



# Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 04-Jan-2018 | Report No: PIDISDSC21895



**BASIC INFORMATION**

**A. Basic Project Data**

Country Africa	Project ID P163752	Parent Project ID (if any)	Project Name AFCC2/RI-3A Tanzania-Zambia Transmission Interconnector (P163752)
Region AFRICA	Estimated Appraisal Date Mar 20, 2018	Estimated Board Date Mar 29, 2018	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) 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.	

**Proposed Development Objective(s)**

The PDO for the overall Series of Project Program 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 PDO for the Series of Project -1 is to increase the availability of grid based power supply to Southern regions of Tanzania and to enable regional interconnection with Zambia

**Financing (in USD Million)**

Financing Source	Amount
Borrowing Agency	10.00
EC: European Commission	30.00
FRANCE: French Agency for Development	90.00
International Development Association (IDA)	400.00
IDA Grant	20.00
<b>Total Project Cost</b>	<b>550.00</b>

Environmental Assessment Category A-Full Assessment	Concept Review Decision Track II-The review did authorize the preparation to continue
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Other Decision (as needed)

## B. Introduction and Context

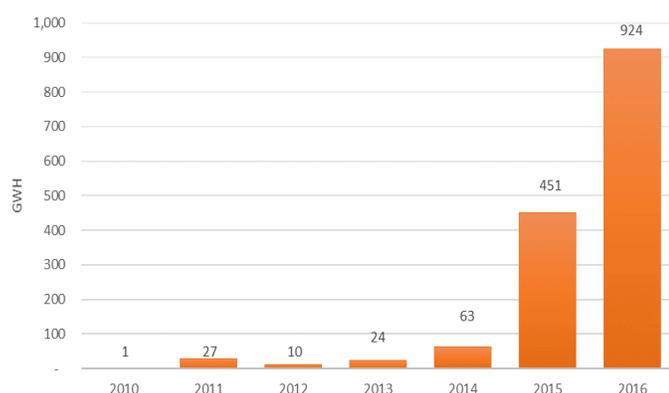
### Regional Context

1. **Regional integration has long been and remains a priority agenda item in Eastern and Southern Africa.** Regional entities such as the East African Community (EAC), Southern African Development Community (SADC), and the Common Market for Eastern and Southern Africa (COMESA) have been established to promote mutually beneficial trade and wider economic cooperation between the countries in the region. Common markets, customs unions and a reduction in trade barriers are expected to maximize gains based on exploitation of diverse resource endowments and natural advantages through lowering of production costs and access to larger regional markets.
2. **Regional infrastructure development is critical to facilitating regional integration to maximize economic benefits.** Both COMESA and SADC recognize and prioritize the development and integration of regional infrastructure to facilitate greater cooperation and trade amongst member countries. In addition to institutional infrastructure, investment in regional transportation (roads, railways, ports) and electricity infrastructure is growing in the region. Tanzania, as a member of SADC, and Zambia, as a member of both COMESA and SADC, are implementing increased transportation and electricity investments to link to the regional markets.
3. **The development of regional electricity trade in Eastern and Southern Africa goes in parallel with the development of the enabling regional institutional capacity.** The Eastern Africa Power Pool (EAPP) and South Africa Power Pool (SAPP) are the two active power pools in the Eastern and Southern Africa regions, respectively, comprising of member countries from the COMESA and SADC economic communities. As with other power pools in the continent, the two power pools are operating under the umbrellas of the two regional organizations, COMESA and SADC respectively for EAPP and SAPP. The Democratic Republic of Congo (DRC) and the Republic of Tanzania belong to both power pools. Interconnection appears to have been growing over the last two decades, culminating in the establishment of SAPP in 1995, and EAPP in 2005. Regional power pool regulatory bodies have been established to facilitate the adoption of common principles, guidelines and methodologies governing cross-border power trade. Since Tanzania is a member of both EAPP and SAPP, its energy regulator – Energy and Water Utilities Regulatory Authority (EWURA) – is part of regulatory bodies of both the EAPP and SAPP.
4. **Power trade can address key energy challenges in Africa, including the continent's chronic need for adequate availability of generation capacity to address supply shortages at least cost.** The regional integration of Africa's power systems would facilitate large-scale development of the region's cost-effective and clean energy sources. Regional transmission interconnections, supported by legal frameworks for electricity trade, would allow the countries in the region accessing the benefits of diverse primary generation sources and thereby optimize the costs related to electricity service provision. For instance, countries with small domestic markets will be able to access much larger regional markets, thus leveraging economies of scale for development large domestic generation resources. Improved reserve margins and the possibility to access regional supplies for serving peak demand will enable importing countries to defer and/or reduce/avoid large and lumpy investments in domestic generation, greatly reducing the internal fiscal burden.
5. **Regional power trade in SAPP has long carried out through bilateral exchanges and an active short-term electricity market.** The majority of electricity trade in SAPP is through bilateral contracts. The short-term energy market operates mostly in the form of the Day Ahead Market (DAM), started operations in 2009. More recently intra-day, weekly futures, and monthly futures markets are also gaining ground. According to the SAPP 2015 annual report, total energy traded in 2015 was 8,471 GWh, 6 percent of which was traded on the competitive market. In 2016, the SAPP members



traded an estimated 924 GWh on the DAM at an average price of 0.07 US cents/kWh.<sup>1</sup> The Republic of South Africa (RSA) is the dominant player in the SAPP, thus price on the short term-market is synchronized with the demand-supply balance in RSA.

POWER TRADED ON SAPP DAM (2010-2016)



Share of Competitive Market in SAPP (2014-2016)



6. **Currently, all power trade in EAPP is through bilateral power purchase agreements.** Interconnected member countries are trading power through medium to long term bilateral contracts. With Ethiopia expecting highly competitive hydropower generation developments, EAPP is looking to scale up mutually beneficial power trade among its members and beyond. Ethiopia and Kenya have signed a 20-year power purchase agreement for 400 MW to be delivered through the Ethiopia-Kenya interconnection, which is expected to be commissioned in 2019. Tanzania and Ethiopia are also currently negotiating a long-term PPA for another 400 MW to be delivered in two stages once the ongoing Kenya-Tanzania interconnection is completed.

7. **Short-term power purchase contracts and markets are likely to be increasingly relevant in the context of increasing investments in domestic generation capacity and increased weather-vulnerability of hydropower dependent systems due to climate change.** While the vast majority of trade between the SAPP member countries is based on long-term PPAs, the short-term market has been developing rapidly (as shown in the graphs above). During 2015-16, 14 percent of the energy traded in SAPP was through competitive markets as compared to bilateral agreements. Countries such as South Africa and Mozambique are increasingly turning to the short term market to try and sell surplus electricity to those facing short-term deficit. For countries facing a negative supply shock, sourcing energy through short-term power markets is usually significantly cheaper than relying on expensive and polluting emergency rental power. In view of this, the planned capacity expansion of member countries, and significant hydropower reliance, the EAPP secretariat has put in place an Action plan to enable an expansion in power trade by establishing the regulatory, commercial and legal foundations for power trade in EAPP. This includes the development of bilateral and multilateral trading platforms (including short-term markets), and preparation for the future interconnection with SAPP.

Country Context

Tanzania

8. **Over the past decade, Tanzania has experienced robust growth accompanied by a relatively high population growth rate.** The country has grown at a robust 6.5 per cent per annum in GDP – higher than the average growth for Sub-

<sup>1</sup> Ricardo/ED61887/Issue Number 2 (based on SAPP CC data)



Saharan Africa of 5.8 percent.<sup>2</sup> Increasing economic diversification has underpinned the strong growth performance largely driven by emerging sectors, such as finance, telecommunications, and construction. The growth in population of approximately 3 percent over the last decade was slightly above the average for sub-Saharan Africa at 2.7 percent. The country's population of 51.8 million is set to reach 74 million by 2030.<sup>3</sup> An estimated 73 percent of Tanzanians live in rural areas but, based on urbanization trends, it is expected that nearly half of the country's population will settle in major and secondary cities by 2030. During the past decade, per capita GDP grew at an average rate of 3.2 percent. Tanzania has witnessed a greater pace of poverty decline from 34 in 2007 to 28 percent in 2012 (extreme poverty dropped by about 2 percentage points), however growth in population implies that the absolute number of people under the national poverty line is approximately the same as in 2007: around 12 million. There is considerable geographical disparity in poverty rates, with the highest rates for regions in the South and West, in particular near **the border with Mozambique, Zambia and Burundi** – these areas tend to be rural, dependent on agriculture, and with poor access to infrastructure services.

9. **Increased integration with regional markets is critical for Tanzania to sustain growth and continue poverty alleviation.** Tanzania is well-positioned to become a regional trade hub. The country is endowed with rich and diverse natural resources and benefits from a strategic location as a coastal economy bordering eight countries, six of which are nearly or completely land-locked. Tanzania has a record of decades of sociopolitical stability, with significantly fewer conflicts than any other East African country. Lowering the barriers to trade with regional markets could lead to the development of export value chains, job creation, and sustained poverty alleviation. Increasing infrastructure linkages (such as roads, railways, and electricity) to regional markets is thus critical for Tanzania's continued robust growth.

### **Zambia**

10. **Zambia is a lower-middle-income country that has achieved significant socio-economic progress over the past two decades.** The country has benefitted from a long period of political stability, growing on average 7.6 percent annually for the past decade, while the average for Sub-Saharan Africa was 5.8 percent (WDI).<sup>4</sup> Per capita incomes improved considerably in the 2000s moving from US\$925 in 1996 to US\$1,619 in 2015 (2010 prices). With population growth averaging close to 3 percent per annum, real GDP per capita growth averaged 4.6 percent between 2004 and 2014. The country's population is about 16 million.<sup>5</sup> Zambia is landlocked but has an open economy, sharing a border with eight countries, which serve as an expanded market for its traded goods and as a route for international and regional trade. Zambia is also a democracy and one of the most politically stable countries in Africa.

11. **The Zambian economy slowed down in 2015 and 2016, as internal and external challenges intensified.** Zambian economy remains largely dependent on copper (typically 77 percent of Zambia's exports), making the country vulnerable to fluctuations in world commodity prices that fell by 50 percent from their 2011 peak. Recent declines in commodity prices, along with tight global financial conditions as well as domestic challenges, led to a slowdown of economic growth to 2.9 percent in 2015 and 3.0 percent in 2016.

12. **The economy is starting to recover and is expected to perform better in 2017.** GDP growth is forecasted to rise to 4.0 percent in 2017 and 4.2 percent in 2018. The forecasts are subject to upside and downside risks, but the return of investor confidence in the fourth quarter of 2016 (evidenced by over-subscribed bond auctions), bold measures by the Government of the Republic of Zambia (GRZ) (including the removal of fuel subsidies), a rally in copper prices (between November 2016 and January 2017), and improved rainfall suggest that economic circumstances are improving.

13. **Progress against poverty has been uneven in urban and rural areas.** The rapid and sustained growth achieved from the early 2000s to 2014 was insufficiently inclusive and despite the economy doubling in size, poverty remains widespread. 57.3 percent of Zambians live in extreme poverty (below US\$1.9 per day, purchasing power parity terms),

<sup>2</sup> Systematic Country Diagnostic (110894-TZ), February 2017

<sup>3</sup> World Bank 2015. *Tanzania Country Economic Update*.

<sup>4</sup> Zambia Systematic Country Diagnostic (Concept Note), February 2017.

<sup>5</sup> Zambia SCD concept Note, February 2017.



poverty is higher among women, and rural poverty at 74 percent is more than double the urban poverty rate of 35 percent. An estimated 54.4 percent of Zambians live below the national poverty line of ZMW 214 per adult equivalent per month, or about US\$0.7 per-day at current exchange rates.

14. **The objective of GRZ is for the country to reach the status of a prosperous middle-income country by 2030.** The GRZ’s Vision 2030 and the new Government’s economic plan – Zambia Plus – lay out a framework for restoring fiscal sustainability and economic diversification. The infrastructure deficit, especially for the rural poor, is an important vehicle for achieving the goal of inclusive, diversified economic growth.

Sectoral and Institutional Context

**Tanzania Power Sector**

Parameter	Value
Electricity Access rate	39% (2015)
Number of electricity customers	1,473,217 (June 30, 2015); 1,163,967 (Dec 2013)
Installed capacity (integrated grid) <sup>a</sup>	1,352 MW (2016) + 73 MW in 18 TANESCO isolated grid plants
Capacity mix (integrated grid) <sup>a</sup>	586 MW (43.4%) hydro; 578 MW (42.8%) gas; 163 MW (12.1%) HFO; 5 MW (0.4%) diesel; 19.4 MW (1.4%) biomass
Share of private sector in the capacity mix (integrated grid) <sup>a</sup>	305 MW (22.5%) (2016)
Peak Demand (integrated grid)	1,026 MW (March 2016)
Average cost of service	286.28 TZS/kWh (13.12USc/kWh) <sup>b, c</sup> 263.02 TZS/kWh (12.05 USc/kWh) <sup>d</sup>
Average tariff (2016) <sup>b</sup>	242.4 TZS/kWh (11.1 USc/kWh) <sup>b</sup>
Average T&D losses	17.5% (2015)
Electricity bill collection rate	86% (2015)

15. **Tanzania Electricity Supply Company (TANESCO), a vertically integrated electricity utility, is at the center of the electricity sector in Tanzania.** TANESCO is a state-owned national utility responsible for electricity generation, transmission, distribution and sale of electricity to the mainland, and bulk power to Zanzibar.<sup>6</sup> Generation assets owned and operated by TANESCO include both on-grid and isolated-grid facilities. Thermal power comprises 63 percent of the total installed capacity, while hydropower represents 37 percent. Private sector participation in generation is in the form of Independent and Small Power Producers (IPPs and SPPs) operating grid-connected and off-grid facilities. The Rural Electrification Agency (REA), formed in 2007, is responsible for promoting rural electrification by investing in rural electricity distribution, using financing from the Rural Electrification Fund. The Ministry of Energy and Minerals (MEM), is responsible for sector coordination and policy-making, and represented at the governing boards of both TANESCO and REA. The sector is regulated by EWURA, an autonomous multi-sectoral regulator, responsible for licensing and regulating access to the market, setting tariffs, establishing technical standards and promoting the quality and reliability of the electricity and water supply services.

16. **Tanzania is pursuing ambitious plans to expand generation and transmission capacity with the aim of improving the reliability and security of supply.** Tanzania has made significant efforts in increasing its generation capacity and diversifying the generation-mix, as well as expanding the national grid, including in rural areas. These efforts were supported by enabling regulatory and institutional frameworks for the growth in electricity supply.<sup>7</sup> In the 2016 Power

<sup>6</sup> Zanzibar has its own distribution utility Zanzibar Electric Supply Company (ZECO).

<sup>7</sup> This includes milestones in regulating the sector such as the Rural Energy Act (2005); the Electricity Act and the Petroleum Act (2008); the revision of the Model Production Sharing Agreement; the establishment of Standardized Power Purchase Agreement and Tariffs (2008); setting up of the



System Master Plan (PSMP), the GoT has declared a very ambitious objective to increase electricity generation from 1,343 MW (as of 2016) to 4,915 MW by 2020 by harnessing Tanzania’s significant thermal and renewable energy resources. According to the PSMP, most of the increase in generation capacity by 2040 will be thermal based, leading to a generation-mix comprising: natural gas (40 percent); coal (35 percent); and hydro (20 percent). Renewables and other sources will constitute 5 percent.<sup>8</sup>

17. **Financial constraints and delays in generation development imply that the security of supply remains at risk.** Seasonal droughts, affecting hydropower production (37 percent of the current generation-mix) and delays in the development of new gas-to-power generation capacity implies that the electricity supply is still vulnerable to hydrological variability. In addition, the transmission capacity is severely constrained in certain sections, particularly during peak hours, leading to substantial technical losses (estimated at 5.5 percent in 2016).<sup>9</sup>

18. **Further investments to strengthen and extend the transmission grid are necessary to expand access to electricity, while ensuring availability and reliability of supply.** The main transmission corridors run from (a) the East to the center, connecting the Dar-es-Salaam gas-to-power generation fleet to major load centers in Iringa, Morogoro, Arusha and Singida; and (b) the North to South, connecting Shinyanga, through Dodoma to Iringa.<sup>10</sup> The coverage of the transmission network remains geographically uneven with the Western and Southern parts of the country having almost no transmission infrastructure.

19. **The Western and Southern regions of Tanzania, characterized by higher poverty rates, lack adequate transmission infrastructure which has constrained development of agro-industry, impeding efforts to alleviate poverty in those regions.** Several districts in the South and the West rely on 33 kV lines stretching over long distances, limited cross-border power supply (e.g. a 66 kV line connecting Sumbawanga with Zambia), and isolated small generation plants. The existing grid infrastructure in the area is incapable of supporting scale-up of rural electrification and inadequate to support the development of productive loads in agriculture, mining and other economic activities. Given the substantial agricultural development and growing demand for electricity services in these under-served communities, there is a dire need for the expansion of transmission grid in these areas. This will provide reliable power to the Southern Agricultural Growth Corridor (SAGCOT), which is on the line route.

20. **Regional power trade presents an opportunity for Tanzania to enhance energy security and access to regional financing.** The planned expansion of gas-based generation in Tanzania can create an opportunity for electricity exports/imports to/from hydro-dependent systems of EAPP or SAPP member countries. The import of stable thermal power from Tanzania could improve supply security of other EAPP and SAPP countries and generate revenues for Tanzania. In parallel, Tanzania can also benefit from importing cost competitive electricity from EAPP and SAPP, both through long term contracts and short-term markets to optimize the energy supply mix. In recognition of the benefits, Tanzania is actively looking to enhance its role in regional electricity trade through, (a) the construction of interconnections with Kenya (ongoing), Rwanda (ongoing), Zambia (proposed), Uganda (planned); (b) strengthening of transmission backbone infrastructure to reliably transfer regional power; (c) expansion in generation capacity to enable export to regional markets.

**Zambia Power Sector**

Parameter	Value
Electricity Access rate	31% (2015, Living Condition Monitoring Survey)

Energy and Water Utilities Regulatory Authority- EWURA (2006), of the Rural Energy Agency and Rural Energy Fund (2007), and the establishment of Petroleum Importation Coordinator Ltd (2012)

<sup>8</sup> Total current installed electricity generation capacity of the interconnected system is of which 566 MW is hydropower and 777 MW is thermal.

<sup>9</sup> TANESCO’s tariff application of February 2016

<sup>10</sup> A transmission map is displayed in Annex 4.



Number of electricity customers	740,000 (2015)
Installed capacity	2,743 MW; of which 1,506 MW is available (2016)
Energy mix	90% - hydro; 10% - coal (2016)
Share of private sector in generation	15% (2016)
Average cost of service	8.4 US cents/kWh (2015 estimates)
Average tariff	5.2 US cents/kWh
Average T&D losses	18% (2015)
Electricity bill collection rate	95%

21. **ZESCO Limited, a state-owned, vertically integrated company, owns and operates the majority of the generation, transmission, and distribution assets in the country.** ZESCO supplies electricity to all consumers in the country, with the exception of the copper mining industry in the Copperbelt Province of Zambia, which is served by the Copperbelt Energy Corporation (CEC). CEC is the single largest ZESCO customer, and purchases bulk power from the utility for resell to mining companies in the Copperbelt. The Zambian electricity sector is overseen by the Ministry of Energy (MoE), which provides overall policy guidance. The sector is regulated by the Energy Regulation Board (ERB), responsible for licensing, tariff setting, and quality of supply and service standards.

22. **Zambia is investing to diversify its generation-mix and improve transmission capacity to ensure quality, security, and reliability of supply.** The grid network includes around 3,200 km and follows the main road network with limited distribution into rural areas. Zambia plans to increase the capacity and diversity of its power supply sources. Therefore, various regional transmission interconnectors, such as the proposed Tanzania-Zambia interconnection, are being pursued. Zambia has recently expanded its central–North-East backbone between Kabwe in the center of the country and Kasama in the north-east, through the construction of a 330kV line. The same corridor is expected to form part of the interconnection with Tanzania through an extension to the border town of Nakonde and the strengthening of transmission capacity.

**Rationale for a Regional Program**

23. **The proposed program supports the construction of a transmission line between Tanzania and Zambia that will provide the first high voltage interconnection between EAPP and SAPP.** This will open up a market for mutually beneficial inter-pool power trade. Recognizing its regional benefits, both EAPP and SAPP masterplans classify the proposed Tanzania-Zambia interconnector as a priority transmission project in the region. Cross-border interconnections, enabling regional power trade is critical for meeting the security of supply and leveling the cost of peak power in Tanzania and Zambia as well as across other interconnected countries. Regional transmission interconnections with a supporting legal framework for electricity trade would allow Tanzania and Zambia diversifying primary generation sources and thereby optimize electricity supply costs. The EAPP and SAPP member countries also would benefit from cost-effective alternatives to access affordable and reliable power supply during droughts, maintenance downtimes, and other supply- related disruptions. To address the increasing demand vis-à-vis shortage and quality of supply, Zambia and Tanzania, along with many other countries in the region, have adopted a medium to long-term multi-track approach for:

- (i) developing new sources of power generation based on hydro, coal, renewables, and recently discovered/developed oil and gas fields;
- (ii) reinforcing and expanding the domestic power transmission network to evacuate power from new generation sources and to extend services to the un-served and under-served population areas; and
- (iii) constructing cross-border interconnectors to facilitate power trade with neighboring countries, and to increase intra-power-pool and inter-power-pool electricity trade both within and between EAPP and SAPP.

24. **The proposed interconnection is the last component of the Ethiopia-Kenya-Tanzania-Zambia (EKTZ) transmission corridor that is being developed in a phased manner.** The corridor development has been identified as



one of the priority power infrastructure projects for Africa designated by Program for Infrastructure Development in Africa. Earlier phases of the EKTZ corridor development include: (i) the 500 kV HVDC Ethiopia-Kenya double-circuit interconnector (co-financed by the World Bank under the Eastern Electricity Highway Project, P126579) – *under construction, is scheduled for completion by June 2019*; (ii) 400 kV Kenya-Tanzania double-circuit interconnector (funded by the African Development Bank (AFDB) and Japan International Cooperation Agency (JICA)) – *under construction, is scheduled for completion by December 2019*; and (iii) 400 kV double-circuit Tanzania backbone line (funded by AFDB, JICA, European Investment Bank, South Korea Economic Development Cooperation Fund and the World Bank under the Tanzania Backbone Transmission Investment Project, P111598) – *completed in December 2016*. This regional power corridor is key for materializing the potential for power trade between the SAPP and EAPP and improving energy security and quality of supply in the region. As mentioned above, the PPA between Ethiopia and Kenya is already in place and between Ethiopia and Tanzania is being negotiated.

25. ***Substantial portion of the inter-pool trade volumes would be traded through the Zambia-Tanzania interconnector.*** In particular, the interconnector would serve to supply power from Ethiopia, which is expecting imminent surplus capacity, via Kenya and Tanzania to Zambia and the SAPP, providing both Tanzania and Zambia with benefits of affordable electricity for consumption and/or profits from wheeling. Based on energy price alone, it may indeed be most economic to purchase power from Ethiopia in the region. Moreover, the interconnector will give the EAPP countries with surplus energy potential access to SAPP DAM. Linking of the EAPP and SAPP networks through the Tanzania-Zambia interconnection is a critical element is providing an expanded market for diversifying the supply sources and leveling the cost of electricity supply across the region.

26. ***The proposed Program will support technical assistance to TANESCO and ZESCO in preparation for regional trade, and will be complemented by ongoing support to the EAPP and SAPP to bolster capacities for scaling up regional power trade.*** The strengthening of regional power pools and the capacity of national utilities to undertake regional transactions and planning are key to the success of regional energy infrastructure investments and for regional electricity market integration. The proposed Program will include technical assistance to ensure that both countries have adequate planning and operational capacities to actively participate in regional power trading. This will be complemented by support to the utilities in the form of transaction advisors to support commercial negotiations to be funded potentially through the existing SAPP Advancing Regional Energy Project (SAPP AREP) Program.

27. ***The Tanzania-Zambia interconnection has been conceptualized as a series of two projects.*** The overall objective of the series is the interconnection of the Zambian and Tanzanian power systems to allow for regional power trade between SAPP and EAPP. Therefore, both SOP-1 and SOP-2 will contribute to the same objective. The scope of SOP-1 would include a 620 kilometer 400 kV double-circuit transmission line and associated infrastructure connecting Iringa, Mbeya, Tunduma (with a short 3 km branch to the Zambian border) and Sumbawanga in Tanzania. SOP-2 would include the second circuit along the central back bone between Kabwe and Nakonde (near the Tanzania border) and further to the border to interconnect with Tanzania.<sup>11</sup>

Relationship to CPF

### C. Proposed Development Objective(s)

The PDO for the overall Series of Project Program 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 PDO for the Series of Project -1 is to increase the availability of grid based power supply to Southern regions of

<sup>11</sup> The exact scope of the SOP-2 will be determined later depending on further developments in Zambia.



Tanzania and to enable regional interconnection with Zambia

Key Results (From PCN)

**Key results for the overall SOP Program:**

- 1. Interconnection between SAPP and EAPP through the Zambia-Tanzania interconnector commissioned (yes/no)
- 2. Cross-border power trade initiated through interconnection (yes/no)

**Key results for the SOP-1:**

- 1. Maximum transmission capacity in the project area subsystem (MW, Iringa-Mbeya-Tunduma-Sumbawanga)
- 2. Reduction in the average number of power outages between Iringa and Mbeya (number of outages/year)

**D. Concept Description**

28. **The proposed Tanzania-Zambia interconnection Program (SOP-1 and SOP-2) covers the construction of the transmission lines from Iringa (Tanzania) to Kabwe (Zambia), with an additional spur in Tanzania between Tunduma and Sumbawanga.** The total cost of the Program is expected to be US\$540 million for SOP-1 (US\$420 million from IDA, and US\$120 million from L'Agence Française de Développement [AFD]); and an additional US\$360 million for SOP-2 (US\$180 million from IDA and US\$180 million from the European Investment Bank [EIB]).

**SOP-1**

29. **The main investment component under SOP-1 will strengthen and extend the Tanzania transmission backbone in the southern and western parts of the country and bring it up to the border with Zambia in preparation for interconnecting with Zambia.** SOP-1 will finance a 620 kilometer 400 kV double-circuit transmission line connecting Iringa, Mbeya, Tunduma (on the Zambian border) and Sumbawanga, and associated substations, all within the boundaries of Tanzania. The Tanzanian segment of the transmission line would start at Iringa, the termination point of the existing transmission backbone that runs from Shinyanga to Iringa (also 400 kV double circuit). In the north the backbone connects to the Kenya-Tanzania interconnection, which is currently under construction. The overall transmission line is thus the main conduit for power flows (originating in Ethiopia) from Kenya into Tanzania and into Zambia and the SAPP. The Tunduma substation will be equipped with a conversion transformer to step down from 400kV to 330kV, used in the Zambian system. This link will in effect interconnect EAPP with the SAPP networks, facilitating bi-directional power trade.

30. **The investments under the proposed SOP-1 will deliver significant national and regional benefits.** Construction of the transmission line will bring reliable national grid based power to under-served and unserved areas of South-western of Tanzania. The increased availability of reliable power will enable the expansion of the national electrification program to these areas, and allow for the development of agro-industry along the SAGCOT corridor and other productive uses. The availability high capacity transmission infrastructure will also the enable evacuation of power from planned generation facilities in the project area. The interconnection with Zambia at the proposed Tunduma substation, will be the first high-voltage interconnection of EAPP with SAPP and will allow mutually beneficial allow trade across the two power pools. It will be the final segment of the transmission corridor from Ethiopia through Kenya and Tanzania into Zambia and SAPP

**Project Funding Sources (US\$ million)**

SOP-1	IDA	AFD	EU Grant	Total
	420	90	30	540
SOP-2 (Estimates)	IDA	EIB	EU Grant	Total
	180	180	30	380



31. **The SOP-1 has four components.** The first component relates to construction of transmission infrastructure to be built in Tanzania, the second component includes ICT hardware and software installation and upgrade at TANESCO Headquarters and regional offices, and setting up of a NCC, the third component provides TA for TANESCO, and finally the fourth component include TA to the EAPP for establishing a power market management operations and capacity strengthening of the EAPP secretariat in power pool management and trade coordination.

32. **Component 1: Tanzania Transmission Extension and Associated Substations. Estimated cost is US\$455 million,** of which US\$335 million from IDA and US\$120 million from AFD. The IDA part of the Component 1 will finance (i) the construction of a 400 kV double circuit transmission lines between Iringa and Sumbawanga; and (ii) the construction of associated substations. The AFD financing include US\$90 million for construction of two substations, US\$30 million grant (co-financing with AFD) for the 3 kilometer 330 kV connection line from Tunduma to the Zambian Boarder and installation of conversion gear in Tunduma).

33. The scope of the project includes the construction of approximately 620 kilometers of 400 kV double circuit transmission lines between Iringa, Kisada, Mbeya, Tunduma and Sumbawanga (strung on one side between Tunduma and Sumbawanga due to lower expected load in the short and medium term in that part of the line). The transmission line will also be extended to the border with Zambia from the Tunduma substation (over approximately a 3 kilometer distance). Component 1 will also finance four new substations: a 400/220/33 kV substation in Kisada; a 400/220/33 kV Mbeya substation in Iganjo; a 400/220/33 kV Tunduma substation in Chiwanda; and a 400/220/66/33 kV Sumbawanga substation in Sumbawanga and 400 kV switchgear in existing Iringa substation in Iringa. The WB will finance the Kisada and Iringa (400 kV switchgear only) substations, while the AFD will finance Mbeya, Tunduma and Sumbawanga substations. In addition, the AFD will finance the conversion facility at the Tunduma substation to allow for electricity conversion from 400 kV required by the Tanzanian grid into 330 kV required for the Zambian grid.

34. **Component 2: TANESCO ICT Infrastructure and National Control Center (NCC): Estimated cost is US\$40 million.** This component will support a needs assessment study and the design, procurement, and implementation of the upgraded ICT system for TANESCO for an efficient integrated utility and grid management system, which will be linked with the new national control system. The component will also include setting-up of a National Control Center (NCC) at the Iringa substation (approximately US\$20 million) to efficiently manage operation, control and dispatching from the entire national grid through transmission connections with neighboring countries, to EAPP and SAPP, once interconnected.

35. **Component 3: Technical Assistance and Project Management Support. Estimated cost is US\$25 million.** This component will support TANESCO in the project supervision and management (both Component 1 and Component 2) and will build TANESCO's capacity to participate in the regional trade at the technical level (the capacity to operate synchronously between EAPP and SAPP) as well at the commercial level (the capacity to conclude PPAs and wheeling agreements and to trade on the spot market). Technical assistance will also provide training in long-term planning by funding the preparation of feasibility studies for key future transmission and generation investments.

36. **Component 3 has two Sub-components:**

**Sub-component 3.1: Support to project management. Estimated cost is US\$ 12 million.** The Sub-component will support the implementation of the engineering, procurement, management and supervision by hiring an owner's engineer consulting services for Components 1 and 2;

**Sub-component 3.2: Capacity building and feasibility studies.** (Estimated cost: US\$ 13 million) will (i) provide capacity building and training to TANESCO; and (ii) support preparation of feasibility studies for new generation and transmission projects as well as for the new NCC at Iringa.



37. **Component 4: Technical Assistance to EAPP.** (Estimated cost: US\$ 20 million) This component will (i) facilitate knowledge- sharing between SAPP and EAPP (South-South exchange); (ii) help design and operationalize a market operator for the EAPP to facilitate short-term power trade. This component may also support measures to facilitate interconnection of EAPP and SAPP, such as grid code harmonization, and putting in place the legal and regulatory mechanisms. The precise scope will be identified during preparation and will be closely aligned to the ongoing Bank-executed MDTF support to the EAPP secretariat.

## SOP-2

**The main investment component under SOP-2 project would finance the required transmission backbone reinforcement and extensions in Zambia to enable the interconnection with Tanzania.** SOP-2 would finance the construction of the second circuit of the central backbone between Kabwe to Nakonde and further to the eastern border with Tanzania. The investments supported under SOP-2 would increase the capacity and reliability of the line to facilitate bi-directional power trade between the two countries and across the two power pools. Specific components under SOP-2 project will be determined during its preparation and appraisal.

## SAFEGUARDS

### A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The Iringa-Mbeya segment of the line under the SOP1 is in Tanzania's Southern Highlands. Most of the Mbeya-Sumbawanga segment lies in the Great Rift Valley. Vegetation cover is miombo woodland (a grassland-savanna-scrubland biome), grassland, bush, cropland and plantations. 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), the Chimala Scarp Forest Reserve, and two Important Bird Areas. It traverses the Igambo-Igawa Wildlife Corridor that links the MKGR and Ruaha National Park. The line traverses through a number of settlements, largely in rural area. Agriculture is one of the key economic activities in the project area.

### B. Borrower's Institutional Capacity for Safeguard Policies

TANESCO has an 18-person Environment Department that consists of the manager (who is an environmental specialist), six environmental officers/technicians, six surveyors, one surveyor technician, and four social scientists. In the implementation of the Backbone Transmission Development Project (BTDP) and the on-grid component of Tanzania Energy Development and Access Project (TEDAP), the department has demonstrated sufficient capacity to implement projects in compliance with World Bank environmental safeguards policies. A recent TEDAP supervision mission revealed certain deficiencies in TANESCO's documentation of RAP implementation. This is investigated as part of the due diligence review of resettlement activities ahead of the TEDAP closing. This review also looks at client's capacity to implement resettlement in line with the WB policies. The results of the review will be available prior to the project Appraisal and included in the Appraisal stage version of this document.

### C. Environmental and Social Safeguards Specialists on the Team

Thomas E. Walton, Environmental Safeguards Specialist  
Mary C.K. Bitekerezho, Social Safeguards Specialist  
Jane A. N. Kibbassa, Environmental Safeguards Specialist  
Ekaterina Romanova, Social Safeguards Specialist



D. Policies that might apply

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	<p>The project is in Category A for environmental assessment because of its length, its 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. An ESIA has been prepared by an international consultant for the Iringa-Mbeya segment of Component 1 under the Nile Equatorial Lakes Subsidiary Action Program (NELSAP) of the Nile Basin Initiative and reviewed and approved by NELSAP and NEMC. Bank safeguards policies were taken into account in its preparation. The Bank project team participated in the NELSAP review process. An ESIA has also been prepared for the Mbeya-Sumbawanga segment of Component 1 and approved by NEMC. The Iringa-Mbeya ESIA requires updating, since it was issued in 2012, plus the addition of a few new topics such as risk of bat collisions with the line and the construction/renovation work for the National Control Center at the Iringa Substation, the potential impacts of which will be managed under the ESMP contained in the ESIA. The Mbeya-Sumbawanga ESIA, which was prepared by TANESCO when bilateral funding was contemplated, needs more substantial revision to be brought into conformance with Bank policies. The two ESIA's will be kept as separate documents, but one consolidated Executive Summary covering both will be prepared. Apart from temporary impacts during construction, such as noise, dust, pollution from oil and fuel spills and construction camp wastes, potential social conflict between "foreign" workers and local communities, the ESIA's list the main adverse impacts as: bird 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. Four alternative alignments were evaluated on environmental, social, and technical grounds for the Iringa-Mbeya section of the line. Although the preferred option had the highest number of project-affected people, it has the fewest residential structures to be moved, the lowest area of</p>



permanent loss of land, the least impact on land use and tree crops production. It would have the lowest resettlement/land acquisition cost. While it and one other alternative would involve the lowest loss of vegetative cover, it is inferior to the other three in terms of impact on wildlife and to two of the others with respect to bird collision risk. The ESIA for Mbeya-Sumbawanga does not have an adequate analysis of alternatives – a gap that will be filled when it is revised. Both ESIA's and the consolidated summary will be completed and disclosed prior to appraisal. They cover all associated facilities.

No resettlement impacts are expected as a result of any construction and installations financed under Component 2, as they will be within the boundaries of the existing and planned substations under the project. There are no users or occupiers of such land. Environmental management for all construction and installations under Component 1 and 2 is provided by means of the ESIA's and ESMPs.

Feasibility studies prepared under Subcomponent 3.2 will need to take Bank safeguards policies into account. Component 4 and Subcomponent 3.1 will have no impacts

Natural Habitats OP/BP 4.04

Yes

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 it 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 Important Bird Areas, 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. Mitigation measures will be required 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.



Forests OP/BP 4.36	No	The policy is not triggered for several reasons. Although the alignment is adjacent to the Chimala Scarp Forest Reserve and the MKGR, it remains outside their boundaries. The Igambo-Igawa Wildlife Corridor has been disturbed by human activities including cultivation, grazing, and charcoal burning. The potential impacts on those areas will be managed in accordance with OP 4.04. Miombo woodland is not considered forest. The project will thus not convert natural forest, nor will it support forest conversion, forest harvesting, or forest management.
Pest Management OP 4.09	No	The project will not fund procurement of pesticides or cause increases in pesticide usage. TANESCO does not use herbicides for wayleave clearing or maintenance.
Physical Cultural Resources OP/BP 4.11	Yes	Village graveyards are present within the proposed transmission line corridor. If they cannot be avoided, they will need to be relocated in accordance with OP 4.12 and the applicable Tanzanian law. If any graveyards to be relocated are identified, the RPF/RAP will provide clear guidance on the process. The proposed alignment avoids the one known archaeological site at Isimila near Iringa. A chance-finds procedure will be included in the ESIA's and in construction contracts in case other physical cultural resources are discovered during line or substation construction.
Indigenous Peoples OP/BP 4.10	No	A due diligence review has been carried out in July 2017 as part of project preparation. The review has confirmed that there are no indigenous peoples per the policy criteria along the transmission line corridor.
Involuntary Resettlement OP/BP 4.12	Yes	Land acquisition will be required for the transmission line wayleave and tower locations and for the substations. Under SOP 1, the resettlement impact will be due to activities under Component 1 and some impact may be expected due to substation improvements under Component 2. A Resettlement Action Plan (RAP) was prepared in 2012 for the Iringa-Mbeya segment of the line, where the alignment is fairly well determined. The length of this segment is approximately 200 km. The estimated number of affected households was 359 and the land to be acquired was 2800 ha, mostly used for agriculture and tree crops. This RAP will be updated, given that it was prepared five years ago, and disclosed prior to appraisal. A Resettlement Policy Framework (RPF) will be prepared for the remainder of the line, where the



corridor is only approximate. The RPF will be disclosed prior to appraisal, and the RAP or RAPs for Mbeya-Tunduma-Sumbawanga, 400 km in length, will be prepared immediately following an update of both the Feasibility Study and the ESIA for this section of the transmission line

Safety of Dams OP/BP 4.37	No	The project does not involve construction or rehabilitation of dams, nor does it depend on any existing dam.
Projects on International Waterways OP/BP 7.50	No	The project will have no impact on the quality or quantity of water in any international waterway.
Projects in Disputed Areas OP/BP 7.60	No	The project is not located in any disputed territory.

### E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Jan 15, 2018

Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

Actions prior to appraisal:

- Update and disclosure of Iringa-Mbeya RAP
- Update and disclosure of Iringa-Mbeya ESIA (the executive summary to include information for the whole corridor in Tanzania.)
- Preparation and disclosure of RPF
- Revision and disclosure of Mbeya-Sumbawanga ESIA

Action prior to a contract award for the Mbeya-Tunduma-Sumbawanga section:

- Preparation and disclosure of Mbeya- Tunduma- Sumbwanga RAP(s)

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