Is there any oil offshore East Africa?

“Improved technology helps to oil the wheels for East Africa”
The Times, 7th January 2012
So just what has been discovered?
(Exploration wells: 2008 – present)

<table>
<thead>
<tr>
<th>Country</th>
<th>Gross Expln Wells</th>
<th>Gross Disc</th>
<th>Gross Comm Disc</th>
<th>Gross Oil (mm bbls)</th>
<th>Gross Gas (Tcf)</th>
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<tbody>
<tr>
<td>Mozambique</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>0</td>
<td>~32.1</td>
</tr>
<tr>
<td>Tanzania</td>
<td>13</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>~2.4</td>
</tr>
<tr>
<td>Kenya</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>TOTAL</td>
<td>27</td>
<td>15</td>
<td>9</td>
<td>0</td>
<td>~34.5</td>
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East Africa – Main Offshore O&G Players

- Apache, Tullow, Origin
- FAR, Ophir
- BG Group, Premier
- Statoil, ExxonMobil
- Anadarko, Total
- Cove
- Shell
- Petrobras
- Ophir
- BG Group, Ophir
- ENI
- Anadarko, Mitsui, Bharat, Videocon, ENH
- Cove

Offshore Tanzania
- Ophir, BG ~5 TCF gas
- Statoil, ExxonMobil 5+ TCF gas (oil potential)

Offshore Mozambique
- ENI 30+ TCF gas
- BG, Anadarko, Cove 15 – 30+ TCF gas
OFFSHORE KENYA:

- Similar depositional environment to Rovuma basin in Mozambique
- PCL consider offshore Kenya to be an oil play, rather than gas
- Evidence of petroleum system (flat spots, oil seeps), multiple play types
- Under explored – only 4 wells drilled offshore Kenya, one in the last 20 years
- PCL & JV partners (Apache, Origin, Tullow) to drill 1 well offshore Kenya in or before Q3 2012
UNDER-EXPLORED - EAPC 2005 & later
Myths .. Myopia .. Misinformation ..

• “East coast Africa is at best gas prone”
  Gas actually maybe anomalous
• “There are no contiguous source rocks”
  Not supported by the evidence
• “The Campanian is a recognised source rock in Tanzania”
  Actually not encountered as a source anywhere in East Africa
• “The Jurassic is too mature”
  New basin modelling puts Jurassic in hydrocarbon window
  Low heat flow
• “The Eocene can generate”
  Unlikely as too immature
• “We have explored East Africa; we drilled a well there didn’t we?”
  Result: East Africa received scant modern attention until ±1 year ago

CJMD for MDOIL/EAX, EAPC 2005
EXPLORATION > 2008
More Data ..

- “East coast Africa is at best gas prone”
  Lots of gas, where’s the Oil?
- “There are no contiguous source rocks”
  Not supported by the evidence
- “The Campanian is a recognised source rock in Tanzania”
  The youngest source rock is Mid-Jurassic
- “The Jurassic is too mature”
  Jurassic in gas window, buried by great thicknesses in deltas
  Low heat flow
- “The Eocene can generate”
  The youngest source rock is Mid-Jurassic
- “We are exploring offshore East Africa”
  East Africa now receiving ‘attention’

AND: Governments have woken up to the Capital Gains
Tax issue if small companies try to sell out

CJMD for MDOIL/EAX, EAPC 2005
Global LNG Cost Curve – source: Bernstein analysis and estimates
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<tr>
<td>Uganda</td>
<td>18</td>
<td>15</td>
<td>14</td>
<td>877</td>
<td>0</td>
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“Improved technology helps to ‘gas up’ East Africa”

*Not* The Times, 7th January 2012
Misinformation: A source rock is created

Ref EAPC 2005

Kimbiji East #1 “The Type example”

In Adjacent Kimabji Main #1 no TOC’s reach 1% in the Campanian

CJMD for MDOIL/EAX, EAPC 2005
For a potent source rock system the following ingredients are essential:

- High TOC
- High hydrogen content
- Material volume of source rock
- Optimal maturity

Recognized effective Generative sequences

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<th>Relative organic carbon enrichment</th>
<th>Expected percentage of sampled rock in each class</th>
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<tr>
<td>Significantly below average</td>
<td>Below average</td>
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<tr>
<td>6.4%</td>
<td>22.2%</td>
</tr>
<tr>
<td>Average</td>
<td>40.0%</td>
</tr>
<tr>
<td>Above average</td>
<td>24.2%</td>
</tr>
<tr>
<td>Significantly above average</td>
<td>6.7%</td>
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Adapted from Bissada, Leeper & Saasen by CJMD for EAPC 2005
General Stratigraphy
Modified from Rusk & Bertagne by CJMD for MDOIL/EAX, EAPC 2005
Tanzania: Schematic Basin Section
+7 TCF recoverable resources discovered to date

Based on internal Ophir Energy estimates of primary targets only as of March 2012