Power Sector in Zambia – Opportunities for Private Companies

Presentation of the Information Workshop on Decentralised Energy Supply and Load Management in Zambia
Berlin, Germany, December 2017
Outline

• Structure of Zambia’s electricity sub sector
• Legal and Regulatory regime
• Generation mix
• Investment opportunities for private German Companies in the sector
• Wind Sun Energy Zambia Limited
  – Company Profile
  – Project outlook
  – Networking opportunities
Structure of the Electricity Sub-sector

Ministry of Energy Development

Rural Electrification Authority

Energy Regulation Board

Lunsemfwa Hydropower Company

Maamba Coal Plant

Ndola Energy (HFO)

New Solar Projects
  - Scaling Solar
  - ReFiT

ZESCO Limited (National Electricity Utility)

Power Imports

Power Exports

Northwest Energy Corporation

Copperbelt Energy Corporation

CONSUMERS

Mining Consumers

Zengamina Mini hydro

Mpanta Mini solar grid

Shiwang’andu

Source: Adapted from Kapika and Eberhard, 2013
Legal and Regulatory Framework

• Ministry of Energy:
  – Implements government policy framework and guidance

• Zambia Development Agency:
  – One stop shop for all Investors under Ministry of Commerce, Trade and Industry
  – Drives economic growth and development
  – Promotes Trade and Investment

• Zambia Bureau of Standards
  – Development and enforcement of Standards
  – Provides facilities for examination and testing for compliance
### Legal and Regulatory Framework

- **Office for Promoting Private Power Investment (OPPPI):**
  - Unit under MoE responsible for attracting investment in power generation facilities above 20MW
  - Coordinates expansion of the interconnected power system

- **Industrial Development Corporation**
  - Government-owned investment company
  - Taken up development of generating facilities between 10MW and 20MW

- **Energy Regulation Board:**
  - Independent energy regulator
  - Provides regulation framework and harmony among the sector players for the benefit of consumers
  - Responsible for issuance and administration of licenses
  - Interim manager of the Grid Codes

- **Rural Electrification Authority:**
  - Government institution responsible for implementing rural electrification
  - Management of the Master Plan
  - Management of the Rural Electrification Fund
  - Develops mechanisms for operation of grid extension network
  - Administration of capital subsidies
  - Development of generating plant of capacities up to 10MW
## Installed Capacity

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>POWER PLANT</th>
<th>GENERATION CAPACITY (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zesco</td>
<td>Hydro</td>
<td>2217</td>
</tr>
<tr>
<td>Zesco/ Tata</td>
<td>Hydro</td>
<td>120</td>
</tr>
<tr>
<td>Maamba</td>
<td>Coal</td>
<td>300</td>
</tr>
<tr>
<td>Lunsemfwa Hydro</td>
<td>Hydro</td>
<td>34</td>
</tr>
<tr>
<td>Ndola Energy</td>
<td>HFO</td>
<td>50</td>
</tr>
<tr>
<td>CEC</td>
<td>Diesel</td>
<td>80</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2,801</strong></td>
</tr>
</tbody>
</table>
Zambia’s Power Generation Mix

- Hydro, 89.4%
- Coal, 5.7%
- HFO, 1.9%
- Diesel (Emergency), 3.0%
## Transmission/ Distribution Capacity

<table>
<thead>
<tr>
<th></th>
<th>VOLTAGE LEVEL</th>
<th>LENGTH (km)</th>
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</thead>
<tbody>
<tr>
<td><strong>Zesco</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission</td>
<td>330kV</td>
<td>2241</td>
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<tr>
<td></td>
<td>220kV</td>
<td>571</td>
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<tr>
<td></td>
<td>132kV</td>
<td>202</td>
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<td></td>
<td>88kV</td>
<td>794</td>
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<tr>
<td></td>
<td>66kV</td>
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<tr>
<td>Distribution</td>
<td>33kV</td>
<td>2100</td>
</tr>
<tr>
<td></td>
<td>11kV</td>
<td>1037</td>
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<tr>
<td><strong>CEC</strong></td>
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<td></td>
</tr>
<tr>
<td>Transmission</td>
<td>220kV</td>
<td>246</td>
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<tr>
<td></td>
<td>66kV</td>
<td>678</td>
</tr>
</tbody>
</table>
ELECTRICITY CONSUMPTION PER SECTOR

- Mining, 48%
- Industrial and Commercial, 20%
- Residential, 15%
- Social Services, 5%
- Export, 2%
- Agriculture, 10%

Source: Ministry of Energy
Opportunities

• Economic activities
• Hydro-dominated power generation
• Scaling solar opportunity
• ReFit program
• Low electricity access
• Regulatory reforms
  – Establishment of Grid Codes and Open Access regime
  – Standard PPAs
Zambian Power System

Source: OPPPI
## Power Generation Capacities

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>POWER PLANT</th>
<th>(MW)</th>
<th>CAPACITY FACTOR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zesco</td>
<td>Kariba North</td>
<td>720</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Kariba North Extension</td>
<td>360</td>
<td>10</td>
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<tr>
<td></td>
<td>Kafue Gorge</td>
<td>990</td>
<td>69</td>
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<tr>
<td></td>
<td>Victoria Falls</td>
<td>108</td>
<td>89</td>
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<tr>
<td></td>
<td>Lusiwasi</td>
<td></td>
<td>40</td>
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<tr>
<td></td>
<td>Chishimba</td>
<td></td>
<td>&gt;89</td>
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<tr>
<td></td>
<td>Musonda</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lunzua</td>
<td>52</td>
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</tr>
<tr>
<td>Zesco/Tata</td>
<td>Hydro</td>
<td>120</td>
<td>58</td>
</tr>
<tr>
<td>Maamba</td>
<td>Coal</td>
<td>300</td>
<td>80</td>
</tr>
<tr>
<td>LHPC</td>
<td>Lunsemfwa</td>
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<td>76</td>
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<tr>
<td></td>
<td>Mulungushi</td>
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<td>64</td>
</tr>
<tr>
<td>Ndola Energy</td>
<td>HFO</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>CEC</td>
<td>Diesel</td>
<td>80</td>
<td>0</td>
</tr>
</tbody>
</table>
The Company

• Private company, limited by shares
• Incorporated in 2009 by 2 Engineers with a view to participate in the realisation of increased access to electricity in Zambia
• Supplied over the Zambian market over 5000 LED lighting systems, thereby contributing to the reduction of energy consumption by lighting of over 4,000 kWh per day
• WE BELIEVE THAT EVERY KWH SAVED LIGHTS UP THE NEXT HOUSE!
Strategic Positioning

• Highly experienced Engineers, Financial Managers, Business Strategists and Environmental specialists

• Positioning ourselves as a private investor/operator of RE generation facilities
Our 3-Year Vision

To attain annual Renewable Energy Power generation of 2,000MWh, and savings from Energy Efficiency strategies of 50,000MWh.
Our 3-Year Objectives

• Install and operate at least 4MW of mini and small hydro generation, connected to off-grid networks.
• Install and operate at least 1 grid tied solar network supplying a business, shopping mall, school, hospital or residential premises
• Retrofit at least 100,000 LED lights
Current Projects

• Pre-feasibility of a mini grid, 200km east of Lusaka
• Reconnaissance studies for micro/mini hydro generators
• Operation of a distribution network in Lusaka with 1000 connected customers
Project No. 1: Development of a Solar hybrid mini grid at Mpanshnya Mission (St. Lukes’ Mission Hospital), 200km east of Lusaka

CURRENT PROJECTS
Mphanshya Mission Solar hybrid Mini grid

• Mission Hospital operated by the Bolomeo Sisters
• 200km East of Lusaka
• Infrastructure under the mission includes
  – Hospital, catering for over 60,000 people
  – Nursing college with over 300 students
  – Nursery school
  – Home for the aged with an adjacent bakery business
  – 40 housing units
Mpanshya Mission Solar hybrid Mini grid: Problem Statement

• The place has no electricity, save for 80kVA diesel generator:
  – At least 300l diesel/ week
  – If available, only operates for 3 hours/ day
  – Many frequent breakdowns

• Cooking is by firewood
  – Carbon footprint
  – Deforestation

• Grid electricity
  – At least 1 year away
  – Provides opportunity for GetFit
Mpanshya Mission Solar hybrid Mini grid
Mphanshya Mission Solar hybrid Mini grid
Current Projects:

- Mpanshya Mission
- Electrification
Mphanshya Mission Solar hybrid Mini grid: Project Status

• Initial study
  – Needs assessment
  – MoU of intent with the Mission
  – Conceptual desktop designs

• Next steps:
  – Load assessment
  – Detailed feasibility
Project No. 2: Development of a Mini hydro Pilot Project along Manshya river, Shiwangandu

CURRENT PROJECTS
Manshya river Mini hydro

• Development of a mini hydro demonstration project, using hydro-kinetic technology:
  – Either to feed into an off-smart-grid, supplying schools, health centres and households within a determined catchment area, or
  – Feeding into an existing network supplied by 1MW Shiwang’andu hydro power plant, which grid is isolated with a possibility to connect to the national grid

• Site is in Muchinga Province, 750km North-East of Lusaka
  – Downstream of 1MW Shiwang’andu hydro owned by the national utility
Manshya river Mini hydro

Existing 1MW Hydro Plant
PROPOSED FARM PLOT FOR CHANDA LINUS K,
CHIEF MUKWIKILE.
SHIWANG'ANDU DISTRICT.
APPROX. 65 HECTARES

Scale 1:50,000
sheet no. 113181

POINT | X COORD | Y COORD
--- | --- | ---
1 | 341320 | 8767361
2 | 340574 | 8766560
3 | 339881 | 8766904
4 | 340074 | 8767380

OCT 2015 TSB MUCHINGA, COMPILED; PHIRI N.L.
Hydro kinetic turbine
Our Interest

• Project promoters and financiers
  – Feasibility stage of the pilot project

• Replicability of the technology is very high
  – Possible collaboration with Rural Electrification Authority of Zambia
THANK YOU VERY MUCH!
VIELEN DANK!