TANZANIA: AN EMERGING ENERGY PRODUCER

PROF. S. MUHONGO (MP)
MINISTER FOR ENERGY AND MINERALS
UNITED REPUBLIC OF TANZANIA

CHATHAM HOUSE, LONDON

TUESDAY, 26 FEBRUARY 2013
EARLY CRETACEOUS

Breakup of Pangaea (135-96 Ma)
During the Cretaceous, the supercontinent Pangaea completed its tectonic breakup into present day continents
World Oil and Gas Reserves
TOTAL PROVED OIL RESERVES

- **1652 billion barrels**
- recoverable in the future from known reservoirs under existing economic and operating conditions

Source: BP Statistical Review, of World Energy, June 2012
TOTAL PROVED GAS RESERVES

208 trillion cubic metres

Source: BP Statistical Review, of World Energy, June 2012
Emerging TANZANIA’S Prospects
Sedimentary Basins of Tanzania

- Inland Basins and Modern Rift System: 114,000 km²
- Coastal and continental shelf basins: 280,000 km²
- Deep Sea Basins: 140,000 km²
- TOTAL: 534,000 km²
Petroleum (Exploration and Production) Act, 1980

- Framework for application, award, modification, cancellation and relinquishment of petroleum exploration and production licences

Income Tax Act 2004

- Framework for taxation

Model Production Sharing Agreement (MPSA 2008)

- Tripartite draft Agreement (Government, TPDC and Contractor)
- Defines all parties rights and obligations
Exploration for Oil and Gas

Started in 1952

- Total geophysical data coverage to date
  - **Seismic**
    - **2D (Km)**, **3D (Sq. Km)**
      - **onshore**
        - 2D: 25,875
        - 3D: NONE
      - **offshore**
        - 2D: 72,281
        - 3D: 15,644
      - **beyond EEZ**
        - 2D: 10,151
        - 3D: NONE
      - **TOTAL**
        - 2D: 108,207
        - 3D: 15,644
  - **Airborne magnetic and gravity**: onshore and shelf
  - **Shipborne magnetic and gravity**: deep sea and L. Tanganyika
  - **Land gravity**: in some basins
67 wells drilled since 1954

- 16 discovery wells
- Drilling in progress - 2 wells
<table>
<thead>
<tr>
<th>Operator</th>
<th>Licence</th>
<th>No. of Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maurel et Prom</td>
<td>Mnazi Bay</td>
<td>1</td>
</tr>
<tr>
<td>Statoil</td>
<td>Block 2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 in progress</td>
</tr>
<tr>
<td>Ndovu</td>
<td>Ruvuma Licence</td>
<td>2</td>
</tr>
<tr>
<td>BG</td>
<td>Block 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 in progress</td>
</tr>
<tr>
<td>Dodsal</td>
<td>Ruvu Block</td>
<td>1</td>
</tr>
<tr>
<td>Heritage</td>
<td>Latham</td>
<td>1</td>
</tr>
<tr>
<td>Dominion</td>
<td>Block-7</td>
<td>1</td>
</tr>
<tr>
<td>Afren</td>
<td>Tanga</td>
<td>1</td>
</tr>
<tr>
<td>Ophir</td>
<td>E. Pande</td>
<td>1</td>
</tr>
<tr>
<td>Petrodel</td>
<td>Kimbiji</td>
<td>1</td>
</tr>
<tr>
<td>Hydrotanz</td>
<td>Mnazi-Bay</td>
<td>1</td>
</tr>
<tr>
<td>PanAfrica</td>
<td>Songo Songo</td>
<td>1</td>
</tr>
<tr>
<td><strong>Approx. total</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>
New Opportunities in Tanzania
9 blocks will be offered through the 4\textsuperscript{th} licensing round to be launched after ratification of the Gas Policy Possibly in Q4 of 2013
New Opportunities ..... cont

Onshore Blocks

- Under Applications
  - Ruhuhu Basin
  - Lake Tanganyika North
  - Kisangire
  - Selous Basin
  - Luwegu and Tunduru
  - Eyasi Wembere

- Open Acreages
  - Mandawa Basin
Gas Fields

- Songo Songo
- Mnazi Bay
- Mkuranga
- Kiliwani
- Ntorya
- Deep Sea
Gas Fields - Songo Songo

- Discovered in 1974
- Development for commercial operations started in June 2000
- Commercial production started in July 2004
- Producing 103 mmscfd
Gas Fields - Songo Songo ...cont

**Songo Songo Gas Utilization**

- Power generation in Dar Es Salaam (414 MW)
- Heating source in industries in Dar Es Salaam - 37 industries currently connected
- Compressed Natural Gas (CNG) for domestic use, hotels and vehicles in Dar Es Salaam

**Demand for Gas in Dar Es Salaam is higher than the Production**
Gas Fields – Mnazi Bay

- discovered in 1982
- developed in 2002
- commercial production started in 2006
- Used for power generation: 18 MW installed.
Gas Fields – Mnazi Bay  .....cont

- **Processing Plant**
  - Located onshore at the Msimbati Peninsula
  - Process up to 10 mmscfd
  - Current demand 1.5 – 2.0 mmscfd

- **Transportation**
  - 8 inch-pipe, 27km long from Mnazi Bay to Mtwara
  - Maximum Throughput 70 mmscfd
Mnazi Bay Gas Utilization

- Power Generation in Mtwara
  + 18 MW gas generators installed in Mtwara
  + Power demand Mtwara and Lindi Regions: 12 - 15 MW

Infrastructure is being put to utilise the potential for power generation – 36 inch pipeline under construction

>400 MW in Mtwara
Gas Fields – Mkuranga and Kiliwani

- **Mkuranga Gas Field**
  - Discovered in 2007, 50 km south of Dar Es Salaam

- **Kiliwani Gas Field**
  - Discovered in 2008 south of Songo Songo

- **Ntorya Gas Field**
  - Discovered in 2012, approx. 35 km west of Mtwara

- Utilization awaits infrastructure
- Plan: to connect these fields to the 532 km-Gas Pipeline under construction
drilling started in 2010
+ First discovery Pweza-1 Well in Block-4 drilled by Ophir.

more discovery wells drilled in blocks 1, 2, 3 and 4

to date 11 wells drilled
+ 8 wells – gas discoveries
+ 2 Appraisal Wells
+ 1 Dry well

Success Ratio ≈ 90%
Summary of Gas Reserves in Tanzania

<table>
<thead>
<tr>
<th>Location</th>
<th>GIIP (tcf)</th>
<th>Proven (tcf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Songo Songo</td>
<td>1 to 2.5</td>
<td>0.880</td>
</tr>
<tr>
<td>Mnazi Bay</td>
<td>3 to 5</td>
<td>0.262</td>
</tr>
<tr>
<td>Mkurangana</td>
<td>0.200</td>
<td>0.200</td>
</tr>
<tr>
<td>Kiliwani</td>
<td>0.070</td>
<td>0.027</td>
</tr>
<tr>
<td>Mtwara-Ntorya</td>
<td>0.178</td>
<td></td>
</tr>
<tr>
<td>Deep Sea</td>
<td>29.570</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35.768</strong></td>
<td><strong>1.369</strong></td>
</tr>
</tbody>
</table>

Gas Initially in Place (GIIP)
In the light of recent big gas discoveries the Government is coming up with appropriate policies and legal frameworks to guide future exploration, and exploitation of the resources.

- Gas Policy – is in the final stage
- Gas Act -
- Gas Utilization Master Plan – is almost ready
- Petroleum Exploration Policy under preparation
- Petroleum Exploration and Production Act 1980 under review
OPPORTUNITIES FOR DOWNSTREAM

- Gas pipe line from Mtwara to Dar es Salaam (+ 532 km-long: up to 784 mm/scfd)
- Power generation from Natural Gas
- Fertilizer manufacture
- LNG
- Smelting plants
- Cement factories
- Gas for: Industries, Vehicles, Household
- Gas for Fertilizers
- Methanol
- Plastic factories
- Petrochemical industries
COALFIELDS OF TANZANIA
MKUJU PROJECT: 137.3 Million Lbs

Namtumbo - 35.9 MILLION LBS
Tunduru - 101.4 MILLION LBS

MANYONI PROJECT: 19 Million Lbs (57 M tonnes)

Prospecting Licenses (Regions):
Arusha, Dodoma, Iringa, Lindi, Ruvuma, Mbeya, Morogoro, Mtwara, Rukwa, Shinyanga, Singida and Tanga

4. Namibia: 4,496 tons, 8.4% world’s production
5. Niger: 4,198 tons, 7.8%
11. Malawi: 670 tons, 1.2%
12. South Africa: 583 tons, 1.1%
Available renewable energy The volume of the cubes represent the amount of available geothermal, hydropower, wind and solar energy in TW, although only a small portion is recoverable. The small red cube shows the proportional global energy consumption.
GLOBAL SOLAR POTENTIAL

(Source: DLR 2009, Derived from NASA SSE 6.0 Dataset (NASA 2009)

(S Source: DLR 2009, which was derived from NASA SSE 6.0 dataset (NASA)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rated Power</th>
<th>Rotor Diameter</th>
<th>Hub Height</th>
<th>Annual Energy Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>30 kW</td>
<td>15 m</td>
<td>30 m</td>
<td>35,000 kWh</td>
</tr>
<tr>
<td>1985</td>
<td>80 kW</td>
<td>20 m</td>
<td>40 m</td>
<td>95,000 kWh</td>
</tr>
<tr>
<td>1990</td>
<td>250 kW</td>
<td>30 m</td>
<td>50 m</td>
<td>400,000 kWh</td>
</tr>
<tr>
<td>1995</td>
<td>600 kW</td>
<td>46 m</td>
<td>78 m</td>
<td>1,250,000 kWh</td>
</tr>
<tr>
<td>2000</td>
<td>1,500 kW</td>
<td>70 m</td>
<td>100 m</td>
<td>3,500,000 kWh</td>
</tr>
<tr>
<td>2005</td>
<td>3,000 kW</td>
<td>90 m</td>
<td>105 m</td>
<td>6,900,000 kWh</td>
</tr>
<tr>
<td>2008</td>
<td>6,000 kW</td>
<td>126 m</td>
<td>135 m</td>
<td>~ 20,000,000 kWh</td>
</tr>
</tbody>
</table>

Source: BWE, modified
When asked, „What is a friend?“ Aristotle (384-322 BC) replied: „One soul inhabiting two bodies“

(TANZANIA & UNITED KINGDOM)

WELCOME TO TANZANIA - THE APPROPRIATE DESTINATION FOR YOUR INVESTMENTS