ZESA HOLDINGS (PVT) LIMITED

PRESENTATION ON

‘POWER GENERATION OPTIONS’

BY

O. NYATANGA
GENERAL MANAGER
CORPORATE AFFAIRS
PRESENTATION OVERVIEW

1. Power Sector Reforms In Zimbabwe
   - Legislation
   - New ESI Structure

2. Electricity Generation Information

3. Generation Expansion Projects
   - Justification
   - The Projects
     - Western Power Plant
     - Gokwe North
POWER SECTOR REFORMS
IN ZIMBABWE
THE NEW ESI STRUCTURE

MINISTRY OF ENERGY & POWER DEVELOPMENT

ZESA HOLDINGS (PVT) LTD

RURAL ELECTRIFICATION FUND

IPPs

ZPC

ZETCO

ZEDC

ZESA ENT.

POWERTEL
ELECTRICITY SECTOR REFORMS

- **Reform Objectives**
  - Availability
  - Accessibility
  - Affordability
REGIONAL INVESTMENT OPPORTUNITIES
## ELECTRICITY GENERATION INFORMATION

### CURRENT POWER STATIONS

<table>
<thead>
<tr>
<th>POWER STATION</th>
<th>TYPE OF STATION</th>
<th>INSTALLED CAPACITY</th>
<th>DEPENDABLE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hwange Power Station</td>
<td>Thermal</td>
<td>920 MW</td>
<td>780 MW</td>
</tr>
<tr>
<td>Kariba Power Station</td>
<td>Hydro</td>
<td>750 MW</td>
<td>750 MW</td>
</tr>
<tr>
<td>3 x Small Thermals</td>
<td>Thermal</td>
<td>270 MW</td>
<td>170 MW</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td><strong>1 940 MW</strong></td>
<td><strong>1 700 MW</strong></td>
</tr>
</tbody>
</table>
LOCATION OF POWER STATIONS
Existing Power Sources in Zimbabwe

- **KARIBA SOUTH**
  - 750 MW
- **HWANGE**
  - 920 MW
- **BULAWAYO**
- **HARARE**
  - Mutorashanga
  - Bindura
  - Norton
- **BOTSWANA**
  - Orange Grove
- **MOZAMBIQUE**
- **ZAMBIA**
  - Empress
  - Sherwood
  - Chertsey
  - Insukaminini
  - Marvel
  - Tokwe
- **RSA**
- **HARARE**
  - Alaska
  - Norton
  - Dema
  - MUNYATI
- **Triangle**
- **BULAWAYO**
  - Alaska
  - Alaska
GENERATION EXPANSION PROJECTS

: THE JUSTIFICATION
GENERATION EXPANSION PROJECTS

JUSTIFICATION

Current Supply-Demand Situation

Internal Dependable Capacity 1700 MW
Imports through bilateral agreements 650 MW
Available Maximum Capacity 2350 MW
Maximum Demand 2100 MW

Future Supply-Demand Situation

Zimbabwe will require an additional 1750MW by 2007 made up of the following:

- Import Displacement 650 MW
- Expanded Rural Electrification Program 450 MW
- GDP Growth/New Investments 400 MW
- Spinning Reserve 250 MW
Demand and Energy Forecast for Zimbabwe (2005 – 2011)

JUSTIFICATION
ZIMBABWE’S PLANNED SHORT TERM GENERATION PROJECTS

- Kariba
- Mutorashanga
- Norton
- HWANGE EXPANSION
- KARIBA SOUTH EXTENSION
- Empress
- Sherwood
- Haven
- Chertsey
- Marvel
- Tokwe
- Insukamini
- Plutree
- Harare P/S
- Byo P/S
- Munyati P/S
- CBM
- Lupane CBM
- Botswana
- Beitbridge
- Harare
- Warre
- Moutoashanga
- Bindura
- Harare
- Dema
- Orange Grove
- Triangle
- RSA
- Mozambique
GENERATION EXPANSION PROJECTS

JUSTIFICATION

- **Energy Security Requirement**
  - Power Deficit in SADC Region (SAPP) in **2007**
  - Increase in Demand Against **Limited Growth in Supply**
  - New Imports Contracts Required Annually in Constrained Supply Situation (**2005-2007**)
GENERATION EXPANSION PROJECTS

JUSTIFICATION

Annual Energy Supply and Demand in GWh

Supply gap beyond 2007
GENERATION EXPANSION PROJECTS

JUSTIFICATION

- To meet growing requirements of the economy (EREP, EEUID, New Mines, )
- Replace ageing power plants
- Alternative to hydro generators prone to drought (*Hydrological Risk*) in the SAPP (SADC) Region
GENERATION EXPANSION PROJECTS

JUSTIFICATION

- The least-cost generation option for commissioning in three years
- Largest IPP in SADC (SAPP) when completed
- Premium power exports to SAPP post 2007
- Large coal deposits (30 billion tonnes reserves)
COALFIELDS IN ZIMBABWE

Figure 1.
Karoo basins within metamorphic belts around the Zimbabwean Craton
(adopted from Duguid K.B., 1986)
# KNOWN COAL RESOURCES

<table>
<thead>
<tr>
<th>COAL DEPOSIT</th>
<th>INSITU (million tonnes)</th>
<th>No. of Drill Holes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mid-Zambezi</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hwange</td>
<td>418</td>
<td>3,900</td>
</tr>
<tr>
<td>Chaba</td>
<td>103</td>
<td>150</td>
</tr>
<tr>
<td>Western area</td>
<td>952</td>
<td>26</td>
</tr>
<tr>
<td>Entuba</td>
<td>532</td>
<td>34</td>
</tr>
<tr>
<td>Lubimbi</td>
<td>21,083</td>
<td>124</td>
</tr>
<tr>
<td>Lusulu</td>
<td>1,200</td>
<td>12</td>
</tr>
<tr>
<td>Sengwa</td>
<td>400</td>
<td>50</td>
</tr>
<tr>
<td>Lubu-Sebungen</td>
<td>83</td>
<td>5</td>
</tr>
<tr>
<td>Marowa</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Sinamatella</td>
<td>96</td>
<td>?</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td><strong>24,881</strong></td>
<td><strong>4,304</strong></td>
</tr>
<tr>
<td><strong>Sabi-Limpopo</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessami- Kaonga</td>
<td>1,000</td>
<td>12</td>
</tr>
<tr>
<td>Bubi</td>
<td>60</td>
<td>13</td>
</tr>
<tr>
<td>Sabi</td>
<td>569</td>
<td>12</td>
</tr>
<tr>
<td>Tuli</td>
<td>115</td>
<td>5</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td><strong>1,744</strong></td>
<td><strong>42</strong></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>26,625</strong></td>
<td><strong>4,346</strong></td>
</tr>
</tbody>
</table>
PRODUCTION HISTORY

COAL PRODUCTION TRENDS

- HPS
- HCC
- TOTAL COAL
WESTERN POWER PROJECT
WESTERN POWER PROJECT
WESTERN POWER PROJECT

Project Salient Features

❖ Steam Coal

❖ 1 billion tonnes steam coal reserves
  ✔ 900 million tonnes from Western
  ✔ 100 million tonnes from Sinamatela

❖ 11m thickness for full seam development for Western

❖ 4.5m thickness for full development for Sinamatela

❖ 15-30 % ash content

❖ Dragline investment required

❖ 0.8% sulphur content
WESTERN POWER PROJECT

Project Salient Features

❖ Coking Coal

- 140 million tonnes coking coal reserves
  - 128 million tonnes requires underground mining up to 350m
  - 12 million tonnes requires open cast mining

- 3.9m thickness for underground mining
- 2.4m thickness for open cast mining
- Ash Content below 13%
WESTERN POWER PROJECT

Project Salient Features

- 4 x 300 MW generators (1 200MW) OR 4 x 600 MW generators
- Cost of project: US$1.4 billion for 1 200MW or US$2.4 billion for 2 400 MW
- Dependable Capacity: 1 080 MW on 1 400 MW station or 1920 MW on 2 400 MW station
- 2 x 420kV line connections to Insukamini
WESTERN POWER PROJECT

Project Salient Features

- Levelised Electricity Tariff : +/- USc4.5/kWh
- IRR : 18%
- Coal Consumption : 5.0 million tonnes/year
- An export market Power Station
## Western Power Project

The project financing plan: 1 200 MW

<table>
<thead>
<tr>
<th>Source of Funding</th>
<th>US$ Million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign (EPC Contract)</td>
<td>980</td>
<td>70.0</td>
</tr>
<tr>
<td>Local (Own Funding)</td>
<td>420</td>
<td>30.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 400</strong></td>
<td><strong>100.0</strong></td>
</tr>
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</table>
## WESTERN POWER PROJECT

### THE PROJECT FINANCING PLAN: 2 400 MW

<table>
<thead>
<tr>
<th>SOURCE OF FUNDING</th>
<th>US$ MILLION</th>
<th>% OF TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign (EPC Contract)</td>
<td>1 680</td>
<td>70.0</td>
</tr>
<tr>
<td>Local (Own Funding)</td>
<td>720</td>
<td>30.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2 400</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
THANK YOU
GOKWE NORTH POWER PROJECT
Gokwe North Project

LOCATION

KEY
- EXISTING POWER STATION
- EXISTING PRIMARY TRANSMISSION SYSTEM

Gokwe North

ZAMBIA

MOZAMBIQUE

HWANGE

BOTSWANA

RSA
SITE LOCATION
GOKWE NORTH POWER PROJECT

Project Salient Features

- 1,3 billion tonnes coal reserves
- 4 735 ha coal mining area
- 22m thickness for full seam development
GOKWE NORTH POWER PROJECT

Project Salient Features

- 21.6% ash content
- 0.38% sulphur content
- No dragline investment required
- Conveyor belt used to deliver coal to power station
GOKWE NORTH POWER PROJECT

Project Salient Features

- 4 x 350 MW generators (1 400MW)
- Cost of project: US$1.68 billion
- Dependable Capacity: 1 283 MW
- 2 x 420kV line connections to Alaska and Chakari
GOKWE NORTH POWER PROJECT

Project Salient Features

- Levelised Electricity Tariff - USc4.52-5.22/kWh
- IRR : 13.79% - 19.76%
- Coal Consumption : 5.4 million tonnes/year
- Power station located 2km from mine
GOKWE NORTH POWER PROJECT

Project Salient Features

- Power station to occupy 40ha
- Water pumped from Lake Kariba (85km)
- Water used for wet cooling system, industrial, mine and township/domestic purposes
Possible Cooling System – Air Cooling

GOKWE NORTH - ZIMBABWE
Computer Generated View and Photomontage of Power Station
4 x 350 MW Units - Air Cooled
Recommended Cooling System – Indirect Cooling

GOKWE NORTH - ZIMBABWE
Computer Generated View and Photomontage of Power Station
4 x 350 MW Units - Indirect Cooled
Recommended Cooling System: Indirect Cooling

85 km of water pipeline from Lake Kariba
POSSIBLE AGREEMENT WITH GOVERNMENT

Contractual and Shareholder Issues

(IPP) Project Company

Power Purchaser

- Power GWh
- Revenue $

Plant Supplier

- Capital
- Plant

O & M Contractor

- Service
- Money

Financier

- Loans
- Re-payment

Fuel Supplier

- Fuel
- Money

PPA

PPC

FSA

O & M

LOAN
## GOKWE NORTH POWER PROJECT

### THE PROJECT FINANCING PLAN

<table>
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<th>SOURCE OF FUNDING</th>
<th>US$ MILLION</th>
<th>% OF TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign (EPC Contract)</td>
<td>1 030</td>
<td>61.3</td>
</tr>
<tr>
<td>Local (Own Funding)</td>
<td>650</td>
<td>38.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 680</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
THANK YOU
GOVERNMENT INCENTIVES

1. Independent Energy/Price Regulation

2. Tax Holidays for new investment

3. Dividend and Profit Repatriation

4. Other investment incentives