NIGERIA POWER SECTOR PROGRAM

GAS SECTOR ASSESSMENT

April 2019

DISCLAIMER:

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## ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AKK</td>
<td>Ajaokuta-Kaduna-Kano Pipeline</td>
</tr>
<tr>
<td>Bcf</td>
<td>Billion Cubic Feet</td>
</tr>
<tr>
<td>DGSO</td>
<td>Domestic Gas Supply Obligation</td>
</tr>
<tr>
<td>DiID</td>
<td>Department for International Development</td>
</tr>
<tr>
<td>DISCO</td>
<td>Distribution Company</td>
</tr>
<tr>
<td>DPR</td>
<td>Department of Petroleum Resources</td>
</tr>
<tr>
<td>ELPS</td>
<td>Escravos-Lagos Pipeline System</td>
</tr>
<tr>
<td>FGN</td>
<td>Federal Government of Nigeria</td>
</tr>
<tr>
<td>FOSTER</td>
<td>Facility for Oil Sector Transparency and Reform</td>
</tr>
<tr>
<td>GACN</td>
<td>Gas Aggregation Company of Nigeria</td>
</tr>
<tr>
<td>NGFCP</td>
<td>Nigerian Gas Flare Commercialization Program</td>
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<tr>
<td>GSA</td>
<td>Gas Supply Agreement</td>
</tr>
<tr>
<td>GSAA</td>
<td>Gas Supply and Aggregation Agreement</td>
</tr>
<tr>
<td>IOC</td>
<td>International Oil Company</td>
</tr>
<tr>
<td>LNG</td>
<td>Liquefied Natural Gas</td>
</tr>
<tr>
<td>LPG</td>
<td>Liquefied Petroleum Gas</td>
</tr>
<tr>
<td>MMBtu</td>
<td>Million British thermal units</td>
</tr>
<tr>
<td>MMSCFD</td>
<td>Million Standard Cubic Feet Per Day</td>
</tr>
<tr>
<td>MMscf</td>
<td>Million Standard Cubic Feet</td>
</tr>
<tr>
<td>MPR</td>
<td>Ministry of Petroleum</td>
</tr>
<tr>
<td>NAIF</td>
<td>Nigeria Infrastructure Advisory Facility</td>
</tr>
<tr>
<td>NGL</td>
<td>Natural Gas Liquid</td>
</tr>
<tr>
<td>NGMC</td>
<td>Nigerian Gas Marketing Company</td>
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<tr>
<td>NGPTC</td>
<td>Nigerian Gas Processing and Transportation Company</td>
</tr>
<tr>
<td>NNPC</td>
<td>Nigerian National Petroleum Corporation</td>
</tr>
<tr>
<td>NPSP</td>
<td>Nigeria Power Sector Program</td>
</tr>
<tr>
<td>OB3</td>
<td>Obiafu-Obrikom-Oben Pipeline</td>
</tr>
<tr>
<td>PIAB</td>
<td>Petroleum Industry Administration Bill</td>
</tr>
<tr>
<td>PIFB</td>
<td>Petroleum Industry Finance Bill</td>
</tr>
<tr>
<td>PIGB</td>
<td>Petroleum Industry Governance Bill</td>
</tr>
<tr>
<td>RFP</td>
<td>Request for Proposals</td>
</tr>
<tr>
<td>RFQ</td>
<td>Request for Qualifications</td>
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<tr>
<td>SOQ</td>
<td>Submission of Qualifications</td>
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</tbody>
</table>
# TABLE OF CONTENTS

EXECUTIVE SUMMARY ........................................................................................................... 1

PURPOSE OF THE ASSESSMENT ............................................................................................... 1

CURRENT STATE OF THE GAS SECTOR ................................................................................. 1

CONSEQUENCES FACING THE POWER SECTOR ..................................................................... 1

1 INTRODUCTION ....................................................................................................................... 7

1.1 BACKGROUND AND CONTEXT ......................................................................................... 7

1.2 STRUCTURE AND PURPOSE ............................................................................................... 7

2 NIGERIAN GAS SECTOR OVERVIEW ....................................................................................... 8

2.1 GAS-TO-POWER SUPPLY CHAIN ..................................................................................... 8

2.2 GAS UTILIZATION AND MONETIZATION ......................................................................... 8

2.3 GAS SECTOR GOVERNANCE STRUCTURE ..................................................................... 10

2.4 DONOR WORK ................................................................................................................. 11

2.5 SECURITY, THEFT, AND VANDALISM ........................................................................... 12

3 GAS-TO-POWER SUPPLY CHAIN CHALLENGES ................................................................. 14

3.1 EXPLORATION AND PRODUCTION ................................................................................. 14

3.2 GAS PROCESSING ............................................................................................................ 18

3.3 TRANSPORATION ............................................................................................................. 19

3.4 DELIVERY ......................................................................................................................... 23

4 GAS POLICY FRAMEWORK .................................................................................................... 26

4.1 NATIONAL GAS SUPPLY AND PRICING POLICY ......................................................... 26

4.2 NIGERIAN GAS MASTER PLAN ...................................................................................... 28

4.3 “7 BIG WINS” .................................................................................................................. 29

4.4 NATIONAL GAS POLICY .................................................................................................. 30

4.5 NATIONAL PETROLEUM FISCAL POLICY .................................................................... 31

5 CONCLUSION ......................................................................................................................... 33
LIST OF TABLES

TABLE 1: KEY TAKEAWAYS
TABLE 2: RELATED DONOR PROGRAMS
TABLE 3: DOMESTIC GAS TRANSPORTATION INFRASTRUCTURE

LIST OF FIGURES

FIGURE 1: GAS-TO-POWER SUPPLY CHAIN DIAGRAM
FIGURE 2: GAS UTILIZATION IN NIGERIA IN 2017 AND 2018
FIGURE 3: 2017 AVERAGE GAS UTILIZATION
FIGURE 4: NIGERIAN GAS SECTOR GOVERNANCE STRUCTURE
FIGURE 5: HISTORICAL NIGERIAN GAS PRODUCTION
FIGURE 6: FLARE GAS SITES IN NIGERIA
FIGURE 7: NGFCP AUCTION PROCESS FLOW CHART
FIGURE 8: EXISTING NATURAL GAS PIPELINE INFRASTRUCTURE
FIGURE 9: INTENDED ROLE OF GACN (SIMPLIFIED)
FIGURE 10: LEGISLATION, REGULATION, AND POLICY TIMELINE (NON-EXHAUSTIVE)
EXECUTIVE SUMMARY

PURPOSE OF THE ASSESSMENT
To act as a foundation for NPSP’s gas work by providing a snapshot of the Nigerian gas sector and the challenges along the entire gas-to-power value chain and policy landscape. This assessment will identify potential interventions to address these challenges and will inform our strategy to realize NPSP and Power Africa goals, taking the realities of the sector, timing, and the current regulatory and political environment in Nigeria into consideration.

CURRENT STATE OF THE GAS SECTOR
Despite holding the 9th largest proven gas reserves in the world, Nigerian gas production has been stagnant over the last four years, in part due to a fall in oil prices in 2015-2016, but primarily due to a slowdown in upstream investment in new fields (especially non-associated gas). Of the gas that is produced, the majority is either exported or used in upstream operations (e.g., fuel, lift, re-injection) or flared. By comparison, only a limited amount of gas is directed to the domestic market, and of that, only 60 percent is supplied to the power sector. According to the Power Sector Recovery Program, Nigeria has an installed capacity of 12,000 MW of gas-fired generation, of which only 7,000 MW are mechanically available, and an additional ~1,400 MW are constrained due to unreliable gas supply.¹

Gas supply challenges are rooted in the absence of:

1. **Activated gas supply agreements.** Gas Supply and Aggregation Agreements/ Gas Supply Agreements are signed but have not been activated because the conditions precedent have not been met, namely payment guarantees. Because of this, gas in Nigeria is supplied on a best endeavor basis, and there is no penalty to the international oil companies for not supplying the designated amounts of gas to power generators.

2. **Reliable payment of gas invoices.** Power sector illiquidity and the resulting inability of power generators to fulfill obligations and pay suppliers for gas is the largest challenge in the sector and limits the amount of gas available to the power sector. Reliable payment in U.S. dollars makes the export of gas as liquefied natural gas, liquefied petroleum gas, or natural gas liquids to the global market far more attractive to producers than selling to the domestic market.

3. **Cost-reflective tariffs.** Although some gas prices are determined on a contract basis, the gas-to-power price for domestic supply obligations and the transmission tariff are regulated by the government. Because these payments are passed through to the power sector, they directly impact power sector pricing and should be cost-reflective.

4. **An independent gas regulator.** Limited regulatory certainty and oversight of Nigeria’s oil and gas sector disincentivizes investment and participation by companies across the value chain.

5. **Consistent policy implementation.** Despite a comprehensive policy framework in place to guide the development of a sustainable gas sector, implementation of these policies has been inconsistent, with many initiatives unimplemented, and subsequent legal and regulatory efforts sometimes failing to reflect original policy intent.

CONSEQUENCES FACING THE POWER SECTOR
The major challenges in the Nigerian gas sector summarized above have led to a stagnation in the flow of gas to the domestic market, due to a breadth of technical, regulatory, and fiscal issues primarily in the downstream. This has led to a lack of a sufficient and reliable supply of natural gas to the power sector, which is comprised of roughly 85 percent gas-fired generation. Addressing the downstream issues will create a more robust and commercially viable market for gas in the long term. The existence of a viable market will then support the further development of upstream gas resources.

Table 1 below outlines the full array of challenges facing the gas-to-power value chain and potential actions to address them. Based on an analysis of the potential viability and impact of these interventions, NPSP has assigned a level of priority for each (low, medium, high). Ultimately, NPSP identifies the following five near-term priority actions, subject to USAID approval:

1. Develop a report identifying barriers to bankable and active gas supply agreements based on stakeholder interviews and make recommendations based on international leading practices and case studies, taking into account the realities of the Nigerian market;
2. Support the Nigerian Gas Flare Commercialization Program through the whole process from the first auction round, preparing and issuing the RFP documentation, supporting the proposals evaluation process, to the finalization of the commercial agreements (i.e., until the award of Permit to Access Flare Gas);
3. Assess the current role of the Gas Aggregation Company of Nigeria in the sector and support the implementation of agreed upon actions needed to reform the current process, which may include changing roles and responsibilities or transitioning to a new model if deemed appropriate;
4. Identify and evaluate alternatives to the current discrepancy in currency denominations across the gas-to-power sector (gas supply denominated in U.S. dollars and generation/electricity denominated in Naira) to decrease generation company exposure to foreign exchange risk and facilitate active and bankable gas supply agreements; and
5. With the support of the Nigerian National Petroleum Corporation, review the current Gas Master Plan, updating where necessary, with the primary objective of selecting priority interventions and reforms that will support the operation and expansion of the domestic gas sector, and therefore, the power sector.
<table>
<thead>
<tr>
<th>Area</th>
<th>Problems</th>
<th>Potential Solutions</th>
<th>Pro</th>
<th>Con</th>
<th>Priority Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream</td>
<td>Oil and gas pipeline security, theft, and vandalism</td>
<td>Reduce security risks through continuous engagement of the Federal Government of Nigeria in the Niger Delta region (e.g., stakeholder sessions)</td>
<td>• Help ensure a reliable long-term supply of gas from producers</td>
<td>• NPSP is not in a position to address physical security of infrastructure</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Lack of incentive for upstream investment</td>
<td>Develop a more attractive and improved tax regime for non-associated gas Facilitate the divestment of the Nigerian National Petroleum Corporation’s stake in various joint ventures Address historical debts to upstream players</td>
<td>• Incentivize upstream investment and new field development</td>
<td>• Potential challenge of Nigerian National Petroleum Corporation engagement • Debt settlement will be between Nigerian National Petroleum Corporation and international oil companies</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Lack of effective implementation of domestic gas supply obligations</td>
<td>Review the Department of Petroleum Resources' domestic gas supply obligation methodology to improve forecasting, transparency, and enforcement</td>
<td>• Increase domestic gas supply, especially for the power sector</td>
<td>• Potential challenge of the Department of Petroleum Resources engagement • Availability of data required for calculations</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Unattractiveness of the domestic market</td>
<td>Support a transition to a willing seller/willing buyer market with competitive pricing</td>
<td>• Reduce government intervention in the market</td>
<td>• Not really one specific action; more understanding needed to decide how to go about the transition • Need political will to change the model</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Increased power sector liquidity</td>
<td></td>
<td>• Fundamental issue: gas suppliers will be paid</td>
<td>• Does not fall directly under gas supply activities</td>
<td>N/A*</td>
</tr>
<tr>
<td></td>
<td>High flare gas rates</td>
<td>Support efforts to commercialize flare gas by guiding the design of the Nigerian Gas Flare Commercialization Program and supporting its ongoing implementation</td>
<td>• Potential for additional domestic gas supply (e.g., community/off-grid power) • Reduced environmental harm • Already involved with Gas Strategies</td>
<td>• Limited opportunities for grid-based power</td>
<td>High</td>
</tr>
<tr>
<td>Area</td>
<td>Problems</td>
<td>Potential Solutions</td>
<td>Pro</td>
<td>Con</td>
<td>Priority Level</td>
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<tr>
<td>Midstream</td>
<td>Limited domestic processing capacity and specification issues</td>
<td>Revisit the Centralized Processing Facilities outlined in the Gas Master Plan</td>
<td>• More metering and entry points into the national pipeline network</td>
<td>• Need for funding and political will</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced risk of off-spec gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of regulatory oversight</td>
<td>Strengthen the Department of Petroleum Resources’ capacity as a regulator</td>
<td>• Improved implementation of regulations</td>
<td>• Potential challenge of the Department of Petroleum Resources engagement</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase the Department of Petroleum Resources’ capacity to provide oversight and monitor the Nigerian Gas Processing and Transportation Company</td>
<td>• Enforcement of equitable terms for all market participants</td>
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<tr>
<td></td>
<td>Limited domestic gas pipeline infrastructure</td>
<td>Develop a business case for the Ajaokuta-Kaduna-Kano pipeline and other pipeline infrastructure to bring gas supply to the unserved North</td>
<td>• Energy access in the north</td>
<td>• Lengthy timeline</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop a business case for building out pipeline infrastructure in the oil and gas producing regions</td>
<td>• Huge untapped demand, especially for power</td>
<td>• Difficult to secure funding</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Inefficient distribution of gas to power generators</td>
<td>Assist the Nigerian Gas Processing and Transportation Company with the assessment of the current gas allocation methodology and work to formulate a new methodology based on optimizing gas in the most efficient power plant</td>
<td>• Maximize megawatt hours produced from gas molecules</td>
<td>• There could be commercial or infrastructure challenges also at play (e.g., transmission capacity constraints)</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Gas Aggregation Company of Nigeria structure is not commercial</td>
<td>Assess the organization’s role in the market and suggest changes if appropriate</td>
<td>• Determine relevance of GACN in a willing seller – willing buyer model</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Inactive gas supply agreements</td>
<td>Identify barriers and make recommendations based on international leading practices</td>
<td>• Reinforces need for other interventions</td>
<td>• More academic</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conduct an analysis of contract alignment across the gas-to-power value chain (gas supply agreements, power purchase agreements, vesting contracts)</td>
<td>• Help resolve standoffs on contract terms</td>
<td>• Requires stakeholder buy-in</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>• The Association of Power Generating Companies is already conducting one – looking for a government benchmark</td>
<td>• Need for a supportive counterpart (e.g., the Bureau of Public Enterprises)</td>
<td>Medium</td>
</tr>
<tr>
<td>Area</td>
<td>Problems</td>
<td>Potential Solutions</td>
<td>Pro</td>
<td>Con</td>
<td>Priority Level</td>
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</table>
| Regulated gas-to-power price for domestic supply obligations | Offer trainings on an existing gas cost model to support a transition to a willing seller-willing buyer market | • Existing model that NPSP is familiar with  
• Useful tool for determining market prices | • Access to data  
• Finding a willing partner  
• Potential challenge of Department of Petroleum Resources engagement | Medium |
| Foreign exchange risk | Identify and evaluate alternatives to naira designated power and dollar designated gas to decrease generation company exposure to exchange risk | • This is an important roadblock for active gas supply agreements  
• Stand-alone activity | • Requires support and buy-in from counterparts, namely international oil companies | High |
| Incomplete implementation of the National Gas Supply and Pricing Policy and distorted pricing based on liquids | Establish a transparent pricing mechanism for domestic supply obligation gas  
Incorporate the relevant provisions of the Downstream Gas Act into the Petroleum Industry Administration and Finance Bills | • Investor confidence in the gas market grows  
• Policies are fully implemented  
• Interventions are prioritized  
• A transition to a willing seller-willing buyer market is outlined and supported  
• Cost-reflective pricing | Political will  
Counterparty support  
Long timeline | |
| Turning “7 Big Wins” into concrete plans | Minimize discrepancies and conflicts between the 7 Big Wins, policies, legislation, and their implementation | | | Low |
| Missing governance, demand forecasting, and pricing framework guidance in the National Gas Policy | Designate who will drive the plan, give them to power to implement, and have an accountability mechanism in place | | | |
| Alignment of the National Petroleum Fiscal Policy with the Petroleum Industry Finance Bill | Ensure that fiscal policy meets policy objectives, develop a credible transitional pricing plan to support a willing seller/willing buyer market, and establish strong independent regulation of the gas sector | Include transitional gas pricing arrangements in the PIFB that encourage the supply of natural gas to the domestic market | | |
### Area

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<thead>
<tr>
<th>Area</th>
<th>Problems</th>
<th>Potential Solutions</th>
<th>Pro</th>
<th>Con</th>
<th>Priority Level</th>
</tr>
</thead>
</table>
| Out of date Gas Master Plan | Review the existing Gas Master Plan, updating where necessary, to identify priority interventions | • Opportunity to target specific assessments or studies that would be needed for an update of the document  
• Would support other NPSP interventions, if identified as a priority | • Potential challenge of Nigerian National Petroleum Corporation engagement  
• Too much an academic document | | High |

*Being addressed by other areas of NPSP*
1 INTRODUCTION

1.1 BACKGROUND AND CONTEXT

Nigeria has produced natural gas with oil in the Niger Delta region since oil production first began in the country in 1958. Despite an emphasis on oil exploration and production, Nigeria has discovered an estimated 184 trillion cubic feet\(^2\) of gas reserves, that with gas-targeted exploration could reach as high as 600 trillion cubic feet.\(^3\)

The primary route to monetization of gas within Nigeria is the power sector, comprised of roughly 85 percent gas-fired power generation. However, even with an apparent abundance of gas resources, electricity access in Nigeria is severely constrained. The fundamental cause being the lack of liquidity in the gas-to-power chain caused by insufficient funds flowing back to the generation companies, and gas suppliers, mostly due to poor collection of electricity invoices by distribution companies.

The resulting lack of an adequate and reliable supply of gas to the power sector is considered one of the primary obstacles facing energy access in Nigeria. According to the Power Sector Recovery Programme, Nigeria has an installed capacity of 12,000 MW of gas-fired generation, of which only 7,000 MW are mechanically available, and an additional ~1,400 MW are constrained due to unreliable gas supply.\(^3\)

Gas supply challenges for the Nigerian power sector are rooted in the absence of: (1) activated gas supply agreements; (2) reliable payment of gas invoices; (3) cost-reflective tariffs; (4) an independent gas regulator; and (5) consistent policy implementation.

While NPSP is working to unlock stranded gas-fired power generation by addressing these issues, it is important to note that even if enough gas were supplied to generate 7,000 MW, transmission network constraints would limit evacuation capacity to the grid, requiring a resolution of both issues in tandem. Furthermore, while this report does not directly address illiquidity in the power sector, until and unless there is a cost-reflective tariff and reliable payment in the power sector, any efforts to address gas sector issues will be more difficult to accomplish.

1.2 STRUCTURE AND PURPOSE

This assessment is organized into three main sections: (1) an overview of the Nigerian gas sector; (2) a review of the gas-to-power supply chain; and (3) an analysis of the existing gas policy framework. The purpose of this review is to act as a foundation for NPSP’s gas sector work by providing a snapshot of the sector and the different challenges facing the adequate and reliable supply of gas to the domestic market across the gas-to-power supply chain and policy landscape. This assessment will identify potential interventions to address these challenges and will identify five priority, near-term actions to support NPSP and Power Africa goals, taking the realities of the sector, timing, and the current regulatory and political environment in Nigeria into consideration.

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2 NIGERIAN GAS SECTOR OVERVIEW

This section will provide an overview of the Nigerian natural gas sector by: (1) defining the gas-to-power supply chain; (2) breaking down how natural gas is utilized and monetized in Nigeria; (3) identifying the key actors at the federal level; and (4) highlighting the impact of security issues across the sector.

2.1 GAS-TO-POWER SUPPLY CHAIN

For the purposes of this assessment, the gas-to-power supply chain has been broken down along the lines of upstream, midstream, and downstream activities (see Figure 1 below). Upstream gas sector activities include exploration and production, which are primarily conducted by international oil companies (IOCs), NNPC, and private indigenous gas companies. Midstream activities include gas processing and transportation, and downstream activities encompass the marketing and delivery of gas to end users (namely the power sector and industry). This report will individually address exploration and production, processing, transportation, and delivery, identifying current challenges, as well as opportunities to improve operations and support Power Africa goals.

Figure 1: Gas-to-Power Supply Chain Diagram

2.2 GAS UTILIZATION AND MONETIZATION

2.2.1 Utilization

Once natural gas is produced in Nigeria, it is commercialized, used in upstream operations, or flared. Commercialized gas is gas that is sold to the export and domestic markets. In 2017, an average of 3,360 million standard cubic feet per day (MMSCFD) or 44 percent of gas produced was exported, while only 1,076 MMSCFD or 14 percent of gas produced was sold to the domestic market. The power sector utilized less than 10 percent of produced gas, with an online average of 2,790 MW in 2017 (see Figure 3 below).

Producers use the remaining gas to provide fuel for upstream operations and boost oil production through enhanced oil recovery (e.g., re-injection and lift), or flared at the production site. In 2017, these activities accounted for an average of over 3,000 MMSCFD or 42 percent of gas produced in Nigeria (See Figure 2 and Figure 3 below).
2.2.2 Monetization

Export Market

Nigeria exports natural gas as liquefied natural gas (LNG), liquid petroleum gas (LPG), and natural gas liquids (NGLs), or via pipeline. Nigeria LNG is the most successful gas monetization project in Sub-Saharan Africa. It is a vertically integrated operation where the project or its shareholders own and operate all elements of the project, including upstream gas production facilities, transportation pipelines, the liquefaction facility, and the LNG shipping. Being in a position to make export sales, unencumbered by local pricing and revenue security constraints, has enabled Nigeria LNG to expand significantly and generate significant returns for its shareholders (including the Nigerian National Petroleum Corporation, NNPC). It has also provided a reliable outlet for its shareholders’ associated gas (gas that is produced as a byproduct of crude oil production).

Nigeria also exports gas through the West African Gas Pipeline to Togo, Benin and Ghana, however it has failed to consistently deliver the contractual volumes of gas due to pipeline disruption (technical and sabotage) and gas supply shortage (including gas being allocated to serve the Nigerian domestic market rather than being exported).

Domestic Market

The two main gas consuming sectors in Nigeria are the gas-to-power sector and the wholesale/industrial market (roughly a 60:40 split). As discussed in the previous section, these sectors only receive roughly 15 percent of total gas produced in Nigeria, combined. The resulting untapped potential for additional gas-to-power in Nigeria is many thousand megawatts and, with a fast-growing population, is destined to expand over time.

The constraints to achieving a reliable, cost-effective, and ubiquitous electricity supply for Nigerians for both domestic, commercial, and industrial use are many and span from the commercial aspects of gas production right through the value chain to the end-consumer. Achieving this will mean first resolving the issues currently besetting the existing value chain and then increasing capacity across the whole value chain, further discussed throughout this report.

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*NNPC Annual Statistical Bulletin.*
2.3 GAS SECTOR GOVERNANCE STRUCTURE

The Nigerian gas sector is governed by the Ministry of Petroleum Resources and a group of parastatal entities (government-owned organizations) beneath it, as shown in Figure 4.

The different actors and their respective roles and responsibilities in terms of natural gas are outlined briefly below:

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5 NNPC Annual Statistical Bulletin.
• **Ministry of Petroleum Resources (MPR)** – Within MPR, the Department of Gas is responsible for formulating policies and programs for the development of the gas sector. Key objectives include: (1) maximize domestic usage of gas; (2) optimize gas export opportunities; and (3) ensure supply of gas to the domestic market in the long run.

• **Department of Petroleum Resources (DPR)** – DPR is the technical regulator of the petroleum industry, responsible for ensuring compliance and enforcement of petroleum laws, regulations, and guidelines. If/when the Petroleum Industry Governance Bill (PIGB) is passed, DPR will merge with the Petroleum Product Pricing Regulatory Agency to form an independent regulatory body, the Nigerian Petroleum Regulatory Commission.

• **Nigerian National Petroleum Corporation (NNPC)** – Within NNPC, the Gas and Power Directorate oversees operations in the mid- and downstream sectors, including all aspects of transportation and distribution of gas. In 2016, the Nigerian Gas Company, a subsidiary of NNPC, was broken up into the Nigerian Gas Processing and Transportation Company (NGPTC) and the Nigerian Gas Marketing Company (NGMC) to handle midstream and downstream activities, respectively. It is important to note that the detail and structure of these two independent businesses is not clear and it is not known to what extent they operate independently of each other today.

• **Petroleum Product Pricing Regulatory Agency** – This agency monitors and regulates the supply and distribution of petroleum products and determines their prices in Nigeria. If/when PIGB is passed, it will merge with DPR to form the Nigerian Petroleum Regulatory Commission, the independent sector regulator.

• **Gas Aggregation Company of Nigeria (GACN)** – GACN is not a parastatal, but a regulated entity that was established by MPR to monitor demand and supply of gas to the domestic market, act as an intermediary for sellers with domestic gas supply obligations (DGSOs) and buyers, and aggregate payments made for DGSO gas. Both FGN and IOCs are shareholders in GACN.

It is important to note that in Nigeria, just because a responsibility has been mandated to an organization, in practice, that responsibility may be carried out by a different entity (e.g., the DGSO is allocated by DPR, not MPR).

### 2.4 DONOR WORK

Over the last decade a series of donor funded programs have been carried out in Nigeria to at least in part support the development of the gas sector. The table below outlines key donor programs, their goals, and their relation to NPSP work, either in terms of activities to build on or to coordinate with and support.

#### Table 2: Related Donor Programs

<table>
<thead>
<tr>
<th>Donor</th>
<th>Program</th>
<th>Description/Goals</th>
<th>Relation to NPSP Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Department for International Development (DfID)</td>
<td>Facility for Oil Sector Transparency and Reform (FOSTER) Phase 2(^7)</td>
<td>A program designed to achieve more effective use of Nigeria’s extractive industries to support national development. It is the successor program to FOSTER 1, which was delivered from 2011 to 2016. To address 4 key sector deficits: • Transparency deficits in the centralized, government-controlled oil and gas industry;</td>
<td>• Strengthening oil and gas sector oversight and accountability • Decreasing regulatory uncertainty – supporting the development/passage of a new Petroleum Industry Governance Bill</td>
</tr>
</tbody>
</table>

\(^7\) Oxford Policy Management. *Facility for Oil Sector Transformation (FOSTER 2).* [https://www.opml.co.uk/projects/facility-oil-sector-transformation-foster-2](https://www.opml.co.uk/projects/facility-oil-sector-transformation-foster-2).
2.5 SECURITY, THEFT, AND VANDALISM

Before going into detail on the different segments of the gas-to-power supply chain, it is important to acknowledge the threats to the security and integrity of gas infrastructure in the Niger Delta region that have had serious implications throughout the sector. In recent years, gas supply disruptions have been a result of deliberate sabotage of the oil and gas pipelines and facilities in the Niger Delta. Any disruption of oil production causes a disruption in the associated gas produced with it, causing issues along the value chain. In the upstream, oil theft and pipeline vandalism deter new investment in oil and gas exploration and production. In the midstream, attacks on and tampering with pipelines have disrupted gas flows, resulting in lengthy repairs and interrupted delivery to consumers. In the downstream, supply disruptions hurt industries and power generators that rely on gas to operate, resulting in stranded capacity and lost productivity and economic growth. In 2016, vandalism of oil and gas pipelines in the Niger Delta region constrained power generation capacity by up to 2,900 MW, demonstrating the huge impact infrastructure security can have on the power sector.9

Sabotage is primarily a political issue owing to long standing grievances in the Niger Delta. Despite a significant proportion of hydrocarbon production in Nigeria being from the Niger Delta, the local

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population considers that too little of the revenue received from the sale of the hydrocarbons is invested there. Out of frustration, militant groups, such as the Niger Delta Avengers, have resorted to deliberate sabotage of pipelines to draw attention to their cause, creating unreliability in the gas supply chain.

Improved security across the gas-to-power supply chain would help to ensure a reliable long-term supply of gas from producers, unlock stranded generation capacity, and increase the resiliency and reliability of the power sector.

Support FGN efforts to reduce security risks through continuous engagement in the Niger Delta region, including stakeholder sessions to meet with interest groups, which government officials believe has contributed to a calming of tensions and restoration of disrupted oil and gas volumes.
3 GAS-TO-POWER SUPPLY CHAIN CHALLENGES

3.1 EXPLORATION AND PRODUCTION

3.1.1 Snapshot

At approximately 184 trillion cubic feet\(^{10}\), Nigeria is the world’s 9th largest holder of proven gas reserves, and the largest producer of oil and gas on the African continent. As of 2016, 41 companies were operating in Nigeria (including both IOCs and indigenous companies) and producing onshore (swamp and land) and offshore (shallow and deep water) associated and non-associated gas. However, despite an abundance of resources and huge potential, Nigerian gas production has averaged ~1590 billion cubic feet (bcf) per annum over the previous four years (see Figure 5 below) and development of new wells/blocks has been very limited. While sustained low crude oil prices in 2015-2017 were a contributing factor, especially for producers of associated gas, stagnant production growth is largely due to a lack of exploration activity (e.g., drilling in new blocks) and upstream investment.

Figure 5: Historical Nigerian Gas Production\(^{11}\)

3.1.2 Challenges

Upstream Investment

Historically, exploration and production activity in Nigeria has been based on Joint Ventures between NNPC and IOCs/indigenous companies. NNPC acts as the representative of FGN in all oil and gas commercial activities, but has not always responded to cash calls, amounting to over US$5 billion in arrears.\(^{12}\) NNPC has a 55-60 percent interest in upstream oil and gas Joint Ventures, but has not been consistent in honoring cash calls and fulfilling financial obligations as a stakeholder, which acts as a major deterrent for companies that would otherwise be interested in developing new blocks and investing in the upstream, contributing to the overall lack in gas production growth in recent years.\(^{13}\) Joint Ventures apply to most of the land, swamp and shallow offshore blocks. The newer blocks, including all the deep offshore blocks are production sharing contracts, eliminating NNPC’s exposure to both exploration and production costs. To sustain, let alone increase, gas production levels, it is imperative to have continuous investment and exploration in new blocks as existing fields will inevitably

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\(^{10}\) BP Statistical Review 2018 Report.


decline over time. Improving the enabling environment and encouraging upstream investment will help ensure a long-term supply of natural gas to fuel the Nigerian power sector.¹⁴

To address the challenge of limited upstream investment, areas of focus could include: (1) developing a more attractive and improved tax regime for non-associated gas as stated in existing fiscal policies; and (2) facilitating the divestment of NNPC's stake in various joint ventures to incentivize future investment.

These interventions would improve the enabling environment in the upstream oil and gas sector and encourage exploration and production activity and investment by companies. However, given the opaque nature of NNPC operations and historical lack of engagement with donor organizations, these activities will be especially challenging for NPSP and engagement will largely be determined by the results of attempted meetings with NNPC in the near-term.

Regulatory Uncertainty

In the second half of 2018, FGN President Buhari sent back the proposed Petroleum Industry Government Bill (PIGB) to the National Assembly.¹⁵ This would have been the first major petroleum industry legislation passed in Nigeria in almost two decades. The PIGB aims to establish efficient and effective governing institutions with clear and separate roles to support a commercial and profit-driven petroleum sector. Specifically, for gas, the PIGB would have mandated the creation of the Nigerian Petroleum Regulatory Commission, an independent regulator with the responsibility of overseeing and implementing many of the sector reforms needed to increase transparency and improve operation of the Nigerian gas market. Despite approvals from Parliament and the Senate, the PIGB requires the President’s signature to become law. While government officials remain hopeful that the bill will pass in the near term, this delay could potentially push the passage of the bill for years. The PIGB is also supposed to be followed by the passing of the Petroleum Industry Administration Bill (PIAB) and Petroleum Industry Finance Bill (PIFB). This regulatory uncertainty surrounding governance of Nigeria’s oil and gas sector disincentivizes investment because companies do not know what the regulatory environment will be like from one year to the next.

Domestic Gas Supply Obligations

Domestic Gas Supply Obligations (DGSOs) are requirements for gas producers to supply a designated amount of gas to the domestic market. Obligations are calculated annually by DPR based on forecasted domestic gas supply and demand for the following year. The DGSO was introduced as an intermediary step to guarantee domestic gas supply during the transition to a fully liberalized market.¹⁶ However, since the DGSO was established, gas producers have not fulfilled their obligations and penalties have not been enforced. This is largely a result of inaccurate and overestimated forecasts of domestic gas demand that are reflected in unrealistic and unenforceable obligations to gas producers that the sector could not even offtake if they were fully met. Lack of transparency is a recurring issue with DPR, and the DGSO methodology is not made public and the reasoning behind volume designations are unclear to participants, further deterring their fulfillment.¹⁷ As the intended beneficiary of DGSO, the power sector stands to gain a lot from a realistic and enforceable DGSO that accurately reflects the sector’s needs, effectively increases gas supply, and helps unlock otherwise stranded assets.

Unattractiveness of the Domestic Market

As described in more detail in this report, gas sales into the domestic market are faced with a series of challenges, including inadequate infrastructure, largely unenforced regulation, the inability of many generation companies to pay gas suppliers as a result of unreliable demand in the power market, and the issue of Naira gas sales contracts. Whereas, the export of gas (including as LNG), LPG and NGLs to the global market offers producers a reliable cashflow underpinned by robust contracts and provide U.S. dollar denominated revenue. This situation makes gas sales to the domestic market far less attractive proposition; and as a result, many producers would not consider it viable to develop upstream gas discoveries on the basis of gas sales into the local market.

Flare Gas

Nigeria is one of the top ten gas flaring countries in the world, flaring an estimated 324 bcf of gas in 2017. Figure 6 below illustrates the approximately 180 gas flare sites that have been identified in Nigeria. In an effort to eliminate the adverse environmental effects of gas flaring, FGN has committed to eliminating the practice of routine gas flaring within its oil and gas fields by 2020. This is in line with the countries National Gas Policy and the MPR’s “7 Big Wins” (described in detail in the Policy Framework section). FGN endorsed the World Bank’s Zero Routine Flaring Reduction by 2030 initiative in June 2016 and in May 2017 the FGN ratified the 2015 Paris Climate Change Agreement and submitted its first nationally determined contributions, which included gas flaring reduction as a mitigation measure to combat global warming.

To increase the attractiveness of the domestic market to gas producers, support FGN in strengthening Nigeria’s legal, regulatory, and fiscal frameworks, and encourage the willing seller-willing buyer contracting model, in addition to increasing power sector liquidity and generation company’s ability to pay gas suppliers.

The Nigerian Gas Flare Commercialization Program (NGFCP) is the mechanism for implementing Nigeria’s commitment to eliminate routine gas flaring and is the largest program of its kind undertaken globally. The program was approved by FGN in 2016 and lays out the framework to effectively commercialize gas that would otherwise be flared. The subsequent ratification of the Flare Gas (Prevention of Waste and Pollution) Regulations, 2018 provides the regulatory structure for the implementation of the NGFCP. The primary objective is to eliminate routine gas flaring, however there are also significant economic and social benefits for Nigeria and communities in the Niger Delta region specifically. NGFCP has the potential of generating approximately US$3.5 billion of inward investment and the potential GDP benefit is estimated at US$1 billion per annum.

Under the NGFCP, FGN takes ownership of associated gas at the flare site free of charge and bids it out to third parties in a series of auctions designed to attract private sector participants to develop projects to commercialize the flare gas. Following the release of the Flare Gas Regulations 2018, the NGFCP launched its first auction round by issuing a Request for Qualifications (RFQ) in November 2018. In response to the RFQ interested parties submit a Statement of Qualification (SOQ) to demonstrate their ability to meet the minimum technical and financial capabilities required to implement a Project under the NGFCP.

Those who submit a SOQ and are deemed qualified by FGN are invited to respond to the Request for Proposals (RFP) process. Bidders then submit proposals in response to the RFP. The proposals are evaluated on a technical and commercial basis by a Proposals Evaluation Committee, established by the Minister of Petroleum Resources. Successful proposals will be awarded preferred bidders’ status. Figure 7 outlines the NGFCP Auction Process from end to end.

Figure 7: NGFCP Auction Process Flow Chart

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19 Nigeria Gas Flare Tracker. [http://gasflaretracker.ng/](http://gasflaretracker.ng/). The image was produced by Nigeria Gas Flare Tracker, an online map application designed to provide data and insight to help guide regulation and investment in the region using satellite data on gas flares.
All Projects will be obliged to act in accordance with the *Nigerian Oil and Gas Industry Content Development Act (2010)*. As one key principle of the NGFCP is to provide social benefits to Nigeria, part of a project’s obligations during the operations phase will be to contribute to a community development fund that will be used by communities in the vicinity of the project.

As of 18 March 2018, the NGFCP’s RFQ phase is ongoing with the SOQ submission deadline having passed. The number of submitted SOQs is expected to exceed 50 and the initial interest in the programme is encouraging. The successful implementation of the NGFCP will result in the effective commercialization of Nigeria’s flared gas which has the potential to increase domestic supply to on- or off-grid power sector projects and increase access to reliable, more environmentally friendly electricity in the under-served Niger Delta region.

**3.2 GAS PROCESSING**

**3.2.1 Snapshot**

Natural gas processing facilities in Nigeria are predominantly owned and operated by IOCs and indigenous gas companies. Although the NNPC subsidiary NGPTC has “processing” in its name, it mainly facilitates domestic gas transportation and does not currently process gas. NGPTC could play a role in the Central Processing Facilities earmarked in the Gas Master Plan, but no significant progress has been made for their creation to date. Unlike other segments of the Nigerian gas market, natural gas processing fees are unregulated and determined on a contract basis between producers and processors and then between consumers and producers, but tri-party agreements are now being considered between producers, processors, and consumers. In some instances, producers simply process and consume their own gas in their facilities.

**3.2.2 Challenges**

**Domestic Processing Capacity**

The primary gas processing challenge is linked to the percentage of output capacity designated to the export market versus the domestic market. While IOCs and indigenous gas companies may direct some supply to the local market, based on export volumes, most processed gas is directed toward

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export facilities (Nigeria LNG, Escravos Gas-to-Liquids Project, West Africa Gas Pipeline). As a result, an increase in gas supply to the domestic power sector will require an increase in processing capacity directed to the domestic market.

Increasing the commercial viability of the downstream will increase the attractiveness of the domestic gas market. Once sufficiently commercial, domestic gas projects and investment in domestic processing capacity would materialize. However, it is important to note that insufficient domestic processing capacity is a potential immediate constraint once liquidity unlocks gas supply/demand, unless new processing facilities come online near term. For comparison, existing pipeline transport capacity is ~2,000 MMSCFD (excluding an additional ~3,000 MMSCFD of capacity nearing completion, see Table 3 below), but domestic gas processing capacity is estimated at only ~600 MMSCFD.\textsuperscript{21}

**Gas Specifications**

Due to the lack of enforceable gas supply contractual arrangements, issues of un- or under-processed gas supplied to power generators that does not meet specifications and contains too much condensate have been raised which can potentially damage machinery and affect generation. The issue of contract enforceability is discussed in detail in the section on delivery.

Revisit the potential of Centralized Processing Facilities outlined in the Gas Master Plan to address some of these issues. Assess how some could be brought online and which locations would be most impactful.

### 3.3 TRANSPORTATION

Transportation covers the transmission of gas from the processing plant to the distribution network (industry) or final consumer (power sector). The major FGN players in gas transportation are: 1) DPR – the technical regulator of the pipeline system; 2) MPR – in charge of policy; and 3) NNPC – NGPTC is the owner and operator of the majority of the domestic gas pipeline network (excluding IOC-owned pipelines, primarily used to supply export facilities). To gain access to the domestic pipeline system, gas producers need to sign a Gas Transmission Agreement with NGPTC, which includes terms such as duration, termination clause, capacity reservation, and others. However, while the transportation network is functional, it is not operating on a commercial basis (e.g., customers are not nominating gas deliveries daily, in accordance with a Gas Transmission Agreement).\textsuperscript{22}

A postage stamp transmission tariff of US$0.80/MMBtu is applied for use of the pipeline system, meaning that the transmission tariff remains the same regardless of other factors such as the distance the gas travels. A transportation tariff is designed to fund operations and future investments in the pipeline system to improve and/or expand service. A simplified tariff formula is shown below.

\[
\text{Tariff} = \frac{\text{Cost of Service}}{\text{Gas Volume}}
\]

The existing Nigerian pipeline network that serves the domestic market is comprised of two main systems, the Western and Eastern networks. It is important to note that pipeline connectivity is limited in Nigeria, with LNG/export and domestic pipeline networks separate from one another, apart from the West Africa Gas Pipeline that is connected to ELPS but has not exported at its intended capacity since commissioning. This further complicates efforts to redirect gas volumes to the domestic market. Table 3 below provides a list of existing, planned (under construction), and proposed domestic gas pipelines (see Figure 8 for a map visual). It is important to acknowledge that while the domestic gas

\textsuperscript{21} Based on NPSP research and calculations.

\textsuperscript{22} Gas Strategies. USAID Rapid Assessment of the Nigerian Gas Sector. September 2016. Pg 16.
pipeline network is limited, on the export side, there are six pipelines that supply the Nigeria LNG export facility, all financed by IOCs to guarantee supply for their operations and exports.\(^{23}\)

### Table 3: Domestic Gas Transportation Infrastructure

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Status</th>
<th>Length</th>
<th>Capacity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escravos-Lagos Pipeline System (ELPS)</td>
<td>Operational</td>
<td>439 km</td>
<td>~1000 MMSCFD</td>
<td>Western network; supplying gas to demand centers in the West, namely Lagos, and well as the West Africa Gas Pipeline for export</td>
</tr>
<tr>
<td>Alakiri-Obigbo-Ikot Abasi Pipeline System</td>
<td>Operational</td>
<td>~600 km</td>
<td>~1000 MMSCFD</td>
<td>Eastern network; located where there is limited demand, but abundant resources; not connected to ELPS</td>
</tr>
<tr>
<td>Escravos-Lagos Pipeline System (ELPS 2)</td>
<td>Under Construction</td>
<td>363 km</td>
<td>~1000 MMSCFD</td>
<td>Looping expansion to the existing Escravos-Lagos Pipeline system; No recent updates on timing</td>
</tr>
<tr>
<td>Obiafu-Obrikom-Oben Pipeline (OB3)</td>
<td>Under Construction</td>
<td>127 km</td>
<td>2,000 MMSCFD</td>
<td>Start-up delayed to first half of 2019 due to weather/flooding</td>
</tr>
<tr>
<td>East West Offshore Gas Gathering System</td>
<td>Under Construction</td>
<td>550 km</td>
<td>3,000 MMSCFD</td>
<td>~US$2.5 billion; to deliver gas to the Dangote Refinery Complex in Lagos; unclear how/if the pipeline will be connected to the domestic network</td>
</tr>
<tr>
<td>Ajaokuta-Kaduna-Kano Pipeline (AKK)</td>
<td>Proposed</td>
<td>614 km</td>
<td>1,000 MMSCFD</td>
<td>Estimated cost of US$2.8 billion; 2-year timeline (likely ambitious)</td>
</tr>
</tbody>
</table>

3.3.1 Challenges

Sector Regulation

As discussed earlier in this report, the PIGB was sent back to the National Assembly this year, adding to the regulatory uncertainty in the Nigerian gas sector. If passed, the PIGB will establish the Nigerian Petroleum Regulatory Commission as the independent regulator of the sector through a merger of DPR with the Petroleum Products Pricing Regulatory Authority. Currently, there is a lack of an effective sector regulator in the midstream that has resulted in opaque price setting and the unchallenged increase of the transmission tariff by NNPC. In addition, revenue collection from the tariff is not overseen or managed by an independent entity to ensure support of pipeline expansions and other sector initiatives.

Improving regulatory oversight and strengthening Nigeria’s overall regulatory environment will have a positive spillover effect on other areas such as upstream investment by building more confidence in the sector. Furthermore, because the payment of the transmission tariff is passed through to the power sector, ensuring it is cost-reflective and has proper regulatory oversight will directly impact power sector pricing.

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24 Gas Strategies.
NNPC Monopoly

In the midstream, NNPC and its subsidiaries are the monopoly buyer, seller, and transporter. NGPTC, currently owns the majority of Nigeria’s pipeline infrastructure and there is limited competition and transparency. Without regulatory oversight, when the domestic gas network is constrained, there is no way to monitor if NGPTC is inappropriately prioritizing gas from its sister company NGMC over other suppliers.

Limited infrastructure

The existing domestic gas pipeline network is not comprehensive and does not serve/reach across the entire country (see Figure 8). Completion of ELPS2, a duplication of the existing western pipeline system (ELPS) that will double capacity to 2,200 MMSCFD, has the greatest potential to improve the reliability of the gas network for regions (and generation companies) that are already served by ELPS near-term, but the project has faced repeated delays. The planned OB3 will increase East-West connectivity (anticipated completion in first half of 2019), which is critical for connecting under-developed gas reserves in the East with demand in the West. Currently the Eastern and Western systems are not connected, drastically reducing the ability to redirect or reallocate volumes. However, despite these ongoing pipeline projects, the North remains isolated. The proposed AKK pipeline would help address this problem by becoming the first major gas trunk line to the North. Although NNPC is looking to attract Chinese financing for the project, AKK is unlikely to have an impact for many years due to delays associated with pipeline construction in Nigeria.

Completion of ELPS2 and OB3 near-term will support a more comprehensive domestic gas pipeline system that will increase gas available for power generation, especially in underserved regions. This will create opportunities for additional MWs and connections from projects that were previously held up due to a lack of gas supply. Construction of new pipelines will likely not fall within the five-year NPSP timeline, but efforts to establish a strong regulatory framework and cost-reflective tariffs will support the expansion of the domestic network in the long-term.

Assist MPR and NNPC with developing an investment plan for actualizing the AKK pipeline to bring gas supply to the unserved North.

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Priority Dispatch to Power Generators

As is usual, some Nigerian power stations are more efficient than others and some are in locations optimal for the evacuation of more power. At present, the allocation of gas appears to be based on gas network operational considerations rather than the optimization of gas based on the most effective use of gas into the power sector. If gas were allocated to power generation plants in a way that optimized efficiency and evacuation, power generation and evacuation would increase for the same volume of gas supplied, meaning more MWh of generation for the same level of MMBtus of gas. There is an opportunity to implement this technical intervention to better facilitate power dispatch. This intervention would need to be driven within NGPTC, as the party responsible for gas allocation of gas.

3.4 DELIVERY

3.4.1 Snapshot

Delivery of natural gas refers to the final segment of the gas-to-power supply chain where gas reaches consumers either directly from the pipeline transmission network (power generators) or via a separate distribution network (industrial users). NGMC oversees gas marketing in the downstream for NNPC, while IOCs independently market their gas to customers. GACN manages the DGSO and acts as an intermediary between sellers (IOCs and indigenous companies) and buyers of gas in the domestic market, ensuring the supply of gas to the Strategic Sectors in accordance with the approved national gas pricing framework.

Between gas suppliers and buyers, there are two types of agreements that can be made: 1) a Gas Supply Agreement (GSA) – a direct supply agreement between a buyer and seller; and 2) a Gas Supply and Aggregation Agreement (GSAA) – a tri-party agreement including GACN. On pricing, there is a government-regulated price for gas-to-power set at US$2.50/MMBtu for gas supplied through GSAAAs to meet DGSO requirements, while gas supplied by GSA is determined on a willing seller-willing buyer basis.

3.4.2 Challenges

GACN Structure is Not Commercial

In practice, GACN has never been able to function as it was designed because the conditions required for gas aggregation have not been met and is largely ineffective as NNPC has no incentive to take part in aggregation when it is selling gas predominantly to industrial consumers that pay higher rates. If NNPC were to use GACN, they would receive a lower price for the gas that they sell to industries because it would be aggregated with the gas IOCs with DGSOs are selling to power generators at the regulated price, as demonstrated in Figure 9 below (in simplified terms). Reforming the current process for managing the DGSOs is an opportunity to improve forecasting and better ensure the adequate supply of gas to the domestic power sector. Furthermore, IOC participation in GSAAAs is less preferable than a willing seller/willing buyer model where buyers and sellers can conduct their own due diligence, and establish a price and other terms, without the involvement of GACN.

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Assist FGN with an assessment of GACN’s role in the market and then support the implementation of agreed upon actions needed to reform the current process, which may include changing the role and responsibilities of GACN or transitioning to a new model if deemed appropriate.

Figure 9: Intended Role of GACN (simplified)

Inactive GSAAs

GSAAs between IOCs and government-owned power stations were previously negotiated and signed, but never activated. There was a prevailing assumption that partial risk guarantees from the World Bank and others would be available to back these agreements, but they have been very limited since privatization and unbundling of the power sector in 2013. Lack of any guarantees from FGN or other institutions to help mitigate the high risk of non-payment of invoices is an untenable risk for IOCs. Because the GSAAs were never activated, there is no penalty to the IOCs for not supplying the designated amounts of gas to power generators.

As an impartial third-party, NPSP can engage with IOCs and power generators to identify the key roadblocks to activating GSAAs and facilitate a dialogue to help resolve/address outstanding issues regarding contractual terms. In addition, NPSP can explore alternative payment guarantees that would still be acceptable to the different stakeholders. Facilitating the activation of current GSAAs and enabling future GSAAs for power generation projects will directly impact MWs available to the domestic market. Sale of the National Integrated Power Projects Calabar, Geregu, and Omotosho is a top priority activity for NPSP, but these transactions will be unable to reach Financial Close until gas supply agreements are in place.

Pricing

The regulated gas-to-power price set at US$2.50/MMBtu is much lower than the price of gas sold to industrial customers, hurting the attractiveness of supplying gas for power. GACN was meant to help address this problem through price aggregation, but as mentioned above, since NNPC deals directly with higher paying industrial customers and does not use GACN, there is little financial incentive for IOCs and other gas producers to supply the domestic power sector. Proper modeling with comprehensive data would enable the calculation of the true cost of gas for producers, which could be used to support an overall transition toward market-based pricing and a cost-reflective gas tariff in Nigeria. A shift to market-based gas prices that reflect the cost of production will increase the attractiveness of the domestic gas market for IOCs and accurately signal the market based on supply/demand fundamentals, increasing gas available to the power sector.

Foreign Exchange Risk

A key challenge across the Nigerian gas and power sectors is that GSAAs are denominated in dollars, but Power Purchase Agreements are in Naira. This discrepancy makes power producers vulnerable to foreign exchange risk and can impact their ability to pay gas invoices when the value of Naira changes (in 2017 the US$/₦ exchange rate ranged from 304-368). There is an ongoing dispute between the electricity market which wants gas invoices denominated in Naira without any indexation to the dollar and the IOCs that want full payment in dollars.

Work with stakeholders in the gas and power sectors to identify and evaluate viable alternatives to help displace the foreign exchange risk away from the power producers and improve their ability to pay gas invoices (e.g., U.S. dollar portion for CAPEX/investment and Naira portion for gas molecules). Look at other countries that have faced similar issues for lessons learned.

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32 XE. XE Currency Charts: USD to NGN. https://www.xe.com/currencycharts/?from=USD&to=NGN&view=5Y.
4 GAS POLICY FRAMEWORK

Despite a comprehensive policy framework in place to guide the development of a sustainable gas sector, a lack of policy and legislative coordination and implementation has been the primary obstacle in the pursuit of gas market reforms in recent years. In Nigeria, policy creation and development falls upon MPR, while policy implementation and adherence are monitored by the technical regulator, DPR. The current gas policy framework in Nigeria consists of five foundational policies, though the fifth remains to be formally signed:

1. National Gas Supply and Pricing Policy (2008);
2. Nigerian Gas Master Plan (2007/2013);
3. 7 Big Wins (2016);
4. National Gas Policy (2017); and,

Over the last decade, implementation of these policies has been inconsistent, with many initiatives unimplemented, and subsequent legal and regulatory efforts sometimes failing to reflect original policy intent. In Nigeria there is often a discrepancy between policy and practice, especially when it comes to mandated roles and responsibilities, undermining the efficacy of policies that if fully implemented would otherwise aid the development of the sector.

These policy issues not only present unique challenges for the gas sector, but for the Nigerian power sector as well, especially in the case of gas pricing policies and domestic supply obligations, which directly impact the economics and capacity of gas-fired generation in the country.

This section will discuss the purpose, objectives, and primary elements of each of the five foundational gas sector policies. The timing of these policies and related legislation and regulations is summarized in Figure 10 below for context.

Figure 10: Legislation, Regulation, and Policy Timeline (non-Exhaustive)

4.1 NATIONAL GAS SUPPLY AND PRICING POLICY

4.1.1 Snapshot

Purpose

The National Gas Supply and Pricing Policy was published in 2008 to define gas pricing for downstream consumers (industry/power sector), to address the domestic gas supply shortfall in Nigeria.34 This policy coincides with the passing of the 2008 National Domestic Gas Supply and Pricing Regulations

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33 U.S. Department of State: Technical Assistance for Steady Supply of Natural Gas for Power Generation in Nigeria. Gas Market Framework Report. September 2018. This section of the report builds on the work completed by the Department of State on reviewing the existing legal and regulatory framework, which helped inform the NPSF gas policy framework recommendations and proposed interventions.

which provide the framework to implement this policy and additional elements of the Gas Master Plan (discussed in detail in the following section). The policy lays out an implementation approach for gas pricing to support supplier participation in the market, balancing the need for domestic economic growth and revenue generation from exports (LNG, NGL, LPG).

**Key Components**

This policy is built on the assumption that the high value of gas liquids would drive the economics of gas supply in Nigeria due to the high percentage of associated gas production (gas produced as a byproduct of oil production). Associated gas could be supplied at relatively little or no cost because a project would remain profitable on the strength of the liquids. Therefore, the associated gas would be first directed to the supply of strategic domestic and industrial sectors.

The policy creates and defines three pricing sectors for gas, each with a unique pricing framework.

1. **Strategic domestic gas sector (gas-to-power).** This sector is fully regulated to ensure the lowest, sustainable cost of gas to the power sector, at the floor price of US$0.40/MMBtu.
2. **Strategic export sector (e.g., methanol, fertilizer).** This sector is pseudo-regulated, with pricing based on the netback price (realized price minus costs of production) to ensure IOCs a post-tax 15 percent rate of return.
3. **Other commercial sectors (LNG, compressed natural gas, cement, domestic industries).** This is the unregulated, market-led sector where prices are negotiated on a willing seller/willing buyer basis.

In addition, the policy creates a Gas Regulatory Commission through the proposed Downstream Gas Act to regulate the price of gas supplied and utilized in the downstream gas sector to promote the reliable and efficient use of gas throughout Nigeria. The policy also goes on to describe the process of setting an aggregate price and some of the functions of the gas aggregator, GACN.

### 4.1.2 Challenges

**Pricing Framework Implementation**

While the 2008 National Gas Supply and Pricing Policy provides a credible gas pricing framework that is both fair to consumers in establishing the least cost option for gas supply, and ensuring all IOCs receive an aggregate price for DGSO gas regardless of the market sector it is sold to, the policy has never been fully implemented and the potential benefits have not been realized by the sector. For example, components of the Downstream Gas Act were never implemented, including the creation of the Gas Regulatory Commission. Lack of implementation and continuing government intervention are common threads in the value chain and throughout Nigerian gas policy where interventions that would otherwise support and improve the sector are not followed through in legislation and practice.

**Emphasis on Liquids**

One of the primary challenges created by this policy is that subsidizing the production of gas through the monetization of gas liquids has had a detrimental effect on the sector. This artificially lowered prices and created an unsustainable framework for the longer term by not allowing dry gas and non-associated gas to reflect true production costs. This is a fundamental policy issue creating lasting and ongoing distortions in the true price of gas in the Nigerian market.

To address these challenges, support FGN in: (1) establishing a transparent pricing mechanism for natural gas delivered under the DGSO to reflect true cost of production and see if GACN can work as envisioned by the policy; and (2) incorporating the relevant provisions of the Downstream Gas Act into the PIAB and PIFB.
4.2 NIGERIAN GAS MASTER PLAN

4.2.1 Snapshot

Purpose

In 2004 the United Nations Development Programme and the World Bank published the Strategic Gas Plan for Nigeria\textsuperscript{35}, which served as the foundation for FGN’s Nigeria Gas Master Plan. The original version of the Gas Master Plan was published as a presentation in 2007 and used for an investor roadshow in 2008 to attract investment in the domestic gas sector.\textsuperscript{36} The 2007 version proposed four key interventions: (1) central processing facilities; (2) an infrastructure blueprint; (3) a gas pricing framework; and (4) identification of investment opportunities for private investors.

FGN eventually published the current Gas Master Plan in 2013. The purpose of the document is to provide an overview of the Nigerian gas sector, a diagnosis of the sector, required strategic interventions, and plans to achieve the stated goals.

Key Components

The 2013 Gas Master Plan is divided into three sections. The first section provides the context for the Gas Master Plan, looking at the upstream gas sector, evolution of gas utilization, the market opportunity for gas, and the need for FGN intervention in the sector. The second section outlines the different policy intervention requirements, building on the National Gas Supply and Pricing Policy in pursuit of developing a gas-based economy in Nigeria. The final section covers the status of different ongoing gas infrastructure projects (as of 2013), as well as projects planned for the near future.

4.2.2 Challenges

Out-of-Date Information

One of the largest gaps in the Gas Master Plan relates directly to the data used. From the original 2007 presentation to the final version published in 2013, the data and figures were not updated with new numbers. In addition, three fundamental market developments were not addressed or factored into the final design of the plan:

1. The U.S. shale revolution – In the document, the U.S. is referred to as an import market for natural gas, when since 2010, the U.S. has emerged as a major global gas producer and has become a net exporter of the commodity.
2. Privatization of the Nigerian power sector – The Gas Master Plan does not discuss the changes to the domestic gas market that have come because of the privatization and unbundling and the impact it has on the interventions it prescribes.
3. Changes in pricing – The increase in the price of gas-to-power and the gas transportation tariff is not accounted for.

These developments directly impact the efficacy and implementation of the current Nigerian gas sector strategy, requiring updates and revisions that account for the realities of the market, including shifting economic conditions and new legislation. Any revision should also include a complete and comprehensive update of all data and figures used in the document. The sector is constantly evolving and FGN cannot rely on the existing Gas Master Plan to provide an efficient and effective way forward.

Missed Targets

Multiple targets that were set by the Gas Master Plan, either for infrastructure or sector governance have already been missed and the plan relies on some incorrect assumptions, including the ready availability of partial risk guarantees from the World Bank for gas supply agreements.

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Assumptions
The Gas Master Plan includes actions and steps that are based on assumptions outside of FGN’s control. For example, the plan assumes that partial risk guarantees will be readily available for gas supply contracts, but the reality is that the GSAAs signed during privatization remain inactive in part due to a lack of guarantees to mitigate the risk of non-payment for gas suppliers.

**Assist FGN with an update of the existing Gas Master Plan or creation of a new one that:**

- Reflect changes and developments in both the domestic and global gas markets since it was published in 2013;
- Sets realistic milestones;
- Removes assumptions regarding the impact of external events and actions outside of FGN’s control;
- Incorporates a national supply and demand study, a transparent methodology for calculating a gas transportation tariff, and other relevant commercial information.

4.3 “7 BIG WINS”

4.3.1 Snapshot

**Purpose**
In 2016, the strategic “7 Big Wins” document was published under President Buhari. The “7 Big Wins” identified short and medium-term priorities to grow Nigeria’s oil and gas industry from 2015-2019, across seven different areas. The seven areas include: (1) policy and regulation; (2) business environment and investment drive; (3) gas revolution; (4) refineries and local productivity capacity; (5) Niger Delta and security; (6) transparency and efficiency; and (7) stakeholder management and international coordination.

**Key Components**
For each of the seven “Wins,” the document outlines priorities and highlights specific near and medium-term actions or interventions that will support FGN goals for the oil and gas sector. For the purposes of this assessment, this section will not cover areas four and five of the “7 Big Wins” as they do not directly pertain to gas issues.

1. **Policy and Regulation**
The primary objective of FGN in this area is to “…remedy challenges in the Nigerian Oil and Gas industry through robust policies and laws that drive efficiency, encourage investments and improve local participation in the sector.” Since the “7 Big Wins” were published, there has been significant progress made with the passing of the PIGB by the National Assembly (though delays are expected because it was sent back by the President), and approval of the National Gas Policy and the National Petroleum Policy by the Federal Executive Council in June 2017 and July 2017, respectively. Moving forward, the PIFB and the PIAB are expected to be sent to the President near-term, the initial draft of the National Petroleum Fiscal Policy is out for consultation, and the Downstream Policy for liberalization and deregulation to incentivize investment is underway.

2. **Business Environment and Investment Drive**
FGN is looking to accelerate income streams and generate additional revenue from the initiation of capital investments into midstream and downstream assets such as pipelines, depots, and refineries. In terms of the gas sector, the goal is to establish an enabling environment to attract investors to deliver on the President’s gas revolution agenda.

3. **Gas Revolution**

FGN identifies five main developments to support a transition to a gas-based industrial economy: (1) gas infrastructure development – new pipelines (OB3, ELPS2, etc.) and a shift to investor-built infrastructure; (2) promotion of domestic utilization of LPG and compressed natural gas; (3) reduction of gas flaring; (4) gas commercial framework implementation – DGSO, develop domestic gas-based industries, and move to an incentive-based compliance model; and (5) gas-to-power – address disturbances/vandalism, develop a secure framework for investment, and fast-track key projects to increase production.

6. **Transparency and Efficiency**

To address a lack of transparency in the gas sector, FGN aims to improve access to information, promote revenue and cost transparency, and increase data accountability. FGN will design and deploy key performance indicators to help track and measure performance and progress in pursuit of these goals.

7. **Stakeholder Management and International Coordination**

FGN has three main goals to support stakeholder management and international coordination: (1) develop a communication strategy for MPR to improve communication across agencies and departments; (2) identify and build key stakeholder relationships, both nationally and internationally; and (3) increase bilateral cooperation through common policy initiatives and projects, roadshows to attract funding and investment, and engagements at international seminars to build local capacity.

4.3.2 **Challenges**

**Turning Policy into Concrete Plans**

Of the seven priority areas, in the last two years FGN has made the most progress on new gas policy and regulations. However, while the interventions and actions outlined in these policies will support a more comprehensive gas sector and gas-based industrialization in Nigeria, the challenge lies in turning them into concrete plans. FGN should use the policy focus created by the “7 Big Wins” to drive the execution of gas sector policies and plans needed to support and achieve the goals set by the PIGB.

Support FGN to develop a comprehensive and cohesive gas strategy based on existing policies by:

- Minimizing any discrepancies and conflicts between the 7 Big Wins, policies, legislation, and their implementation to achieve them;
- Designate who will drive the plan;
- Provide the various teams supporting the 7 Big Wins with sufficient powers and capabilities to successfully execute the policy vision; and
- Ensure there is an accountability mechanism in place.

4.4 **NATIONAL GAS POLICY**

4.4.1 **Snapshot**

**Purpose**

The National Gas Policy was approved by the Federal Executive Council in June 2017. The policy builds on the goals FGN outlined in the “7 Big Wins”, setting targets, strategies, and an implementation plan to introduce an appropriate institutional, legal, regulatory, and commercial framework for the Nigerian gas sector. Furthermore, the policy aims to remove the barriers affecting investment and development of the sector.

**Key Components**

1. **Governance** – Reduce the regulatory overlaps in oil and gas by combining existing authorities into a single, independent regulatory authority (in line with the PIGB). Strengthen MPR’s

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policy-making and surveillance capability with new technologies. Establish clear, transparent, and globally competitive commercial and fiscal frameworks.

2. **Industry Structure** – Unbundle various activities, such as transportation and wholesale gas supply. All regulatory and pseudo regulatory activities will be removed from corporate entities and taken over by the independent regulator.

3. **Developing Gas Resources** – Encourage strong gas resource management, especially directing low-cost gas for delivery to the domestic market by eliminating gas flaring, limiting reinjection, and increasing the penalty for flaring gas.

4. **Infrastructure** – Follow infrastructure plans that are very similar to those originally proposed in the Gas Master Plan.

5. **Building Gas Markets** – Identify current market opportunities for domestic gas to support FGN’s vision of gas-based industrialization of Nigeria.

6. **Communications** – Address challenges faced by FGN in communicating the vision and mission of the policy.

7. **Roadmap and Action Plan** – Goals and actions to be completed in the first two years.

4.4.2 **Challenges**

**Governance**

In the section on governance, the policy establishes an extensive list of departments and mandates that is inconsistent with the goal of reducing existing overlaps in the regulatory framework. Dividing responsibilities between new departments could unintentionally create new overlaps.

**Forecasting Demand**

This policy is missing a forecast component to determine the demand requirements for the domestic gas market, as well as a rationale for the “right-price gas” as referenced in the National Petroleum Fiscal Policy.

**Pricing Framework Guidance**

The policy aims to transition the market to a willing seller/willing buyer framework, but it does not provide guidance on how the current market should go about the transition.

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To successfully reform the gas market as described by the National Gas Policy, support FGN in:

- Ensuring that fiscal policy meets policy objectives, specifically, the PIFB should create a fiscal environment that enables the realization of a gas-based industry and improved and more reliable gas-to-power;
- Developing a credible transitional pricing plan to support the establishment of a willing seller/willing buyer market; and
- Establishing strong independent regulation of the gas sector to support an increase in private control of gas assets and markets.

### 4.5 NATIONAL PETROLEUM FISCAL POLICY

4.5.1 **Snapshot**

**Purpose**

The National Petroleum Fiscal Policy acknowledges the need for Nigeria to move away from a crude oil export-based economy, combined with a move towards a gas-based industrial economy. The policy aims to support these goals by making gas economically viable to exploit by reducing the state burden and establish gas as an independent commodity, separate from oil production. This would therefore make gas projects viable on their own economics, without being leveraged against income from liquids,
a major transition from the previous policies reviewed in this section. The policy is currently under review by the Federal Executive Council and could be subject to changes before final approval.

**Key Components**

To support the transition of gas into a standalone commodity, the policy looks at the current pricing regime and describes an evolution away from the cross-subsidization from oil, as well as the aggregated price policy. To achieve this, the gas pricing policy is being integrated into fiscal terms to encourage investment and development of the market. The fiscal focus of the policy will:

- Exploit the potential for gas to accelerate economic development;
- Focus concurrently on viable domestic, regional, and other export markets;
- Competitively position Nigerian gas in terms of cost competitiveness and scalability of capacity;
- Support an integrated infrastructure strategy to support and connect different markets;
- Attract new players into the Nigerian gas value chain; and
- Ensure commerciality for all investments.\(^{39}\)

FGN will also support policy objectives by reducing the royalty and tax burdens on gas projects and developing a more market-oriented gas pricing methodology (until full deregulation is possible).

**4.5.2 Challenges**

**Alignment with PIFB**

Because the National Petroleum Fiscal Policy has not been approved by the Federal Executive Council yet, and could be subject to changes, it is difficult to identify gaps in the policy. However, implementation of the policy will rely on the PIFB, which will provide the powers to enforce the policy strategy. The PIFB needs to encourage investment and development of energy markets, including regional integration, increased economic activity, and poverty reduction. To support this goal, FGN should include transitional gas pricing arrangements in the PIFB that encourage the supply of natural gas to the domestic market. This will act as the foundation and building blocks for a willing seller/willing buyer market in Nigeria.

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5 CONCLUSION

There are many challenges along the gas-to-power supply chain and policy framework, that if addressed/overcome can help to unlock investment and guarantee an adequate and reliable supply of natural gas to the power sector. This section considers how these challenges can be addressed through improved implementation, rather than pursuing entirely new policies or amending existing policy which can be very time consuming. Full implementation of existing institutions and arrangements such as GACN and the DGSO can help the sector realize their benefits, which so far have not been actualized due to their incomplete execution.

This assessment will act as the foundation for the NPSP gas-to-power program which will balance near-term efforts with long-term initiatives, considering the political realities of the Nigerian market that will make some interventions and engagements more feasible than others during the lifetime of NPSP. Based on the findings of this report, NPSP identifies the following five priority near-term actions, subject to USAID approval:

1. Develop a report identifying barriers to bankable and active gas supply agreements based on stakeholder interviews and make recommendations based on international leading practices and case studies, taking into account the realities of the Nigerian market;
2. Support the Nigerian Gas Flare Commercialization Program through the whole process from the first auction round, preparing and issuing the RFP documentation, supporting the proposals evaluation process, to the finalization of the commercial agreements (i.e. until the award of Permit to Access Flare Gas, see Figure 7);
3. Assess the current role of the Gas Aggregation Company of Nigeria in the sector and support the implementation of agreed upon actions needed to reform the current process, which may include changing roles and responsibilities or transitioning to a new model if deemed appropriate;
4. Identify and evaluate alternatives to the current discrepancy in currency denominations across the gas-to-power sector (gas supply denominated in U.S. dollars and generation/electricity denominated in Naira) to decrease generation company exposure to foreign exchange risk and facilitate active and bankable gas supply agreements; and
5. With the support of the Nigerian National Petroleum Corporation, review the current Gas Master Plan, updating where necessary, with the primary objective of selecting priority interventions and reforms that will support the operation and expansion of the domestic gas sector, and therefore, the power sector.

NPSP will deliver technical assistance to relevant public and private stakeholders through a combination of transaction advisory services, reports, and trainings/workshops, when appropriate, keeping in mind the challenges of: (1) a potential change in leadership within FGN following the elections; and (2) gaining access to complete and comprehensive data, among others. Throughout this process, a heavy emphasis will be placed on donor coordination to ensure NPSP is leveraging work that has already been completed in the Nigerian gas sector and is providing new and innovative ideas to address these challenges. Furthermore, NPSP will build on and collaborate with ongoing donor activities in the gas sector to identify synergies and opportunities to support them (e.g., World Bank and NGFCP, DFID and NIAF II).

Ultimately, as NPSP continues to engage with different power sector actors, especially generation companies, the Program should consider these gas-to-power supply chain and policy challenges when determining the efficacy and potential impact of different interventions. These overarching challenges across the value chain reinforce the need for a wholistic approach to these issues, which NPSP and USAID both understand and support in this work.