### Project Title:

**Nigeria – Algeria Pipeline**

### Countries | Region

Nigeria, Niger, Algeria | West Africa

### Project Location (current line routing)

4,400 km pipeline from Warri (Nigeria), through Niger to Hassi R'Mel in Algeria

### Sector | Sub-sector

Energy | Transmission

### Project description

Natural gas pipeline for export to Europe. The Nigeria – Algeria Pipeline is also referred to as the Trans – Sahara gas pipeline (TSGP).

### Objectives

- Diversification of export route for marketing Nigerian natural gas
- Integrating economies and strengthening regional cooperation
- Boosting domestic gas supply in the countries
- Assisting in the fight against desertification through sustainable and reliable gas supply

### Economic Sustainability and expected benefits

Nigerian gas reserves are estimated at 5 trillion cubic meters – equal to roughly 10 years of consumption of the EU. In light of growing demand factors from Europe due to the depletion of European gas fields, and the need for an alternative to Russian gas, the demand from Europe is likely to remain high. Hence, this project would enable these African economies access a new market for their gas reserves, thereby increasing their incomes.

The TSGP would contribute to eliminating natural gas flaring in Nigeria. The TSGP is also has the critical advantage of supplying gas to Northern Nigeria, Niger, Southern Algeria, as well as Burkina Faso, and Southern Mali which are currently affected by high energy prices and desertification.

### REC

AMU, ECOWAS, CEN - SAD

### Project Sponsors

Governments of Nigeria, Niger, Algeria

### Implementing Authorities

Nigeria’s Infrastructure Concession and Regulatory Commission, Nigerian National Petroleum Corporation (NNPC), Sonatrach (Algeria), the Niger National Oil Company, as well as the Union du Maghreb Arabe and the Economic Community of West African States

### Project Status

- Feasibility studies concluded and accepted by sponsors in September 2006
- Inter-governmental agreement (IGA) between sponsor governments executed and ratified
- NNPC progressing with the Trans-Nigerian Segment of the Pipeline to kick-start and fast track the initiative

### Total estimated Project Value

USD 20 billion

### Way Forward

- Market revalidation study; the project feasibility study is currently being revalidated
- Conclude the Trans-Nigerian optimization study and identify critical areas of synergy with the Trans – Sahara Gas Pipeline from a construction point of view
- Update the IGA in line with an alternative Sonatrach participating arrangement and secure internal NASS ratification
- Commence with the relevant Directorates of NNPC, the review of supply options based on the revalidated study of the market and economics of gas supply
- Planned commencement year: 2015; Construction duration: 4 years

### Political Support

The pipeline was selected as a Presidential Infrastructure Champion Initiative project. The Nigerian government has made a commitment of USD 400 million in the 2013 budget to finance the project up to the next stage.
Background

14 January 2002
Memorandum of Understanding to jointly develop the TSGP project was signed during the inaugural session of a Bi-National Commission between Nigeria and Algeria.

March, 2003
Nigerian National Petroleum Corporation (NNPC) and the Algerian Sonatrach executed a preliminary study agreement.

September 2006
Feasibility studies concluded, and were accepted by sponsors.

February 2008
The Republic of Niger was admitted as project co-sponsor at Abuja.

3 July 2009
An Intergovernmental Agreement (IGA) between sponsor governments was signed at Abuja.

• The ratification of the IGA by sponsor governments has been carried out by Niger and Algeria.

• The review of the unincorporated joint venture agreement (UJVA) between the three countries is on hold pending the resolution of Sonatrach’s participation in Nigeria’s upstream activities.

• In 2013, Nigeria set aside a sum of US$400 million for construction of the Calabar-Ajaokuta-Kano pipeline; first direct activity to bring gas into the TSGP project.

Economic Sustainability and Strategic Importance

Natural gas is poised to occupy a more important place in the worldwide energy balance. Coupled with other renewable energy sources, natural gas is an energy source of choice for the development of Africa and offers a vehicle for its integration with the world economy.

The main objectives of this project are as follows:

• Diversification of export route for marketing Nigerian natural gas

• Integration of the economies of the sub-region in line with objectives of NEPAD

• Strengthening regional cooperation

• Creation of wealth and poverty alleviation by opening up economic growth opportunities in the sub-region
• Boosting the GDP and improving the living standards of the people within the sub-region
• Boosting domestic gas supply in the country
• Assisting in the fight against desertification through sustainable and reliable gas supply

Being the first of this kind, this project is an example of South-South integration and also has the potential to reinforce the role of energy in bridging the gap between Europe and Africa. With this pipeline, Africa can contribute to the global market with a sustained and diversified supply of natural gas that countries with excess demand are looking for, particularly the European Union (EU), which is a proximate market.

EU access to Nigerian gas reserves is particularly crucial since European gas consumption and gas imports will increase significantly in the future. An increase in demand for natural gas and declining domestic production will result in a significant growth of import dependency. Consequently, natural gas imports may reach 85% of EU gas consumption by 2030 compared to 50% in 2000. This raises significant concerns about the EU’s long-term security of supply. This is particularly the case given the growing dependency upon gas imports originating from a limited number of supplier nations, combined with the need for long distance transport infrastructures. Various elements, underpin the European need for Nigerian gas including:

**DEPLETION OF EUROPEAN GAS FIELDS:** As domestic production declines, by 2025, 80% of the gas the EU consumes will be imported, compared with 58% in 2005. This means the continent will have to import nearly 7.063 Tcf (200 billion cubic meters) more gas a year than it does now.

**DEMAND FOR OIL IN EUROPE IS LIKELY TO REMAIN HIGH:** Natural gas demand in the EU is expected to rise by 43% by 2030 and the amount of additional supplies needed will likely increase from 10% in 2015, up to 22% in 2020, and to roughly 39% in 2030. The factors contributing to the high European demand for natural gas include environmental concerns over greenhouse gas emissions, choice to use natural gas being financially attractive for the electric power sector, slowdown in European nuclear energy development, and the credibility of reaching an offtake agreement.

**UNCERTAINTY OVER THE FEASIBILITY OF SHALE-GAS PRODUCTION IN EUROPE:** As shale gas is a booming energy source in the United States, companies are now looking for shale gas in Europe. However, among the impediments to a similar boom in Europe are the depth of the deposits, regulatory issues, lack of supply chain, lack of appropriate rigs and equipment, conflicts with surface owners over developments in heavily populated Europe, and concerns over the environmental impact of industrial development. Hence, at this point, Europe’s shale-gas appears to offer a meaningful but small target.

**PREFERENCE FOR A GAS PIPELINE OVER LIQUEFIED NATURAL GAS (LNG) TECHNOLOGY:** Despite recent improvements, LNG is considered cost competitive with pipelines only over distances greater than 4,800 kilometres. According to this criterion, the 4,400 kilometres of the TSGP makes the pipeline more competitive than LNG. Further, another key criticism is that, 15–18% of gas is wasted during the process of liquefaction. Also, though both the TSGP and the LNG option would contribute to eliminating natural gas flaring in Nigeria. The TSGP is also has the critical advantage of supplying gas to Northern Nigeria, Niger, Southern Algeria, as well as Burkina Faso, and Southern Mali which are currently affected by high energy prices and desertification.
PRESENCE OF SUFFICIENT NIGERIAN RESERVES: Nigeria has the 7th largest gas reserves in the world. The gas quality is high, being particularly rich in liquids and low in sulphur. To date, although Nigeria has not explored for gas, the scope for huge growth exists.

Further, there are large local economic benefits of this project, as listed below.

The TSGP between Algeria and Nigeria will recover flared gas in Nigeria and bring it through a pipeline toward the European market. This gas is burnt currently in flares and hence, represents a loss of energy equivalent to 220,000 barrels/day for Nigeria and thus has serious consequences on the environment.

The TSGP will provide energy to the areas which it crosses, thereby contributing particularly to the revival of those areas, where there exists water and fertile land. Also, it will enable several countries in the region to access electricity.

The TSGP will facilitate exploration by international companies and this will not only create economic activity and employment in the short run, but may also lead to new sources of energy being discovered in the region.

Enhanced economic activity will have a stabilising effect on the region and will prevent the presently wandering populations from moving.

The distribution of natural gas for energy would prevent usage of wood for this purpose, and therefore reduce deforestation.

Hence, it can be said that the TSGP project has the potential to yield to economic and social benefits for the countries involved, reducing the basic cost of the energy need of the sub-region in addition to boosting the establishment of industries using cheaper energy, thus creating conducive conditions for sustainable growth and development.
Technical Specifications

The Trans-Saharan Gas Pipeline (TSGP) is a proposed natural gas pipeline from Nigeria to Algeria designed to supply Europe by connecting to the existing Trans-Mediterranean, Maghreb-Europe, Medgaz and Galsi pipelines across the Mediterranean coast.

The length of the pipeline is estimated at roughly 4,400 kilometers. The pipeline would initiate in the swampy region of the Niger Delta basin, then across the cultivated lands and tropical forests of North Nigeria. In Niger, the pipeline would cross the Sahel region, a semi-arid tropical savanna preceding the Sahara desert. Almost half of the proposed route traverses arid expanses before crossing over the Atlas Mountains, finally reaching Hassi R'Mel, a hub for natural gas and oil pipelines running to the Algerian coast.

The route of the pipeline will be as follows:

- Calabar-Kano-Nigerian border with Niger Republic = 1037km
- Nigerian border with Niger, which extends/continues to the Nigerien border with Algeria = 841km
- Gas Infrastructure pipeline route within Algeria = 2303km
- The border between Algeria & Spain = 220km

En route to Europe, it will connect to the existing Trans-Mediterranean, Maghreb-Europe, Medgaz (which started operations in early 2011) and Galsi (expected to come on stream in 2014) gas pipelines.

Once functioning, the TSGP is expected to reach a capacity of 1,059 billion cubic feet or 30 billion cubic meters of natural gas per year.
The proposed Nigeria – Algeria pipeline project will involve the cooperation of three countries as co-owners of the site. The demand for energy will come from the EU, the 3 countries’ utilities: NNPC for Nigeria, Sonatrach for Algeria and the Niger National Oil Company for Niger.

Nigeria’s Infrastructure Concession and Regulatory Commission is the focal point responsible for developing financing options for the project through a public private partnership (PPP).
**Phase 1: Conceptual**
- Project development philosophy
- Sponsors’ buy-in
- Appoint Consultant

**Phase 2: Feasibility**
- Determine Gas Market /demand scenario
- Identify Gas supply sources
- Establish Pipeline Infrastructure requirement
- Determine EIA/SIA Issues
- Establish Project cost Estimates
- Policy
- Regulatory and Institutional Framework Analysis,
  Economic and Financial Analysis and Regional Benefit

**Phase 3: Definitional**
- Develop Sponsors’ JV Agreement
- Select Consultant / Financial Adviser
- Incorporate SPV/TSGP Company
- Identify and obtain long-term commitments for the development and supply of gas and for gas buyers in Europe
- Establish TSGP companies, carry out EIA/SIA, route survey and implement them FEED, EPC contract packages, etc
- Execute Commercial/Term Sheets/ Agreement
- Prepare a Final Development Plan
- Conduct upstream resources due diligence
- Complete tendering for EPC
- Conclude land acquisition
- Take FID

**Phase 4: Construction**
- Implement EPC to Mechanical Completion
- Develop company Policies & Standards
- Develop company HR Resources
- Institute continuous Corporate Governance
- Transition to business unit
- Develop sustainable CSR

**Phase 5: Operation**
- Deliver Gas
- Meet contractual obligations
- Commit for expansion
- Meet Shareholder expectations
- Meet environmental/social standards
- Maintain CSR

**Current Position**
The status update on the project is as follows:

- **NNPC** progressing with the Trans-Nigerian Segment of the Pipeline to kick-start and fast track the initiative
  - Completed the FEED of a 2X48” pipeline from Calabar, via Ajaokuta to Kano
  - Identified and surveyed the pipeline right of way
  - Carrying out an optimization study of the pipeline to enable domestic utilization in the first instance
    - During construction, loop pipeline at critical locations – River Crossings etc. to reduce construction costs when full TSGP capacity pipeline is being deployed
  - Progress engineering design and commence construction ACTIVITIES within Nigeria in 2013
- **Market Revalidation**: TSGP sponsors to carry out a full market revalidation in 2013 –
  - Assess changing global market dynamics, particularly in Europe in view of USA shale gas, Russian pipeline to southern Europe, LNG imports etc.
  - Revalidate economics of project and impact on overall pipeline design and scope
- **Project Governance Issues**
  - Nigeria is making Progress in securing NASS ratification of the IGA for the project
- **Gas Supply**
  - NNPC re-assessing gas supply options in view of unprecedented growth in domestic gas demand vis-à-vis demand at the initiation of the project
  - Also making progress on the alternative for Sonatrach’s participation in the Nigerian upstream as basis for progressing with the project
- **PPP**
  - ICRC in collaboration with NNPC, has undertaken the following towards the successful implementation of the project:
    - Constitution of an inter-ministerial team made up of NNPC, ICRC, Debt Management office (DMO), and Nigerian electricity regulatory commission (NERC) to fast track the implementation of the project through a PPP model
    - Engagement of private investors and financial institutions such as the AFDB, African Finance Corporation (AFC) and European Investment Bank (EIB) to provide funding for the actualization of the project
  - While the following are in progress:
    - The review of the Gas Transmission Tariff Study
    - Consultation strategies to discuss a way forward with other sponsoring governments on the ratification of the IGA.
The next steps on the project will be as follows:

→ Kick-off the market revalidation study in the 4th quarter 2013

→ Conclude the Trans-Nigerian optimization study and identify critical areas of synergy with the TSGP from a construction point of view

→ Update the IGA in line with the alternative Sonatrach participating arrangement and secure internal NASS ratification

→ Commence with the relevant DIRECTORATES OF NNPC, the review of supply options based on the revalidated study of the market and economics of gas supply

### Risk Analysis

<table>
<thead>
<tr>
<th>Potential Risk</th>
<th>Description</th>
<th>Impact on Project</th>
<th>Mitigation Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall in European Demand</td>
<td>There are alternative sources for EU demand</td>
<td>Will impact project viability</td>
<td>Continued discussions between project sponsors and EU buyers New feasibility study to assess demand conditions.</td>
</tr>
<tr>
<td>Inflation of project costs</td>
<td>Inflation of project cost may lead to tariff structures that less viable</td>
<td>May impact project feasibility, if tariffs become too high for off-takers</td>
<td>New feasibility study to assess feasible tariff structures.</td>
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### Financial Status

<table>
<thead>
<tr>
<th>Total estimated Project Value</th>
<th>USD 20,000,000,000</th>
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**Highlights of feasibility study (2006):**

<table>
<thead>
<tr>
<th>PIPELINE CAPEX</th>
<th>USD 10 billion</th>
<th>48” line diameter</th>
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</thead>
<tbody>
<tr>
<td>GAS GATHERING CAPEX</td>
<td>USD 13.7 billion</td>
<td>56” line diameter</td>
</tr>
<tr>
<td>BORDER PRICE</td>
<td>USD 3 billion</td>
<td>$4.2 – 5.1 US$/MMBTU (MSCF) @ $25 – $40/BBL OIL</td>
</tr>
<tr>
<td>PROJECT FUNDING</td>
<td>EQUITY + DEBT FINANCING</td>
<td></td>
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<tr>
<td>INTERNAL RATE OF RETURN</td>
<td>15.5 - 25%</td>
<td></td>
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<tr>
<td>EQUITY PAYBACK</td>
<td>4 – 7 YEARS</td>
<td></td>
</tr>
<tr>
<td>GAS MARKET IN EUROPE</td>
<td>GAS MARKET OF 20BCM/Y (2BCF/D) EXISTS FROM 2015</td>
<td></td>
</tr>
</tbody>
</table>

| Preparation cost Incurred    | USD 2 billion |
| Preparation cost planned/remaining | USD 3/1 billion |
| Planned debt – equity ratio  | 70 – 30 |

**Funding Gap**

| USD 20 billion |