Zambia-Tanzania-Kenya Power Interconnector

Project Location
Kabwe (Zambia) to Iringa (Tanzania)

Owners & Project Sponsors
Government of Zambia
Government of Tanzania

Implementing Partners
ZESCO
TANESCO

Regional Economic Community
Common Market for Eastern and Southern Africa
Zambia-Tanzania-Kenya Power Interconnector

**Project Description**

- The project entails interconnecting the power systems of Zambia, Tanzania and Kenya through the construction of high voltage AC transmission lines.

- **Project Routing:** Kabwe-Pensulo-Kasama-Nakonde-Tunduma-Mbeya-Iringa-Singinda-Arusha-Isinya.

- **Total Distance:** 2,344km
  - Zambia (904km);
  - Tanzania (1344km);
  - Kenya (96km)
Zambia-Tanzania-Kenya Power Interconnector

Main objectives are to:

✓ Enhance electricity Trade;
✓ Improve security and reliability of electricity supply;
✓ Foster socio-economic development and promote Regional Integration;
Zambia-Tanzania-Kenya Power Interconnector

Benefits

✓ Create the largest power market on the Continent by connecting SAPP & EAPP thereby creating a Cape to Cairo power highway;

✓ Contribute to direct economic development and job creation in Zambia, Tanzania and Kenya including the entire SAPP and EAPP.

✓ Create ICT super highway through the inclusion of the Optical Fibre Ground Wire (OPGW) on the towers between the two power pools of EAPP and SAPP
Location

ZTK Power Interconnector

ZAMBIA

TANZANIA

908km

414km

Funding Required
**Zambia - Tanzania - Kenya Power Interconnector Project**

**Graphical Concept for the Kabwe Iringa Section**

- **Existing Pensulo Substation**
- **Existing Kafue Substation**
- **Future Kabwe Substation**
- **Existing Kabwe Substation**
- **Future Nabwera Substation**
- **Existing Kasama Substation**
- **Future Kasama Substation**
- **Existing Kasama Substation**
- **Future Nakonde Substation**
- **Existing Nakonde Substation**
- **Future Mbeya Substation**
- **Existing Mbeya Substation**
- **Existing Izinga Substation**
- **Future Mbeya Substation**
- **Existing Mbeya Substation**
- **Existing Izinga Substation**

**Key Projects:**
- **298km, 330kV Pensulo-Kabwe**
  - 1st Circuit: Old Line
  - 2nd Circuit: Funds are yet to be secured under the ZTK project
- **381km, 330kV Kasama - Pensulo**
  - 1st Circuit: Commissioned in 2015 by ZESCO
  - Cost: US$ 153 million
  - 2nd Circuit: Funds are yet to be secured under the ZTK project
  - EPC + Finance Model by ZESCO
- **194.2km, 330kV Pensulo - Mpika**
  - 2nd Circuit: Funds are yet to be secured under the ZTK project
- **292km, 400kV Iringa - Mbeya**
  - Double Circuit
  - Funds are yet to be secured
  - Estimated Cost: US$ 110 million
- **211.8km, Nakonde - Kasama**
  - 330/400kV Nakonde substation
  - 1st circuit: 211.8km of 330kV line to Kasama. EPC + Finance Model by ZESCO
  - 2nd Circuit: 211km of 330kV line between Nakonde and Kasama. Funds are yet to be secured under the ZTK project
- **381km, 330kV Kasama - Pensulo**
  - 1st Circuit: Commissioned in 2015 by ZESCO
  - Cost: US$ 153 million
  - 2nd Circuit: Funds are yet to be secured under the ZTK project
- **211.8km, Nakonde - Kasama**
  - Proposed scheme
  - 1st Circuit: 211.8km of 330kV line to Kasama. EPC + Finance Model by ZESCO
  - 2nd Circuit: 211km of 330kV line between Nakonde and Kasama. Funds are yet to be secured under the ZTK project
- **423km, 400kV Double Circuit**
  - to singida
Zambia-Tanzania-Kenya Power Interconnector

Funding gaps

✓ Zambia (about US$200 million)
✓ Tanzania (about US$260 million)
Zambia-Tanzania-Kenya Power Interconnector

Implementation Strategy

✓ Each country shall **Finance, Build, Own and Operate** the transmission infrastructure within its boundaries;

✓ The Power Utilities will **Operate and Maintain** the infrastructure within their countries (ZESCO, TANESCO, KETRACO);

✓ Each country has established a Project Management Unit (PMU) to co-ordinate the development of the Project within its borders;

✓ PMU in Zambia has been entrusted with overall coordination. The Zambia PMU is the Office for Promoting Private Power Investment (OPPPI) in the Ministry of Energy; and

✓ The three Governments shall establish appropriate mechanisms for coordinating the interconnector operations and power trading post commissioning of the project.
Zambia-Tanzania-Kenya Power Interconnector

Project Preparation Support
✓ World Bank, NEPAD – IPPF, Norwegian Government, European Union, COMESA, KfW

✓ Outputs
   ✓ Transaction Advisory Services and Reports
     ✓ Project structuring; Private sector/PPP Models considered
   ✓ Feasibility study reports,
   ✓ Complementary study reports on power markets, trading, power transfers and interconnections
   ✓ IGMOUs, TIGMOUs
 ✓ Resource mobilisation through Financiers’ Conference (29-30 November, 2017 in Livingstone, Zambia)
STATUS

ZTK Power Interconnector Project
Technical Features
ZTK Power Interconnector

1,322km Transmission Lines + 9 Substations

Zambia: 908km (330kV) + 6 Substations
Tanzania: 414km (400kV) + 3 Substations
Business Model & Project Costs
ZTK Power Interconnector

• **Using a Public Financing Model:** TANESCO and ZESCO will procure and fund their sections of the interconnector via EPC contractors.

• An opportunity exists for the private sector to lease excess optical fibres (“dark fibres”) from TANESCO and ZESCO.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>TOTAL (USD’000)</th>
<th>TANZANIA (USD’000)</th>
<th>ZAMBA (USD’000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINES</td>
<td>167 593 000</td>
<td>52 442 000</td>
<td>115 151 000</td>
</tr>
<tr>
<td>SUBSTATIONS</td>
<td>118 081 000</td>
<td>71 796 000</td>
<td>46 285 000</td>
</tr>
<tr>
<td>SUB-TOTAL</td>
<td>285 674 000</td>
<td>124 238 000</td>
<td>161 436 000</td>
</tr>
<tr>
<td>ENVIRONMENTAL AND SOCIAL COSTS</td>
<td>29 124 000</td>
<td>17 952 000</td>
<td>11 172 000</td>
</tr>
<tr>
<td>TOTAL (2017 FEASIBILITY STUDY)</td>
<td>314 798 000</td>
<td>142 190 000</td>
<td>172 608 000</td>
</tr>
</tbody>
</table>

MBEYA – IRINGA (2012 TERMS) 110 000 000 110 000 000

GRAND TOTAL 424 798 000 152 190 000 172 608 000
Financial Analysis & Revenue Model
ZTK Power Interconnector

<table>
<thead>
<tr>
<th>US$ MILLION</th>
<th>REAL TOTALS</th>
<th>DISCOUNTED REAL TOTALS (@10%)</th>
<th>ASSUMPTION USED IN 2017 FEASIBILITY STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Benefits</strong></td>
<td>2,902.8</td>
<td>798.1</td>
<td>[describe high level assumption]</td>
</tr>
<tr>
<td><strong>Capex</strong></td>
<td>(314.8)</td>
<td>(265.7)</td>
<td>Total construction costs and associated social costs</td>
</tr>
<tr>
<td><strong>Opex</strong></td>
<td>(142.8)</td>
<td>(40.9)</td>
<td>$5.71 million per annum over 25 years.</td>
</tr>
<tr>
<td><strong>Residual Value</strong></td>
<td>250.3</td>
<td>18.3</td>
<td>Balancing figure</td>
</tr>
<tr>
<td><strong>Net Benefit (Scenario 1)</strong></td>
<td>2,695.4</td>
<td>509.8</td>
<td>NPV of $510m calculated using a real discount rate of 10%</td>
</tr>
<tr>
<td><strong>Real IRR (Scenario 1)</strong></td>
<td>25.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After commissioning, TANESCO and ZESCO intend to enter into Power Purchase Agreements (PPAs) and Wheeling Agreements with various regional players in the EAPP and SAPP.
add high level description
Carla Rooseboom, 12/1/2017
Funding Opportunities
ZTK Power Interconnector

- Governments of Zambia and Tanzania will raise long-term concessionary loans and grants from multilateral financing institutions, which will be supplemented by commercial loans if a funding gap exists.
- Loans will be passed onto TANESCO and ZESCO, by their respective Governments, with the necessary guarantees and counterpart funding.
- Financing using project bonds is a possibility once the Project has been commissioned.
- Project bonds would allow concessionary lenders to recycle their loans earlier (i.e. after 4 years when the Project is commissioned).
- Project bonds may also offer an opportunity to raise funding in local currencies that are also inflation linked which may be attractive to Zambian and Tanzanian institutional investors.
Environmental & Social Assessments

ZTK Power Interconnector

For ZAMBIA,

- the project routing is sparsely populated areas, with few sensitive sites
- Proposed line is mostly accessible with formal roads.
- Most impacts are either of low significance or insignificant in magnitude.
- The only impact of potentially high significance is the positive effect of increased power supply within the communities that will be fed by the line.

For TANZANIA,

- the negative impacts of the planned project are relatively modest.
- most of the line will run through low-density populated woodland with only scattered cultivation.
- Game and Forest Reserve have been avoided in the line routing
- minor negative impacts are envisaged for the resettling of households, and wildlife and nature conservation in the areas where the line crosses or runs close to protected areas.

In both Zambia and Tanzania, significant positive social impacts will arise from increased employment both during construction and more sustainably during line operation and maintenance.
ZTK Will Generate an Estimated 290,000 Job Years over Its Useful Life of 25 Years

26,000 JOB YEARS FROM PROJECT DEVELOPMENT, CONSTRUCTION, AND OPERATION

<table>
<thead>
<tr>
<th>PHASE</th>
<th>Zambia</th>
<th>Tanzania</th>
<th>Kenya</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>Indirect</td>
<td>Induced</td>
<td>Direct</td>
</tr>
<tr>
<td>Project Preparation</td>
<td>105</td>
<td>16</td>
<td>92</td>
<td>31</td>
</tr>
<tr>
<td>Construction</td>
<td>1,158</td>
<td>111</td>
<td>2,006</td>
<td>526</td>
</tr>
<tr>
<td>Total One-Time</td>
<td>1,263</td>
<td>127</td>
<td>2,098</td>
<td>557</td>
</tr>
<tr>
<td>O&amp;M (over 25 years)</td>
<td>3,600</td>
<td>350</td>
<td>6,225</td>
<td>1,125</td>
</tr>
<tr>
<td>Total Primary Effects</td>
<td>4,863</td>
<td>477</td>
<td>8,323</td>
<td>1,682</td>
</tr>
</tbody>
</table>

263,000 JOB YEARS FROM SECONDARY SPILL OVER EFFECTS ON THE ECONOMY

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual Electricity Supply (million US$)</th>
<th>Annual</th>
<th>Over Useful Life (25 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Direct</td>
<td>Indirect</td>
</tr>
<tr>
<td>Tanzania</td>
<td>$104.4</td>
<td>2,031</td>
<td>6,171</td>
</tr>
<tr>
<td>Zambia</td>
<td>$7.5</td>
<td>122</td>
<td>160</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,153</td>
<td>6,331</td>
</tr>
</tbody>
</table>
ZTK Generates An Estimated 13,700 Average Annual Jobs
(BASED ON PRELIMINARY ASSUMPTIONS)

<table>
<thead>
<tr>
<th></th>
<th>Project Preparation</th>
<th>Construction</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(17 years)</td>
<td></td>
<td>(3 years)</td>
<td>(25 years useful life)</td>
</tr>
<tr>
<td>Number of Average Annual Jobs</td>
<td></td>
<td></td>
<td>10,500 Secondary effects (Direct, indirect, induced)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>700 O&amp;M jobs</td>
</tr>
<tr>
<td>18 direct, indirect, induced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,500 jobs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10,500 Secondary effects (Direct, indirect, induced)
700 O&M jobs
## Required Job Skills & Potential Interventions to Maximize African Jobs

<table>
<thead>
<tr>
<th>PROJECT PHASE</th>
<th>EXAMPLES OF OCCUPATIONS</th>
<th>EXAMPLES OF POTENTIAL INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Preparation</td>
<td>• Project developers&lt;br&gt;• Financial advisors&lt;br&gt;• Engineers</td>
<td>• Require local content, hiring, and training in procurement documents&lt;br&gt;• Provide in-country training</td>
</tr>
<tr>
<td>Project Construction</td>
<td>• Construction supervisors&lt;br&gt;• Engineers&lt;br&gt;• Procurement experts&lt;br&gt;• Safety directors</td>
<td>• Require contractors to hire locally and train employees&lt;br&gt;• Provide peer-peer training&lt;br&gt;• Provide tax incentives for local jobs and content</td>
</tr>
<tr>
<td>Project Operations and Maintenance</td>
<td>• Plant operators&lt;br&gt;• Mechanical operators&lt;br&gt;• Maintenance and control engineers&lt;br&gt;• Site safety specialists</td>
<td>• Provide incentives for local hiring/training&lt;br&gt;• Track training and employment performance by key targets</td>
</tr>
</tbody>
</table>
Way Forward
ZTK Power Interconnector

Supplementary Market Study on Power Trade Volumes and Wheeling Agreements
- Dec 2016
  - Meeting of Officials from the participating countries

2016-ongoing
- Letters to potential lenders (Debt financing) and Potential EPC contractors
  - Mid-2017
    - Financiers'/EPC Contractors Conference

Nov 2017
- EPC Contract Procurement
  - Due diligence, negotiations & signing with lenders
    - TBC
      - Financial Close
        - PPAs / Wheeling Agreement Negotiations & Signing

TBC