
Data Source	EAPP progress reports
Methodology for Data Collection	
Responsibility for Data Collection	EAPP PIU



Indicator Name	12. Independent Regulatory Body (IRB) strategic plan drafted
Definition/Description	Independent Regulatory Body (IRB) strategic plan drafted
Frequency	semi-annual
Data Source	EAPP progress reports
Methodology for Data Collection	
Responsibility for Data Collection	EAPP PIU
Indicator Name	13. Market Platform installed and training completed
Definition/Description	Market Platform installed and training completed
Frequency	semi-annual
Data Source	EAPP progress reports
Methodology for Data Collection	
Responsibility for Data Collection	EAPP PIU



ANNEX 1: DETAILED PROJECT DESCRIPTION

COUNTRY: Africa

AFCC2/RI-3A Tanzania-Zambia Transmission Interconnector

1. The proposed project will interconnect the transmission grids of Tanzania and Zambia to complete the ZTK interconnection and create the first high-voltage link between the EAPP and the SAPP for bidirectional regional power trade. It will strengthen the capacity of TANESCO to become an operating member of the SAPP and to actively participate in the intra- and inter-pool power trade among the EAPP and SAPP member countries. The project will also enable the environment for the extension of TANESCO's distribution networks in project target areas for the provision of grid-based electricity services to unserved and underserved areas of the country. In addition, the project will advance regional integration between Eastern and Southern Africa by interconnecting the SAPP and EAPP power markets and strengthening the capacity of the EAPP for inter- and intra-regional power trade while accruing tangible economic benefits to Tanzania through enhancing power supply options and increasing potential revenues from inter-pool power trade.
2. The proposed project will finance a 620 km extension of the Tanzania transmission backbone from Iringa (the current termination point of the existing 400 kV backbone) to Sumbawanga, passing through Kisada, Mbeya, and Tunduma (on the Zambian border). The project activities will include the construction of the 400 kV double circuit line and associated substations and the communication/SCADA systems, all within the boundaries of Tanzania. The existing Tanzanian 400 kV transmission backbone runs from Shinyanga to Iringa, passing through Singida which is the connecting point to the 400 kV Kenya-Tanzania interconnection currently under construction along the Singida-Arusha (Tanzania)-Isinya (Kenya) corridor. The overall 400 kV transmission line is thus the main conduit for power flows (originating in Ethiopia) from Kenya into Tanzania and onward into Zambia and the SAPP. The Tunduma substation will be equipped with auto-transformer switchgear to step down from 400 kV to 330 kV used in the Zambian system. The 330 kV double-circuit link between Tunduma substation in Tanzania and the Nakonde substation in Zambia will in effect interconnect the EAPP and SAPP networks, facilitating bidirectional power trade.
3. Construction of the 400 kV Iringa-Sumbawanga transmission line will bring reliable grid-based power to underserved and unserved areas of southwestern Tanzania. The increased availability of reliable power will enable the expansion of the national electrification program to these areas and will enable the development of agro-industry and other productive uses along the SAGCOT. The availability of high-capacity transmission infrastructure will also enable evacuation of power from planned generation facilities in the project areas. The current transmission network is inadequate for absorbing the output from new planned generation plants, such as the expanded Songwe hydropower plant and possible geothermal sources near Mbeya. The interconnection with Zambia near the proposed Tunduma substation will be the first



high-voltage interconnection of the EAPP with SAPP and will allow mutually beneficial power trade among member countries of the two power pools. It will be the final segment of the transmission corridor from Ethiopia through Kenya and Tanzania into Zambia and the SAPP. This interconnector will enable Tanzania, which currently is a nonoperating SAPP member, to access the already active SAPP short-term power markets for cost-optimizing trade. Other member countries of the EAPP, such as Ethiopia and Kenya, may also be able to benefit from access to these markets in the short term while the EAPP trading platforms are being developed.

4. Therefore, an upgrading and reinforcement of the power transmission lines within Tanzania is essential for improved reliability and quality of power. Feasibility studies, carried out by international consultants, have determined the most cost-effective technical and economical options for the transmission lines and substations under the N-1 criteria to improve the reliability of the networks in Tanzania. The least-cost simulations considered future generation, demand growth, mining loads, and import/export from Zambia and Kenya. The planned 620 km of 400 kV double circuits transmission lines will have a total maximum power transfer capacity of 1,700 MW (850 MW per circuit) except for the line from Tunduma to Sumbawanga which will be designed for double circuits but with only one circuit strung initially due to expected low loads in the near and medium term.

5. The project consists of two financing streams. The project has four components.

Financing Stream 1: To the Government of Tanzania

Component 1: Transmission Infrastructure Extension (Estimated cost: US\$465 million, of which US\$335 million equivalent from IDA, US\$100 million from AFD, and US\$30 million from EU/AFD)

6. The scope of the project includes the construction of approximately 620 km of 400 kV double circuit transmission line between Iringa and Tunduma, passing through Kisada, Mbeya, and Tunduma, and a 400 kV single circuit extension from Tunduma to Sumbawanga (which will be designed for double circuits but only one circuit will be strung originally due to lower loads expected in the Sumbawanga area in the short and medium terms). The transmission line will also be extended to the border with Zambia from the Tunduma substation (over approximately a 4 km distance). The transmission line will include a fiber optic communication line. IDA and the AFD will co-finance (72.1 percent and 27.9 percent, respectively) the following activities: (a) the construction of a 400 kV double circuit transmission line between Iringa and Tunduma and a 400 kV single-circuit line (designed for double circuits but with only one circuit strung initially) between Tunduma and Sumbawanga and (b) the construction of Sumbawanga, Tunduma, Kisada, and Mbeya 400 kV substations and the installation of two line bays and associated shunt reactors at Iringa substation. The AFD will seek to secure an additional US\$30 million EU grant for the installation of auto-transformation switchgear (from 400kV/330 kV) in Tunduma and the 4 km 330 kV double circuit line from Tunduma to the Zambian border. The financing of the transmission and substations component will cover the electrical and civil works, switchgear,



control-protection-communication and SCADA aspects, and auxiliary systems along the entire transmission route and substations, including spares for transmission lines and substations.

Component 2: TANESCO Transmission System Readiness for Interconnection and Corporate Commercial Management Improvements (Estimated cost: US\$99 million equivalent from IDA)

7. This component will have two subcomponents.

Subcomponent 2.1: TANESCO Transmission System Readiness for Interconnection (US\$34 million)

8. This subcomponent will finance (a) a technical assessment of TANESCO's transmission system to identify the operational, planning, and technical gaps in meeting the requirements for operational integration in the SAPP and the EAPP for power system stability, operational ancillary enabling services, frequency synchronization, tie-line control, protection, metering, and other technical requirements; (b) the procurement and installation of necessary additional equipment and reinforcements for the generation/transmission system infrastructure (and associated operational training) to ensure that the Tanzanian grid meets all technical requirements of the interconnected networks and can engage reliably and efficiently in power trade with Zambia and Kenya and in the SAPP and EAPP markets; and (c) consultancy services for coordination of the operational and planning aspects of TANESCO's readiness for interconnection with Zambia (SAPP) and Kenya (EAPP), covering the relevant aspects of power system operation and technical coordination with Kenya (EAPP) and Zambia (SAPP) that are essential for ensuring that the respective power systems can transmit power in accordance with the agreed interconnection rules in the general areas of operational planning (for example, operating reserves, transfer limits, frequency regulation, tie-line control, power system stability, synchronizing procedures, and outage scheduling); ancillary enabling services (for example, scheduling dispatch, reactive power and voltage control, loss compensation, system protection, and so on); power system planning (for example, generation capacity, plant capability, transmission system load capability, and so on); technical grid code compatibility telecommunications and control systems, protection, metering, and so on); and market compatibility (for example, network capacity allocation, energy losses, market data, and so on).

9. The activities under part (b) will ensure that the Tanzanian transmission system will be ready for synchronizing with the SAPP (through the interconnection with Zambia) and the EAPP (through the interconnection with Kenya). In the areas where the EAPP and SAPP interconnection and operational requirements differ in technical and operational standards, a more stringent requirement will be adopted to ensure seamless operation of Tanzania's transmission system within both power pools until the EAPP and SAPP agree on harmonized standards and requirements.

Subcomponent 2.2: Corporate Commercial Management Improvements (US\$65 million)



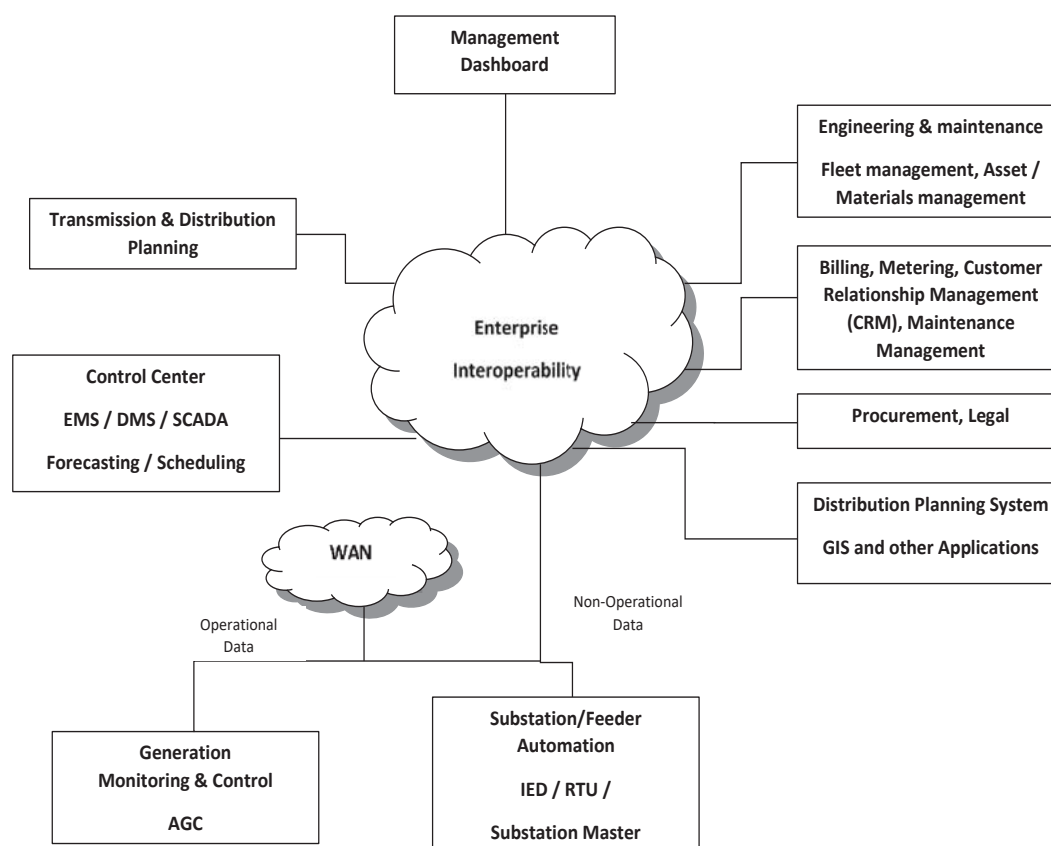
10. This subcomponent will support the implementation of an integrated ERP and Energy Management System (EMS) which will establish an integrated system for managing core business processes, including financials, billing, customer service, asset management, materials management, human resources (HR), fleet management, and other services. Other modules include energy billing within the power pool space, centralized GIS distribution planning system, integration with distribution SCADA to enhance visibility of distribution networks for improved customer service. The subcomponent is expected to be implemented in three phases, starting with a pilot and followed by the complete rollout:

- (a) **Phase I:** Resources management system, which primarily includes shared services such as accounting, finance, materials management, fleet management, payroll, HR, legal, and audit.
- (b) **Phase II:** Commercial management system, which includes billing, customer relations management, asset management (maintenance), procurement and technical services management system, which will offer services such as technical asset management and maintenance for the distribution, transmission, and generation assets.
- (c) **Phase III:** Integrated planning and management services which will be introduced upon successful completion of Phase I and II, will include field mobility system, energy billing within the power pool space, and centralized GIS-based distribution planning system, integration with distribution system SCADA to enhance the visibility of the distribution network support issues for better customer service.

11. Subcomponent 2.2 will consist of two main activities (a) consultancy services for review of interoperability and integration needs assessments, preparation of functional requirements specifications, and drafting of the required bidding documents and (b) procurement of EMS/ERP solution providers/contractors for implementation of the required systems to facilitate seamless information flow among TANESCO's functional units.



Figure 1.1. Information and Communication Architecture at TANESCO ^a



Note: Adapted from: Mini S. Thomas, and John D. McDonald, "Power System SCADA and Smart Grids", CRC Press, 2015.

Component 3: Project Implementation Support and Capacity Building (Estimated cost: US\$21 million equivalent from IDA)

12. This component will support TANESCO in project supervision and management and will build TANESCO's capacity to participate in regional power trade at institutional, technical, and commercial levels. Proposed technical assistance to TANESCO under this component includes training of at least four certified power traders (as required by the SAPP), relevant training to the National Control Center staff on power pool operations, live line maintenance training for 400 kV transmission line, and feasibility studies for high-priority national and regional transmission line corridors such as Mtwara-Mbeya/Dodoma high-voltage direct current or high-voltage alternating current line. Assistance to the MoE and EWURA will also be supported based on identified needs. Component 3 will have four subcomponents:

Subcomponent 3.1: Support to Project Management (Estimated cost: US\$10 million)



13. The subcomponent will support the implementation of the engineering, procurement, management, and supervision by hiring an owner's engineer consulting services for Component 1.

Subcomponent 3.2: TANESCO Technical Assistance Facility and Feasibility Studies (Estimated cost: US\$6 million)

14. This subcomponent will (a) support preparation of feasibility studies for national and regional transmission grid reinforcement and (b) provide access to national and international expertise and knowledge to develop technical sound and bankable investments.

Subcomponent 3.3: Readiness for Regional Power Trade and Capacity Building for TANESCO, EWURA, and MoE (Estimated cost: US\$4 million)

15. This subcomponent will include the following:
- (a) **Live line maintenance training program** for the 400 kV and 220 kV transmission lines will be supported (US\$1 million).
 - (b) **Commercial readiness for trading - the SAAP trader training program (five people).** This is a certification required for TANESCO to participate and trade in the SAPP market. The key institutions will be trained on basics of trading concept/SAPP rules (wheeling and markets)/portfolio management/water value/concept of value at risk and various methodologies for wheeling charge. This will introduce the key sector stakeholders to basic concepts and issues of regional trade. This will provide both an introductory understanding for high-level decision makers and a more technical exposition for technical staff at the utility (US\$1 million).
 - (c) **Development of potential trading strategy/setting up a trading unit.** TANESCO will need to develop a training unit within the utility to manage day-to-day operations. Development of such a unit and related skills will be informed by the experience of other utilities in the region that have been engaging in trade—for example, *Electricidade de Moçambique* and ESKOM South Africa. The planned unit will engage consultants to carry out a hydrothermal optimization study. Key software to carry out such analyses and accompanying training on its use can be supported by the project (US\$1 million).
 - (d) **Impacts of regional trade on regulatory and policy framework.** The Tanzania Grid Code needs to be aligned with the regional grid Interconnection codes of the EAPP and SAPP (or a harmonized EAPP-SAPP interconnection code, once it materializes). As interconnection with the EAPP and SAPP will be sequential, and EAPP-SAPP codes may not be fully harmonized by then, the assessment should propose any interim arrangements for grid code compliance before the final adoption of the harmonized grid code is completed. Also, a specific training for EWURA will focus on the impacts of regional trade on Tanzanian regulatory framework and any other areas that EWURA and the MoE will need to develop their capacity to effectively regulate the wheeling and electricity export/imports, and to effectively deal with regional integration and power trade issues, respectively. EWURA will also need to familiarize itself with the required changes to the grid code to comply with the SAPP and



EAPP operational rules and procedures as well as cross border imbalance settlement (US\$1 million).

*Subcomponent 3.4: Implementation of Safeguards Instruments and Gender Plan
(Estimated cost: US\$1 million)*

16. The subcomponent will support strengthening capacity of TANESCO's environmental and social safeguards unit and preparation and implementation of the proposed gender plan. The capacity building of the safeguards unit will assess ways to improve efficiency and efficacy of safeguards assessments and monitoring. The gender action plan action plan will be informed by a gender gap assessment and will be supported through relevant training.

Financing Stream 2: To the EAPP

Component 4: Technical Assistance to EAPP (Estimated cost: IDA Grant US\$10 million equivalent)

17. This component will (a) provide institutional strengthening and capacity building to the EAPP to ensure synchronized operation of grids in the power pool; (b) support the operationalization of centralized short-term markets to complement long-term bilateral contracts; (c) strengthen the IRB and capacity building and knowledge sharing among the region's regulatory boards; and (d) support the establishment of a regional technical facility for necessary future transmission line feasibility studies. Further details on each subcomponent are as follows:

- (a) **Institutional strengthening.** This component will support the institutional development and strengthening of the EAPP, especially in fiduciary capacity and interconnected grid and market operations. The component will support the strengthening of capacity in key fiduciary and technical areas through support for skills and training needs, including the development and operationalization of the market committee. Key needs include strengthening skills in grid and market operations. Synchronizing the diverse networks across the EAPP and coordinating the power pool's operations will require specialized skills in power grid operations. Similarly, the development of various short-term markets and the need for handling short-term congestion management, will require skills in general market operation, and more specifically, on managing short-term markets (day ahead, intraday, and so on). Development of the abovementioned skills will be supported under the project. This component will also facilitate knowledge sharing with the SAPP which already is coordinating a vast synchronized system and operates a series of short-term markets. This component will also include consultancy to support the EAPP in updating the 2014 Regional Master Plan and updating the EAPP Strategic Plan that may be needed to adapt to emergent changes in the regional context (US\$3 million).
- (b) **Operationalization of the market.** This subcomponent will support the purchase, installation, and training of a market platform for the EAPP. Support will also be provided to the EAPP in the finalization of the market design, rules, and consultations with member governments—including specific assessments that may be needed on a balancing market. This will build on prior work already undertaken by the EAPP in market design. The EAPP started developing the market design in 2010 through various consultancies examining



market design alternatives. Based on the studies that have been conducted, market design should be finalized in consultation with member governments and utilities. Further, the implementation of a DAM will also require the finalization of market rules and the establishment of a day-ahead trading platform. As the SAPP market development has demonstrated, the implementation of a nonregulated imbalance settlement methodology is crucial for effective functioning of the DAM. The initial market rules must include such methodology (US\$4 million).

- (c) **Regional regulator (IRB) strengthening.** This subcomponent will support the capacity strengthening of the IRB, along with capacity building of electricity regulators of member countries, and the formulation and implementation of the IRB Strategic Plan. This subcomponent will provide technical assistance to assist the IRB in carrying out its initial tasks. The region's regulatory board has little experience in power system operations and market operations because the regional system is yet to be synchronized and national markets are not operational. This facility will enhance knowledge sharing among the national regulators. These regulators will also need to be trained in the implications of the regional market for their domestic markets (including, harmonization of national Grid Codes with the EAPP Interconnection Code requirements, how to implement the agreed upon wheeling charge methodology nationally, how to regulate imports and export by national utilities) (US\$1 million).
- (d) **Regional technical assistance facility.** This subcomponent will support two regional windows: (i) feasibility studies for new transmission lines to further integrate the regional market and (ii) capacity building and knowledge sharing among the regions utilities. This subcomponent will fund feasibility studies for identified EAPP priority projects in the revised future investment plan and should be formally requested by participating countries/utilities. (US\$2 million).

18. Additional needs identified for the EAPP include transmission system synchronization readiness and harmonization with the SAPP. The finalization of the ongoing EAPP interconnection code compliance, harmonization of codes with the SAPP, the implementation of information and communication technology/SCADA systems for the EAPP, and technical support to member countries in regional synchronization will be critical to increased regional trade within the EAPP and with SAPP. It is likely that additional studies and inspections will be needed to solve problems when the systems will be interconnected. The EAPP may need to take the lead in its role as a technical coordination center. Some of these aspects are funded through other sources and development partners. However, additional sources of funding may be required in the future to cover these as needs emerge.

19. Currently, there are four committees in the EAPP: operations, planning, environmental, and governance/HR. A market committee is planned to be established soon. Implementation of the EAPP technical assistance activities will be carried out by the EAPP General Secretariat which is responsible for the administration of the EAPP and is led by the Secretary General supported by key technical staff. The procurement, FM, monitoring, and reporting activities related to the



EAPP technical assistance component will be carried out by the Secretariat, with appropriate assistance from expert consultants on an as-needed basis. The parallel World Bank-executed project, financed through the SAPP MDTF is currently supporting the EAPP Secretariat in developing its capacity for resource portfolio management and effective bilateral trading.

Table 1.1. Cost Estimates Per Component for Financing Stream 1 – Government of Tanzania

TAZA Components	World Bank (US\$, millions)	AFD/EU (US\$, millions)	GoT	Total (US\$, millions)
Component 1: Transmission Infrastructure Extension	335	130		465
620 km double circuit transmission line	196	59		255
Substations, including Iringa 400 kV switchgear (2-line bays)	139	41		180
S/S conversion at Tunduma (EU grant)	0	30		30
Component 2: TANESCO Transmission System Readiness for Interconnection and Corporate Efficiency Improvements	99	0		99
TANESCO Transmission System Readiness for Interconnection	34			34
Corporate Commercial Management Improvements	65			65
Component 3: Project Implementation Support and Capacity Building	21	0		21
Subcomponent 3.1: Support to Project Management (including supervision consultants for Component 1)	10	0		10
Subcomponent 3.2: TANESCO Technical Assistance Facility and Feasibility Studies	6	0		6
Subcomponent 3.3: Readiness for Regional Power Trade and Capacity Building	4	0		4
Subcomponent 3.4: Implementation of Safeguards Instruments and Gender Plan	1	0		1
Borrower's Resettlement Compensation			10	10
TOTAL	455	130	10	595

Table 1.2. Cost Estimate for Financing Stream 2 – EAPP

Component Cost	IDA Grant (US\$, millions)
Component 4: Technical Assistance to EAPP	10
<i>(*) IDA grant is sourced from regional IDA allocation</i>	



ANNEX 2: IMPLEMENTATION ARRANGEMENTS

COUNTRY: Africa

AFCC2/RI-3A Tanzania-Zambia Transmission Interconnector

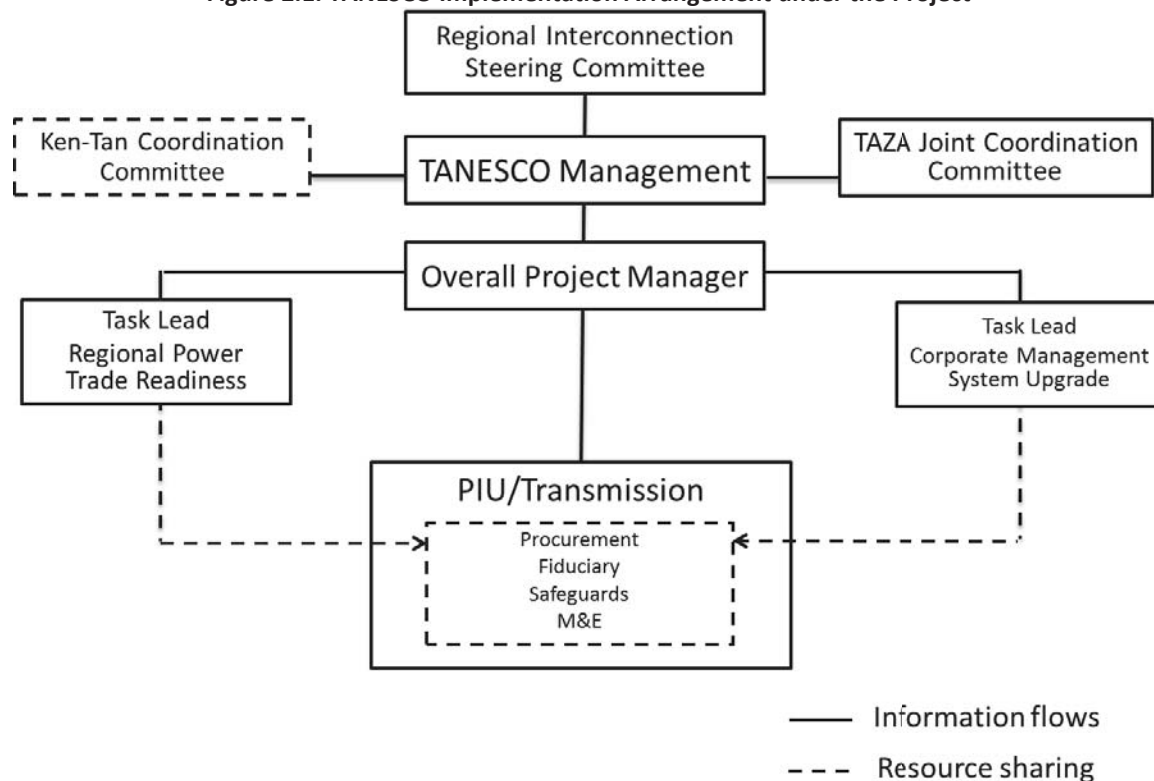
Project Institutional and Implementation Arrangements

1. The project will be implemented over six years. TANESCO (responsible for Components 1, 2, and 3) and the EAPP (responsible for Component 4) will be the implementing agencies for the project activities and will each be supported by dedicated technical assistance. TANESCO and ZESCO will coordinate on the transboundary infrastructure through a JCC, which has already started to meet formally.
2. TANESCO has extensive experience in implementing World Bank projects over the past few years. Most recently, TANESCO has successfully implemented the BTIP (which was similar to the proposed project in terms of transmission infrastructure development) and TEDAP (an urban transmission and distribution project). Taken together, TANESCO has implemented an IDA portfolio of about US\$230 million in the recent past. In addition, TANESCO is also implementing its allocation under the Energy Sector Capacity Building Project (P126875). The implementation arrangements under the proposed project will build on this extensive implementation experience including lessons learned. The detailed implementation arrangements will be described in the PIM.
3. The project implementation arrangement in TANESCO will consist of a core PIU, headed by an OPM. Specialized activities under Component 2 will be carried out by specialized technical task teams. Overall project governance will be headed by an RISC. Figure 2.1 describes the arrangement.
4. The RISC will monitor the overall project implementation progress and address key issues related to sector and institutional readiness for interconnected grid operations—both with respect to the EAPP and SAPP. The RISC will be chaired by the Permanent Secretary of the MoE or his/her designee. Members of the RISC will include representatives from the Ministry of Finance and Planning, the management of TANESCO and EWURA—TANESCO managing director and EWURA's DG or their respective designees. The RISC is expected to meet at least once every six months after project effectiveness to ascertain TANESCO's progress on achieving readiness for interconnection and give guidance on strategic issues related to the interconnection of Tanzania to regional power pools.



5. A dedicated PIU, already established under the BTIP and ongoing Kenya-Tanzania Interconnector Project, will be responsible for the implementation of this project in TANESCO. The PIU will be responsible for procurement, fiduciary support, M&E, quality assurance, and safeguards oversight. TANESCO will appoint an OPM to head the PIU. The OPM will have the overall responsibility of the implementation of the project. The OPM will be assisted by Project Manager – Transmission, who will be assisted by four transmission engineers and two substation engineers, each of which will be responsible for a specific construction lot of the project. In addition, (a) a dedicated project accountant; (b) a dedicated safeguards and social risk team, including at least one environmental specialist, one social specialist, and one GRM specialist; (c) an M&E specialist; and (d) a procurement team, will assist the OPM. The PIU, especially the safeguards and social risk team, will be trained in issue related to GBV risks, prevention and response. The OPM will report to TANESCO’s management (DMDI). In keeping with the normal reporting structures of TANESCO, the project accountant will report to the Chief Financial Officer, who will report directly to the Managing Director; the Environmental Group will also report to the Senior Manager of Research and Environment (who reports to DMDI) and the procurement unit will also report to the Senior Manager, Procurement. Additional supervisors’ counterpart staff to the supervision engineer will also be assigned by TANESCO, as required. This arrangement with TANESCO has worked well with previous World Bank energy projects (BTIP and TEDAP).

Figure 2.1. TANESCO Implementation Arrangement under the Project



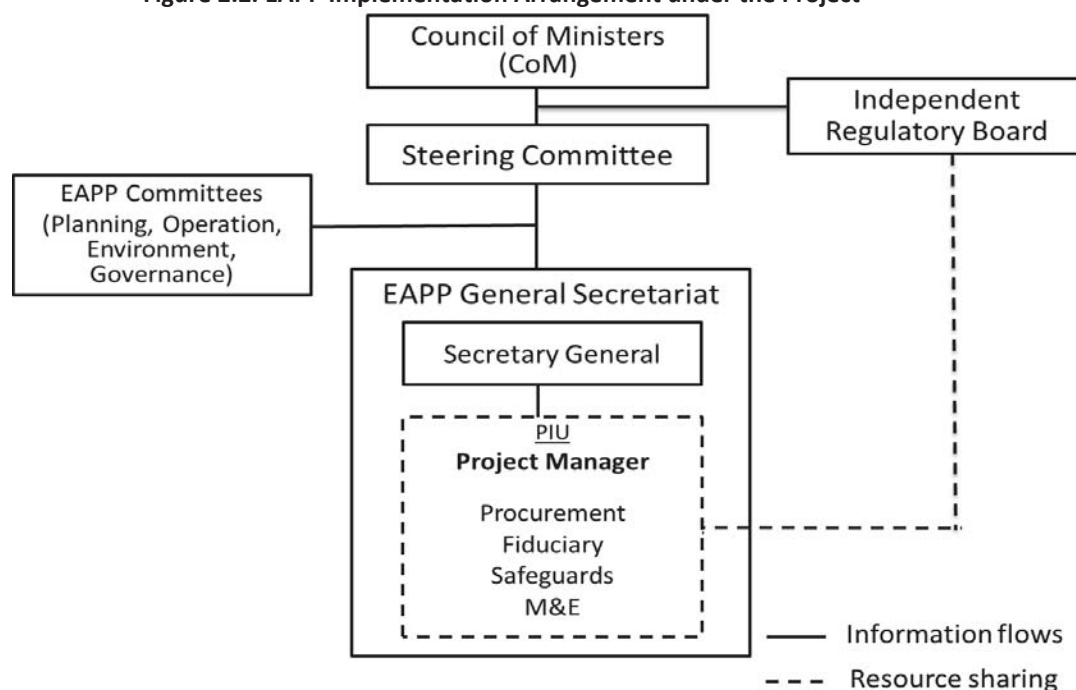
6. Specialized activities under Component 2 will have their dedicated task leads. The task leads for the regional power trade readiness task team (Subcomponent 2.1) and the corporate



management systems upgrade task team (Subcomponent 2.2) will report on activity progress to the OPM. Each task lead will be assisted by a technical team as required but will use procurement, fiduciary, and safeguard capacity within the PIU established for Component 1.

7. Effective implementation of the trans-boundary interconnection project will rely on two JCCs—one comprising TANESCO and ZESCO representatives for the TAZA interconnector under this project and another comprising TANESCO and KETRACO representatives for the ongoing interconnection with Kenya. The TAZA JCC will ensure smooth coordination on project issues common to both countries. The role of the TAZA JCC will be coordination on design, procurement, and implementation. TANESCO and ZESCO have already been coordinating on planning and design issues as part of the joint feasibility study funded by NELSAP. This coordination arrangement is being formalized. Going forward, the role of the committee will be the sharing of regular updates on implementation progress in both countries, discussion on any issues regarding coordination in implementation, and subsequent operations. Coordination in procurement may be required for the short 4 km interconnection and associated 400/330 kV auto-transformation equipment for the Tunduma substation. These arrangements will be discussed during the committee meetings. The JCC shall also be responsible for the compilation and circulation of consolidated quarterly progress reports to the management of the two utilities and the respective Governments. Reports of JCC meetings and agreements will be made available to the World Bank by the OPM.

Figure 2.2. EAPP Implementation Arrangement under the Project



8. The EAPP Secretariat, headquartered in Addis Ababa, will be responsible for implementation of Component 4. The EAPP will establish a PIU, headed by a project manager,



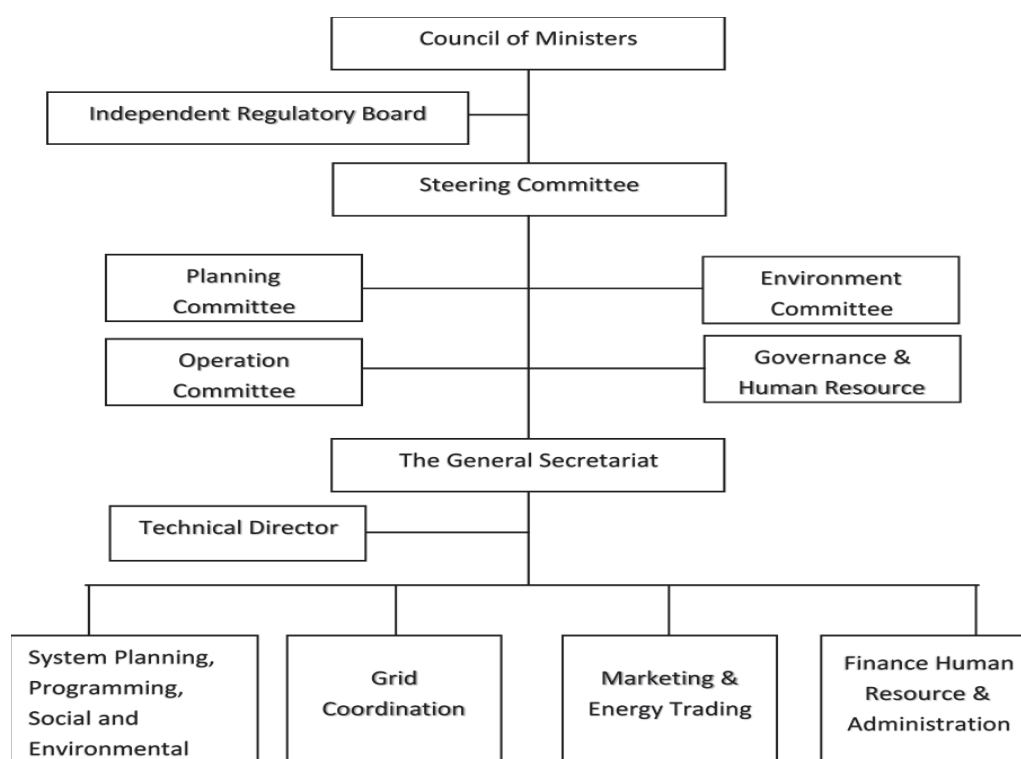
with a dedicated procurement specialist, an FM specialist, and required technical experts. The PIU will report directly to the Secretary General of the EAPP. Technical assistance activities for the IRB will be managed by the head of the IRB and will leverage procurement and FM resources residing in the PIU. The implementation arrangement within the EAPP will be in accordance with the normal reporting and governance structure of the EAPP. Thus, overall governance of activities carried out by the EAPP lies with the Steering Committee of the EAPP that is composed of the chief executive officers or managing directors of member utilities.³⁵ The Council of Ministers, comprising the Ministers of Energy of member countries, is the overall governing body of the EAPP that decides on and resolves any matters of strategic regional importance. The Steering Committee typically meets twice a year and the Council of Ministers meets once a year.

9. As the EAPP does not have prior experience in implementing World Bank projects, detailed fiduciary assessments—including procurement, FM, safeguards, and fraud and corruption—were carried out during project preparation. Results of these assessments and the subsequent capacity strengthening plan are presented in the following paragraphs. Ongoing support under the World Bank-executed MDTF will also put in place technical and fiduciary capacity strengthening to enable the EAPP to meet the requirements of an implementing agency under the project and to execute its activities with efficiency and efficacy.

10. The EAPP adopted a new organizational structure in April 2014. The technical subcommittees on planning, operations, environment, and governance and HR committees are composed of representatives of member countries/utilities. The subcommittee on planning is responsible for the coordination of master plans and development programs of member utilities, the subcommittee on operation is responsible for the definition of operating and maintenance rules of the power systems of (interconnected) member countries, the subcommittee on environment is responsible for environmental impact assessment and mitigation measure on regional power investments within the EAPP, and the subcommittee on governance and HR is reasonable for deciding on HR issues and related matters of the EAPP Secretariat. The various subcommittees are expected to meet regularly, but the frequency varies depending on the need. A market sub-committee is expected to be established to coordinate regional power trade.

Figure 2.3. EAPP Institutional Structure

³⁵ During the Council of Ministers meeting held in February 2018, the Council adopted a resolution to expand the membership of the Steering Committee to include Permanent Secretaries of the respective ministries.



Implementation Support

11. A multidisciplinary management and engineering consulting firm (project implementation consultant) that will assist the TANESCO PIU with the overall implementation of the project, particularly in engineering support, construction supervision, and quality control. Management support to the PIU will include technical assistance to the technical design and contract management, institutional strengthening, procurement, safeguards, M&E, and implementation status reporting. The PIU—in conjunction with the project implementation consultant—will be responsible for the day-to-day management of project implementation including procurement, contract management, FM, disbursement, safeguards, M&E, reporting, and capacity building/training activities.

12. In addition, the project implementation consultant will supervise the implementation of an HIV/AIDS awareness and prevention plan in the project areas to mitigate the possible spread of HIV/AIDS as contractors bring outside workers to the area. TANESCO has agreed that the proposed project implementation consultant will be responsible for submitting quarterly reports, through TANESCO, to all financiers of the project and will be required to organize its duties in a way that ensures close supervision of the execution of all lots. In addition, the AFD will recruit external auditors for auditing all the project accounts.

Project Implementation Manual (PIM)

13. TANESCO and EAPP will each prepare a PIM for their respective parts of the project.



TANESCO's PIM will cover Components 1, 2, and 3; and EAPP's PIM will cover Component 4 of the project. The two PIMs will each provide the detailed arrangements and procedures for the implementation of the project, including (a) institutional coordination and day-to-day execution of the project; (b) budgeting, disbursement, and FM; (c) procurement; (d) environmental and social safeguard guidelines; (e) monitoring, evaluation, reporting, and communication; and (f) such other administrative, financial, technical, and organizational arrangements required for the project.

14. The PIM prepared by TANESCO will be reviewed and cleared by the World Bank and AFD, thereby allowing for a smoother implementation of the project. The adoption of the PIM for Components 1, 2, and 3 by TANESCO is a condition of effectiveness of the IDA Credit for the project; and the adoption of the PIM for Component 4 of the project by EAPP is a condition of effectiveness for the IDA Grant for EAPP.

Implementation Schedule

15. TANESCO has already employed an international consultant for the preparation of the bidding documents up to construction contract award. The bidding documents will be based on the line sections' basic design for each lot whereas the detailed design will be provided by the selected engineering, procurement, and construction contractor. To facilitate completion of the project at the same time, all bids for construction of transmission lines and substations will be issued in parallel.

16. It is expected that preparation of tender documents for the transmission line lots and the substations expansion lot will be completed by August 2018 and contracts for the construction lots are awarded in parallel by February 2019. Completion of construction of the transmission line and expansion of substations is expected by June 2024.

Commissioning and Testing

17. Before commissioning, several tests will be performed to ensure the proper functioning of the line. The following critical points regarding compliance of the transmission line to a certain voltage level will be verified before commissioning:

- **Tower design.** The tower has to be designed to ensure the required distances between the conductors and between the hot electrical line components (conductors, lower arcing horns of insulator strings) and the earthed tower parts. The tower design is thoroughly checked during design approval.
- **Tower spotting.** The longitudinal line profile has to show that the towers chosen have sufficient height to meet the required clearances for a 400 kV line to ground, roads, and other obstacles to be crossed, considering the appropriate conductor sag curves. The profile plans are also thoroughly checked during design approval.



- **Insulators.** In general, the insulators and complete insulator strings are tested in the factory regarding their electrical and mechanical properties. The factory tests ensure that the insulators comply to the required voltage-level requirements.
- **Conductor stringing and sagging.** A stringing table corresponding to the assumptions for the profile plans and tower spotting has to be submitted for approval. The clearance of the conductor to ground/crossed objects is subject to inspections and independent check measurement during site supervision.
- **Jumpers.** The jumper connections at the tension/angle towers have to be designed to ensure sufficient clearance to the tower cross-arms. The jumpers are checked on site by measurement of the clearance.

18. The final testing for commissioning after the final erection checks is usually made to ensure absence of deficient connections. This is verified by resistance measurements (earthing and impedance). However, this test is independent of the voltage level.

Maintenance Arrangements

19. Monitoring of the transmission line maintenance will be the responsibility of TANESCO's head office. TANESCO's zonal workshops at Iringa, Moshi, and Mwanza and regional transmission crews will be responsible for the day-to-day maintenance of the transmission line. Due to the expansion of the transmission network, the zonal workshop at Iringa will be strengthened with additional staff and maintenance equipment. Live line works will be enhanced by providing additional training to the staff responsible for live line maintenance. TANESCO has procured a transmission line maintenance software to improve the company's maintenance practices. In addition, JICA and TANESCO have entered into a contract for capacity development of efficient distribution and transmission systems. All maintenance works will adhere to the International Electrotechnical Commission (IEC) and Institute of Electrical and Electronics Engineers (IEEE) standards.

Implementation Support from the Lenders

20. Even though the project is relatively simple from an engineering perspective, it is deemed critical that project execution be undertaken in a coordinated fashion. To maximize collaboration among the lenders during project implementation, the lenders have agreed to undertake two joint lenders supervision missions during the first year of project implementation. This will allow close supervision of all of project activities, including those related to safeguards across the complete line. After the first year of project implementation, the joint lenders will conduct at least one joint supervision mission every year.

Financial Management



21. As part of project preparation, the World Bank conducted an FM assessment of TANESCO, the implementing agency of Components 1, 2, and 3, and the General Secretariat of the EAPP, the implementing agency of Component 4. The objective of the assessment was to determine (a) whether TANESCO and the EAPP have adequate FM arrangements to ensure that project funds will be used for the purposes intended, in an efficient and economical way; (b) project financial reports will be prepared accurately, reliably, and on time; and (c) the project assets will be safeguarded.

22. Both TANESCO and the EAPP are well-established and solid entities with adequate installed capacity, including qualified and experienced accounting staff, good FM policies and procedures for planning and budget management, and sound internal control arrangements. TANESCO has experience in managing World Bank-funded projects and has a good performance track record. Overall, project design is straightforward, and while it involves co-financing and large contracts, it does not necessarily require complex FM arrangements (no decentralized funds flow arrangements or sub-implementers). Challenges are mainly related to the following:

- (a) The inadequate accounting system in TANESCO (iSCALA software), which does not produce accounting/financial reports, thus requiring the use of spreadsheets. Considering that the project is co-financed by at least three different sources, the preparation and timely submission of IFRs and end-of-year financial statements might be delayed, which would also affect disbursements; and
- (b) The EAPP's lack of familiarity with World Bank requirements and lack of internal audit function.

23. Overall, fiduciary risk from the FM perspective is considered Substantial at this stage, but it will be downgraded as mitigating measures are in place.

24. Mitigating measures have been discussed and agreed, including (a) staff training on World Bank FM and disbursement requirements; (b) designation of additional FM staff as need arises; (c) confirmation of the format and content of IFRs for TANESCO, considering all sources of financing; and (d) procurement of a robust accounting system that will address the financial reporting challenges, would be part of the ERP implementation under Sub-Component 2.2.

25. Based on the assessment, and subject to the successful implementation of the abovementioned mitigating measures, the proposed FM arrangements can be considered adequate to support project implementation.

Summary of Financial Management Arrangements

26. **Organization and staffing.** TANESCO and the EAPP will use existing structures and staffing to support project implementation. TANESCO will be solely responsible for implementation of Components 1 to 3 including FM, procurement, and physical monitoring reports on implemented activities. The managing director is the overall accounting officer supported by the Directorate of Finance, headed by a chief finance officer. Project FM function will be supported by a dedicated project accountant who will report to the chief financial officer.



27. The EAPP's Finance, Human resources, and Administration (FHRA) Unit is responsible for finance, HR, and general and information technology (IT) services and reports to the Secretary General. The FHRA includes a finance subunit staffed with one finance officer. The FHRA's staff have adequate education background and experience and are considered adequate to support project implementation. However, the EAPP will review its staffing capacity and if deemed necessary will explore the possibility of recruiting an additional accountant within six months of effectiveness. The curriculum vitae (CVs) of the selected accountants will be notified to the World Bank for 'no objection'.

28. **Budgeting arrangements for TANESCO.** Project budget preparation and monitoring will follow institutional arrangements in place that are considered adequate. Preparation of the annual work plans and budgets (AWPBs) follows a participatory bottom-up approach. The Finance Directorate leads the preparation process and produces variance analysis reports comparing planned to actual expenditures on quarterly basis. The periodic variance analysis enables timely identification of deviations from the budget. The budgets are reviewed and consolidated for management review and approval by TANESCO's board. The budget is based on the Medium-Term Expenditure Framework.

29. **Budgeting arrangements for the EAPP.** The EAPP's fiscal year runs from April 1 to March 31. The draft finance policies and accounting procedure manual provides for an orderly budget preparation process, allowing the timely approval before the beginning of the new fiscal year. The responsibility for the preparation of the annual budget of the EAPP lies with the Secretary General. Each department prepares its work program and cost estimates and the FHRA manager includes estimates of staff costs and operating costs and consolidates work plan and budget for the EAPP. The consolidated work plan and budget after review by the Secretary General is submitted to the Steering Committee for final approval. The project will follow the same framework and will be approved by the Steering Committee. The AWPB of the project will be submitted to the World Bank for 'no objection' by January 15 of each year.

30. The EAPP has an adequate budget monitoring and control system. Payments undergo budget check before they are authorized and the finance officer maintains records in Excel to register commitments and disbursements to track the available budget. Budget utilization reports are prepared on a semiannual basis and shared to management, including the Steering Committee. Consistently, the project will follow the same budgeting processes, and the project-specific budget monitoring aspects will include (a) transaction-level checking before authorization; (b) maintaining a tracking mechanism to report the project's budget utilization by activities and categories; (c) the use of reports to management; and (d) the use of quarterly IFRs to the World Bank that comprise variance analysis by the project's component and categories including a narrative or notes to the IFR on the reasons for significant variance (if any) and the corrective actions taken or planned to be taken by management.

Accounting Systems, Policies, and Procedures



31. **TANESCO.** Overall, the Accounting Manual and the Financial Regulations are aimed at enhancing clarity on accounting for revenue and expenditure, fixed assets, liabilities, and other assets. The accounting policies and controls are adequately documented by the entity. The project shall maintain adequate financial records in accordance with accepted international accounting standards and practices. TANESCO uses iSCALA computerized accounting system, which is strong in sales and inventory management but is not robust enough when it comes to preparation of project financial reports including the quarterly IFRs, trial balance, and annual financial statements. A robust accounting software is an essential requirement for this project as it is expected to stretch more the project accounting team that uses spreadsheets for preparation of financial reports. Apart from that, comprehensive FM procedures have been developed and are being used by other donor-funded projects. Nevertheless, discussion on the financing and time line for the implementation of the accounting system is pending.

32. **EAPP.** It maintains its accounts on a double-entry, modified cash basis of accounting. It has a draft finance policies and accounting procedure manual, which has been approved by the EAPP Secretary General based on the mandate given by the EAPP Steering Committee. The manual codifies key procedures and regulations in internal control, budgeting, payment, accounting, reporting, and so on. The current practice governed by the draft manual is considered adequate for the project. However, there is a need to develop/update acceptable chart of accounts to meet the project needs and easily capture project activities and transactions within one month of project effectiveness. The EAPP will maintain project-wide accounting records including full sets of accounts (ledgers/records/vouchers), which should be available for review by both World Bank staff as well as external auditors. The EAPP uses Peachtree accounting software to process accounting transaction and for financial reporting. Accordingly, project transactions will be recording in Peachtree accounting software following an acceptable chart of accounts to be developed within one month of project effectiveness.

Internal Control and Internal Audit

33. Both TANESCO and the EAPP have adequate internal control systems that provide for adequate segregation of duties, accounting and arithmetic controls, approval, authorization, periodic bank reconciliation, fixed assets registries, and other controls, which are considered adequate for the project.

34. **TANESCO's** internal control systems are documented in the Public Finance Act 2001 (revised 2010), the Accounting Manual (revised 2014), and the Financial Regulations (revised 2014). The three documents together describe the accounting system, that is, the accounting records, supporting documents, computer files, and chart of accounts; the accounting processes from the initiation of a transaction to its inclusion in the financial statements; authorization procedures for transactions; and the financial reporting process used to prepare the financial statements. The control environment is also supported by a well-functioning internal audit unit, staffed with qualified professionals, an Audit Committee, and the oversight role exercised by the Board. Internal audit conducts quarterly audits of projects in accordance with the Institute of



Internal Auditors standards and audit manual. Reports are submitted to the TANESCO manager and the Audit Committee.

35. In terms of governance and accountability mechanisms, TANESCO has a good system in place and uses hotlines to report corruption and other forms of fraudulent activities, including misuse of power. There is a need for TANESCO to continually strengthen the current arrangements of the Customer Care Department and the Integrity Committee that handle complaints.

36. **EAPP.** Its internal controls are mainly documented in the draft finance policies and procedure, which, once approved, will also apply to the project. While the control environment is found sound, the external audits for the past two years indicated internal control weaknesses in obtaining supporting documents for advance contributions from members, existence of long-outstanding advances, and problems in applications of exchange rates. While the EAPP's structure does not provide for internal audit unit, the entity EAPP should address the issues identified, which will also be followed up by the World Bank during implementation of the project.

Financial Reporting Arrangements

37. Both TANESCO and the EAPP will prepare quarterly unaudited IFRs to be submitted to the World Bank 45 days after the end of each quarter, as well as annual project audited financial statements. Specific arrangements on the content and format are detailed in the following paragraphs.

38. **TANESCO.** The format and content of the IFRs will remain the same as the one currently in use by TANESCO. This has already been discussed and agreed with the Government. The IFRs will include sources and uses of funds statement, uses of funds by project activity/component, and Designated Account (DA) activity statement. The World Bank and TANESCO will confirm whether the IFRs will report on World Bank proceeds and proceeds from co-financiers.

39. The annual financial statements will be prepared in accordance with International Financial Reporting Standards. The IDA Financing Agreement will require the submission of audited financial statements to the World Bank within six months after the financial year end. These financial statements will comprise the following:

1. A **statement of sources and uses of funds/cash receipts and payments**, which recognizes all cash receipts, cash payments, and cash balances controlled by the entity and separately identifies payments by third parties on behalf of the entity.
2. A **statement of affairs/balance sheet** as at the end of the financial year showing all the assets and liabilities of the project.



3. The **accounting policies adopted and explanatory notes**. The explanatory notes should be presented in a systematic manner with items on the Statement of Cash Receipts and Payments being cross-referenced to any related information in the notes.
4. A **management assertion** that World Bank funds have been expended in accordance with the intended purposes as specified in the relevant World Bank Legal Agreement.

40. **EAPP**. At the institutional level, the EAPP prepares monthly and quarterly financial statements submitted to the management and to the Secretary General within two weeks. In addition, annual financial statements have to be submitted for audit within six weeks after the end of the financial year, for subsequent submission to the Steering Committee.

41. At the project level, the format and the content of the quarterly IFRs has been agreed with the EAPP and will include, as a minimum, the following: statement of source and use of funds and opening and closing balances for the quarter and cumulative, statement of use of funds by project activities/components/categories (for the quarter and cumulatively for the year-to-date and the project) with comparison against budgets, and notes or explanation on financial performances, including budget variances. Trainings on IFR preparation will be provided to the project accountant/s by the World Bank as appropriate.

42. In compliance with its procedures as well as World Bank's requirements, the EAPP will produce annual financial statements for the project. The annual financial statements will be similar to the IFRs with some modifications as indicated in the audit ToR. These financial statements will be submitted for audit at the end of each year, as explained in the next section.

43. **External audit**. In accordance with the World Bank policy, TANESCO and the EAPP are required to submit annual project financial statements audited in accordance with International Standards on Auditing, by an acceptable external auditor and following ToRs approved by the World Bank. Specific arrangements are detailed in Table 2.1.

Table 2.1. External Audit Arrangements

Country	Implementing Entity	Audit Type	Auditor	Due Date
Tanzania	TANESCO	Project financial statements Management Letter	Auditor General (who may subcontract a private audit firm acceptable to the World Bank. Final report being issued by the Auditor General	Six months after the end of the financial year
Regional	EAPP	Project financial statements Management Letter	Private audit firm acceptable to the World Bank	Six months after the end of each fiscal year (due by September 30)

44. In accordance with the World Bank's Policy on Access to Information, the World Bank



requires that the Borrower disclose the audited financial statements in a manner acceptable to the World Bank. Therefore, TANESCO and the EAPP will disclose the reports (for example, on their websites). Following the World Bank's formal receipt of these statements from the entities, the World Bank makes them available to the public as per the policy.

Funds Flow and Disbursement Arrangements

45. Disbursement arrangements will follow the World Bank's disbursement guidelines and general practice and procedures applicable in each country. Accordingly, the following disbursement methods may be used to withdraw funds from the IDA credits/grants: (a) advance; (b) reimbursement; (c) direct payment; and (d) special commitment. Under the advance method, a DA in U.S. dollar will be opened in an acceptable financial institution, and it will be used exclusively for deposits and withdrawals of proceeds for eligible expenditures. Funds deposited into the DA as advances will follow World Bank's disbursement policies and procedures, which should be described in the Disbursement Letter (DL). The DA can be used to make U.S. dollars payments and transfers to the respective project accounts primarily to meet transactions in the local currency. Following the current practices, advances made to the DA will be documented through the use of summary reports (IFRs) and supporting documents defined in the DL. Specific arrangements are summarized in Table 2.2.

Table 2.2. Funds Flow and Disbursement Arrangements

Country	Implementing Entity	DA (US\$)	Other Project Bank Accounts	Supporting Documents (to Be Further Detailed in the DL)
Tanzania	TANESCO	DA (Bank of Tanzania)	Project account (TSh) in commercial bank acceptable to IDA	<ul style="list-style-type: none"> ▪ Quarterly IFRs (to be submitted 45 days after the end of the quarter) ▪ DA activity statement ▪ DA and project bank account statements. ▪ Bank reconciliations for DA and project bank account ▪ Summary statement of DA expenditures for contracts subject to prior review ▪ Summary statement of DA expenditures for contracts not subject to prior review ▪ Six-month cash forecast
Regional	EAPP	DA (National Bank of Ethiopia or commercial bank acceptable to IDA)	Project account (Ethiopian birr)	<ul style="list-style-type: none"> ▪ Quarterly IFRs (to be submitted 45 days after the end of the quarter) as per formats agreed ▪ Six-month cash forecast (net expenditure forecast) as part of IFR ▪ Statement of movement of the DA as part of IFR



46. TANESCO signatories to both accounts are set in two categories. Category A will include the technical group while Category B shall include the finance group led by the chief financial officer. The signing mandate is for any two signatories, one from each category.

Figure 2.4. Funds Flow Arrangements

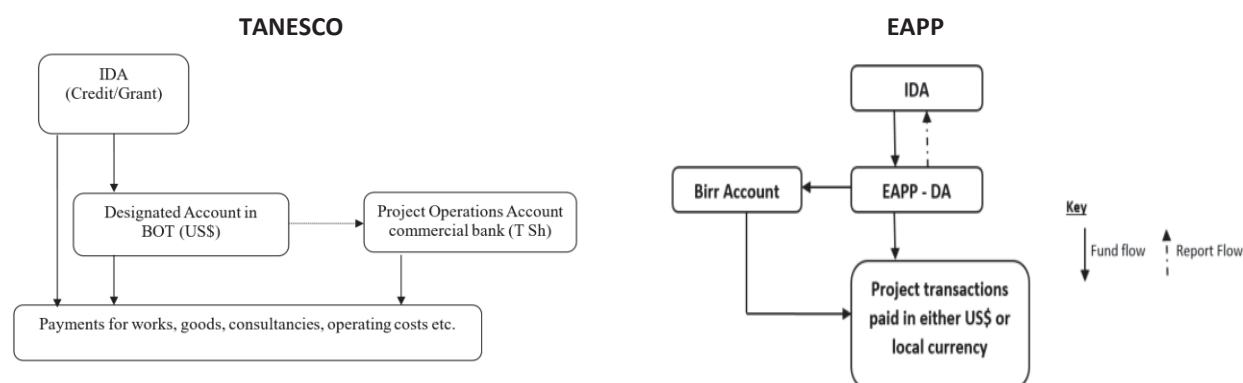


Table 2.3. Disbursement Category Allocations for Tanzania

Category	Amount of the Financing Allocated (expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, and consulting services, Operating Costs and Training for Part 1 of the Project	335,000,000	Up to 100%, as notified by the Association to the Recipient from time to time by written notice.
(2) Goods, works, non-consulting services, and consulting services, Operating Costs and Training for Parts 2 and 3 of the Project	120,000,000	100%
TOTAL AMOUNT	455,000,000	

Table 2.4. Disbursement Category Allocations for EAPP

Category	Amount of the Grant Allocated (expressed in SDR)	Percentage of Expenditures to be Financed



		(inclusive of Taxes)
1. Goods, non-consulting services, Training, Operating Costs and consulting services for Part 4 of the Project	6,900,000	100%
TOTAL AMOUNT	6,900,000	

FM Action Plan

47. The action plan in Table 2.5 indicates the actions to be included into the PIM to strengthen the FM systems.

Table 2.5. FM Action Plan

	Action	Due Date
	TANESCO	
1	Open a DA and a project account and communicate the details of the bank account and signatories to IDA.	One month after project effectiveness
2	Follow up on the implementation of a robust computerized accounting software for preparation of financial reports, together with a timeline for its implementation.	To be defined based on time frame defined for ERP under Subcomponent 2.2
3	Train the accounts and internal audit staff on the more recent World Bank FM and Disbursement Guidelines.	Within three months after project effectiveness
	EAPP	
1	Prepare project work plan and budget that is mapped to the chart of accounts.	During implementation
2	Budget: AWPB will be prepared and submitted for approval and the World Bank's 'no objection'.	Every year following the EAPP's calendar
3	Accounting: a) Develop/update acceptable chart of accounts that will meet the project needs and will easily capture project activities and transactions. b) Review the existing staffing arrangement to define the need to recruit additional accountant, under ToRs and CVs approved by the World Bank.	a) Within one month of project effectiveness b) Within six months of effectiveness
4	Agree on the format and content of the project's IFR and agree on ToR for the external audit.	Within six months of effectiveness
5	External audit for the project: a) Recruitment of external auditors at early stages of the project b) Closing annual financial statement c) Submission of the annual financial audit report d) Prepare audit action plan for all findings reported e) Preparing status report on action taken on audit report findings f) Disclosure of the audit report as per the World Bank's Access to Information policy	a) Within six months of effectiveness b) Three months after the end of the fiscal year c) 6 months after the end of the fiscal year, that is, September 30 of every year d) One month after receipt of the audit report



	Action	Due Date
		e) Two months after the receipt of the audit report f) Annually
6	Entity audit: Address issues raised in the entity audit report of the EAPP for the year ended March 31, 2016, to avoid recurrence in the subsequent audits.	As soon as possible
7	Carry out an FM discussion/training on World Bank FM requirements.	Within one month of project effectiveness

Implementation Support Plan

48. The World Bank's FM team will provide implementation support over the project's lifetime. The project will be supervised on a risk-based approach. Supervision will cover, but not be limited to, the review of audit reports and IFRs and advice to the task team on all FM issues. Based on the current assessed risks and project complexity, project implementation will be supervised periodically. Frequency may be adjusted when the need arises.

Table 2.6. Implementation Support Plan

Activity	Frequency
Desk reviews	
IFRs review	Quarterly
Audit report review	Annually
Review of other relevant information such as internal audit/fiduciary reports	Annually
On-site visits	
Review of overall operation of the FM system	Biannual visits to TANESCO Annual visits to EAPP
Monitoring of actions taken on issues highlighted in audit reports, auditors' Management Letters, internal audit and other reports	Continuous
In-depth transaction reviews	As required
Capacity building	
FM training	Before project start and thereafter annually
Technical assistance	Continuous

Disbursements

Procurement

49. **Procurement procedures.** Procurement activities under the proposed project will be carried out in accordance with the World Bank's 'Procurement Regulations for IPF Borrowers' (Procurement Regulations), dated July 2016 and revised in November 2017, under the 'New Procurement Framework'; the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated July 1, 2016; and the



provisions stipulated in the Financing Agreement.

50. **PPSD.** The Borrower has prepared the PPSP identifying optimum procurement strategies for meeting the PDOs. The PPSP includes detailed Procurement Approaches and Arrangements. The PPSP is a living document that may be updated at any time and depending on the market conditions. The issues that require attention of the project are as follows:

- Training/competency development for TANESCO and EAPP project implementation teams on the basic tools and techniques of the PPSP and the New Procurement Framework.
- Greater involvement of TANESCO and EAPP contract management staff to manage the performance and outputs of the contracts.
- Increased focus on the development of key performance indicators for the contracts implemented under the project. The World Bank staff will provide the necessary 'hands-on' support to TANESCO and EAPP staff.
- Enhanced monitoring to ensure that procurements are processed as per the timelines in the procurement plans, including timely preparation of ToRs and specifications by user and technical departments.

51. **Procurement plan.** The Borrower has prepared a Procurement Plan for the first 18 months, setting the selection methods to be used by the Borrower in the procurement of goods, works, non-consulting services, and consulting services under the project. The Procurement Plan will be updated at least every 12 months, or as required, to reflect the actual project implementation needs. Each update shall require World Bank approval and will be publicly disclosed in accordance with the World Bank disclosure policy.

52. **Systematic Tracking of Exchanges in Procurement (STEP).** The World Bank's system STEP will be used to prepare, clear, and update Procurement Plans and conduct all procurement transactions for the project.

53. **National procurement procedures (NPP).** NOCP procedures may be used while approaching the national market. The requirements for NOCP include the following:

- (a) Open advertising of the procurement opportunity at the national level.
- (b) The procurement is open to eligible firms from any country.
- (c) The Request for Bids/Request for Proposals document shall require that bidders/proposers submitting bids/proposals present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts, confirming application of, and compliance with, the World Bank's Anti-Corruption Guidelines, including without limitation the World Bank's right to sanction and the World Bank's inspection and audit rights.



- (d) Contracts with an appropriate allocation of responsibilities, risks, and liabilities.
- (e) Publication of contract award information.
- (f) Rights for the World Bank to review procurement documentation and activities.
- (g) An effective complaints mechanism.
- (h) Maintenance of records of the procurement process.

54. Other procurement arrangements (other than NOCP), which may be applied by the Borrower (such as limited/restricted competitive bidding, RFQs/shopping, and direct selection), shall be consistent with the World Bank's core procurement principles and ensure that the World Bank's Anti-Corruption Guidelines and Sanctions Framework and contractual remedies set out in its Legal Agreement apply. In all cases, the NPP to be used shall give due attention to quality aspects.

55. **Public procurement in Tanzania** is governed by a new law effective July 7, 2016, the Public Procurement (Amendment) Act No. 5 of 2016, construed as one with the Public Procurement Act No. 7 of 2011 and the associated regulations. Under the new act, procurement functions remain decentralized to procuring entities with the Public Procurement Regulatory Authority continuing to provide oversight functions for public procurement. In addition, the new act has maintained the definitions of fraud and corruption with regard to coercive practices, collusive practices, and obstructive practices. The new act has however introduced, among others, (a) mandatory inclusion of local firms and experts in consultancy contracts; (b) domestic preference to both ICB and National Competitive Bidding (NCB); (c) a requirement to set aside contracts to be used for capacity building of local firms; and (d) a requirement to set aside contracts below a specified threshold to be awarded to local firms only; (e) negotiations with the lowest evaluated bidder to reduce price in the case of goods, works, and non-consulting services; (f) the fixed budget method for goods, works, and non-consulting services; and (g) the use of procurement standards established and approved by the Government.

56. The new act has been reviewed by the World Bank and found to be satisfactory to a large extent, with the following exceptions: (a) there will be no preference accorded to domestic suppliers and contractors under NCB for goods, non-consulting services, and works; (b) there should be no mandatory requirements for inclusion of local experts and firms for the consulting assignments; (c) negotiations with the lowest evaluated bidder to reduce price in the case of goods, works, and non-consulting services where competitive methods have been used shall not be allowed; (d) the fixed budget method shall not be used for goods, works, and non-consulting services; and (e) established and approved procurement standards by the government may be used, provided that they are not restrictive. Furthermore, in accordance with paragraph 5.4 of the Procurement Regulations, the following shall be observed: (a) the Request for Bids/Request for Proposals document shall require that bidders/proposers submitting bids/proposals present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts, confirming application of, and compliance with, the World Bank's Anti-Corruption Guidelines,



including without limitation to the World Bank's right to sanction and the World Bank's inspection and audit rights; and (b) rights for the World Bank to review the Borrower's procurement documentation and activities.

57. The EAPP, being a regional body, does not follow specific national procedures. Its internal procedures were not found adequate for use in NCB. Hence, the EAPP shall follow the World Bank's procedure both for international and national bidding.

58. **Procurement arrangements.** Procurement activities under the project will be carried out by TANESCO, and EAPP Secretariat. TANESCO will be responsible for the procurement activities for the works and related services contracts for the transmission line and substations from Iringa through Kisada, Mbeya, and Tunduma to Sumbawanga and the extension to Zambia border. On the other hand, the EAPP Secretariat will be responsible for procurement activities related to its institutional strengthening for regional power trade.

59. **Procurement capacity assessment.** The procurement capacity assessment for the agencies to implement the project was carried out in November 2017 for the EAPP Secretariat and in February 2018 for TANESCO.

60. TANESCO is the lead implementing agency for the project and has a good track record of implementing World Bank-financed projects. TANESCO has successfully implemented several projects including BTIP (P111598), Tanzania Energy Development and Access Project (P101645), and so on. The capacity assessment of TANESCO to implement the project procurement activities under the proposed project revealed the following: (a) staff dealing with procurement have inadequate experience in procurement of works and goods as well as consultancy services through International Competitive Procurement procedures under the New Procurement Framework; (b) inefficiencies in processing, approving, and managing procurement activities; (c) shortage of space for office and keeping of records; and (d) basic equipment for efficiency in the discharge of its duties. The overall unmitigated project risk for procurement is Substantial, which will reduce to Moderate after mitigation.

61. Capacity assessment of the EAPP revealed (a) lack of a unit with a head and a procurement officer for managing procurement activities; (b) deficiencies in the Internal Procurement Manual in that it lacks procedures for handling complaints, procurement auditing, and preparation of Procurement Plans; (c) inadequate number and experience of staff deployed for carrying out procurement activities under the project; and (d) lack of training for staff in procurement under World Bank procedures and in contract management. The overall unmitigated project risk for procurement is High, which is expected to reduce to Moderate after mitigation. The proposed mitigation measures will be included into the PIM for TANESCO and EAPP, respectively.

62. The proposed mitigation measures to be included into the PIM are summarized in Table 2.7.



Table 2.7 PIM Procurement Mitigation Measures

Sr. No.	Risk	Mitigation Measure	Time Frame	Responsibility
1.	Inadequate number of procurement staff allocated for project activities	Assign two specific procurement officers sitting with the PIU reporting directly to OPM to be responsible for the project procurement through the Senior Manager Procurement.	Within three months after project effectiveness	TANESCO
2.	Inadequate working area/rooms and space for record keeping/filing	Provide sufficient working area/rooms and space for record keeping/filing.	Within six months of project effectiveness	TANESCO
3.	Inadequate knowledge and experience in procurement under World Bank procedures and processes for high-value and complex contracts	<ul style="list-style-type: none"> • Provide training in World Bank procurement procedures and processes. • Recruit a procurement/contract management consultant to work with the project team and build capacity of the agency. 	<ul style="list-style-type: none"> • During implementation • Within six months of project effectiveness 	TANESCO
4.	Inadequate knowledge and skills/experience in contract management	Conduct training tailored toward addressing weaknesses in contract management for PMU and Technical Departments staff.	Within 12 months of project implementation	TANESCO
5	The Procurement Manual not officially approved for use and lacks procedures for complaint handling, procurement auditing, and Procurement Plan preparation and update, and filing and retrieval of procurement records procedures. The manual does not recognize Open Competitive Procurement as the default procurement method for high-value and complex procurements.	Revise the Procurement Manual to address the noted deficiencies including procedures for handling procurement complaints, procurement auditing, Procurement Plan preparation and update, recognition of Open Competitive Procurement as the default method for high-value and complex procurements, and secure the approval of the manual from the EAPP governing body	Within three months of project effectiveness	EAPP
6	EAPP does not have a dedicated Procurement Unit to handle and coordinate procurement activities.	EAPP should establish a separate Procurement Unit consisting of at least a procurement head and procurement officer.	Within six months of project effectiveness	EAPP
7	Inadequate number of staff with qualification and experience in procurement deployed for proper execution of the project	<ul style="list-style-type: none"> • EAPP should assign capable procurement staff (at least the head of the unit and a procurement officer) to work on the project. 	<ul style="list-style-type: none"> • Within six months of project effectiveness 	EAPP



Sr. No.	Risk	Mitigation Measure	Time Frame	Responsibility
	procurement activities	<ul style="list-style-type: none"> EAPP should provide procurement and contract management training for procurement and contract management staff. EAPP should engage an individual procurement consultant to assist and coordinate the procurement activities of the project and provide procurement capacity building. 	<ul style="list-style-type: none"> During project implementation Within six months of project effectiveness 	
8	EAPP lacks internal audit system	EAPP should ensure that annual audits include comprehensive procurement audits on all procurement transactions. EAPP should include internal procurement audit system within its structure.	In the first fiscal year of project effectiveness and annually thereafter	EAPP
9	The external audits are done only on the financial statements of the EAPP.	EAPP should ensure that annual external audits include comprehensive procurement audits on procurement transactions.	In the first fiscal year of project effectiveness and annually thereafter	EAPP
10	There were no evidences that the procurement committee reviews and approves procurements including contracts above a certain threshold.	EAPP should ensure that all procurements above a certain threshold based on the risk assessment shall be reviewed and approved by the procurement committee.	Within three months of project effectiveness	EAPP

63. **Procurement oversight and monitoring arrangements.** The World Bank exercises its procurement oversight through a risk-based approach comprising prior and post reviews as appropriate. The World Bank sets mandatory thresholds for prior review based on the procurement risk rating of the project. The requirement for a prior or post review shall be specified in the Procurement Plan. The World Bank will carry out post reviews of procurement activities undertaken by the Borrower to determine whether they comply with the requirements of the Legal Agreement. The World Bank may also use the services of the Public Procurement Regulatory Authority (PPRA) for carrying out post reviews for the project.

64. Since the assessed procurement risk rating is 'Substantial' for TANESCO and 'High' for the EAPP, the Borrower shall seek the World Bank's prior review for contracts of value equivalent to the thresholds detailed in Table 2.8.



Table 2.8. Thresholds for Procurement Approaches and Methods (US\$, millions)

Category	Prior Review	Open International	Open National	RFQ
Works	≥10.0 (≥5 for EAPP)	≥15.0 (≥5 for EAPP)	<15 (< 5 for EAPP)	≤0.2
Goods, IT, and non-consulting services	≥2.0 (≥1.5 for EAPP)	≥5 (≥1.5 for EAPP)	<5 (<1.5 for EAPP)	≤0.1
Category	Prior Review	Short List of National Consultants		
		Consulting Services	Engineering and Construction Supervision	
Consultants (firms)	≥1.0 (≥0.5 for EAPP)	≤0.3 (n.a. for EAPP)	≤0.3 (n.a. for EAPP)	
Individual consultants	≥0.3 (≥0.2 for EAPP)	n.a.	n.a.	

65. **Frequency of procurement supervision.** In addition to the prior review supervision to be carried out from World Bank offices, the capacity assessment of the implementing agency recommends one supervision mission every six months to visit the field to carry out review of procurement actions.

Environmental and Social (including safeguards)

66. **The project is in Category A for environmental assessment** because of the length of the transmission line in Component 1, the line's proximity to protected areas and other important habitat, its passage through a wildlife migration corridor, and the amount of land to be acquired for its wayleave. There are two ESIA's for the project. The first ESIA was prepared by an international consultant and issued in 2012 for the Iringa-Mbeya segment of the line under NELSAP of the Nile Basin Initiative and reviewed and approved by NELSAP and NEMC. World Bank safeguards policies were taken into account in its preparation. The ESIA was updated by TANESCO in 2017 to reflect changes in baseline conditions since 2012. A second ESIA was prepared in 2017 for the Mbeya-Sumbawanga segment of Component 1 by a different international consultant. The two ESIA's are being kept as separate documents, but one consolidated Executive Summary covering both has been prepared. World Bank safeguards policies triggered for the project and taken into account in the ESIA's are OP 4.01 (Environmental Assessment), OP 4.04 (Natural Habitats), OP 4.11 (Physical Cultural Resources), and OP 4.12 (Involuntary Resettlement).

67. Apart from temporary impacts during construction, such as noise, dust, pollution from oil and fuel spills and construction camp wastes, and potential social conflict between 'foreign' workers and local communities, the ESIA's list the main adverse impacts of Component 1 including



bird and bat collisions with conductors, loss of vegetation cover that is habitat for small animals, fragmentation of habitat, disturbance of migrating animals, transmission of HIV/AIDS, and impairment of agriculture-based livelihoods. Feasibility studies prepared under Subcomponent 3.2 and Component 4 for possible projects that could have adverse impacts will need to take World Bank safeguards policies into account. Components 2 and Subcomponent 3.1 will have no impacts. The two ESIA's and their consolidated summary were disclosed in-country on the TANESCO website on January 31, 2018, and on the World Bank's external website on January 31, 2018.

68. **The project is not expected to cause conversion or degradation of any critical natural habitat, and much of the land that will be acquired for the wayleave is modified habitat.** Direct impacts on natural habitat (mostly bush, scrub, shrubland, and grassland) can be mitigated through selective clearing. The proposed alignment does not pass through any protected areas, but the line from Iringa to Mbeya runs along or near the boundaries of the MKGR and the Chimala Scarp Forest Reserve. It passes between two IBA, one 13 km to the south and the other 10 km to the north. It traverses the Igambo-Igawa Wildlife Corridor that links the MKGR and Ruaha National Park, which is 26 km north of the line. Indirect impacts on the MKGR and Chimala Scarp Forest Reserve could include hunting by workers and improved access for poachers. Cumulative impacts on the protected areas are possible and will be assessed in parallel with final design. Mitigation measures are required in the ESMPs for those impacts and for potential loss of biodiversity caused by bird collisions and disturbance of wildlife movement, particularly in the Igambo-Igawa Wildlife Corridor, for which a Wildlife Corridor Management Plan will be prepared before the start of construction. Village graveyards are present within the proposed transmission line corridor, and any that cannot be avoided will need to be relocated in accordance with OP 4.12 and the applicable Tanzanian law. The proposed alignment avoids the one known archaeological site at Isimila near Iringa. A chance-finds procedure is included in the ESIA's and in construction contracts in case other physical cultural resources are discovered during the line or substation construction.

69. The international project implementation consultant to be engaged by TANESCO for supervision and management of the project will review contractors' ESMPs and Health and Safety Plans and advise TANESCO regarding their approval. The consultant will be responsible for field supervision of ESMP and Health and Safety Plan implementation and will include in its team qualified specialist for this purpose.

70. **The project is expected to have positive direct and indirect social impacts on the communities in the project area and more broadly in areas where electricity supply will be provided.** The rate of electrification remains low in Tanzania, particularly in rural areas. The transmission line traverses largely through rural areas, where the rate of poverty may reach up to 70 percent (World Bank SCD 2017). Provision of electricity can help move the population out of poverty, encourage economic growth, advance shared prosperity, and address the persistent geographic inequalities in the country. Access to reliable and cost-effective electricity by users



will not only improve the quality of life at the individual and household levels but will also encourage economic development in the medium and long term in the areas that will be provided with electricity under the project. Construction of the transmission line will create opportunities for employment in the short and medium terms. The contractors will work closely with TANESCO and community leaders to encourage recruitment of local labor from the communities in the immediate vicinity of the transmission line corridor. In line with the previous experience of TANESCO, most of the unskilled and low skilled labor force would be recruited from the local communities.

71. **Safeguards.** Under Component 1, construction of the transmission line and associated four substations will have negative impact on residents within the right-of-way, who will experience physical and economic resettlement. For the construction of the transmission line and the identified substations, according to the national land requirements, TANESCO will purchase the right-of-way of 52 meter along the transmission line corridor from Iringa to Mbeya to Tunduma to Sumbawanga (except where the right of way [ROW] overlaps with the RoW of other transmission lines, thus reducing the area of impact). Since the exact alignment for the section of Iringa-Mbeya has been known during project preparation, a RAP has been prepared prior to Project Appraisal. The RAP for this section of the transmission line (292.2 km of the total 613 km), indicates that most of the impact is on the agricultural land: 1,747 PAPs who conduct farming within the RoW will be affected, out of these 48 PAPs will be physically resettled. Additionally, 315 graves will need to be reburied. The RAP details mitigation measures to address land acquisition, resettlement and reburial of graveyards in this section of the transmission line. The RAP includes special provisions for vulnerable groups. The RAP was disclosed in-country and on the World Bank website on April 13, 2018. A detailed design, feasibility studies and the alignment for the Mbeya -Sumbawanga section of the transmission line and for the 4 km spur from Tunduma substation to the Tanzania-Zambia border are less advanced. For that reason, a Resettlement Policy Framework (RPF) has been prepared for that section ahead of appraisal to address potential resettlement impact and to set principles for any resettlement as a result of civil works in this area. The RPF was disclosed in-country and on the World Bank website on April 14, 2018. RAP(s) for Mbeya-Sumbawanga segment, as well as for the 4 km spur from Sumbawanga substation to the Zambia border will be prepared immediately after the siting of the line is finalized.

72. Prior to the World Bank's involvement, TANESCO had acquired a land lot for Mbeya substation without a RAP in place. To assess the way the land acquisition had occurred, a Resettlement Audit and Corrective Action Plan has been prepared. It has confirmed that 139 PAPs stand to be affected, including two households that need to be physically relocated in the Mbeya substation land plot. Additionally, 117 graves need to be reburied. All but one PAPs received compensations in April 2017, but most of them have not yet relocated and continued use of the land, as TANESCO has not enforced clearance of the lot. A Resettlement Audit determined that the land acquisition process was done according to the national laws and there are a number of identified gaps between national requirements on resettlement and the World Bank policies. A



ReAP will be prepared in line with the Audit's Corrective Action Plan and the RPF, to address the gaps between legacy land acquisition and the World Bank requirements per OP 4.12. The ReAP will be implemented in full before any further impact on PAPs' land and assets, and ahead of the start of any civil works on the substation. The Resettlement Audit and Corrective Action Plan was disclosed in-country and the World Bank website on April 17, 2018.

73. A due diligence review was carried out in July 2017 for the Iringa-Mbeya transmission line section and in December 2017 for the Mbeya-Tunduma-Sumbawanga section as part of project preparation. The review confirmed that there are no indigenous peoples, according to the policy criteria, along the transmission line corridor. Because the project benefits of reliable energy provision extend beyond the direct area of influence, TANESCO has agreed to provide additional benefits to the project-affected communities. These benefits include reduced cost of connection to distribution lines coming to the communities in the future.

74. Safeguards policies will apply to feasibility studies prepared under Subcomponent 3.2 and Component 4. The World Bank will review the ToR prepared under these components to ensure that the safeguards requirements are adequately addressed.

75. **Gender.** The project will address gender related issues at TANESCO and in project implementation. A gender action plan will be formulated for TANESCO to address the identified barriers to the professional development of female staff. Identification and mitigation of risks to female community members from labor influx will also be included as a part of project implementation and monitoring.

76. In Tanzania, while overall labor force participation is high for both women and men (labor force participation rate is 89.4 percent for men and 84.2 percent for women), disparities can be seen when the overall labor market statistics is disaggregated by areas of specialization and levels of hierarchy in job titles. The data show that women hold only 17.4 percent of leadership and decision-making positions in government, large enterprises, and institutions. The science, technology, engineering, and mathematics fields constitute the second highest paid profession in Tanzania; women hold 25.4 percent of professional, scientific, and technical jobs but they earn less than their male counterparts.³⁶ Moreover, only 9.6 percent of female university students compared to 24.7 percent of male university students graduated from science, technology, engineering, and mathematics programs in 2016 (World Economic Forum 2017 Global Gender Gap Report). This is also true in the energy sector, where certain job streams and management-level positions do not have many women. There are structural factors driving this, including cultural and social norms, which are beyond the scope of the project to address.

77. Under the proposed TAZA, TANESCO will undertake a gender gap assessment to (a) identify specializations and departments where women are underrepresented; (b) identify main

³⁶ Tanzania Integrated Labour Force Survey 2015.



barriers women face once recruited (especially in progressing to roles with greater responsibilities); (c) recommend ways to reduce the barriers; and (d) design a recruitment, mentoring, and leadership program targeting women in TANESCO. The activity will be included under capacity building in Component 3 and will especially target technical fields (such as engineering, technology, finance, and economics). The recruitment program also will include leadership development training and mentoring by experienced women employees to equip and ensure that the women who are recruited become leaders in the sector.

78. Experience in the region also has shown that in infrastructure projects, the influx of temporary outside workers can increase risk of sexual exploitation of local communities, especially of women and girls. This can also increase risks of human trafficking and transmission of sexually transmitted diseases including HIV/AIDS. There is also an increased risk of GBV in such situations. It is important to note that in Tanzania, four in 10 women have experienced physical violence since the age of 15 and about 17 percent of women have experienced sexual violence (Tanzania Demographic and Health Survey 2015–2016). TANESCO has prepared ESIA for Iringa-Mbeya and Mbeya-Sumbawanga sections of the transmission line that include ESMPs (the ESIA was disclosed on the World Bank website on January 31, 2018). These safeguards documents identify potential risks associated with labor influx and GBV and introduce mitigation measures to address these risks. The measures include but are not limited to following clear criteria for worker camp set up and location, as well as relevant gender and HIV/STI trainings and information campaign both for workers and local communities. Contractors will be required to prepare a Labor Influx Plan as part of the ESMP that has to be cleared by the World Bank, to foster positive impact on employment generation in the communities and mitigate potential social risks. The supervision consultant will oversee the contractors' compliance with the ESHS Management Plan as well as the code of conduct. TANESCO, in close coordination with the supervision consultant, contractors and local communities, will monitor labor influx, encourage local recruitment and relations between the workers and local communities. Contractors will be required to enforce an Honor Code, particularly for those residing in construction camps, and monitor interactions with the local population. Any inappropriate relations between the workers and local population will be reported to the local law enforcement agencies and to TANESCO. TANESCO's safeguards staff will be trained to recognize, properly record and follow up on sensitive issues such as community relations and GBV. TANESCO will also have a designated gender specialist, who will work specifically on gender issues and GBV within the scope of the project. A GRM will be available to PAPs and local communities to submit any inquires and concerns, and TANESCO will regularly follow up and report on operation of the GRM and resolution of grievances received under the Project.

79. **Citizen engagement.** As part of the project preparation, extensive consultations were held with representatives of various stakeholder groups and residents of communities along the transmission line to inform them about the project designs and discuss potential project impacts, including involuntary resettlement. During preparation of the Iringa-Mbeya ESIA in 2012, consultations were conducted in 53 villages along the proposed transmission line corridor, and



in Dar es Salaam with National Environment Management Council (NEMC), TANROADS, Ministry of Natural Resources and Tourism (Forestry and Beekeeping Division, Wildlife Division, Division of Antiquities), and non-governmental organizations (NGOs). Additional consultations were conducted in communities in January 2018 by TANESCO. On September 12, 2017, a large public/government agency meeting was held in Dar es Salaam to discuss both ESIAs and the ToR for the revision of the Mbeya-Sumbawanga ESIA. Public consultations for the revision of that ESIA took place at 18 locations between Mbeya and Sumbawanga during November 13-17, 2017, and TANESCO conducted additional consultations on the draft ESIA January 13-21, 2018. There were also consultations with the PAPs along the Iringa-Mbeya section of the proposed transmission line during the RAP preparation in March 2018. The consultative process will continue throughout the project implementation. TANESCO has committed to develop a Stakeholder Engagement Plan (SEP) before the contractors are recruited. The SEP will be approved by the World Bank and implemented throughout the project. The regular discussions with stakeholders and community groups can provide feedback regarding the construction process and associated activities and impacts. Meetings with various community groups within the right-of-way, including women, youth, and vulnerable populations, can signal of emerging issues related to the project's impact and address them on time. It will also offer an avenue for the communities to ask questions and receive answers related to project implementation. The community feedback will be reviewed on a quarterly basis and help moderate activities and mitigation measures in the communities.

80. The regular consultations will be complemented by a comprehensive GRM that will be administered by TANESCO, which will have designated staff responsible for implementation of the SEP and operation of the GRM. The GRM will address inquiries and grievances related to various aspects of project implementation, including environmental and social safeguards. The PIM will detail the structure, processes for uptake, registering, and following up on the inquiries received through the mechanism. TANESCO will regularly report on complaints received and responded to. It will publish an annual report on grievance redress and how the issues were resolved. Relevant indicators are included in the Results Matrix.

Monitoring and Evaluation

81. The M&E of Components 1, 2, and 3 will be performed by TANESCO. The OPM, through the PIU, will be responsible for providing the required quarterly implementation progress status reports and elaborating an M&E manual as part of the PIM, which will guide the overall M&E activities. Activities to be monitored include the timely and efficient construction and commissioning of the transmission line lines and associated substations, quality control, and processing of payments to contractors approved by the owner's engineer, as well as the effective implementation of the ESMP and the RAPs of the project and the successful completion of studies and training activities.

82. Project-specific data on the agreed monitoring indicators will be collected by TANESCO.



Section VII presents the project's Results Framework that defines specific outcomes and results to be monitored under this project. In addition, the World Bank will carry out the normal review procedures for procurement, regular supervision missions, financial monitoring reports, quarterly reports provided by TANESCO, independent annual financial audits of the project, and the financial statements of TANESCO. AFD and the World Bank have agreed on a single report format that they will use to monitor environmental and social impacts and track the implementation of the ESMP and RAPs.

83. The monitoring of and reporting on Component 4 will be the responsibility of the EAPP. The project manager for the EAPP will, through the PIU, be responsible for monitoring and reporting on the implementation progress of various technical assistance activities and outcomes achieved. Monitoring and reporting procedures will be guided by the M&E framework detailed in the EAPP's PIM.

Role of Partners (if applicable)

84. **The project will have two co-financing development partners: IDA and AFD.** In addition, financing will include EU grant sourced by AFD for Component 1. IDA will finance all four components. AFD will provide co-financing in the amount of US\$100 million for Component 1, to be disbursed in proportion to the overall contribution of each co-financier for the Component. An additional US\$30 million EU grant (sourced by AFD and included in a financing agreement between GoT and AFD for the AFD's own co-financing) will be provided for the installation of an auto-transformation switchgear (from 400 kV to 330 kV) in Tunduma and the 330 kV double circuit line from Tunduma to the Zambian border.

85. For successful implementation of project aspects related to capacity building for regional integration and trade, the engagement and support from SAPP experts and specialists from other operational power pools will be required. Potential twinning arrangement will be set up with utilities that participate in power pools and implement short-term trading. In addition, to strengthen the capacity of EAPP-IRB, twinning arrangement and knowledge exchange will be organized with similar regional regulatory bodies from Southern Africa and Asia.

86. The proposed support for the EAPP under Component 4 builds on the engagement with the EAPP Secretariat developed through the World Bank-executed MDTF with financing from Swedish International Development Cooperation Agency. Under the MDTF, the World Bank is providing the EAPP with requisite capacity-strengthening and technical support for implementing its immediate priorities under the Strategic Plan (2016–2026). Ongoing and prior engagements from other development partners, including USAID/Power Africa, Norway, and AfDB have laid the foundation for the current EAPP arrangement under the MDTF and the proposed TAZA. USAID/Power Africa helped develop the EAPP road map and is assisting the EAPP in the



preparation of the first phase of the Interconnection Grid Code Study for governing the operations of the regional interconnected electricity networks.



ANNEX 3: IMPLEMENTATION SUPPORT PLAN

COUNTRY: Africa

AFCC2/RI-3A Tanzania-Zambia Transmission Interconnector

Strategy and Approach for Implementation Support

1. Implementation support will be provided through regular semi-annual implementation support missions carried out by the World Bank (jointly with AFD to the extent possible), as well as on-going support through regular written and verbal communications between the World Bank and AFD as co-financiers, and between the World Bank/AFD teams and TANESCO and EAPP as implementing agencies.

Implementation Support Plan and Resource Requirements

2. The implementation of the project is the responsibility of TANESCO (for Components 1, 2, and 3) and EAPP (for Component 4), with targeted and continuous implementation support and technical advice from the World Bank and AFD project teams, and possibly other Development Partners (DPs) as needed.
3. The World Bank's implementation support will broadly consist of the following:
 - Capacity-building activities to strengthen the national and local levels' ability to implement the program, covering the technical, fiduciary, social, and environmental dimensions;
 - Provision of technical advice and implementation support geared to the attainment of the PDO;
 - Ongoing monitoring of implementation progress, including regularly reviewing key outcome and intermediate indicators and identification of bottlenecks;
 - Monitoring risks and identification of corresponding mitigation measures; and
 - Close coordination with AFD and other development partners to leverage resources, ensure coordination of efforts, and avoid duplication.
4. The World Bank support will include the provision of capacity strengthening in procurement, FM and governance, and anticorruption. An annual fiduciary review will be



conducted for the program. Adequate budget will need to be allocated for this review. This review will be supplemented by on-site visits done by the World Bank's fiduciary staff at least once a year. Reliance will also be placed on the annual audit reports produced by the CAG.

5. In addition, desk reviews will be done for audit, financial, procurement, and any other reports received during the financial year. In-depth reviews may also be commissioned by the World Bank whenever deemed necessary.

6. The World Bank team will ensure that the project PIUs are held accountable for preparing and submitting the required quarterly implementation progress reports to the World Bank and AFD teams (TANESCO for Components 1, 2, and 3; and EAPP for Component 4).

7. In close coordination with AFD, the World Bank team will conduct a mid-term review (MTR) of the project to review the status of project implementation, and to make any necessary adjustments to the project design, implementation arrangements, targets, budget allocations, and/or any other aspects of the project as needed.

Table 3.1. Main Focus in Terms of the World Bank Team's Support to Implementation

Time	Focus	Skills Needed	Resource Estimate (US\$)	Partner Role
First 12 months	<ul style="list-style-type: none"> Supervision and technical review of procurement Implementation of environmental and social safeguards Technical review, FM/procurement systems 	Technical, fiduciary, environment, and social	600,000	AFD will jointly review and clear ToRs for Component 1
12–48 months	<ul style="list-style-type: none"> Implementation monitoring of works Technical advice to support program implementation Implementation of environmental and social safeguards Monitoring and support for capacity-building needs 	Technical, fiduciary, environment, and social	500,000 per year	AFD will jointly review and clear ToRs for Component 1
Midterm review	Implementation progress review and identification of necessary midcourse adjustments	Technical (including M&E), fiduciary, environment, social, and operational	250,000	AFD provides inputs on lessons learned



Time	Focus	Skills Needed	Resource Estimate (US\$)	Partner Role
48–72 months	<ul style="list-style-type: none"> Implementation monitoring Technical advice to support program implementation 	Technical, fiduciary, environment, and social	420,000 per year	AFD joint monitoring

Table 3.2. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Project management (task team leader)	Ongoing	15	—
Project management (co-task team leader)	Ongoing	15	—
Technical specialists/team members (power engineer, economist, power markets specialist)	30	12	—
FM specialist	12	—	In Dar es Salaam
Procurement specialist	12	—	In Dar es Salaam
Environmental specialist	12	6	—
Social specialist	12	6	—
Administrative support	Ongoing	—	In Dar es Salaam

Table 3.3. Partners

Name	Institution/Country	Role
AFD	Development partner/France	Co-financier



ANNEX 4. ECONOMIC AND FINANCIAL ANALYSIS

AFCC2/RI-3A TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR

1. This annex provides the economic and financial justification for the proposed Tanzania-Zambia transmission interconnection, between Iringa and Sumbawanga in Tanzania, via Tunduma. The project interconnects Tanzania with Zambia and strengthens and extends the Tanzania transmission backbone in the southern and western regions of the country.

2. The proposed investment is economically viable and remains so under less favorable conditions affecting its implementation. The net economic benefits from the project are estimated at US\$1,718 million (in NPV terms), and the EIRR is estimated at 26.4 percent. These results are robust in a range of scenarios. The project is also financially viable with an internal rate of return of 23.5 percent and an NPV of US\$808 million.

Cost-Benefit Analysis

3. The project generates benefits at a domestic and a regional level for Tanzania: benefits derived from increased electrification and regional trade. There are also benefits that accrue to other countries in the region. For example, Zambia also benefits from a reduction in reserve requirements and increased system reliability and will also have access to the optical fiber network that is integrated into the transmission lines in Tanzania, contributing to better connectivity and Internet access in Zambia. The electricity utilities in Ethiopia, Kenya, and Zambia will also increase their revenues from exports of power. Nonetheless, this economic analysis is presented from the point of view of Tanzania, focusing only on the benefits and costs for Tanzania.

4. On the domestic level, the project helps increase access to reliable and affordable electricity in Mbeya and Rukwa, two regions in the southwest of Tanzania. Currently, there are no transmission lines between Mbeya and Sumbawanga, only a 33 kV line between Mbeya and Tunduma. The project will benefit consumers, including agriculture and agribusiness customers, by potentially lowering electricity prices and increasing the quality of supply. The Sumbawanga area is part of the SAGCOT, which currently relies on an isolated grid with a small diesel generator and power over a cross-border 66 kV line from Mbala in Zambia—a line that often faces high fluctuation and outages. An improvement in the quality and reliability of electricity is expected to increase productivity of the agriculture sector and deliver welfare improvements to households.

5. The new 400 kV interconnector will also replace an existing 220 kV line between Iringa and Mbeya, which is currently overloaded. The implementation of the interconnector will transport electricity at a higher voltage and introduce n-1 reliability into the system, thereby increasing



reliability and efficiency of supply and reducing technical losses in the 220 kV lines. The project will also allow the evacuation of future hydro generation plants that will develop in the areas surrounding Mbeya and Kisada. These include a total of 750 MW over the period. Lastly, the project will generate savings in GHG emissions, from displacing off-grid diesel-fired units with less polluting domestic generation, increase in access, and reduction in technical losses in the 220 kV line.

6. At the regional level, the benefits are several. First, Tanzania could save on generation costs: from reduced reliance on expensive emergency power generation (particularly on periods of low hydrology), reduced need for reserve generation capacity, and ability to optimize the generation mix by comparing costs between installing new generation on the national system and importing power from the SAPP. Second, Tanzania could also benefit from increased revenues from exporting excess electricity to countries in the SAPP region and the ability to develop large regional generation plants that can leverage economies of scale by selling to regional markets. Tanzania could also collect revenues from wheeling charges when electricity is being traded between the EAPP and SAPP countries via Tanzania.

7. Economic costs include investment in capital costs, recurring costs of O&M, inferred generation costs for underserved customers (where grid-supplied electricity substitutes current off-grid or unreliable sources), and inferred costs of generation and distribution for new customers.

Methodology and Assumptions

8. The justification of the transmission line relies on the extension of the Tanzania transmission backbone to the southwest and the ability to source power from Zambia and the SAPP region on a short-term basis—through the SAPP's DAM. The analysis focuses on the trade with the SAPP as the physical interconnection being financed under the project will provide access to the SAPP market. Thus, the evaluated benefits are those that arise from power flows on the project interconnector.

9. The interconnection with Kenya (and the EAPP) will be completed before the completion of the proposed TAZA and will have an impact on Tanzania's system. Tanzania is in fact finalizing a PPA with Ethiopia for 400 MW. Thus, the analysis considers 400 MW being injected from the EAPP as a given, and an additional 200 MW from the EAPP (Ethiopia) to the SAPP, being wheeled by Tanzania. Other potential benefits may arise from the interconnection with the EAPP too. The EAPP will operationalize a short-term market during the period of analysis, and Tanzania could also benefit from trading on that market. This could mean additional benefits for Tanzania from exporting to and importing from the EAPP. How the market in the EAPP develops and what the price mechanisms are have yet to be determined. Given the limited information and uncertainties involved in trading within the EAPP, this analysis adopts a conservative approach by only considering the immediate and known possibility of short-term trading on the SAPP's DAM.



10. The economic analysis is based on three scenarios (since Tanzania has not signed a long-term PPA with Zambia or other SAPP member countries): a base case (Tanzania trading with the SAPP) and two alternative scenarios. Each scenario is summarized below.

- (a) **Scenario 1: No interconnection with the SAPP** (the transmission line is used to serve domestic users only). This scenario models the case where the interconnection with the SAPP does not materialize (for example, due to infrastructure in Zambia not being completed) or trade does not occur across the interconnector. The benefits quantified in this scenario are (i) increase in access to electricity in Mbeya and Rukwa regions due to increased bulk electricity supply; (ii) increase in the level of reliability for existing customers; (iii) displacement of diesel generation in isolated grids being connected to the national grid by the project; (iv) reduction in technical losses between Iringa and Mbeya; (v) evacuation of power from future generation plants in the project area; and (vi) productivity gains from reliable power supply to agribusinesses in the SAGCOT.
- (b) **Scenario 2: Interconnection with the SAPP (base case).** This scenario assumes that the transmission line would also be used for trade between Tanzania and member countries of the SAPP. Thus, the benefits for Tanzania consist of the benefits from power trade and the domestic benefits (described in Scenario 1). The trade flows forecasts were a result of a least cost plan prepared by the World Bank, based on Tanzania's 2016 Master Plan, but using more conservative assumptions, as well as average hydrology conditions. The least cost plan shows that Tanzania would import from, and export to, the SAPP every year, though the volume of imports is consistently larger than that of exports (see Figure 4.1 for details). Thus, the benefits from trade consist of (i) the difference in capital expenses and fixed O&M costs between the least cost expansion plan with and without trade; (ii) the difference in the costs of fuels and variable O&M costs between the least cost expansion plan with and without trade; and (iii) revenues from exporting to Zambia and wheeling through Tanzania minus the cost of imports. The analysis assumes that the transfer capacity from Tanzania to Zambia/SAPP is of 400 MW, while the transfer capacity from Zambia is 250 MW.³⁷
- (c) **Scenario 3: Interconnection with the SAPP and hydrological shock.** This scenario evaluates the net benefits of interconnection under a simplistic model of recurrent hydrological shocks affecting Tanzania's hydropower generation. In the absence of the interconnector, and in the recent past, Tanzania has had to rely on emergency thermal power to overcome supply shortages. Droughts have severe impacts on

³⁷ Based on Complementary Study on Power Trade Volumes, Wheeling Arrangements and Impact on the Interconnected Networks for the ZTK Interconnector Project, December 2016 (prepared by Ricardo; Supplement to the AECOM study).



TANESCO's financials. For example, in the most recent drought in 2011-2013, TANESCO accumulated significant payment arrears to fuel and electricity suppliers of around US\$400 million. In mid-2012, TANESCO's financial shortfall was running at more than US\$40 million per month, as the hydrological condition continued to be below average, and electricity demand kept increasing, requiring continued engagement of the expensive emergency power producers (see Annex 5 for more details). When interconnected to the SAPP, Tanzania will have access to the SAPP short-term market and will not have to rely on expensive emergency power. Thus, this scenario analyzes the additional benefits for Tanzania in years when it experiences low unexpected hydrology.

Table 4.1. Quantified Benefits, by scenario

#	Main economic benefits	Scenarios		
		No interconnection with SAPP	Interconnection with SAPP (base case)	Interconnection with SAPP and hydrological shock
1	Increase in access to electricity in SW ^a	✓✓	✓	✓✓
2	Increase in level of reliability, for existing customers ^a	✓✓	✓	✓✓
3	Displacement of diesel generation in SW ^a	✓✓	✓	✓✓
4	Reduction in line losses among Iringa-Mbeya line ^a	✓	✓✓	✓✓
5	Evacuation of power from generation plants in SW ^a	✓	✓✓	✓✓
6	Savings in GHG emissions ^{a,b}	✓	✓✓	✓✓
7	Savings in Capex and fixed O&M costs of generation plants ^b		✓✓	✓✓
8	Savings in Fuels and variable O&M costs of generation plants ^b		✓✓	✓✓
9	Net revenues from exports and imports ^b		✓✓	✓✓
10	Revenues from wheeling ^b		✓✓	✓✓
11	Avoidance of expensive emergency power ^b			✓✓

Note: *a* – benefits accruing from extension of 400-kV infrastructure; *b* – incremental benefits accruing from power trade with SAPP.

Main Assumptions

11. The economic evaluation of the project spans over 30 years, assuming that the interconnection is commissioned at the beginning of 2024. Both costs and benefits are set up as cash flows over the economic lifetime of the line, including the construction and the operation period. The main assumptions and parameters are included in Table 4.2. Table 4.9 provides a more extensive description of the different assumptions and parameters used.



Table 4.2. Main Assumptions and Parameters

Assumptions	Value	Source and/or Remarks
Discount rate for the ENPV	10%	Based on 'Discounting Costs and Benefits in Economic Analysis of World Bank Projects (2016)'
Project capital costs	US\$447 million ^a	Based on feasibility studies, including taxes
Annual O&M costs	2%	Based on the 2016 Feasibility Study (prepared by SWECO International)
Customers' willingness to pay (WTP)	US\$0.15 per kWh	EWURA. Average D1 and T1 retail tariff
New connections in Mbeya and Rukwa regions	21,000 per year	Figure based on the 2012–2017 electrification target to connect 250,000 new customers per year
Annual demand growth	8%	Based on least cost power system planning analysis prepared by the World Bank, using Tanzania's Master Plan as the basis. Residential demand growth in the region is assumed to flatten in 2030.
Average transmission losses in existing 220 kV Iringa-Mbeya line	5.6%	Consultation with TANESCO
Average transmission losses in the project	3%	Based on the project's technical design
Trade volumes between Tanzania and the SAPP	Average annual imports: 2,110 GWh Average annual exports: 105 GWh	According to the least cost analysis prepared by the World Bank, based on Tanzania's Master Plan, feasibility studies, and using a more conservative approach
Cost of electricity imports from the SAPP	US\$0.046 per kWh	Average of annual weighted average price of imports determined in the least cost plan (based on 2017 hourly DAM clearing prices in the SAPP)
Price of exports to the SAPP	US\$0.107 per kWh	Average of annual weighted average price of exports determined in the least cost plan
Cost of emergency power in Tanzania	US\$0.416 per kWh	Based on total costs of on-grid diesel-fired generation

Note: This includes US\$343 million for transmission lines and substations (Component 1, excluding imports taxes and value added tax [VAT]); US\$78 million for grid infrastructure readiness for interconnection (Component 2, excluding VAT); US\$18 million to support operational readiness for regional power trade (Subcomponents 3.1 and 3.3, excluding VAT); and US\$8 for resettlement compensation.

12. **GHG emissions.** The economic benefit also accounts for savings in GHG emissions. A total of 116,443 tCO₂ are reduced. The sources of GHG emission reductions are displacement of the 5 MW diesel-fired mini-grid in Sumbawanga (16,924 tCO₂ reduced) and new customers accessing the grid (381,883 tCO₂ reduced), due to a lower emission factor of the grid compared to traditional lighting sources used by households. Land clearing needed to build the transmission



line increases GHG emissions (41,157 tCO₂ increased), as well as emissions from technical losses in the grid extension portion (241,206 tCO₂ increased).³⁸

Results

13. This section presents the results of the economic analysis prepared for each scenario. The main results are presented in Table 4.3. Each scenario is also described in detail in the following paragraphs.

Table 4.3. Project ENPV and EIRR

Scenarios	EIRR (%)	ENPV (US\$, millions)
Scenario 1: No interconnection with the SAPP	14.3	580
Base case: Interconnection with the SAPP	26.4	1,718
Scenario 2: Interconnection with the SAPP and hydrological shock	31.0	2,207

14. **Scenario 1: No interconnection with the SAPP.** While the potential benefits from power trade between Tanzania and other members of the SAPP (including Zambia) are substantial, the timing and extent of their realization depend upon the completion of the transmission infrastructure in both countries and enabling commercial and operational mechanisms being in place. In particular, until the Tanzania-Zambia interconnection is fully established on both sides, benefits for Tanzania from the project would be limited to the use of the transmission investments to increase/improve availability of power within Tanzania itself. In that case, the 400 kV line will enable electricity access to unserved customers and improve power supply to underserved customers—who currently obtain power from off-grid supply sources or over the cross-border 66 kV line from Zambia. The line will connect almost 21,000 new customers each year. These benefits are calculated as the customers' WTP (the average retail tariff) times the number of new customers times the average consumption per customer—taking into account an 8 percent annual growth in domestic demand.³⁹

³⁸ For land clearing, the analysis assumes that (a) there is a first clearing event when the entire wayleave area is cleared and (b) the regrowth that occurs in the interval between the original clearing and the first maintenance cutting will sequester more carbon than will be emitted by the decay of the biomass removed in the maintenance cutting. The analysis estimates 6 percent (of the original land clearing emissions) for annual regrowth and 5 percent for the maintenance cut.

For technical losses, the analysis assumes a reduction in emissions for the portion where the grid will be upgraded (reducing technical losses in the existing 220 kV lines). For the line extension, the analysis assumes an increase in emissions, given that it compares the technical losses of the project (3 percent) to baseline emissions that assume a high-efficiency benchmark for technical losses (2 percent).

³⁹ Annual demand growth is assumed to increase at an 8 percent annual growth rate until 2030. After that, it is assumed constant.



15. The project also increases the level of reliability of the existing 214,853 customers in the southwestern region. The analysis assumes that the project will reduce the total duration of outages in the region from the current 36 hours per year to 12 hours per year. The additional day of electricity supplied every year is valued at the customers' WTP for that electricity times the average daily consumption in the southwestern region. The existing 220 kV line from Iringa to Tunduma annually transports 146 GWh. The line losses are currently 5.8 percent each year. Once the new project comes into operation, the existing 220 kV line will be less congested, and transmission losses are expected to reduce to 3 percent each year. This reduction in losses translates to 4.3 additional GWh supplied in the region, which are valued at the average transmission tariffs (the customers' WTP).

16. A 5 MW diesel-fired mini-grid will also be decommissioned in the Sumbawanga region—displacing 2.6 GWh per year from 2024 onward.⁴⁰ The cost difference between the mini-grid and the average cost of power in Tanzania is of US\$0.155 per kWh, which means Tanzania will save around US\$0.5 million per year starting in 2024.

17. The analysis also incorporates productivity gains for small-scale farmers in the Sumbawanga region. Access to electricity can help farmers irrigate their crops better. The analysis assumes that 35,000 hectares start using electricity to irrigate fields and pump water—leading to an increase in crop yields from 461,000 metric tons (MT) to 1,090,000 MT by 2030. The yield increase is valued at the market price of maize—one of the main crops in the Sumbawanga agriculture cluster—and electricity and labor costs are deducted.

18. Last, future development of generation resources in the project area will benefit from the transmission infrastructure being constructed under the project: a 170 MW plant that will start generating in 2025, a 358 MW plant that will start generating in 2033, and a 222 MW plant entering operation in 2034. The 400 kV line will enable the evacuation of the generated power, estimated at 894 GWh in 2024 and 3,942 GWh in 2048. The net economic benefit of the power transferred to other regions of Tanzania is valued at the average tariff, minus the capital investment cost of installing each generation plant, the connection cost, and the cost of the transmission line that will connect each generation plant with the 400 kV project line.

19. The EIRR is estimated at 14.3 percent and the ENPV at US\$580 million, using a discount rate of 10 percent.

⁴⁰ The annual power supplied by the diesel mini-grid is estimated using 2016–2017 figures. Consumption from the mini-grid is also assumed to increase at an annual demand growth of 8 percent until 2030, when it remains constant.



20. **Scenario 2: Interconnection with the SAPP (base case).** As mentioned earlier, the benefits for Tanzania under this scenario consist of the benefits from power trade and the domestic benefits described in Scenario 1.

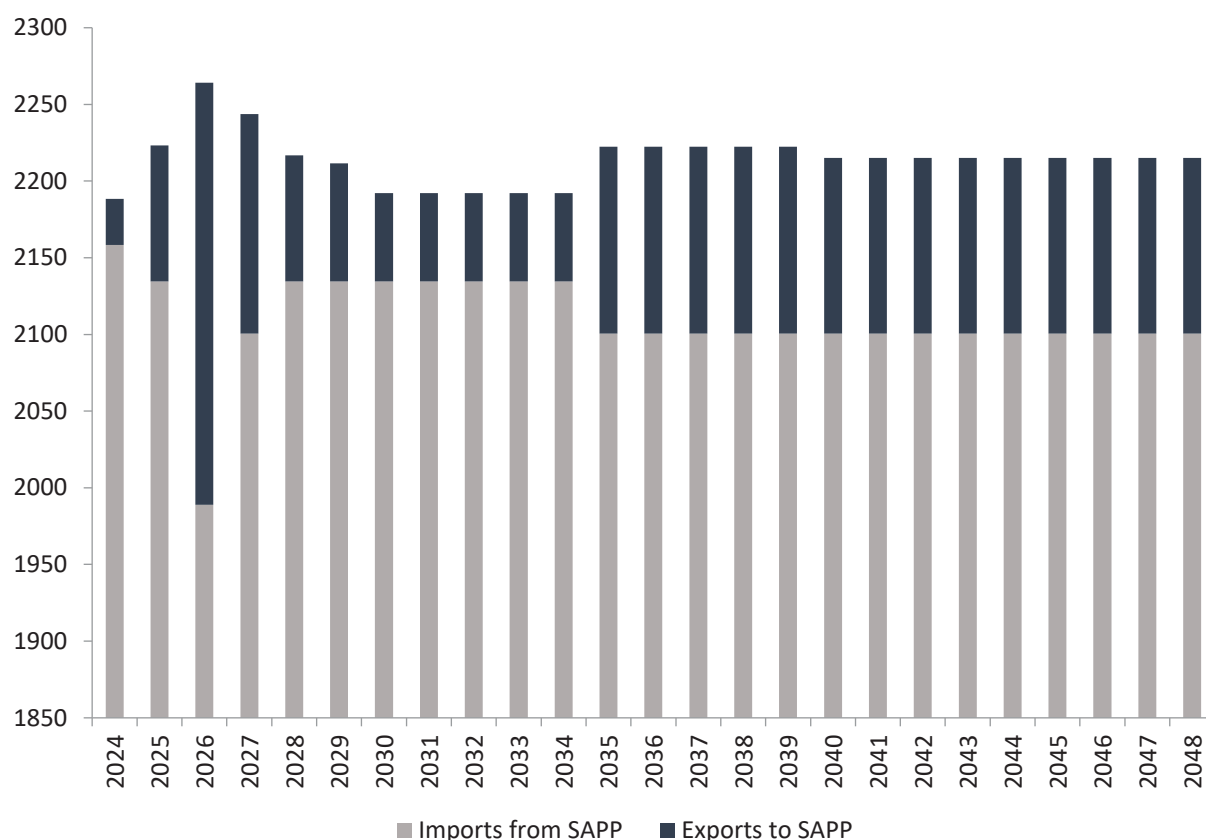
21. Trade with the SAPP is driven by exogenously defined prices: the hourly DAM clearing prices from 2017, the most recent year. Imports and exports between Tanzania and the SAPP are determined as an integral part of the generation plan—where imports delay/displace domestic generation and exports fully consider surplus generation and need for any new peaking capacity to take advantage of high peak prices in the SAPP.⁴¹ As mentioned earlier, the analysis considers 400 MW being injected from the EAPP as a given, through the future Kenya-Tanzania interconnector, and an additional 200 MW from the EAPP (Ethiopia) to the SAPP, being wheeled by Tanzania (where power wheeled is valued at US\$0.0014 per kWh).

22. The volumes forecasted vary by year, but Tanzania is expected to import and export electricity all years throughout the period. The least cost plan was also prepared using an 8 percent annual demand growth and average hydrology conditions.⁴² Figure 4.1 shows the estimated annual volume of imports from and exports to the SAPP.

Figure 4.1. Estimated Volume of Trade with the SAPP, Annual Imports and Exports (GWh)

⁴¹ The least cost analysis is based on Tanzania's 2016 Master Plan, but considering a more conservative scenario, where the annual electricity demand rate in Tanzania is 8 percent (compared to 11.1 percent in the Master Plan), peak demand is projected to grow to 9,941MW in 2040 (compared to 14,330MW in the Master Plan), and there are no restrictions to the electricity generation mix.

⁴² Average hydrology for the existing generation plants was estimated using their average annual capacity factors, according to data from 2002 to 2017. The average capacity factors of future generation plants were defined according to data in the Master Plan.



Source: World Bank

23. The results from the least cost analysis show that the annual weighted average cost of imports is around US\$0.046 per kWh, while the annual weighted average price of exports is about US\$0.107 per kWh. The model shows that Tanzania will import at times when prices in the SAPP are low and export at times when SAPP prices are high. This is why the price difference between the annual weighted average cost of imports and exports is so high. The model takes advantage of the price difference at different times of the day and year, and imports from or exports to SAPP according to that. Apart from the price differential, the transfer capacity of the line also affects the volume of imports and exports. The transfer capacity from Tanzania to Zambia (400MW) is higher than that of Zambia to Tanzania (250MW). This is due to current system configuration and is based on existing feasibility studies prepared for the interconnection.⁴³

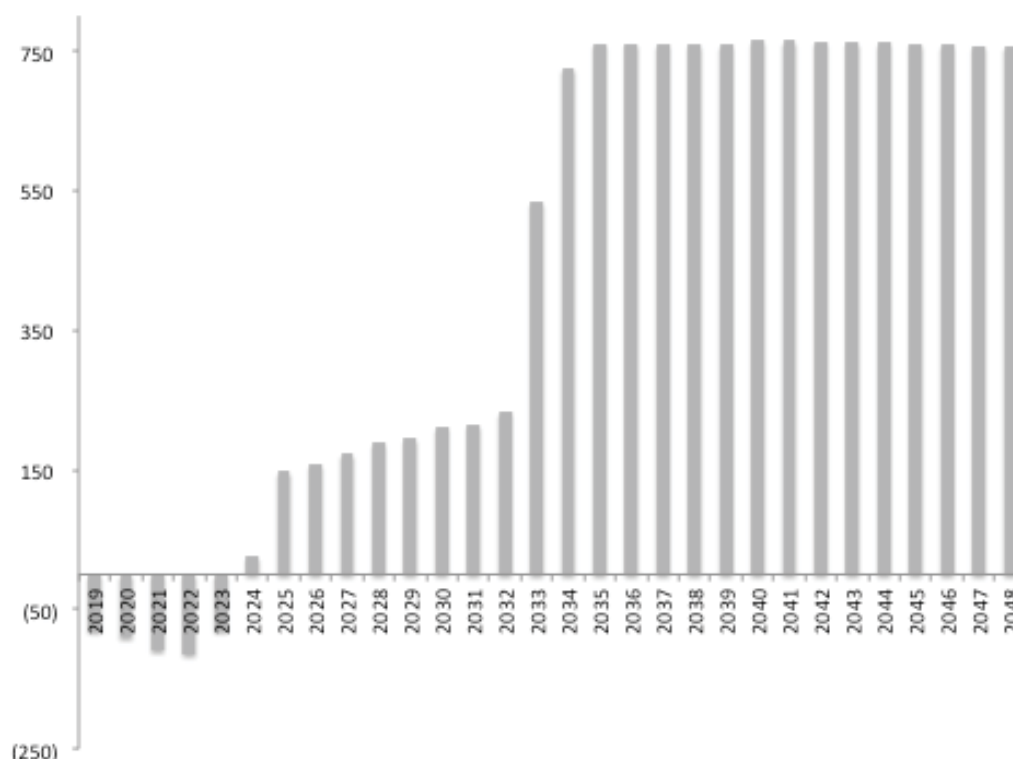
24. The base case EIRR is estimated at 26.4 percent and the ENPV (at a 10 percent discount rate) at US\$1,718 million. Figure 4.2 shows the annual cash flows. The first period of cash flows (until 2024) corresponds to the disbursement period of the project. The period of relatively lower positive cash flows between 2025 and 2032 corresponds to the disbursements made for the first

⁴³ Complementary Study on Power Trade Volumes, Wheeling Arrangements and Impact on the Interconnected Networks for the ZTK Interconnector Project, December 2016 (prepared by Ricardo; Supplement to the AECOM study)



(179MW), second (222 MW) and third (358 MW) hydro generation plants that will evacuate power from the southwest.

Figure 4.2. Estimated Annual Cash Flows for Base Case Scenario (US\$, millions)



Source: World Bank

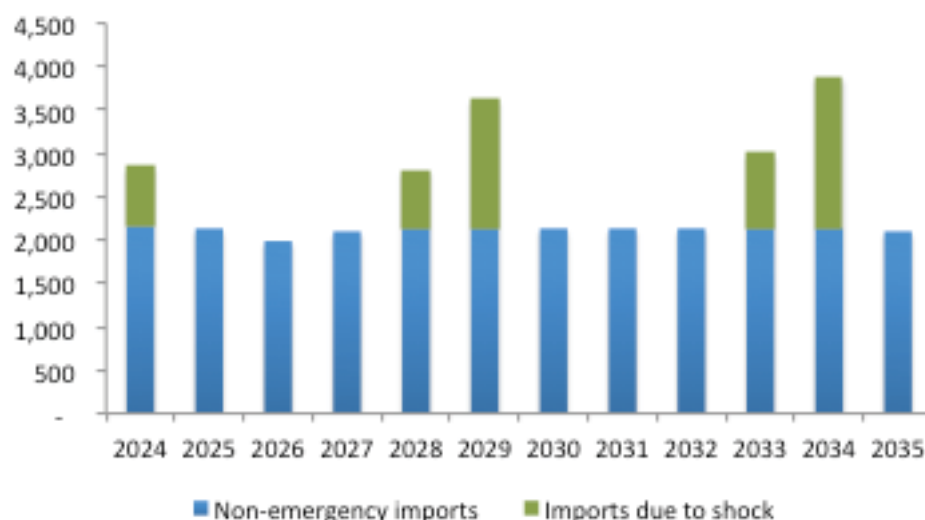
25. When GHG savings are included, the ENPV from the project amounts to approximately US\$1,720 million and the EIRR increases does not vary.

26. **Scenario 3: Interconnection with the SAPP and hydrological shock.** An important benefit of the interconnector is the access to the SAPP's short-term market. Tanzania's ability to buy electricity in the SAPP DAM will also eliminate the need to pay expensive emergency power in times of unexpected negative supply shocks. For example, the average and median monthly DAM clearing price between January 2015 and December 2017 was US\$0.071 per kWh, compared to the cost of emergency power of US\$0.416 per kWh. To evaluate the benefit from reduced reliance on expensive emergency power generation, this scenario simulates a drought episode. The frequency and impact of the drought are estimated using data on hydro generation in Tanzania between 2002 and 2017. The available data suggest that droughts occur every five years and last for two years (see Figure 5.7). During the first year of the drought, hydro generation decreases less than during the second year. Droughts affect all months, but the largest share of supply is lost between July and February (of the following year).



27. When the drought episode occurs, the analysis considers that the capacity factors of all hydro generation plants are reduced. The reduction is modeled as follows: During the first year of the drought, hydro generation decreases by 10 percent, while in the second year it decreases by 20 percent. Three drought shocks are included: in 2023 (until 2024), in 2028 (until 2029), and in 2033 (until 2034), as shown in Figure 4.3. This means that the volume of imports during those 2024, 2028, 2029, 2033, and 2034 (not in the case of 2023 as the interconnector is not operational yet) is larger than those in the base case scenario, to offset the low hydrology. For example, the hydro generation in 2024 in the base case scenario is 3,472 GWh. When the shock is applied, the analysis assumes that the hydro generation decreases to 2,778 GWh in 2024 (20 percent less). Thus, this scenario assumes that the difference (694 GWh) is imported from the SAPP's DAM, instead of generating that power domestically at high prices. Figure 4.3 shows the additional imports in green.

Figure 4.3. Estimated Emergency and Nonemergency Imports (GWh)



Source: World Bank

28. The EIRR is estimated at 31.0 percent and the ENPV (at a 10 percent discount rate) at US\$2,207 million.

Sensitivity Analysis

29. A sensitivity analysis has tested the robustness of the project to unfavorable changes in six variables for the base case scenario. The analysis assessed the impact of:

- An early construction of Stiegler's Gorge, where the first stage becomes available in 2025, 10 years before than the COD stated in the 2016 Master Plan;
- A two-year delay in the interconnector's COD;
- A five-year delay in the construction of hydro-plants that will evacuate power from the southwest to the rest of the country;



- (d) An increase in domestic demand of electricity, from an annual growth rate of 8 percent to 10 percent;
- (e) An increase in SAPP DAM hourly prices from 2028 onward; and
- (f) A reduction in the interconnector's import capacity (from 250MW in the base case, to 125MW).⁴⁴

30. The results are shown in Table 4.4.

Table 4.4. Sensitivity Analysis - Base Case Scenario

	EIRR (%)	ENPV (US\$, millions)
Values of base case scenario	26.4	1,718
Early construction of Stiegler Gorge (2025/2027)	25.7	1,602
Project COD delayed by 2 years	20.9	1,234
COD of generation plants in SW delayed by 5 years	23.4	1,100
Increase in domestic demand	17.8	1,076
Increase in SAPP prices, 5 years after interconnection	26.0	1,524
Interconnector's import capacity reduced to 125 MW	23.6	1,427

Switching Values

31. The switching values compute the values of certain variables that make the ENPV equal to zero. This analysis calculates switching values for an increase in capital investments costs and increase in the price of imports from the SAPP. The switching values are shown in Table 4.5. These show that for the NPV to be zero, the project costs would have to be multiplied by more than five and the weighted average price of imports by four.

Table 4.5. Switching Values - Base Case Scenario

	Base Case Values	Switching Value
Increase in capital investment costs	US\$447 million	US\$2.4 billion
Increase in average SAPP import prices	US\$46 per MWh	US\$191 per MWh

⁴⁴ The base case scenario assumes that hourly prices in the SAPP DAM match those in 2017. The sensitivity on SAPP prices assumes that hourly prices in the SAPP DAM match those of year 2017 between 2024 and 2027, and those of year 2016 from 2028 onwards. This is a simplifying assumption. SAPP prices are driven largely by the demand-supply balance in South Africa. Currently, excess supply in SA has depressed prices in the SAPP DAM. There is an expectation that the situation in SA will reverse somewhere between 2025 and 2030, depending on growth. Thus, the sensitivity assumes that the SAPP DAM stay as those from year 2017 until 2027, and go back up in 2028 (to match prices from year 2016).



Financial Rate of Return Analysis

32. The financial analysis has been carried out for the same scenarios, including the base case. The justification of the transmission line relies on the same two arguments: extending of the domestic transmission system to the southwest and the ability to source power from Zambia and the SAPP region through the SAPP's DAM. Thus, the financial analysis also focuses on the following three scenarios: (a) no interconnection with the SAPP (the transmission line serving domestic users only); (b) interconnection with the SAPP (base case); and (c) Tanzania trading with the SAPP and hydrological shock.

33. The main difference between the economic analysis and the financial analysis is that, for assessing the financial viability of the project, only those monetary costs and benefits that directly affect the financial situation of the implementing entity (TANESCO) have been taken into account in the analysis. Costs and benefits of externalities, those related to reduction of GHG emissions and productivity gains for farmers, while relevant for the economic analysis, have not been considered in the financial analysis. Taxes and duties are included as applicable in the project costs and benefits. The project costs amount to US\$592 million.⁴⁵ These include import duties at 10 percent on imported goods, including machinery, equipment, and materials, and VAT at 18 percent on purchases of goods and services.

34. The viability indicators used are the FIRR and the FNPV. For the FIRR, the analysis considers the before-income-tax FIRR, given that TANESCO may not have to pay income taxes since it is projected to make losses through the project implementation period. The FNPV is estimated at a discount rate of 13 percent, the estimated entity-level WACC.⁴⁶

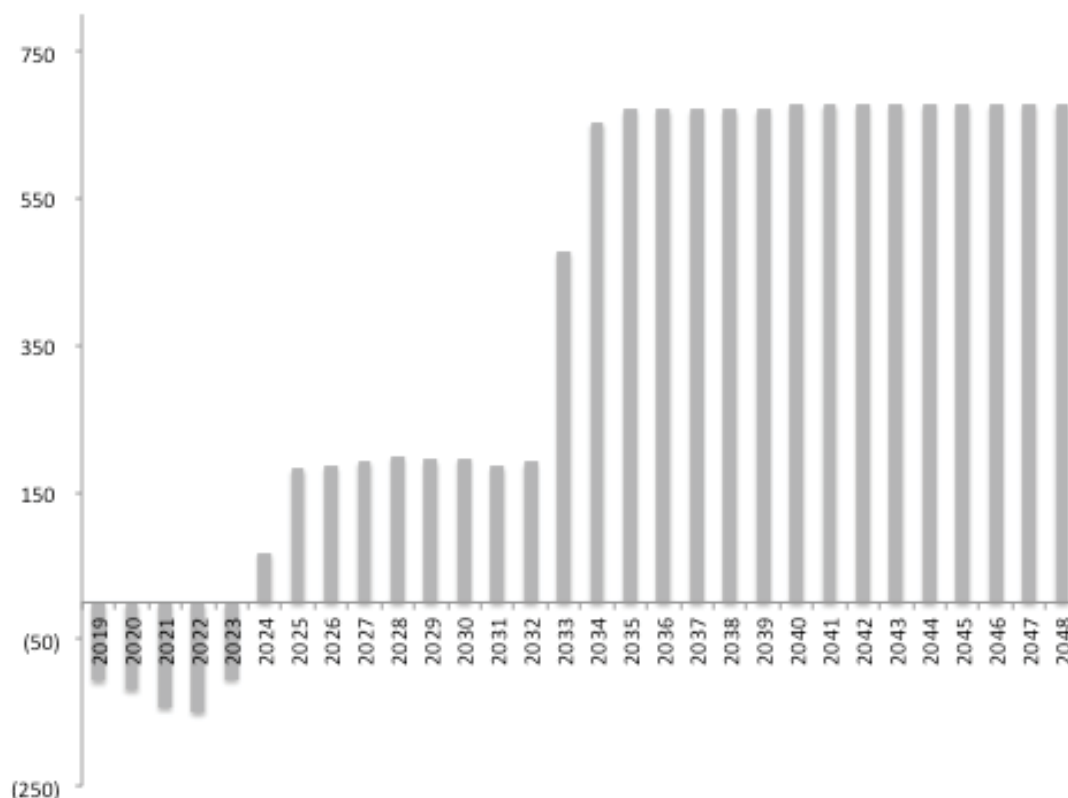
35. **Results.** The base case FIRR is estimated at 23.5 percent and the FNPV at US\$808 million. The FIRR is considerably higher than the entity-level WACC of 13 percent. Figure 4.4 shows the annual cash flows.

⁴⁵ This includes US\$465 million for transmission lines and substations (Component 1, including imports taxes and VAT); US\$95 million for grid infrastructure readiness for interconnection (Component 2, including VAT); US\$22 million to support operational readiness for regional power trade (Subcomponents 3.1 and 3.3, including VAT); and US\$10 for resettlement compensation.

⁴⁶ TANESCO's 2017 tariff adjustment application. EWURA web page.



Figure 4.4. Estimated Annual Cash Flows for Base Case Scenario (US\$, millions)



Source: World Bank.

36. The project is also financially viable under Scenario 3, while the FNPV is slightly negative when there is no interconnection and the transmission line serves domestic users only (Scenario 1). The difference in results, compared to those observed in the economic analysis, relies on the fact that the financial cost of the project for TANESCO is higher than the economic cost of the project (due to taxes) and TANESCO's WACC compared to the discount rate estimated for the country. These results are shown in Table 4.6.

Table 4.6. Project FNPV and FIRR

Scenarios	FIRR (%)	FNPV (US\$, millions)
No interconnection with SAPP	11.6	-142
Interconnection with SAPP (base case)	23.5	808
Interconnection with SAPP and hydrological shock	27.7	1,160

37. Sensitivity tests were carried out to assess the impact of possible adverse variations in the same key parameters as the economic analysis. These are tested for the base case scenario. The results are presented in Table 4.7, which indicates that the project's financial viability remains robust even in adverse scenarios.



Table 4.7. Sensitivity Analysis - Base Case Scenario

	FIRR (%)	FNPV (US\$, millions)
Values of base case scenario	23.5	808
Early construction of Stiegler Gorge (2025/2027)	22.8	733
Project COD delayed by 2 years	19.0	488
COD of generation plants in SW delayed by 5 years	20.7	438
Increase in domestic demand	16.3	345
Increase in SAPP prices 5 years after interconnection	23.2	690
Interconnector's import capacity reduced to 125 MW	21.0	607

38. The switching values compute the values of certain variables that make the FNPV equal to 0. This analysis calculates switching values for an increase in capital investments costs and an increase in the price of imports from the SAPP. The switching values are shown in Table 4.8.

Table 4.8. Switching Values - Base Case Scenario

	Base Case Value	Switching value
Increase in capital investment costs	US\$592 million	US\$1,040 million
Increase in SAPP prices	US\$46 per MWh	US\$98 per MWh

Detailed assumptions

39. Table 4.9 presents all the assumptions used for the economic and financial analysis.

Table 4.9. Assumptions and Data Used

Assumptions	Value	Source and/or Remarks
Year of interconnection	2024	Transmission line becomes operational at the beginning of 2024. Construction costs are disbursed in 5 years according to the following schedule: 18% in FY2019; 20% in FY2020; 23% in FY2021; 23% in FY2022; and 15% in FY2023.
Discount rate for the ENPV	10%	Based on 'Discounting Costs and Benefits in Economic Analysis of World Bank Projects (2016)' ⁴⁷
TANESCO WACC	13%	TANESCO 2017 tariff methodology
Exchange rates	2,250 TSh = US\$1	Average January–February 2018

⁴⁷ The guidelines recommend that "[...] a 3% per capita growth rate translates into a 6% discount rate, and per capita growth rates of 1%-5% yield discount rates of 2%-10%." Average annual per capita growth rate in Tanzania between 2010 and 2017 was 6.7 percent, with a low of 5.1 percent in 2012. The average forecast for 2018–2022 is 6.6 percent. Given these figures, the analysis uses a discount rate of 10 percent, which is between one and two times the per capita growth rate of Tanzania (6.7 percent and 13.4 percent).



Assumptions	Value	Source and/or Remarks
Project capital costs	US\$447 million ⁴⁸ (econ analysis) and US\$592 million (fin analysis)	Estimations prepared for this PAD, based on feasibility studies, including taxes and contingencies
Annual O&M costs	2%	Based on 'Upgrading Feasibility Study from 220kV to 400kV Transmission Line for the Proposed North-West Grid Project,' November 2016, TANESCO (prepared by SWEKO International)
Taxes applied to project costs	18%	Standard rate of VAT in Tanzania based on the Tanzania Revenue Authority. The VAT is subtracted from the project costs for the economic analysis
Average cost of generation	US\$0.0663 per kWh	EWURA
Customers' Willingness to Pay (WTP)	US\$0.15 per kWh	EWURA. Average D1 and T1 retail tariff
New connections in Mbeya and Rukwa regions	21,000 per year	Figure based on the 2012–2017 electrification target to connect 250,000 new customers per year in Tanzania, and the share of existing connections in Mbeya (6.8%) and Rukwa (1.2%) over the total number of connections in 2015. The figure also takes into account forecasts of population growth in Mbeya and Rukwa, based on Prefeasibility Study for Rural Electrification, REA Phase III (2016), TANESCO; and Energy Situation Report (2017), REA.
Average annual consumption per connection, residential customers	1,428 kWh	REA Phase III. Based on (2017) average monthly consumption in Mbeya and Rukwa regions of 75 kWh.
Annual demand growth	8% up to 2030	Based on least cost power system planning analysis prepared by the team, using Tanzania's Master Plan as the basis. Residential demand growth in the region is assumed to flatten in 2030
Capacity of existing diesel-fired mini-grid in Sumbawanga region	5 MW	Consultation with TANESCO
Cost of off-grid diesel in Sumbawanga region	US\$0.22 per kWh	Consultation with TANESCO
Average transmission losses in existing 220 kV Iringa-Mbeya line	5.6%	Consultation with TANESCO
Average transmission losses in the project	3%	Based on the project's technical design
Annual load in Mbeya substation (currently	50 MW	Consultation with TANESCO. To calculate the annual generation, the analysis estimates 8 hours of use per day,

⁴⁸ This includes US\$343 million for transmission lines and substations (Component 1, excluding imports taxes and VAT); US\$78 million for grid infrastructure readiness for interconnection (Component 2, excluding VAT); US\$18 million to support operational readiness for regional power trade (Subcomponents 3.1 and 3.3, excluding VAT); and US\$8 for resettlement compensation.



Assumptions	Value	Source and/or Remarks
connected to 220 kV line)		given demand curve. It also assumes an 8% annual demand growth until 2030
Generation plants connecting to the project in southwestern region (year of connection)	Installed capacity; capital investment cost	The analysis assumes that it takes 4 years to build each generation plant, and costs are disbursed following same schedule as the project
Songwe (2025)	179 MW; US\$469.2 million	PSMP 2016
Ruhudji (2033)	358 MW; US\$666.0 million	PSMP 2016
Rumakali (2034)	222 MW; US\$560.9 million	PSMP 2016
Transmission lines needed to connect generation plant to proposed 400 kV line	Capital investment cost	
Songwe	US\$53.2 million	PSMP 2016
Ruhudji	US\$53.2 million	PSMP 2016
Rumakali	US\$44.2 million	PSMP 2016
Overall connection cost for TANESCO	US\$1,556	NRECA Report. The analysis assumes this cost reduces 30% year-on-year until reaching the cost of service drop
Connection cost – service drop	US\$200	NRECA Report
Trade volumes between Tanzania and SAPP	Average annual imports: 2,110 GWh Average annual exports: 105 GWh	According to the least cost analysis prepared by the World Bank, based on Tanzania's Master Plan and using a more conservative approach.
Cost of electricity imports from the SAPP	US\$0.046 per kWh	Average of annual weighted average price of imports, based on 2017 hourly DAM clearing prices in the SAPP
Cost of emergency power in Tanzania	US\$0.416 per kWh	Based on total costs of on-grid diesel-fired generation
Emission Factors (EF) used to calculate GHG net emissions		
Tanzania's grid EF	0.492 tCO ₂ /MWh	IFI interim harmonized grid factors data set
Diesel EF	0.650 tCO ₂ /MWh	IFI interim harmonized grid factors data set
Off-grid EF (from traditional fuels)	0.800 tCO ₂ /MWh	IFI interim harmonized grid factors data set
Carbon value (of CO ₂ avoided)	From US\$65/ton (2024) to US\$112/ton (2048)	Time series from World Bank Guidance Note of Shadow Price Carbon. Average level of prices

Sources: Tanzania Power Sector Master Plans 2012 and 2016; SAPP Master Plan 2017; EAPP Master Plan 2016; Feasibility Study and Conceptual Design of Tanzania-Zambia Power Interconnection Study, October 2017, NBI (prepared by AECOM); Upgrading Feasibility Study from 220kV to 400kV Transmission Line for the Proposed North-West Grid Project, November 2016, TANESCO (prepared by SWECO International); Feasibility Study, Conceptual Design, and Tender Documents for 400kV Iringa-Mbeya transmission line, November 2012, NBI (prepared by AECOM/SOGREAH); SAPP-EAPP Interconnection Impact Studies, December 2017 (prepared by AURECON under



World Bank project); Complementary Study on Power Trade Volumes, Wheeling Arrangements and Impact on the Interconnected Networks for the ZTK Interconnector Project, December 2016 (prepared by Ricardo; Supplement to the AECOM study); World Bank analysis on Tanzania Least Cost Power Generation Planning (ongoing); Prefeasibility Study for Rural Electrification (REA Phase III), April 2016, TANESCO; and Energy Access Situation Report, February 2017, REA.

Note: NRECA = National Rural Electric Cooperative Association; IFI = International financial institution.



ANNEX 5. FINANCIAL ANALYSIS OF TANESCO

AFCC2/RI-3A TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR

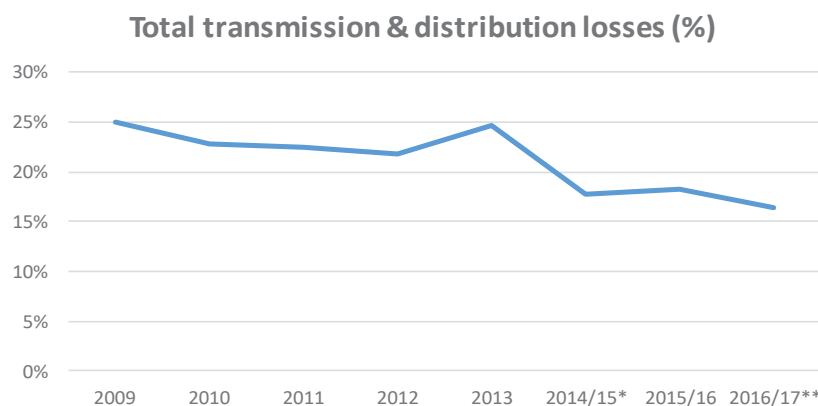
- TANESCO has recovered from its drought-triggered supply shortages in 2011–2013, phased out EPPs, and returned to positive operating cash flow.** In 2011–2013, due to a combination of continued demand growth, underinvestment in power generation and drought conditions severely limiting hydropower production, Tanzania experienced a serious electricity supply crisis. TANESCO entered into a number of expensive short-term contracts with EPPs for a total capacity exceeding 300 MW (the peak demand at that time was about 900 MW). Unable to pass through such expensive contracts to customers, TANESCO quickly accumulated significant payment arrears to fuel and electricity suppliers of around US\$400 million. Only a major Government reform program, supported by two World Bank Development Policy Operations, mitigated a macroeconomic crisis. Since then, average electricity tariffs more than doubled since 2010 in local currency, system losses fell by a quarter, and the cost of supply dropped by half from US\$0.18 per kWh in FY2013 to US\$0.09 per kWh in FY2017. As a result, TANESCO returned to positive cash flow in 2015 and gross profits are expected to be positive for FY2016/17 (audited financial statements are not yet available).
- Tanzania's power sector has faced repeated power crises, the latest one in 2010–2011, which result from its substantial dependence upon domestic hydropower and inadequate system planning to cater to increasing demand.** In the years leading up to 2010, Tanzania was experiencing declining reserve capacity, triggered by growing demand and years of underinvestment in new and diversified generation capacity. Out of total of 1,092 MW of installed capacity in 2010, hydropower represented 52 percent, natural gas 33 percent, oil products 13 percent, and imports 1 percent. In FY2010/11, because of poor rainfall that reduced hydropower production, Tanzania started experiencing a series of supply deficit. At the peak of the crisis, in mid-2011, some parts of the country experienced daily load shedding of up to 12 hours. TANESCO entered into expensive, short-term contracts with private EPPs to provide a total of 317 MW of generation capacity. These steps eased supply shortages but significantly increased the cost of supply: In 2012, the share of electricity generation of the EPPs was 11 percent, but their share of costs was 43 percent, doubling the average unit cost of sales (from US\$0.08 per kWh in 2010 to US\$0.16 per kWh in 2012). This turned the power supply crisis into a financial crisis when the regulator did not pass through the additional costs to consumers. In mid-2012, TANESCO's financial shortfall was running at more than US\$40 million per month, as the hydrological condition continued to be below average, while electricity demand kept increasing, requiring continued engagement of the expensive EPPs. TANESCO accumulated arrears to the EPPs, IPPs, and fuel and other suppliers, as tariffs and government transfers to the sector did not keep up with the rising cost of supply. By the end of 2014, the total cumulative financial gap of the energy sector was expected to be between US\$760 million and US\$1 billion (or between 2.9 percent and 3.8 percent of GDP).



3. **TANESCO's profitability recovered from the 2011–2013 crisis buoyed by tariff increases, improved hydrology, and the phase-out of EPPs.** Because of the measures taken subsequent to the crisis, supported in part by the World Bank Development Policy Operation series, average tariff per unit sold increased from TSh 136 per kWh in FY2011 to TSh 249 per kWh in FY2016 and TSh 238 per kWh in FY2017. GDP growth remained favorable during the same period, at around 7 percent and inflation declined after to around 5–6 percent in FY2013–FY2016/17, cushioning the impact of tariff increases and avoiding erosion of tariffs in real terms. Between FY2011 and FY2015/16, cash collected per year by TANESCO more than doubled and revenues per kWh increased by 82 percent. In parallel, changes in the fuel mix (discussed in the following paragraphs) and the phase-out of 317 MW of expensive EPPs reduced the cost of power generation.

4. **Measures to improve transparency and accountability in TANESCO's operational performance contributed to reducing system losses and improving bill collection.** Technical and nontechnical losses in transmission and distribution fell from 22.4 percent in FY2011 and 24.7 percent in FY2013 to 16.4 percent in FY2017 (Table Error! Reference source not found.5.1).⁴⁹ Average bill collection increased from 82 percent in FY2012 to 101 percent⁵⁰ in FY2016 and 96 percent in FY2017. Several reforms taken by the Government and TANESCO contributed to these improvements, including the performance contract between TANESCO and the MoE and the publication of performance reports, financial audits, and procurement audits, which enhanced transparency and accountability at TANESCO.

Figure 5.1. Decline in Technical and Nontechnical Losses during FY2009–FY2016/17



Source: TANESCO.

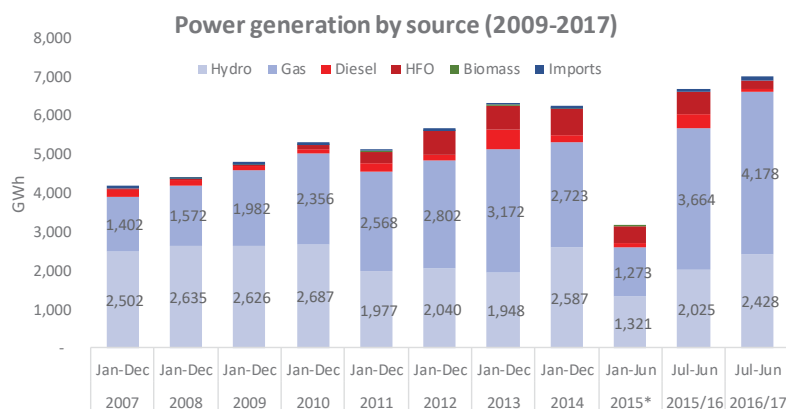
Note: * 18-month period; ** based on TANESCO's management accounts.

⁴⁹ In 2015, the company changed the reporting period from December 31 to June 30 to align its financial year to the Government's fiscal year. As a result, the comparative period is 18 months to June 30, 2015, while the current period which ended on June 30, 2016, covers 12 months.

⁵⁰ The collection rate exceeded 100 percent because the Government made two large, one-off payments to TANESCO to pay off outstanding arrears, and as a result the total cash collected during the year exceeded the total amount billed.



Figure 5.2. Tanzania's Power Generation Mix



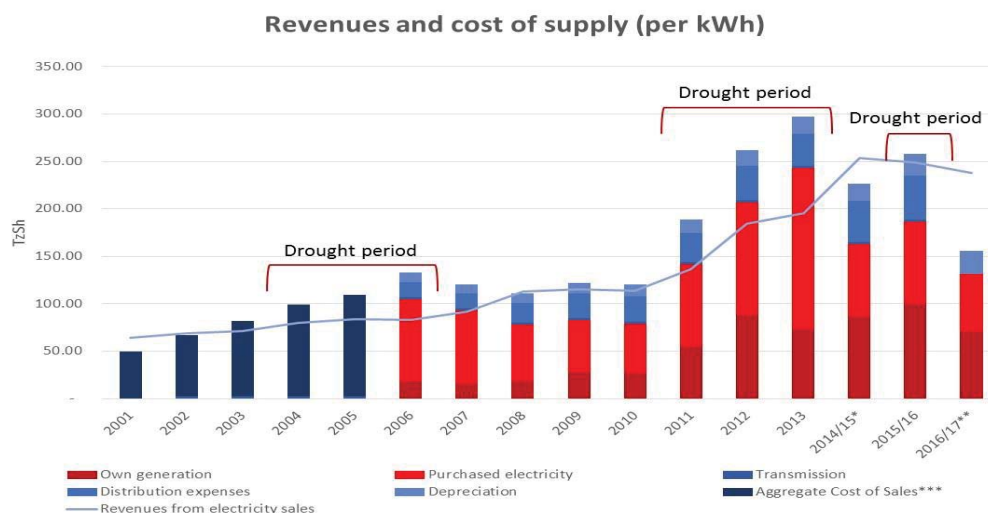
Source: TANESCO.

5. **Newly commissioned gas-fired generation capacity improved supply security and helped phase out oil-fired generation and EPPs.** The Kinyerezi I gas power plant (150 MW) was fully commissioned in 2016 and the first unit of Kinyerezi II was commissioned at the end of 2017. As a result, the share of liquid fuels (diesel and heavy fuel oil) in the generation mix fell from 18 percent in FY2013 to 4 percent in FY2017 (see **Error! Reference source not found.**Table 5.2) leading to lower costs and lower per unit emissions. Together with improved hydrology and lower-than-expected demand growth allowed TANESCO to phase-out 317 MW of oil-fired EPPs.

6. **The switch from oil to gas-fired generation and the phase-out of EPPs contributed to a sharp reduction in the cost of supply.** The average cost of supply (see Figure 5.2) fell by half and returned to pre-crisis levels (US\$0.092 per kWh in FY2017, which compares to US\$0.084 per kWh in FY2010 and US\$0.184 per kWh in FY2013). The main factors were better hydrology (about one-third of the reduction) and the replacement of oil-fired generation and EPPs with natural gas (two-thirds of the reduction).



Figure 5.3. Revenues and Cost of Supply of TANESCO FY2001–FY2016/17



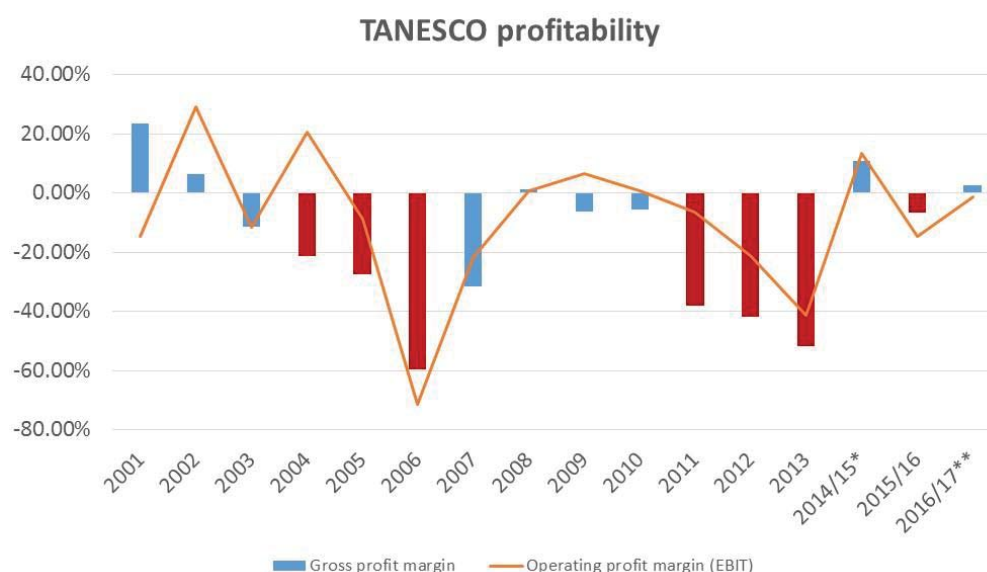
Source: World Bank staff estimates based on TANESCO data.

Note: * 18-month period; ** based on TANESCO's unaudited draft financial statements. *** disaggregated data not available before FY2006.

7. **TANESCO reached operating cost recovery despite the phase-out of operating subsidies from the Government and a major depreciation in FY2015/16.** TANESCO's profitability improved significantly, as shown in Figure 5.3, turning its operating deficit of US\$239 million in FY2013 into an operating surplus of US\$149 million in FY2014/15 and minor operating deficit of US\$7 million in FY2016/17 (FY2015/16 showed an operating deficit of US\$92 million because of poor hydrology conditions). This was achieved amid a period of fiscal consolidation and reduction of budget transfers to TANESCO as well as major exchange rate depreciation during FY2015 (8 percent) and FY2016 (24 percent), which translated into higher fuel cost.



Figure 5.4. Gross Profit Margin (before Government Subsidies and Other Cost and Revenues) and Operating Profit Margin^a of TANESCO during FY2001–FY2016/17



Source: TANESCO.

Note: a. The operating profit margin is defined here as income before financing cost and taxes; * 18-month period; ** based on TANESCO's unaudited draft financial statements.

8. **Government subsidies to cover TANESCO's operating expenses were phased out as profitability improved.** Since the mid-2000s, TANESCO had benefited from Government subsidies to cover its operating expenses. These subsidies escalated during the crisis of 2011–2013, reaching US\$139 million in FY2013. After TANESCO's operational and financial performance improved, Government transfers (net of taxes) to cover operating costs of TANESCO decreased from US\$117 million in FY2012 and US\$139 million in FY2013 to US\$3 million in FY2016 and 0 in FY2017. The Government continues to contribute to financing transmission and generation investment projects in the sector (capital expenses) as well to rural electrification, consistent with the subsidy policies adopted in the NEP 2015.

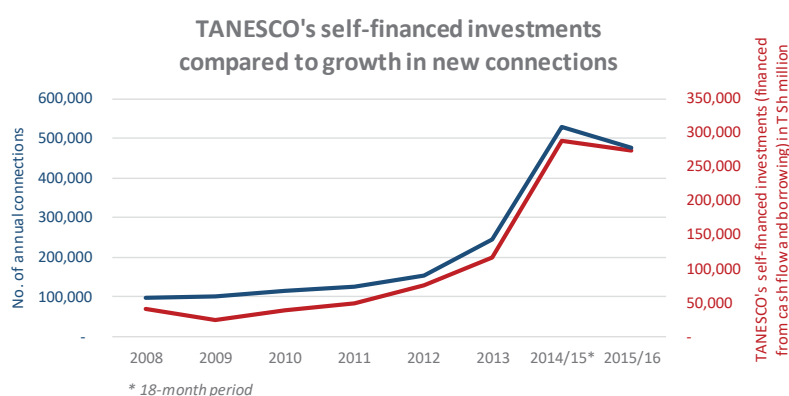
9. Arrears continued to climb; however, the abovementioned measures were insufficient to counterbalance other factors that put pressure on TANESCO's arrears balance. These factors included in particular the acceleration of the electrification program, insufficient Government transfers for investment, and the exchange rate depreciation:

- The sharp depreciation of the local currency between 2015 and 2016 raised the nominal value of TANESCO arrears to suppliers by almost 30 percent in local currency.
- Government support for TANESCO's investment program fell short of cash needs as the Government underwent a period of expenditure consolidation in 2014/15 and 2015/16 to maintain its fiscal deficit target.



- Except for two small commercial loans in the total amount of around TSh 60 billion, TANESCO's access to commercial borrowing to repay arrears was restricted by the Government after FY2014/15.
- After the 2015 election, the new Government put a strong emphasis on a rigorous verification process before clearing outstanding payments/arrears to the private sector, which slowed down payment of outstanding arrears across the public sector.
- At the same time, TANESCO's cash used for investment increased sharply after the Government in January 2013 reduced the cost of new connections by 29 percent to 75 percent and instructed TANESCO to increase its customers' base to 1,500,000 by 2015 and target 250,000 new connections per year (see Figure 5.5).

Figure 5.5. Impact of Acceleration of Electrification Program on TANESCO's Cash Needs for Investment



Source: World Bank staff estimates based on TANESCO data.

10. TANESCO continues to use operating surplus to finance the deficit in capital investment. Table 5.1 **Error! Reference source not found.** summarizes TANESCO's financial performance in 2013–2016. It is evident that the cash generated from financing activities, which include grants from partners, loans from financial institutions, loans from the GoT, and loans from Development Finance Institutions (, was not sufficient to cover TANESCO's capital expenditures in FY2014/15 and FY2015/16, leading to the shortfall being funded from cash generated from operating activities.

Table 5.1. Historical Financial Performance of TANESCO

Item	Unit	2013	2014–2015	2015–2016	2016–2017
Income Statement					
Revenue	TSh billion	934	1,305	1,380	1,415
Cost of sales	TSh billion	(1,430)	(1,164)	(1,469)	(1,379)
Gross profit/(loss)	TSh billion	(496)	141	(89)	36
Gross margin	%	–53	11	–6	3

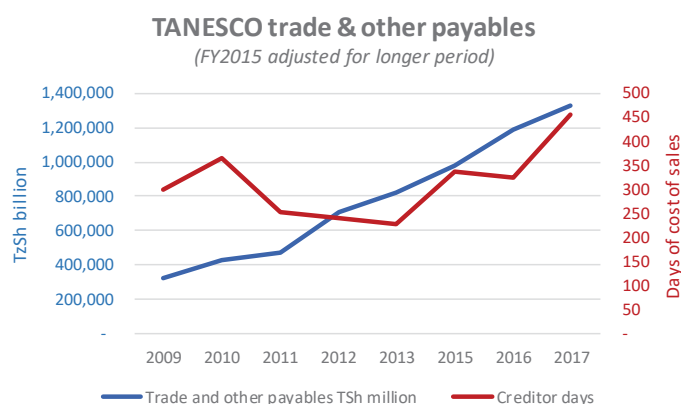


Other income	TSh billion	338	233	163	140
Operating expenses	TSh billion	(241)	(200)	(274)	(192)
Finance Cost	TSh billion	(72)	(193)	(159)	(121)
Net profit (loss) before tax	TSh billion	(468)	(18)	(358)	(137)
Income tax	TSh billion	0	(66)	9	6
Net profit (loss) after tax	TSh billion	(468)	(84)	(349)	(131)
Balance Sheet					
Total Assets	TSh billion	3,774	5,165	8,032	8,565
Non-current assets	TSh billion	3,142	4,578	7,602	7,977
Current assets	TSh billion	632	587	430	588
Non-current liabilities	TSh billion	2,102	3,053	4,234	4,116
Current liabilities	TSh billion	921	1,503	1,830	2,475
Current ratio	Ratio	0.69	0.39	0.23	0.24
Creditor days*	Days	228	336	326	457
Cash Flow Statement					
Net cash generated from/(used in) operating activities	TSh billion	(290)	272	250	291
Net cash generated from financing activities	TSh billion	940	1,083	661	480
Net cash used in investing activities	TSh billion	(509)	(1,319)	(946)	(786)
Net increase (decrease) in cash and cash equivalents	TSh billion	141	36	(35)	(16)
Cash and cash equivalents at the beginning of the year	TSh billion	(13)	128	164	129
Cash surplus (deficit) at the end of year	TSh billion	128	164	129	114

Source: World Bank staff analysis.

Note: * The estimation of creditor days is based on World Bank Staff calculations.

Figure 5.6. Development of TANESCO's Trade and Other Payables



Source: World Bank staff estimates based on TANESCO data; 2017 data based on unaudited draft financial statements.



Table 5.2. TANESCO FY2016 Liabilities

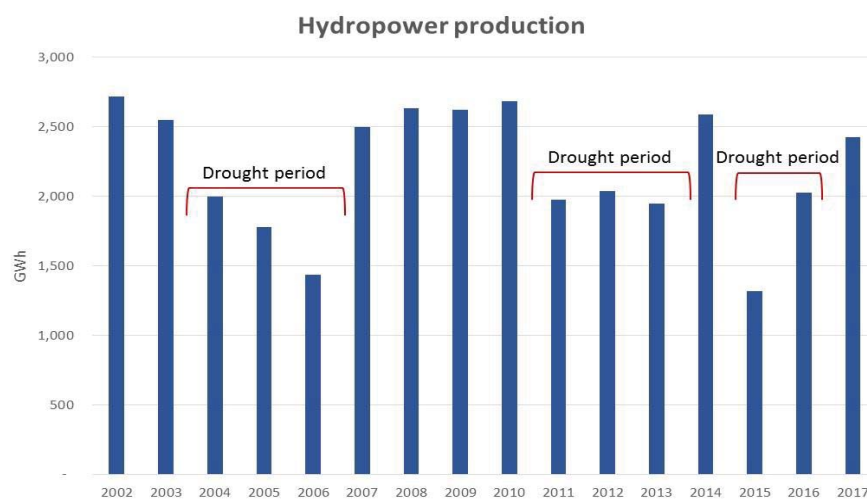
	Total	Of which, arrears
	TSh billion	TSh billion
Total Liabilities	6,062	1,363
GoT on-lent loans	1,074	529
Syndicated loans	456	
Trade payables	873	699
Other payables	314	134
Liabilities with no immediate cash impact (grants, deferred tax liability, post-employment benefits, and so on)	3,345	

11. **Compared with other countries in Sub-Saharan Africa, while Tanzania's power sector is among the better performers on financial parameters associated with operations, it fares worse on financial parameters associated with liquidity.** The left panel in Figure **Error! Reference source not found.**5.8 illustrates that with 92 percent bill collection rate, and 93 percent cost recovery, Tanzania is among the better or mid-performers on key operational performance parameters of the power sector. However, for reasons discussed earlier, the relatively better operational performance is not translated into improvements in liquidity. As the right panel in Figure 5.8 indicates, with a quick ratio of 0.12, payables days at 292, and debt service as a percentage of GDP at 0.18 percent, Tanzania's power sector is among the more illiquid power sectors in sub-Saharan Africa.

12. **Tanzania's power sector is also particularly vulnerable to seasonal variability of domestic hydro resources, and its operational and financial sustainability is strongly affected by droughts in years with tight supply-demand balance.** Tanzania has been hit by three major droughts in the 21st century: 2004–2006, 2011–2013, and 2015–2016. In the first two of these drought periods, TANESCO was facing strained supply-demand balance, and as droughts decreased hydropower generation (Figure 5.7), TANESCO was forced to purchase expensive external power to maintain supply. This led to a sharp increase in the cost of supply, particularly in the drought period of 2011–2013 (Figure 5.3) and consequently in steep gross losses (Figure 5.4). The impact of the drought of 2015–2016 was softened owing, among other factors, to the relatively flexible supply-demand balance. This need not be true for future droughts as the supply-demand balance in Tanzania is expected to shrink and may again expose the power sector to enhanced impacts of droughts.



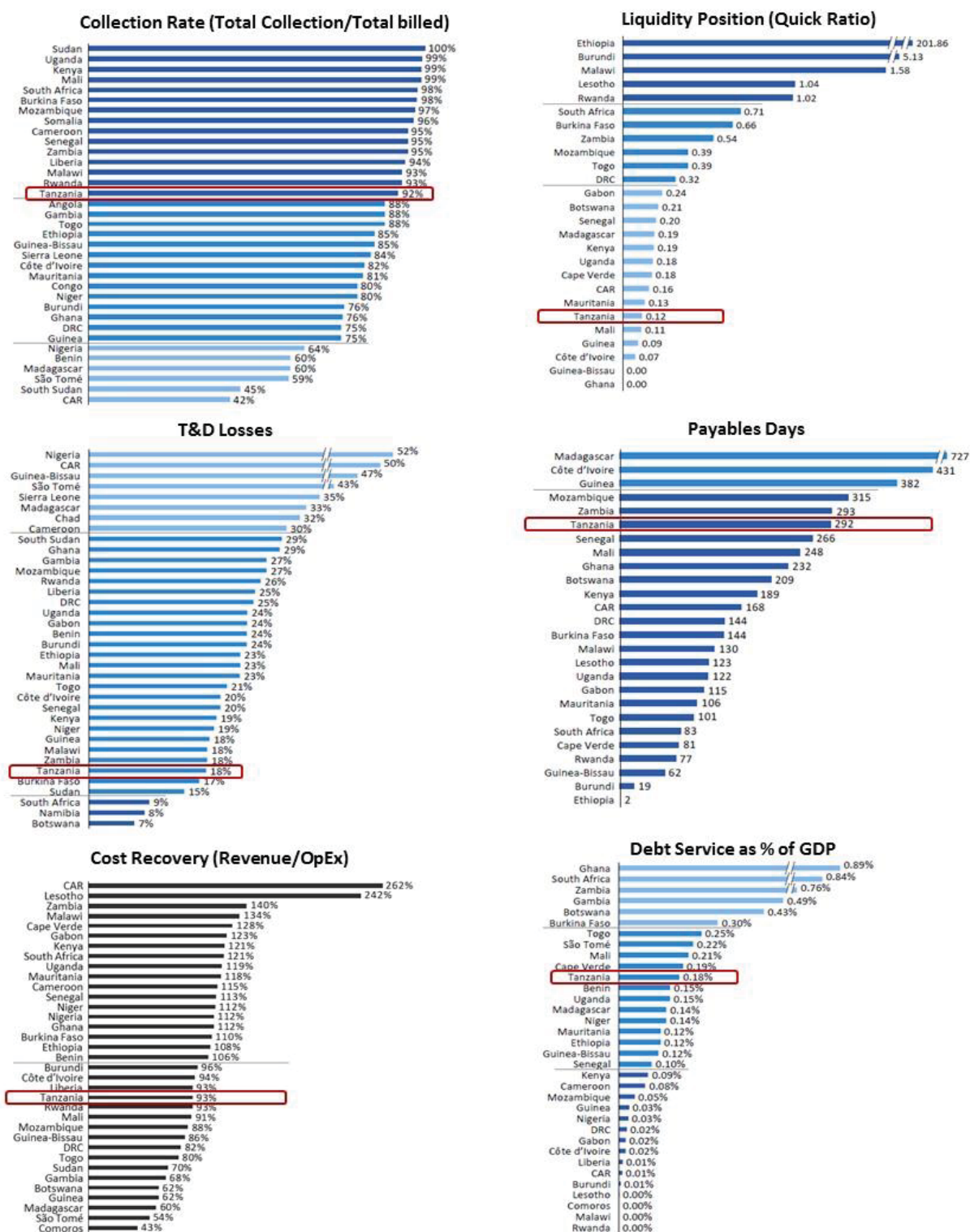
Figure 5.7. Hydropower Production in Tanzania, 2002–2017



Source: World Bank staff analysis.



Figure 5.8. Comparison of Power Sectors of Sub-Saharan African Countries on Key Financial Parameters



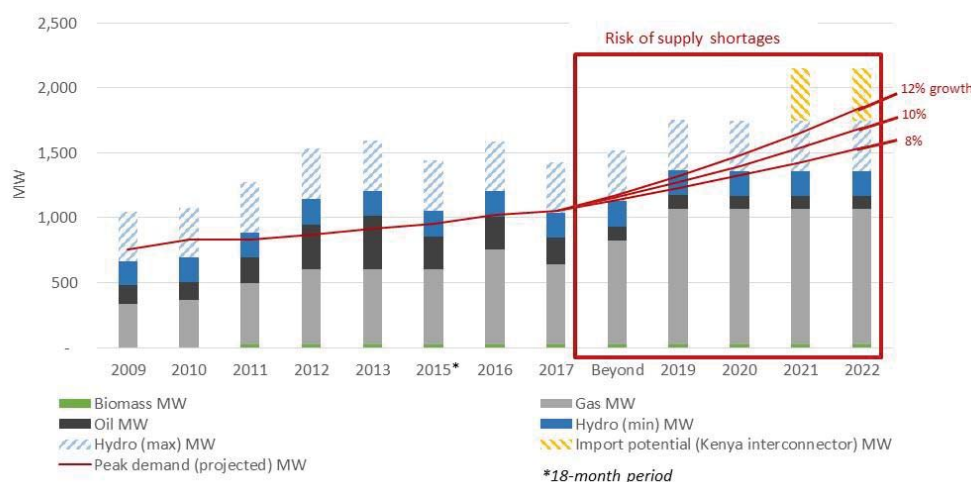
Source: World Bank staff analysis of financial statements of respective utilities of 2016 or latest year available.



Future Outlook

13. **TANESCO's planned capital investments on the supply side aim at improving the supply of electricity and reduce exposure to hydrological risks and dependence on EPPs.** TANESCO has planned total capital investments worth TSh 18.76 trillion over FY2018–2022. The capital investment plan is directed both toward expanding access and adding new non-hydro capacity. Figure 5.9 illustrates future increase in gas-based capacity and import potential that could help TANESCO diversify its supply portfolio.

Figure 5.9. Projected Supply and Demand Balance through 2022



Source: World Bank analysis

14. **Even with planned investments, however, TANESCO will continue being exposed to hydrological risks which may lead to spikes in cost of supply.** While additional gas-based capacity will push up electricity supply, dry years can result in a power deficit as early as 2020 if demand grows at more than 10 percent per year (see Figure 5.9). The deficit may prompt TANESCO to reengage in expensive contracts with EPPs and rapidly deteriorate the already alarming financial situation of the company.

15. **At medium hydropower generation, TANESCO is expected to make positive operating cash flow during FY2018–2022.** Higher revenues and lower cost of sales in non-dry years will result in positive operating cash flows for TANESCO, ranging from an estimated TSh 700 billion in 2018 to TSh 219 billion in 2022. The gradual decline in cash flow can be attributed to revenue growth largely resulting from new consumers added to lower, non-cost-reflective tariff categories.

16. **The proposed TAZA is expected to have a revenue positive impact on TANESCO.** The interconnection with the SAPP will reduce exposure to hydrological fluctuations and consequently to expensive emergency power by providing access to a reliable power pool



uncorrelated with Tanzania's hydrological cycle. In the absence of the interconnection, TANESCO may suffer repeated financial strain from a hydrology shock, in spite of domestic supply diversification planned in the near term. The access to a power pool uncorrelated to Tanzania's hydrology and offering electricity at lower rates than domestic EPPs will, therefore, substantially increase the resilience of Tanzania's power sector.



MAP

AFCC2/RI-3A TANZANIA-ZAMBIA TRANSMISSION INTERCONNECTOR

