ERERA FORUM 2012
Bridging the gap between electricity demand and sustainable supply in West Africa
Dakar, November 20-21, 2012

PERSPECTIVE OF NATURAL GAS SUPPLY FOR POWER GENERATION IN THE SUB-REGION

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WAGPA or WAGP Authority: A body established by the WAGP Treaty to represent the 4 State Parties (Benin, Ghana, Nigeria and Togo) to facilitate and regulate
1. The West African Gas Pipeline
2. Background: Key Dates
3. WAGP – Existing Capacity
4. WAGP Capacity Growth
5. Natural Gas demand in the sub-region
6. WAGP Gas supply perspectives
   • LNG
   • Increasing natural gas supply from Nigeria
7. WAGP Future Potential – Extension ??
8. WAGP Challenges – Security
9. Conclusion
The West African Gas Pipeline (WAGP)

Gas transmission system extending from the ELPS to landfalls in Benin, Togo, and Ghana

**System capacity:**
- Initial 170 MMscfd
- Final 474 MMscfd

**Objective:** Transport Nigerian produced natural gas to commercially viable markets in Benin, Ghana & Togo

**Existing Escravos-to-Lagos Pipeline System (ELPS) Capacity:** 800 mm SCFD owned and operated by Nigerian National Petroleum Corporation (NNPC).
1982 – ECOWAS proposes a Gas Pipeline across West Africa as a key Regional Economic Goal

1992 – World Bank Study confirms Pipeline project viability based on ample reserves of Nigerian Natural Gas and Regional Energy Needs


2000 – Intergovernmental Agreement for a Harmonized Fiscal & Regulatory Regime for the Dev. Construction and Operation of the Pipeline – WAGP Treaty is signed

2003 – 4 Nations and WAPCo sign International Project Agreement for the Development of the Pipeline

2005 – Construction of the West African Gas Pipeline (Offshore) Begins

2006 – Onshore construction begins in Nigeria and Ghana
Dec 2007 – Regulating and Metering (R&M) Station in Takoradi ready to receive uncompressed natural gas

April 2008 – Commissioning of onshore and offshore pipeline begins with the opening of valves at Itoki inlet

April 2009 – Ghana’s VRA generates electricity with natural gas from WAGP

Dec 2010 – WAPCo starts full commissioning of WAGP system

Feb 2011 – Compressed gas transported on WAGP for the first time

Mar 2011 – Approval to Operate received from WAGPA

Mar 2011 – WAPCo begins Commercial Operations
WAGP – Existing Capacity

■ WAPCo Installed Capacity (Compressor Station):
  - 2 Compressors out of 6 installed
  - Installed capacity: 170 MMscf/d; Max capacity: 474 MMscf/d
  - Reserved capacity: 134 MMscf/d; Remaining capacity: 340 MMscf/d

■ Design Capacity of R&M Stations:

<table>
<thead>
<tr>
<th>Station Name</th>
<th>Initial Capacity (MMscf/d)</th>
<th>Ultimate Capacity (MMscf/d)</th>
<th>Lateral Size (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotonou</td>
<td>5.2</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>Lome</td>
<td>5.2</td>
<td>105</td>
<td>10</td>
</tr>
<tr>
<td>Tema</td>
<td>14</td>
<td>234</td>
<td>18</td>
</tr>
<tr>
<td>Takoradi</td>
<td>130</td>
<td>130</td>
<td>20</td>
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</tbody>
</table>
WAGP capacity growth depends primarily on market growth.

Current market forecast shows expansion schedule to increase from 170 MMscf/d in 2017 to 474 MMscf/d in 2026.

Only 30% of pipeline capacity is forecasted to be used over the next 6 – 7 years.
Reserved Capacity requests from prospective regional IPP projects exceeds 400 MMscf/d and continues to grow

- **Regional gas demand**
  - 680 MMscf/d by 2015

- **Alternative supply sought to complement Nigeria gas supply into WAGP for regional demand**
  - Ghana Gas connection
  - Re-gasified LNG Tie - in

**WAGP to be sub-regional backbone for gas distribution**
Receipts and deliveries of gas for the period 1 January to 28 August 2012

<table>
<thead>
<tr>
<th>2012</th>
<th>ITOKI RECEIPTS MMBtu</th>
<th>TAKORADI DELIVERY MMBtu</th>
<th>TEMA DELIVERY MMBtu</th>
<th>LOME DELIVERY MMBtu</th>
<th>COTONOU DELIVERY MMBtu</th>
<th>TOTAL GAS DELIVERED MMBtu</th>
<th>DAILY AVERAGE MMBtu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>January</td>
<td>2,393,225</td>
<td>698,654</td>
<td>1,584,698</td>
<td>137,914</td>
<td>2,421,266</td>
<td>78,105</td>
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<tr>
<td></td>
<td>February</td>
<td>1,281,598</td>
<td>226,581</td>
<td>1,008,493</td>
<td>101,669</td>
<td>1,336,743</td>
<td>46,095</td>
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<tr>
<td></td>
<td>March</td>
<td>2,147,268</td>
<td>565,626</td>
<td>1,335,329</td>
<td>49,457</td>
<td>2,085,547</td>
<td>67,276</td>
</tr>
<tr>
<td></td>
<td>April</td>
<td>1,985,909</td>
<td>553,267</td>
<td>1,163,492</td>
<td>53,862</td>
<td>1,922,050</td>
<td>64,068</td>
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<tr>
<td></td>
<td>May</td>
<td>2,322,939</td>
<td>481,163</td>
<td>1,283,160</td>
<td>82,087</td>
<td>2,002,223</td>
<td>64,588</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>1,754,610</td>
<td>211,070</td>
<td>1,256,452</td>
<td>162,827</td>
<td>1,776,728</td>
<td>59,224</td>
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<tr>
<td></td>
<td>July</td>
<td>2,898,577</td>
<td>570,656</td>
<td>1,985,873</td>
<td>189,803</td>
<td>2,875,749</td>
<td>92,766</td>
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<tr>
<td></td>
<td>August (27 days)</td>
<td>2,789,838</td>
<td>684,245</td>
<td>1,882,909</td>
<td>132,814</td>
<td>2,838,122</td>
<td>105,115</td>
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<tr>
<td></td>
<td>Total – 8 Months</td>
<td>17,573,965</td>
<td>3,991,262</td>
<td>11,500,406</td>
<td>670,850</td>
<td>17,258,427</td>
<td>71,910</td>
</tr>
</tbody>
</table>
WAPCo is working with 3 companies to evaluate LNG offloading.
2 Itoki-olorunshogo
• 24” x 31 km
• Project complete

5 ELPS2: Wari-Oben-Lagos
• 36” x 324 km
• Ongoing project
• will double capacity from 1bscf/d to 2bscf/d by Q1 2013

1 Oben-Geregu
• 36” x 136 km
• Project complete
• supplying gas

3 ELPS A: Escravos–Wari
• 24”/30” x 104 km
• Complete
• Additional 80 MMcf/d
• Further 70 MMcf/d by October

Nigerian options for increased gas supply, Abuja, 23 August 2012
updated gas infrastructure development
4 Obiafu/Obrikom – Oben (OB3)

- 48” x 127km
- Contract awarded April 2012
- Completion 2014
WAGP Future Potential – Extension of Pipeline Network??

- WAGP has the potential to extend beyond Ghana
- Sub-regional oil & gas prospects provides opportunities for improved sub-regional integration
WAGP Challenges: Security
WAGP Challenges: Security
March 2011: Commercial Operations of WAGP begin

High gas demand in the sub region /Limited gas available from Foundation Shipper

LNG options: to be considered as options to meet developed market of the sub-region

Nigeria remains a robust source of gas supply to the sub-region

Despite challenges in the past in Nigeria, significant progress are made:
- Gas sector reform in course
- Pipeline deliveries in course
- Gas supply to the WAGP

Supply of gas from Nigeria to be complemented by discoveries in other countries (Ghana etc...)

Despite the pipeline protection measures in place, the WAGP is still vulnerable;

The main threats to the WAGP security are illegal maritime navigation activities.
THANK YOU!