**Location:** South-Eastern Africa

**Land area:** approximately 800,000 Sq.km

**Coastline:** Approximately 2,700 Km

**Natural Resources:** Hydropower, natural gas, coal, minerals, wood and agriculture

**Capital:** Maputo (about 2 million people)

**Population:** 22.8 million (2011)
- 70% live in the countryside
- 30% live in urban area

**Official Language:** Portuguese

**Independence:** 1975

**President:** Armando Emilio Guebuza
Instituto Nacional de Petróleo
(Institute of National Petroleum)

- INP is the regulatory authority for the petroleum operations (exploration, production and transport of hydrocarbons).

Empresa Nacional de Hidrocarbonetos de Mocambique
(National Hydrocarbon Corporation of Mozambique)

- Is the state oil company established by the Law 3/81.
- Participates, as a stakeholder and in the natural gas project.
- Participates in the exploration, with carried interest, in association with oil companies in exploration.
INP MISSION

“To manage the petroleum resources of Mozambique and administer the related operations for the benefit of the Society, and in compliance with the existing laws, government polices and contractual commitments”
PETROLEUM POLICY FUNDAMENTAL

- Optimal resource recovery of all petroleum resources
- Securing resource rent
- Allowing Industrial development
- Retain an efficient Petroleum regulatory and administrative regime
- Ensure production projects development and revenue collection
Sedimentary Basins

- Rovuma Basin
- Maniamba Basin
- Lake Niassa Basin
- Middle Zambeze Basin
- Lower Zambeze Basin
- Mozambique Basin
Database

Current INP Technical Database
- 189 Wells
- > 100,000 km of 2D
- > 20,000 km² of 3D
- Reports Database (GIS & pdf)

Technical Data Acquired or Planned
- ≥ 36,179 km of offshore MC 2D – WesternGeco
- Gravity Gradiometry – ArkEx
- Onshore of onshore MC 2D – BGP
- Offshore Sediments – TDI Brookes
- HQ Well, Seismic & Reports – ERCL/INP
- Mozambique Digital Atlas – ERCL/INP
LICENCED ACREAGE

OPERATORS
- Anadarko
- Buzi Hydrocarbons
- ENI
- ENH
- PETRONAS
- SASOL
- STATOIL
LICENSED ACREAGE

ONSHORE LICENSES

Onshore Rovuma
Anadarko (35.7%)
PTT (10%)
ENH (15%)
Maurel & Prom (24%)
Wentworth (15.3%)

Pande - Temane
Sasol (70%)
ENH (25%)
IFC (5%)

Buzi
Buzi Hydrocarbons (75%)
ENH (25%)

Area A
Sasol (90%)
ENH (10%)

OFFSHORE LICENSES

Area 1
Anadarko (36.5%)
Mitsui (20%)
ENH (15%)
Bharat P. C.(10%)
Videocon E. R.(10%)
PTT (8.5%)

Area 4
Eni (50%)
CNPC (20%)
ENH (10%)
Galp (10%)
Kogas (10%)

Area 2 & 5
Statoil (40%)
Impex (25%)
Tullow (25%)
ENH (10%)

Area 3 & 6
Petronas (50%)
Total (40%)
ENH (10%)

Sofala Area
Sasol (80%)
ENH (20%)

16 & 19 (Shallow water part)
ENH (15%)
Sasol (85%)
Main Sedimentary Basins

**Rovuma Basin**

**Location**: Along the Eastern margin of Northern Mozambique and Southern Tanzania

**Basin type**: Passive Margin Continental

**Area**: 29,500 Sq Km
- Onshore ~ 17,000 Sq Km
- Offshore ~ 13,000 Sq Km

**Mozambique Basin**

**Location**: Occupies the broad coastal plain and continental shelf of Southern Mozambique.

**Basin type**: Passive Margin Continental

**Area**: 500,000 Sq km
- Onshore ~ 275,000 Sq Km
- Offshore ~ 225,000 Sq Km
HYDROCARBON DISCOVERIES

**Rovuma Basin** (discovery years: 2010/13)
- About 10 offshore discoveries:
  - Prosperidade
  - Mamba
  - Golfinho/Atum

**Mozambique Basin**

**Onshore**
- Pande field (1961)
- Buzi discovery (1963)
- Temane field (1967)
- Temane East discovery (2003)
- Inhassoro discovery (2003) (includes oil)

**Offshore**
- Njika offshore discoveries (2008-9)
Area 1
- **100 tcf** in place (18-36 Tcf recoverable) in Area 1

Area 4
- **90 tcf** in place in Area 4
• Pande – Temane PSA
  – 1.3 to 10.4 tcf in place
  – 11 to 400 MMbbls condensate inplace

• Pande – Temane PPA
  – 3.5 tcf recoverable

• Inhassoro
  – Condensate / light oil
SUMMARY

- 6 Concession Areas
- 5 Gas Fields identified in the Basin (so far)
- 2 Fields in production (Pande & Temane)
- Reserves above 5 TCFs
- Resources above 20 TCFs
- Condensate/light oil discovered in Inhassoro
- On going Exploration activities
LICENSE ROUND STRATEGY

2014 - 2015
INP Strategy

• INP Exploration Strategy
  – To maximise value creation from the petroleum resources in the country.

• INP Future Licensing Policy
  – Licensing through open competitive bidding rounds
  – Access to data / prepared data packages
  – Sufficient time/resources for promotion

• INP expects companies applying for a Licenses to include;
  – Regional overview
  – Prospectivity analysis
  – Technical work program
    • Seismic acquisition
    • Seismic reprocessing
    • G&G studies
    • Wells and TD of wells
  – Duration of exploration phases
  – Relinquishment Plans
Open Areas Offshore

**INP preparations for Licensing**

A. **Deep Water Rovuma**
   - Released data preparation
   - Multi Client Studies

B. **Rovuma to Zambezi**
   - Multi-Client Studies

C. **Zambezi / Beria High**
   - Released data preparation
   - Well Studies
   - Seismic reprocessing
   - New MC Seismic
   - MC FTG (Gravity – Magnetics)

D. **South Mozambique**
   - Released data preparation
   - Seismic reprocessing
   - New MC Seismic
A. Deep Water Rovuma – Open Area

Released data preparation
Multi Client Studies
A. Deep Water Rovuma – Open Area

Area under Consideration
Approximately 30,000 sq km in consideration for the following licensing round

• Deep water

• Technical data base review
  – Limited 2D seismic data
  – No 3D seismic
  – No high resolution gravity / magnetic data
A. Deep Water Rovuma – Open Area

- **Seabed**
- **Near Top Jurassic**
- **Top Basement**
- **Break Up - Rift**
- **Top Karoo**
- **Top Basement**
- **Pre Break Up**
- **Post B. – Early Drift**
- **Post B. – Late Drift**
- **Near Top Early Cretaceous**
- **Near Top Late Cretaceous**
- **Early Eocene Unconf.**
- **Oligocene Unconf.**
- **Early Miocene Unconf.**
- **Tertiary: End of Drift and Delta Progradation**

ERCL / INP Interpretation

Seismic Line example ION East AfricaSPAN
A. Deep Water Rovuma – Open Area

Definition of potential play concepts:

- Interpretation of petroleum elements (Source, Reservoir, Seal);
- Structural and stratigraphic traps;
- Possible migration pathways.

Limited technical data
Early indications are that the deep water Rovuma area is extremely prospective.
B. Rovuma to Zambezi

Multi-Client Studies
# Schlumberger New MC 2D

## 2013 Multi-Client Program
- 36,179.6 Km New 2D Seismic Data
- Most of data available to interested companies

## Deliverables and Descriptions

<table>
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<th>Deliverable</th>
<th>Description</th>
<th>Format</th>
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<td>CMP after Post Migration Radon but with Final Stacking Velocities</td>
<td>SegY*</td>
</tr>
<tr>
<td>KpSTM Unscaled Stack - Full Offset Range</td>
<td>Stack with Final Stacking Velocity and with Final post migration pre-stack processing, No Residual Gain, No Amplitude Inversion or Post-Stack Processing</td>
<td>SegY*</td>
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<tr>
<td>KpSTM Unscaled Stack - Near, Mid, Far, Ultra Far</td>
<td>Angle Stack Input Data : CMP Gather after all Post Migration Pre-stack Processing and NMO with Stacking Velocity, Angle calculation with Migration Velocity</td>
<td>SegY*</td>
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<tr>
<td>Final Stack - Full Offset Range</td>
<td>Final Stack with Residual Gain and Post Stack Processing</td>
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<td>With Coordinates and Shotpoints</td>
<td>VELF</td>
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<td>Time Migration Velocities: Vp</td>
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<tr>
<td>Time Migration Velocities: Vt</td>
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</tbody>
</table>

Schlumberger Multi-Client data acquired by WesternGeco
C. Zambezi / Beira High

Released data preparation
Well Studies
Seismic reprocessing
New MC Seismic
MC FTG (Gravity – Magnetics)
Open Area – Offshore Zambezi / Beira High

Offshore Zambezi Area

- > 100,000 sq km Open
- Technical Data Available
  - Released Seismic – ERCL/INP
  - Released Wells – ERCL/INP
  - Released reports – ERCL/INP
  - Interpretation – ERCL/INP
  - MC Seismic – WG
  - MC FTG - ARKeX

- Possible 5th Round Area
- Block Size < between 6,000 to 10,000 sq km
• Strutural plays
• Compressional and extensional
• Thrust structures associated with hanging walls
• Flowers structures
• Roll over anticlines
INP has been working with ERCL to prepare the released technical data for the forthcoming license rounds.
ARKeX and INP Multi-Client Program Mozambique

- Full Tensor Gravity Gradiometry (FTG)
- High Resolution Magnetic Survey
- Initial Area ~ 50,000 sq km
- Comprehensive Deliverables
- Qualitative Interpretation

FTG Program - Zambezi / Beria High Area

**Planned Schedule**
- Acquisition - Q2 2014
- Processing - Q3 2014
- Interpretation - Q4 2014

**Additional Areas Considering**
- Maniamba Basin
- Onshore South Mozambique
Reprocessing Legacy Data

Schlumberger reprocessing
• Legacy WG MC Data

Original

PSTM Reprocessed
D. South Mozambique – Open Area

Released data preparation
Multi Client Studies
Seismic reprocessing
Reprocessing Legacy Data

Line
SM81-100

TEST REPROCESSING

ORIGINAL
Onshore MC Seismic

Mozambique Basin

- Zambezi Tie Program
- Limpopo-Palmeira Tie
- Mazenga Detail
Multi Client Project

Mozambique Digital Atlas

• A regional framework of Mozambique
  – Wells, Headers, Formation Tops,
  – Seismic Stratigraphic Framework
  – Key Horizons

• Industry standard formats
  – GIS
  – SMT, Petrel, Landmark

• In collaboration with INP
Offshore License Round Strategy

Areas in consideration for the 5th round may include:

• Deep Water Rovuma
• Offshore Zambezi
• Selected onshore areas
Offshore License Round Strategy (subject to approval)

Offshore 5th Round – 2014
• Deep Water Rovuma
• Offshore Zambezi

Other Areas to License after 5th Round
• Zambezi to Rovuma
• South Mozambique basin
• Other selected onshore and offshore areas
NATURAL GAS VENTURE
In 2004 Mozambique became a producer and exporter of natural gas from Pande & Temane in the centre of the Mozambique

**Actual annual production:**
- Rump up from 120 MGJ to 149 MGJ

**Total investment:**
- >$ 1 billion

**Use of natural gas in Mozambique:**
- Power generation
- Fuel to industries (Mozal, cement plant, etc)
- Fuels to vehicles (CNG - Compressed natural gas)
### Structure of Natural Gas Value Chain

#### Exploration
- **Sasol Petroleum Temane 70%**
- **Moz Govt 25%** (Via ENH/CMH)
- **World Bank / IFC 5%**

#### Processing
- **Sasol Petroleum Temane 70%**
- **Moz Govt 25%** (Via ENH/CMH)
- **IFC 5%**

#### Transmission
- **Sasol Gas Holdings (50%)**
- **SA Govt 25%** (Via CEF/Gas)
- **Moz Govt 25%** (Via ENH/CMG)

#### Distribution
- **Market**
  - **Sasol Gas external markets**
  - **Sasol Gas internal markets:**
    - Spring Lights Gas (49%)
    - Sasol Synfuels
    - Sasol Oil
      - Tshwarisano 25%
      - LFB 75%
    - Sasol Chemical Industries

#### Marketing
- **INP (Regulator in Mozambique)**
- **NERSA (Regulator in SA)**
UTILIZATION OF NATURAL GAS
NATURAL GAS UTILIZATION
LNG PROJECTS
LNG PROJECT

2012
- Appraisal Testing
- FEED Contracts
- Negotiations

2013/14
- Potential Unitization
- Reserves Certification
- GSA
- PDO
- EPC

2014-2018
- Fabricate Facilities
- Drill Development Wells
- Install Subsea Architecture
- Secure Shipping Agreements
- Evaluate Expansion Opportunities

Potential Expansion Area
MARKET OPPORTUNITIES
OTHER INVESTMENT OPPORTUNITIES-LNG
INVESTMENT OPPORTUNITIES - LNG

- Petrochemical
- Pipeline
- Power Generation
- Air Transports
- Railway
- Port
- Accommodation
- Health Care
- Rail Transportation
- LNG Development
GAS MASTER PLAN
Objectives:

- An understanding of gas-utilization sector (net-back analysis) to assess the options for local development in Mozambique.
- A strategy for the optimal location of gas off-take and development poles consistent with current development planning.
- Address optimal pricing structures and mechanisms for the use of gas revenue streams by Mozambican interests (GoM and others).
- A roadmap for promoting social improvements (employment, education, environmental protection, tourism) consistent with GoM Plans.
SCENARIOS FOR INFRASTRUCTURES DEVELOPMENT
CHALLENGES

- Construction of natural gas pipelines and LNG facilities
- Distribution systems (villages and remote locations)
- Local processing of natural gas in different industrial products
- Guarantee competitive prices for the natural gas in the local market
- Training and employment of local staff in natural gas related industries
- Ensure local content in provision of goods and services
FINAL REMARKS
FINAL REMARKS

- Underexplored sedimentary basins with active petroleum systems and improved access to legacy and released petroleum technical data

- New data acquisition will open up petroleum potential of new Areas

- Huge natural gas discoveries offshore Rovuma Basin Areas 1 and 4

- Potential markets for consumption of natural gas close to Mozambique

- LNG Projects will be a transformational factor for the country with potential to boost its industrial development

- Several investment opportunities in logistics, constructions, telecom and other related services

- Stable country with favorable legal, regulatory and fiscal framework
Muito Obrigado!
Thank you!