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**The World Bank**  
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Report No: ICR88918

**IMPLEMENTATION COMPLETION AND RESULTS REPORT**  
Guarantee No. B-006-0-GH

ON A

**PARTIAL RISK GUARANTEE**

**IN THE AMOUNT OF US\$ 50.00 MILLION**

**TO THE**

**REPUBLIC OF GHANA**

**FOR**

**THE WEST AFRICAN GAS PIPELINE PROJECT**

June 30, 2014

Energy Group  
Sustainable Development Department  
Africa Region, IDA

## CURRENCY EQUIVALENTS

3.09 Ghana Cedi (GHC) = 1 US Dollar  
(as of June 17, 2014)

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

AG	Associated Gas
Agip	Nigerian Agip Oil Company Limited, a subsidiary of Eni S.p.A.
Bbl	Barrel
CAS	Country Assistance Strategy
CDP	Community Development Projects
CEB	Communaute Electrique du Benin (Benin Electricity Company)
CNL	Chevron Nigeria Limited
COD	Commercial Operation Date
CRR	Community Relation Representatives
DPR	Department of Petroleum Resources (Nigeria)
EA	Environmental Assessment
ECOWAS	Economic Community of West African States
EFA	Economic and Financial Assessment
EIA	Environmental Impact Assessment
EIR	Extractive Industries Review
EIRR	Economic Internal Rate of Return
EITI	Extractive Industries Transparency Initiative
Elf	Elf Petroleum Nigeria Limited, a subsidiary of TOTAL S.A.
ELPS	Escravos-Lagos Pipeline System
EMP	Environment Management Plan
EPC	Engineering, Procurement and Construction
ERP	Emergency Response Plans
ERR	Economic Rate of Return
ESAP	Environment and Social Advisory Panel
ESMP	Environmental and Social Management Plan
FGN	Federal Government of Nigeria
FID	Final Investment Decision
FIRR	Financial Internal Rate of Return
FME <sub>env</sub>	Federal Ministry of Environment (Nigeria)
FoE-Ghana	Friends of the Earth, Ghana
GCSA	Government Consent and Support Agreement
GDP	Gross Domestic Product
GEPA	Ghana Environmental Protection Agency
GGFR	Global Gas Flaring Reduction Public-Private Partnership
GHGE	Green House Gas Emissions
GSA	Gas Sales Agreement

GTA	Gas Transportation Agreement
GWh	Gigawatt-hour
HSE	Health, Safety, and Environment
ICR	Implementation Completion Report
IDA	International Development Association
IFC	International Finance Corporation
IITA	International Institute of Tropical Agriculture
IOC	International Oil Companies
IPA	International Project Agreement
IRR	Internal Rate of Return
JV	Joint Ventures
LBCS	Lagos Beach Compressor Station
LCO	Light Crude Oil
LNG	Liquefied Natural Gas
M&E	Monitoring and Evaluation
MAP	Management Action Plan
MERF	Ministry of Environment and Forestry (Togo)
MIGA	Multilateral Investment and Guarantee Agency
MMBtu	Million British Thermal Units
Mmcf/d	Million Cubic Feet per Day
MOU	Memorandum of Understanding
MW	Megawatts
NAG	Non-associated gas
NEPAD	New Partnership for Africa's Development
N-Gas	N-Gas Limited
NGC	Nigerian Gas Company
NGO	Non-Government Organization
NNNGO	Nigeria Network of NGOs
NNPC	Nigerian National Petroleum Corporation
NPV	Net Present Value
O & M	Operating and Maintaining
OPIC	Overseas Private Investment Corporation
OPTS	Oil Producers Trade Section
PAP	Project Affected Persons
PDP	Project Development Plan
PDO	Project Development Objectives
PER	Project Evaluation Report
PRG	Partial Risk Guarantee
QAG	Quality at Entry
QSA	Quality at Supervision
R&M	Regulating and Metering
RAP	Resettlement Action Plan
RIAS	Regional Integration Assistance Strategy
RoR	Rate of Return
ROW	Right of Way
SPDC	Shell Petroleum Development Company of Nigeria Limited

VRA	Volta River Authority
VTMS	Vessels Traffic Management System
WACC	Weighted Average Cost of Capital
WAGP	West African Gas Pipeline
WAGPA	West African Gas Pipeline Authority
WAPCo	West African Gas Pipeline Co.
WAPP	West African Power Market Development Project
Zurich	Steadfast Insurance Co., a subsidiary of Zurich Financial Services Group

Vice President:	Makhtar Diop
Regional Director:	Colin Bruce
Country Director:	Yusupha Crookes
Sector Manager:	Meike van Ginneken
Project Team Leader:	Waqar Haider

# AFRICA

## The West African Gas Pipeline Project

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## Data Sheet

<b>A. Basic Information</b>			
Country:	Africa	Project Name:	West African Gas Pipeline Project
Project ID:	P082502	L/C/TF Number(s):	
ICR Date:	June 25, 2014	ICR Type:	Core
Lending Instrument:	PRG	Borrower/Guarantor:	Republic of Ghana
Original Total Commitment:	USD 50.0 million	Disbursed Amount:	USD 0.00
<b>Environmental Category: Category A</b>			
<b>Implementing Agencies: West African Gas Pipeline Company (WAPCo)</b>			
<b>Co-financiers and Other External Partners: SPDC, CNL, NNPC, VRA, CEB</b>			

<b>B. Key Dates</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	08-07-2003	Effectiveness:	28-Feb-2007	31-Dec-2007
Appraisal:	06-16-2004	Restructuring(s):	-	
Approval:	23-Nov-2004	Mid-term Review:		
		Closing:	12-31-2013	

<b>C. Ratings Summary</b>	
<b>C.1 Performance Rating by ICR</b>	
Outcomes:	Moderately Satisfactory
Risk to Development Outcome:	Moderate
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

<b>C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)</b>			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Satisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Moderately Unsatisfactory	Implementing Agency/Agencies:	Moderately Unsatisfactory
<b>Overall Bank Performance:</b>	Moderately Satisfactory	<b>Overall Borrower Performance:</b>	Moderately Satisfactory

<b>C.3 Quality at Entry and Implementation Performance Indicators</b>			
<b>Implementation Performance</b>	<b>Indicators</b>	<b>QAG Assessments (if any)</b>	<b>Rating</b>
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	Satisfactory
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	Satisfactory
DO rating before Closing/Inactive status:	Satisfactory		

<b>D. Sector and Theme Codes</b>		
	<b>Original</b>	<b>Actual</b>
<b>Sector Code (as % of total Bank financing)</b>		
Power	50%	
Oil and Gas	50%	
Sustainable Energy		100%
<b>Theme Code (Primary/Secondary)</b>		
Regional Integration	Primary	Primary

<b>E. Bank Staff</b>		
<b>Positions</b>	<b>At ICR</b>	<b>At Approval</b>
Vice President:	Makhtar Diop	Gobind Nankani
Country Director:	Yusupha B. Crookes	Mats Karlsson
Sector Manager:	Meike van Ginneken	Yusupha B. Crookes
Project Team Leader:	Waqar Haider	Michel Layec

#### **F. Results Framework Analysis**

The WAGP will contribute to: (a) improving the competitiveness of the energy sectors in Ghana, Benin, and Togo by promoting the use of cheaper and environmentally cleaner gas from Nigeria in lieu of solid and liquid fuels for power generation and other industrial and commercial uses, and by diversifying energy supply sources, and (b) fostering regional economic and political integration that would support economic growth, and in particular the development of the West Africa electricity market.

**KPIs :**

**a. PDO Indicators:**

<b>Indicator Name</b>	<b>Baseline</b>	<b>Actual</b>	<b>End Target</b>
<u>Indicator-1:</u> Decrease in the average wholesale cost of electricity supply in Ghana, Benin, and Togo compared to the "without gas" scenario (USD/kwh).	0%	Decrease of 14% in Ghana; and 12% in Benin and Togo	Decrease of 10-20% in Ghana; and 40% in Benin and Togo
	02 May 2005	31 Dec 2013	31-Dec-2013
	Hydro at USD 0.01/kwh. LCO-fired open-cycle gas turbine cost at USD 0.28/kwh (2012 prices). Weighted-average wholesale cost estimated at USD 0.0561/kwh.	Average wholesale cost in Ghana estimated at USD 0.0773/kwh reducing by 14% during 2011. Average wholesale cost reduced in Benin and Togo from 69.04 to 60.62 CFA/KWh, a reduction of 12%.	Cost of electricity production in Ghana reduced by 10-20%, and in Togo and Benin by 40% in 2008 as compared with the status quo.
<u>Indicator-2:</u> Physical completion of regional gas pipeline and of spurs into Ghana, Benin, and Togo, including main connections to target power plants (%).	0.00 %	100.00 %	100.00 %
	02 May 2005	31 Dec 2013	31-Dec-2013
	Project gets underway.	Pipeline operational since mid-2011.	WAPCo passes its performance testing specified in the Project Development Plan (PDP) by end CY 2006.
<u>Indicator-3:</u> Number of large, medium and small gas customers in Benin Ghana and Togo (No).	0	4	Not Specified
	02 May 2005	31 Dec 2013	31-Dec-2013
	None	CEB and Contour Global (Benin and Togo); and VRA and Sunon-Asogli (Ghana) are consuming gas.	Specific target was not set.
<u>Indicator-4:</u> Expanded volume of energy trade in the region, measured in terms of gas exports from Nigeria (MMscf/day).	0.0	80.5	133.0
	02 May 2005	31 Dec 2013	31-Dec-2013
	None	Average Gas export over the last three months of 2013.	Contracted gas volume for Ghana, Togo and Benin.
<u>Indicator-5:</u> Harmonization of the regional institutional, legal, and regulatory framework to increase private sector participation in the gas sector.	No	Yes	Yes
	2 May 2005	31 Dec 2013	31-Dec-2013
	There was no regional authority	WAGPA has largely harmonized the institutional, legal, and regulatory framework, including granting open access to WAGP.	Active involvement of West Africa Regional Authority in Project monitoring.



### G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	IP	Actual Disbursements N/A
1	18 Apr 2008	Satisfactory	Moderately Satisfactory	0.00
2	30 May 2008	Moderately Satisfactory	Moderately Unsatisfactory	0.00
3	07 Oct 2008	Moderately Satisfactory	Moderately Satisfactory	0.00
4	19 Dec 2008	Moderately Satisfactory	Satisfactory	0.00
5	03 Sep 2009	Moderately Satisfactory	Satisfactory	0.00
6	05 Jun 2010	Satisfactory	Satisfactory	0.00
7	23 Dec 2010	Satisfactory	Satisfactory	0.00
8	14 Sep 2011	Satisfactory	Satisfactory	0.00
9	23 May 2012	Satisfactory	Satisfactory	0.00
10	18 Mar 2013	Satisfactory	Satisfactory	0.00

### I. Disbursement Profile

No disbursement took place, as the project entailed only a PRG.



## 1. Project Context, Development Objectives and Design

1. The West African Gas Pipeline (WAGP) project comprises about 678 kilometers of onshore and offshore pipelines to transport gas from Nigeria to power generation plants in Benin, Togo, and Ghana, and associated processing/receiving facilities. The WAGP connected power plants in Ghana, Togo, and Benin to large gas resources in Nigeria. The project was one of the first regional Public-Private Partnership (PPP) initiatives for large infrastructure in West Africa.

### 1.1 Context at Appraisal

2. Regional/country context. Of the four participating countries, *Nigeria*, with an estimated population of about 133 million at the time of project appraisal, was Africa's most populous and hydrocarbons-rich country. It had made impressive progress in consolidating the political transition to a democratic nation, and had increased economic growth from 2 percent during 1995 to 1999 to an estimated 4.1 percent between 2000 and 2003. In addition, Nigeria had also started full implementation of the Extractive Industries Transparency Initiative (EITI) by 2004. *Ghana*, with a population of about 20 million and a Gross National Income per capita of US\$280 (2002), had made considerable progress in laying the foundations for sustainable growth and poverty reduction. This resulted in sustained per capita output growth, averaging 1.6 percent per annum, and increased private sector activity and investment, with corresponding improvements in social indicators. With a population of about 7.3 million in 2003, *Benin* had a per capita income of US\$380, with over one third of its population living in poverty and inadequate access to health care, education and other social services. Relative to most other countries in the sub-region, Benin had achieved remarkable progress in sustaining robust growth while building up a pluralist democracy over the past decade. *Togo* had a population of about 5.6 million in 2003, and while it had strong growth from 1960 to the mid-1970s, largely through a boom in international phosphate prices in 1975, the economy experienced severe strains in the 1980 and 1990s. Togo's economic situation deteriorated sharply in 1998 with the four-month energy crisis and the worsening of the economic and business climate that accompanied the contested presidential election in June 1998.

3. Energy sector background. Over 95% of foreign exchange earnings and 80% of Nigeria's Gross Domestic Product (GDP) in 2004 was based on the export of crude oil. Nigeria also had very large hydrocarbon resources, with 30 billion barrels of proven oil reserves and about 180 trillion cubic feet of gas. While oil production of approximately 2.2 million barrels per day, all of it from the Niger Delta, was largely exported, gas production was limited due to a lack of infrastructure, as a result of which 75% of the all gas produced (2,700 MMscf/day) had to be flared. The inadequate processing and transmission pipelines also constrained the supply of gas to thermal power plants in Nigeria. Ghana had historically relied on electricity supplies from the hydroelectric plants of Akosombo (900 MW) and Kpong (100 MW) as well as on imports from Cote d'Ivoire. With an average consumption growth of 8% p.a., and also to overcome seasonal variations in hydro-generation, thermal generation had become imperative in the 1990s. The 330 MW Takoradi (T1) power plant was first built, and a second unit (T2) was also contracted out to avert a power supply crisis. In Togo and Benin, power demand had also more than doubled—from 510 GWh in 1993 to 1054 GWh by 2003 (growth of 10% p.a.). The electricity requirements were met through one hydro plant in Togo, imports from Ghana and

Cote d'Ivoire, and limited domestic thermal generation. The joint electric utility for Benin and Togo sought to overcome rapid growth in demand and low access rates in these two countries by increasing thermal generation capacity in Lome and Cotonou.

4. At the time of project appraisal, the energy sectors in the four countries were faced with the following challenges: (a) high cost of thermal electricity generation on account of use of expensive liquid fuels; (b) generation capacity deficits leading to unreliable power supply; (c) non-utilization and flaring of gas in Nigeria, with attendant environmental consequences; (d) insufficient regional cooperation in energy trade due to physical, institutional, regulatory, and legal constraints, and weak political commitment; (e) poor power sector performance, and the need for reforms in the participating countries; and (f) low access of the population to modern sources of energy. WAGP was conceived as a response to address all the foregoing challenges.

5. Rationale for World Bank Group assistance. Over several decades, the World Bank Group (IDA, IFC, and MIGA) had been playing an important role in the energy sectors of Benin, Togo, Ghana, and Nigeria as well as fostering private sector expertise and financing; it also had experience in implementing large infrastructure projects. Support to the WAGP was also part of the World Bank's West Africa Regional Integration Assistance Strategy (RIAS), which focused on 15 countries<sup>1</sup> to create an open, unified economic space through the integration of markets. At the time of project appraisal, the West Africa sub-region had embarked on phased integration in key sectors - air, road, and sea transport, energy, and telecommunications. The Bank was also supporting several regional integration activities and was involved in a complementary initiative called West Africa Power Pool (WAPP) project. The WAGP project was also part of the action plan of the New Partnership for Africa's Development (NEPAD) and actively supported by the Economic Community of West African States (ECOWAS).

6. WAGP was a collaborative effort of the World Bank (IDA PRG to cover payment risk) and MIGA which arranged investment guarantees to cover the payment risk of VRA under the Breach of Contract cover. Close coordination has been maintained during preparation, appraisal, implementation and post-completion evaluation of the project. The field mission for the ICR was jointly conducted by the World Bank and MIGA in October 2013. While this ICR covers the IDA PRG, an independent Project Evaluation Report (PER) on the investment guarantee is being prepared by MIGA.

## **1.2 Original Project Development Objectives (PDO) and Key Indicators**

7. Project development objectives. The WAGP will contribute to: (a) improving the competitiveness of the energy sectors in Ghana, Benin, and Togo by promoting the use of cheaper and environmentally cleaner gas from Nigeria in lieu of solid and liquid fuels for power generation and other industrial and commercial uses, and by diversifying energy supply sources, and (b) fostering regional economic and political integration that would support economic growth, and in particular the development of the West Africa electricity market.

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<sup>1</sup> Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

8. Key indicators. The following key indicators were defined to track progress towards the achievement of the development objectives of the project :

*Economic Indicators:*

- Decrease in the average wholesale cost of electricity supply in Ghana, Benin, and Togo compared to the "without gas" scenario;
- Number of large, medium, and small gas customers in Ghana, Benin, and Togo;

*Physical Indicators:*

- Physical completion of regional gas pipeline and of spurs into Ghana, Benin, and Togo, including main connections to target power plants;
- Expanded volume of energy trade in the region, measured in terms of gas exports from Nigeria;

*Institutional and Regulatory Indicators:*

- Harmonization of the regional institutional, legal, and regulatory framework to increase private sector participation in the gas sector.

### **1.3 Revised PDO and Key Indicators**

9. The project development objectives and key indicators were not revised.

### **1.4 Main Beneficiaries**

10. Primary beneficiary. WAPCo is the primary beneficiary of the IDA PRG, related to payment risk by VRA for gas purchases committed under the Gas Sales Agreement (over 92% of the foundation gas volume is for VRA plants).

11. Other beneficiaries. There are a number of other beneficiaries/groups which have benefited from WAGP, as follows:

*Participating Governments:* Nigeria benefits through a market outlet for its large gas resources, increased revenues from gas exports, and a modest contribution to reduced flaring in the Niger delta; Ghana, Benin and Togo benefit from the availability of cheaper and environmentally cleaner gas for thermal power generation.

*Power consumers:*

Cost-effective generation through gas (instead of liquid fuels) aimed at improving access and affordability of electricity for consumers in Ghana, Benin and Togo.

*Rural population:*

(a) Community development programs for WAGP project affected persons envisaged to contribute to improvements in rural health, education and common infrastructure; and (b) Reduction of gas flaring was aimed at providing significant health benefits to communities

where flaring was close to living and working environments (reduced CO, CO<sub>2</sub> and particulate emissions).

## 1.5 Original Components

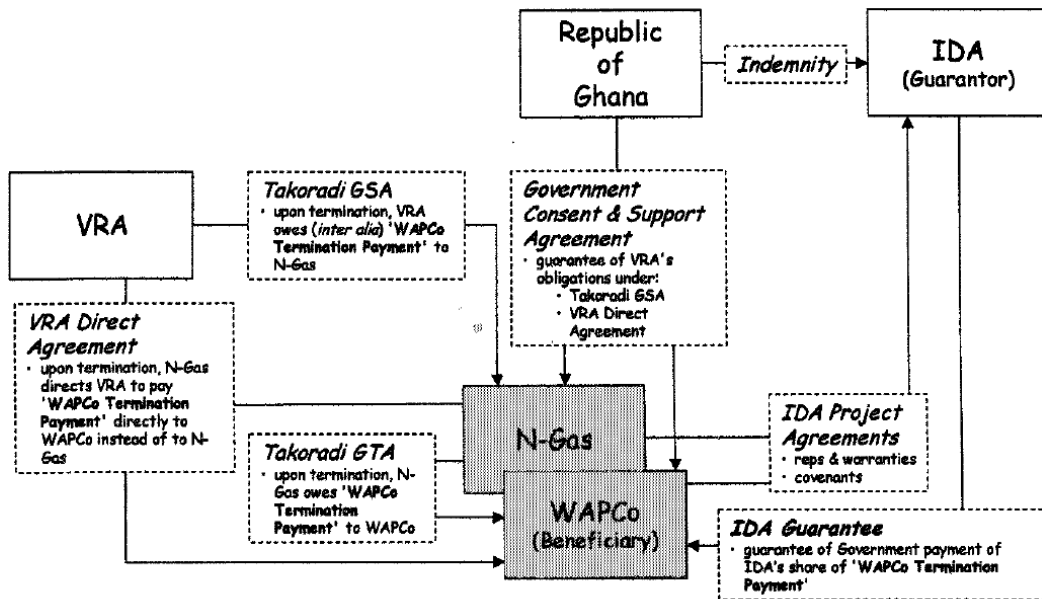
12. Physical infrastructure. The original components of WAGP included the construction of a high-pressure natural gas pipeline, which was to supply gas delivered from the western part of the Niger Delta in Nigeria, via an existing high-pressure gas pipeline, the Escravos-Lagos Pipeline System (ELPS), to the markets in Benin, Togo, and Ghana. The WAGP is a 678 km long, (30 inch diameter onshore in Nigeria; and 20 inch diameter offshore pipeline) commencing close to Lagos where the ELPS terminates. From the commencement point to the Nigerian coast at Lagos beach (about 56 km) the pipeline is onshore. At Lagos Beach, a compression station is constructed and thereafter the alignment runs about 15-20 km offshore along the coast to Ghana.<sup>2</sup> The termination point of the pipeline is the site of the Takoradi thermal power station in Ghana. Lateral pipelines are laid to permit natural gas delivery at regulation and metering stations at Cotonou in Benin, Lome in Togo, and Tema and Takoradi in Ghana. The initial installed capacity is about 170 MMscf/day but the pipeline has been sized to allow for expansion to meet future demand growth, up to a maximum of 474 MMscf/day.

13. Partial Risk Guarantee. Under the project (see Figure-1), N-Gas (owned by NNPC, Chevron and Shell) contracts for the purchases of natural gas from the respective Chevron and Shell joint ventures (JV) with NNPC at two delivery locations on the Escravos-Lagos Pipeline System (ELPS) in Nigeria. N-Gas is also responsible for shipping gas on ELPS and WAGP to the buyers in Benin, Togo, and Ghana. Since VRA in Ghana is the largest, single purchaser of gas, the Bank provided a limited IDA Partial Risk Guarantee (PRG) to cover a portion of the payment due to WAPCo for gas sold to VRA. The Gas Sales Agreement (GSA) includes a portion of VRA's overall payment to pay WAPCo for the transport of gas. In the event of any continuing failure by VRA to pay its obligations, N-Gas could consider terminating the GSA, but such a termination will result in VRA owing a "termination payment" to N-Gas and to WAPCo. The PRG is designed to cover the risks faced by investors in WAPCo, arising from non-payment by VRA for the gas received which could result in the termination of GSA.

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<sup>2</sup> The initial compression would be two 12,500 horsepower centrifugal units, including 100% standby. The station would be constructed to allow expansion with another four 12,500 horsepower units to accommodate the future expected gas capacity of 470 MMscf/day.

Figure-1: IDA Partial Risk Guarantee Structure



## 1.6 Revised Components

14. The project components were not revised.

## 1.7 Other Significant Changes

15. International oil prices. Crude oil prices rose from an average of approximately \$30/bbl at the time of project appraisal in 2004 to a peak of \$140/bbl in 2008, with prices in early 2014 about \$100/bbl. This dramatic rise in commodity price led to high demand and competition for petroleum related construction projects and related services globally but also increased the economic benefits of the WAGP investment.

16. Nigeria's power sector reforms. Over the past ten years, Nigeria has embarked on an ambitious plan for increasing its own thermal power generation capacity. It also put in place: (i) a gas pricing policy; (ii) gas aggregation mechanisms<sup>3</sup>; (iii) a gas master plan; and (iv) domestic supply obligations on International Oil Companies (IOCs). Gas prices were steadily increased to assure more supplies to the new power plants, and plans for augmenting the processing and transmission infrastructure were developed in Nigeria. These changes meant a re-focus on meeting the natural gas needs for domestic thermal plants, before any significant exports could be contemplated.

<sup>3</sup> In managing all gas demand and supply requirements within Nigeria, the mechanism aggregates gas from IOCs for resale to the strategic sectors at the aggregated price, and acts as a one stop intermediary point between the suppliers and the diverse demand sectors. IOCs are not free to sell gas to any consumer, or export gas, without the consent of the Aggregator.

## 2. Key Factors Affecting Implementation and Outcomes

### 2.1 Project Preparation, Design and Quality at Entry

17. Project preparation. The project was prepared in 2004 and the project documentation correctly identified the key issues that had to be addressed in order to attract investment from mainly the private sector for this large regional infrastructure undertaking. The background analysis was sound and robust and the Bank's knowledge of the energy sector in the participating countries was duly reflected in the project documents. A multi-disciplinary team undertook due-diligence and project preparation activities. Detailed assessments of the macroeconomic context, the energy sector, environmental and social assessments, and future demand for fuel in power generation in Nigeria, Benin, Togo and Ghana were undertaken in order to establish a need for the PRG.

18. Project design. The provision of a PRG to catalyze major investments in a gas transmission pipeline system between four countries under a Public-Private Partnership (PPP) was unique in the West African sub-region. In preparing the proposed Project, the Project team drew lessons from the experience in developing power transmission facilities in the countries of the region (Nigeria, Senegal / Mauritania / Mali) and in building regional pipeline facilities worldwide (Chad / Cameroon, Mozambique, Bolivia, and Argentina). The innovative project design resulted in the following major outcomes: (a) WAPCo's shareholders, particularly the public sector entities such as VRA and CEB, were able to arrange for sufficient funding (including risk mitigation instruments) to meet the cash requirements of the Project; (b) WAPCo was able to initiate construction in early 2005; and (c) effective communication and consultation was carried out with all stakeholders upfront.

19. Quality at entry. A Quality at Entry review undertaken by QAG overall rated the project Satisfactory<sup>4</sup>. All technical, commercial, financial and economic, and environmental and social safeguards aspects of the project were thoroughly studied. The contractual framework had been extensively designed and developed by the time of the Board. A total of 15 stakeholder meetings were organized and 963 individuals were consulted (194 female) in all the four countries. The project was assessed as robust under varying assumptions of future energy demand and prices. For the most part, the project risks were thoroughly analyzed<sup>5</sup> and mitigation measures proposed during project preparation; the gas supply risks were not fully assessed given that Nigeria's domestic consumption was relatively low, and a large amount of associated gas was being flared. While in hindsight, it is easy to state that these risks were not properly assessed, these were hard to anticipate at the time of appraisal. The commitment of the four participating countries to supply and consume gas was adequately embodied in the International Project Agreement (IPA).

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<sup>4</sup> Strategic relevance and approach, compliance with safeguard policies, implementation readiness and arrangements, and risk assessment and mitigation were each rated Satisfactory; and technical, financial and economic aspects were rated Highly Satisfactory. However, the project was identified as meriting close supervision because of potential reputational risks that arise from its very nature, including reliance on gas that came from an area (the Niger Delta) that faced security problems and civil unrest directly related to the petroleum sector, and possible concerns about its consistency with the Bank's Extractive Industries policy.

<sup>5</sup> The significant political and social issues in the Niger delta were recognized, and the project's limited leverage to resolve these larger issues was clearly stated in the project documents.



## 2.2 Implementation

20. The project was conceived in 1982 by the Economic Community of West African States (ECOWAS), which was followed by a Study to confirm the viability of WAGP, and signing of an Agreement by all the four participating countries. Table-1 provides the chronology of events in the implementation of the project.

Table-1: Implementation progress of West African Gas Pipeline Project

Month/Year	Milestone Event and Key Activities completed
Pre-May 2005 (Preparation Phase)	<ol style="list-style-type: none"> <li>(1) Signing Intergovernmental Agreement for Harmonized Fiscal and Regulatory Regime (2000).</li> <li>(2) Establishment of preliminary Commercial Structure (August 2002).</li> <li>(3) Signing of WAGP Treaty by Benin, Ghana, Nigeria and Togo (January 2003).</li> <li>(4) Conceptual Design Package of Pipeline submitted to the States (April 2003).</li> <li>(5) WAPCo formed as BOT entity; International Project Agreement signed (May 2003).</li> <li>(6) Sensitization Seminars / Technical Workshops held (September – December 2003).</li> <li>(7) Final WAGP Environmental Impact Assessment (EIA) Report submitted (January 2004).</li> <li>(8) Ratification of WAGP Treaty by the 4 Project countries (October 2004).</li> <li>(9) Nigeria, Benin, Ghana and Togo issue EIA Permits/provisional approvals (November 2004).</li> <li>(10) Enabling legislation for WAPCo passed; Final Investment Decision taken (December 2004).</li> <li>(11) Environmental Authorities in Benin, Ghana and Togo grant final EIA Permits (April 2005).</li> <li>(12) The four States give WAPCo the License to construct the pipeline (April 2005).</li> </ol>
August 2005 – April 2009 (Construction Phase for free-flow gas supply)	<ol style="list-style-type: none"> <li>(1) Offshore construction of West Africa Gas Pipeline commences (August 2005).</li> <li>(2) Onshore civil construction begins in Nigeria and Ghana (March 2006).</li> <li>(3) Construction of compressor station in Nigeria commences (April 2006).</li> <li>(4) Onshore civil construction in Benin and Togo starts (September 2007).</li> <li>(5) Offshore pipeline ready for commissioning (November 2007).</li> <li>(6) Takoradi Regulating &amp; Metering Station ready to receive free-flow gas (December 2007).</li> <li>(7) Commissioning of onshore and offshore pipeline; Itoki inlet valves opened (August 2008).</li> <li>(8) First natural gas supply through WAGP arrives in Ghana (December 2008).</li> <li>(9) Ghana's VRA generates electricity with free-flow natural gas from WAGP (April 2009).</li> </ol>
May 2009 – April 2011 (Construction Phase for compressed gas supply)	<ol style="list-style-type: none"> <li>(1) Gas deliveries made at Tema R&amp;M Station (August 2010).</li> <li>(2) Lome R &amp; M station gassed-up and prepared for free flow gas (October 2010).</li> <li>(3) Remaining works at Itoki tie-in station, Lagos Beach Compressor Station, Cotonou R&amp;M, Tema R&amp;M stations completed (November - December 2010).</li> <li>(4) Gas compression into offshore pipeline commenced (February – March 2011).</li> <li>(5) WAGPA approves the WAPCo request for the completion of the project (April 2011).</li> </ol>
May 2011 – To-date (Operational Phase)	<ol style="list-style-type: none"> <li>(1) Commercial Operation Date of the project reached (October 2011).</li> <li>(2) Gas supplies disrupted on account of pipeline rupture in Lome (August 2012).</li> <li>(3) Pipeline repair completed and gas supplies restored to Foundation customers (June 2013).</li> <li>(4) Gas supplies to VRA and CEB being delivered while ELPS in Nigeria is under Force Majeure.</li> </ol>

21. The project was implemented by WAPCo, and supervision was undertaken jointly with MIGA to ensure that the Bank's policies on environmental assessment (OP/BP 4.01) and involuntary resettlement (OP/BP 4.12) were complied with. The safeguard missions started during the early months of construction (2005-07) and focused on strengthening the implementing agency's (WAPCo) capacities to comply with the Bank's environmental and social safeguard policies and procedures. During this time, corresponding safeguards documents were completed and disclosed prior to completion of physical works.

22. On April 27, 2006, prior to project effectiveness, the Inspection Panel (IP) registered a Request for Inspection submitted by the Ifesowapo Host Communities Forum of WAGP,

comprising 12 communities affected by the Project around the Badagry area in Lagos State. The request pertained to: (a) WAPCo's non-compliance with Bank's environmental assessment policies; (b) WAPCo's non-adherence to the Bank's involuntary resettlement policies; and (c) the Bank not undertaking adequate project supervision. The IP undertook its field investigation in March 2007 and found the Bank team to be non-compliant on all three counts. One of the key findings was the early lapse in preparation and delays in addressing major safeguards issues during initial implementation. A final report was presented to the Board in July 2008, containing a Management Action Plan (MAP) that aimed at resolving key project implementation issues. In the MAP, at least two Bank supervision missions per year, and monthly field visits until project completion, were scheduled. In addition, increased attention by Bank Management was provided for addressing evolving issues, especially those pertaining to directly affected households. Details of the safeguards compliance and project outcomes are provided in Annex-2.

23. Aside from the safeguards issues, the implementation of the project was impacted by *force majeure* events attributed to illegal anchoring of a ship in the exclusion zone<sup>6</sup> in Benin, and damage to the pipeline lateral in Lome, during the construction phase<sup>7</sup>. In addition, there were unforeseen issues with the main onshore pipeline contractor which required its de-mobilization, and subsequent engagement of a new contractor. From 2008 onwards, the Bank Management and task teams stayed engaged closely with WAPCo to ensure that the project could be completed with minimum delays.

### **2.3 Monitoring & Evaluation (M&E) Design, Implementation and Utilization**

24. M&E Design. The M&E arrangements were extensive. The institutional arrangements allowed a number of entities to undertake specific monitoring activities, and generate data for monitoring project outcomes and results. The design entailed coordination among the following:

*ChevronTexaco*: Managing the construction and commissioning of the WAGP pipeline, and monitoring of physical progress.

*WAPCo*: Monitoring overall progress including HSE issues, contracting with environmental firms to conduct independent audits of the implementation of the Environmental Management Plan (EMP) at least twice, and possibly three times, during the 12- to 15-month construction period and once every three years thereafter, and implementing the RAP.

*Energy Ministry in the four countries*: Providing the short- and medium-term plans for the expansion of power generation, and the development of gas sector.

*VRA and CEB*: Providing progress reports on converting the power plants to use natural gas, in addition to liquid fuels.

*Bank task team*: Supervising pipeline construction, technical, commercial, environmental and social safeguards implementation, and placing key reports for public dissemination.

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<sup>6</sup> Exclusion zone on the Maritime maps refer to the area where ships are not allowed to lower their anchor.

<sup>7</sup> There were two incidents of pipeline breaks due to illegal anchoring at Cotonou in 2008, and at Lome in 2010 during the construction phase.

*WAGP Authority:* Monitoring compliance of WAPCo with permits and regulations, and meeting of its obligations under the project-related documents.

25. The PDO and related indicators were ambitious and went somewhat beyond what could realistically be leveraged by the operation. Some indicators were not well defined, and some indicators lacked either the target or baseline. For Indicator 1, the average wholesale cost of electricity supply in Ghana, Benin, and Togo was compared to the "without gas" scenario, even though the comparison entailed variation of hydro availability and large increase in demand in the future years. Under Indicators 3 and 4 (number of customers; and expanded volume of energy trade in the region), no targets were indicated<sup>8</sup>. In the case of Indicator 5 there was a mismatch between target and the indicator, where the indicator was broad and referred to harmonization of the regional institutional and, legal and regulatory framework, the target referred merely to the participation of the West African Regional Authority in monitoring.

26. M&E Implementation. Notwithstanding the extensive M&E design, implementation fell short of what was intended, especially relating to gas supply, commercial and safeguard issues. The main reasons for weak M&E implementation were: (a) *ChevronTexaco* and WAPCo initially concentrated on monitoring the progress on civil works and financial aspects but did not give enough attention to the gas supply, commercial and safeguard issues, and only incorporated environmental and social indicators in the second year; and (b) there was no functional M&E set-up in WAPCo during the project's early months.

27. M&E Utilization. Once the IP initiated its investigation in March 2007, the Bank task team collected data on the associated and non-associated gas production in Nigeria, levels of gas flaring, gas utilization, commercial implications, environmental parameters and social impacts and resettlement costs with the full assistance of the M&E institutions. Demand and consumption of gas in Nigeria, supply projections, and supply-demand gaps were also estimated.

## **2.4 Safeguard and Fiduciary Compliance**

28. The 2007 IP investigation found shortcomings in project supervision. In the Management Action Plan, the Bank task team was to address the issue of "inadequate compliance with OP/BP 10.04 on Economic Evaluation of Investment Operations, and OP/BP 13.05 on Project Supervision," in particular:

- Incorrect assumptions for the economic evaluation of the Project relating to reduction of the flaring of associated gas in Nigeria; and
- Inadequate project supervision by the Bank team.

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<sup>8</sup> During the period of July 11, 2013 to December 31, 2013, WAGP delivered an average of 77.093 MMscf/day to Ghana, Benin and Togo. The average delivered gas in CY2011 was 80.5 MMscf/day against a contract volume of 133 MMscf/day.

29. Environmental and Social Safeguards. WAPCo disclosed relevant environmental and social management plans for WAGP infrastructures in each of the participating countries. These plans were presented by WAPCo in a Stakeholder Workshop in 2007 and the updated EMP and RAP reports were discussed at in-country workshops in 2008-2009. While safeguard activities during the early implementation stages were inadequate, resulting in an IP investigation, these were later corrected through the execution of a thorough Management Action Plan<sup>9</sup>. Further, the IP noted that WAPCo was to undertake corrective actions in the following key areas:

- Damage to the land and livelihoods of certain communities.
- Loss of incomes, specifically by:
  - Fishermen in Nigeria and Ghana due to environmental impacts of the Project on their fishing grounds / ecosystem; and
  - Project affected persons (PAPs) losing land, trees and/or other assets, including future income streams along the right-of-ways.
- c. Inadequate disclosure of relevant information, such as the EA and RAP.

30. The Bank task team addressed the issue of “inadequate compliance with OP/BP 10.04 on Economic Evaluation of Investment Operations, and OP/BP 13.05 on Project Supervision,” in particular: (a) incorrect assumptions for the economic evaluation of the Project relating to reduction of the flaring of associated gas in Nigeria; and (b) inadequate project supervision by the Bank team. On reduction of the flaring of associated gas in Nigeria, it was clarified that the project would make a modest contribution given the small volume of gas export compared to the total quantity flared. Inadequate supervision by the Bank during the early months of project supervision was recognized, and at least two Bank missions in a year and monthly field visits by the staff were undertaken during the remaining period of project construction.

31. Environmental and Social Mitigation Measures. During implementation, and following the IP investigation, WAPCo adopted several corrective measures: (a) completed the updated RAP to cover land owners, who were inadequately compensated for land and assets along the pipeline right of way and construction sites, which required WAPCO to assess the fair market value and opportunity costs for loss of trees, crop and structures; (b) revised the EMP to include clearly identified environmental management counterparts in participating countries; and (c) provided Community Development Projects focused on health and skills training and livelihood support. These were undertaken in addition to a comprehensive 24 point-Management Action Plan (MAP) that was implemented based on the IP’s findings. At the time of the ICR, WAPCo had completed all activities agreed under MAP.

32. Financial Management, Procurement and Disbursement. Since the project was a PRG, there were no financial management, procurement or disbursement issues.

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<sup>9</sup> Detailed Progress Reports 1 to 5 on the implementation of the Management Action Plan by the Sector Management to the Board, is available (see 30-34 in Annex 9).

## 2.5 Post-completion Operation/Next Phase

33. Post-completion operation. The Commercial Operation Date (COD) was reached on November 1, 2011 and triggered a number of provisions under the contractual framework. Prior to COD, natural gas was being supplied to the foundation customers on a ‘best-endeavor’ basis, without ‘take-or-pay’ provisions being applied, in the event of default by either the suppliers or the buyers. Since construction and commissioning of the Lagos Beach Compressor Station (LBCS) took time, non-compressed free-flow gas was supplied to Ghana throughout 2010, again on a best-endeavor basis. The WAGP faced initial problems during the first few years of its operation as follows: (a) delivered gas in Nigeria in the early months did not meet WAGP specifications; (b) there was one pipeline rupture near Lome, resulting in the disruption of gas deliveries; and (c) there were fatalities at Takoradi R&M station during the re-commissioning of the pipeline in November 2012 which obliged WAPCo to undertake a comprehensive review of its safety protocols on their entire pipeline system.

34. The gas supply obligations to WAGP i.e. ‘Foundation Volume (133 mmscf/d) have not been met since commissioning. The main reason for this is that domestic demand for gas increased in Nigeria, gas infrastructure development in Nigeria was slower than expected, and the limiting capacity of the Escravos-Lagos Pipeline System (ELPS) in Nigeria became a constraint to increasing gas supplies to the WAGP. However, Nigeria is actively pursuing the development of its domestic gas supply infrastructure, including doubling of the capacity of ELPS, which would greatly enhance the delivery of contracted volumes to WAGP by 2015. Given the huge financial and economic benefit of using gas, VRA and CEB are reluctant to invoke the pertinent clauses of their supply contracts, and instead have been relying on the goodwill of N-Gas to provide whatever gas volumes they could. In fact, supplies have been under Force Majeure since re-commissioning of the pipeline in July 2013, so ‘send or pay’ has been suspended.

35. Completion of WAGP initiated the beginning of a West African gas market. Potential demand for gas from power utilities and other customers far exceeds the 1<sup>st</sup> phase pipeline capacity (170 MMscf/day). This capacity has not yet been fully utilized because of gas supply constraints in Nigeria<sup>10</sup>, even though the prospects of its full utilization from 2015 onwards are quite optimistic. Consideration is, therefore, being given to investing in additional compression facilities to increase the transmission capacity to 474 MMscf/day (in a 2<sup>nd</sup> phase expansion) as the regional gas market develops. With the recent discovery of oil and gas in Ghana, new opportunities have arisen in terms of incorporating the WAGP infrastructure into plans for the development of a domestic pipeline system in Ghana. There has been interest expressed by the authorities in Cote d’Ivoire for extension of WAGP to connect their power utility. It is important to emphasize that the pace of development of the Nigerian gas system in the short term will likely determine how well its domestic and export markets (including WAGP) are served. Overall, WAGP has laid the foundation of a sub-regional market with a large number of customers exploring supplies from large gas producers, and through imported LNG.

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<sup>10</sup> The ELPS is currently under partial *Force Majeure* and repairs and looping are expected to be completed by end 2014. In the meanwhile, WAGP has been declared an open-access infrastructure and suppliers other than ChevronTexaco and SPDC can become shippers of gas for customers in Ghana, Benin and Togo.

### 3. Assessment of Outcomes

#### 3.1 Relevance of Objectives, Design and Implementation

36. Relevance of objectives. The project objectives, which aimed at reducing power generation costs and fostering regional economic integration, remain **highly relevant** to each individual country's growth strategy and to the Bank's regional integration strategy in West Africa. Growth in electricity demand remains robust in each participating country, and the use of higher cost, imported fuels when lower-cost natural gas is unavailable has primarily a budget impact as well as an impact on the balance of payments of these countries.

37. Design. The design arrangements for a regional infrastructure investment also remain **relevant**. Project design was kept simple, comprising only essential investment components and the necessary institutions in the supply and beneficiary countries. The institutional framework for this regional project was also well defined. Regional and national ownership was strong and the investment supported by key regional institutions such as ECOWAS and NEPAD. Finally, the importance of developing and implementing an effective communications and consultation program for affected stakeholders was recognized during project design.

38. The PRG structure for enabling the shareholder investments for WAGP focused on the off-taker risk of VRA, the primary purchaser of gas flowing through the pipeline. This was an appropriate use of the PRG instrument and proved effective. Risks associated with the supply of gas volume from Nigeria were not foreseen, given the large resource availability and gas flaring in Nigeria. Several subsequent events took place which had an important bearing on the gas supply situation for WAGP, as follows: (a) Nigeria experienced a period of political and social unrest in Niger Delta, resulting in frequent vandalization of gas supply infrastructure; (b) Nigeria also embarked on its own gas master plan including sector reforms, but the implementation progress of different projects remained slow; and (c) an ambitious and gas-to-power program was launched which impacted the availability of gas volumes for WAGP. The PRG framework did not fully take into account the developments in the Nigerian domestic gas market and infrastructure which had an important bearing on the financial viability of the project.

39. Implementation. The approach adopted for implementing the project through WAPCo, and drawing on resources of the IOCs (NNPC, Chevron, and Shell) was **appropriate and relevant** as it fostered a cooperative spirit. Implementation of the project using international skills and domestic experience was also relevant in terms of a transfer of knowledge and know-how. The PRG was also instrumental in facilitating the necessary investments in the project. However, the contractual framework, which was envisaged to bring commercial discipline (take-or-pay provisions; make-up volumes; penalties; etc) between the sellers and buyers in the evolving gas market, has not been enforced due to *Force Majeure* events.

#### 3.2 Achievement of Project Development Objectives

40. Overall. The achievement of the PDO's is rated **Moderately Satisfactory**. While the West Africa Gas Pipeline is recently starting to improve the competitiveness of the energy sectors of Ghana, Benin and Togo (by promoting the use of cheaper and environmentally cleaner

gas from Nigeria over the project period), key outcome indicators-in particular the volume of gas exports from Nigeria- has been substantially achieved by the project's closing date, December 31, 2013<sup>11</sup> (but not fully achieved). Going forward, WAGP has the potential to further foster regional economic and political integration through the development of the West Africa energy market. It is likely that the PDO will be fully achieved in the coming years as the volume of gas in the WAGP will increase by mid-2015 when the ELPS transmission capacity in Nigeria is expected to have been doubled. Finally, the beginning of a West African regional gas market is already evident as several potential stakeholders (producers in Nigeria and Ghana, LNG importers, consumers, WAPCo as a transportation entity) are taking steps to enter into commercial arrangements.

41. **Indicator 1: *Decrease in wholesale generation cost.*** With the availability of natural gas since late 2009, the wholesale generation cost has been decreasing in Ghana, Benin, and Togo (see Annex-2 for details). The thermal generation cost using natural gas is about 40% compared to use of Light Crude Oil in the three countries<sup>12</sup>. During 2011, when the supply of gas continued without interruption, the wholesale generation cost in Ghana decreased by 14% (in line with the target of 10-20%) and in Benin and Togo by 12% (compared to a target of 40%), not accounting for changes in the generation mix (higher national demand; low hydro availability; increased thermal generation) and sharp increase in oil prices. This indicator has been substantially achieved<sup>13</sup>.

42. **Indicator 2: *Physical completion of gas pipeline and spurs.*** All physical infrastructure related to WAGP was completed by mid-2011, *albeit* a few years later than what was planned. As of end 2013, the gas pipeline and spurs were fully operational despite quantities of gas supplied through WAGP to Ghana, Togo and Benin being below the contracted volume i.e. 133MMscf/day. With the physical completion of WAGP infrastructure, it may be used to support expanded trade in the ECOWAS region, as new gas reserves and domestic supply infrastructure are developed in Nigeria and in other regional countries (such as Ghana). This indicator has been fully achieved.

43. **Indicator 3: *Number of large, medium and small gas customers.*** The current number of gas customers is four. Currently, natural gas is being supplied to VRA (Ghana) and CEB (Benin/Togo) as well as to two new entities, namely, Sunon Asogli Power<sup>14</sup> in Tema (Ghana) and Contour Global power plant in Lome (Togo). Supply of gas to other new gas customers beyond these main consumers has not yet been possible due to gas supply constraints. While no quantitative target was set at appraisal for this indicator, gas is currently being supplied through the WAGP to each of the main gas consumers envisaged at appraisal, as well as two new entities, and the indicator is considered to have been substantively achieved.

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<sup>11</sup> The World Bank Operational Policies (BP 14.25 – Guarantees) prescribes that ICRs for Partial Risk and Partial Credit Guarantees are initiated two years after Project Completion and completed within six months thereafter.

<sup>12</sup> Ghana Power Sector Financial Review (June 2013), World Bank Internal Paper.

<sup>13</sup> This takes into account that Ghana consumes 95% plus of the gas (and was also envisaged to be the main gas consumer at appraisal); in Benin and Togo, cost of generation is expected to reduce drastically in the coming year.

<sup>14</sup> Ghana-Chinese IPP in Tema, Ghana.

44. **Indicator 4: Expanded volume of energy trade in the region.** The objective of expanded trade in the West African sub-regional market has been substantially realized, notwithstanding gas supply constraints in Nigeria. Free-flow gas has been supplied since early 2009 though interruptions were experienced on account of moisture content (March 2009 - February 2010) and rupture of the pipeline near Lome (August 2012 - June 2013)<sup>15</sup>. Table-2 provides historical supply of gas to WAGP and deliveries in Ghana, Benin and Togo. Throughout project implementation, gas reserves and supply potential continued to be abundant even though demand in Nigeria's power sector has also been growing. Domestic gas pipeline capacity constraints and security issues in Nigeria amounted effectively to *force majeure*, resulting in reduced gas volumes for WAGP during the period under review. The target gas volumes were the 'contracted' volumes i.e. 133 MMscf/d, but the average gas volume (for a full year operation) has been 84.0 MMscf/day in 2011. During October-December 2013, the average gas delivery has been 80.5 MMscf/day<sup>16</sup>, or 60% of contracted volumes.

Table-2: Historical receipt of gas for WAGP, and delivery in Ghana, Benin and Togo

Year	Supplies to WAGP		Deliveries in Ghana		Deliveries in Togo		Deliveries in Benin		Total
	MMscf	MMsf/d	MMscf	MMsf/d	MMscf	MMsf/d	MMscf	MMsf/d	MMscf
2009	283,489	1	197,977	1	-	-	-	-	197,977
2010	14,585,068	40	13,207,620	36	-	-	-	-	13,207,620
2011	30,594,449	84	28,393,810	78	268,072	1	184,209	1	28,846,091
2012*	17,769,346	49	15,477,848	42	668,991	2	1,095,201	3	17,242,040
2013*	13,881,965	38	11,573,011	32	867,615	2	819,505	2	13,260,131

\* The daily average gas supply figures account for days when the pipeline was not operating due to *Force Majeure* event.

Source: WAPCo

45. In addition, other positive developments have taken place: (a) the gas supply from Nigeria has shown an upward trend, and during the first week of January 2014, average delivery was about 108 MMscf/day; (b) there has been a decrease in the use of liquid fuels in thermal generation plants in Ghana, Benin and Togo; and (b) the flaring of AG in Nigeria has decreased by about 50%, some of which is due to WAGP (see Annex-2). Overall, this indicator is considered to have been substantially achieved by end 2013.

46. Indicators 1-4 are closely linked to the first sub-objective of the overall PDO (e.g. improving the competitiveness of the energy sectors in Ghana, Benin, and Togo by promoting the use of cheaper and environmentally cleaner gas from Nigeria in lieu of solid and liquid fuels for power generation and other industrial and commercial uses, and by diversifying energy supply sources). Since all these indicators have been either fully or substantially achieved, this sub-objective has been substantially achieved with some moderate shortcomings, as follows: (a) the project implementation experienced delays with cost over-runs, even though free-flow gas was supplied from early 2009 onwards; (b) while Ghana is reaping the full benefits of a cheaper

<sup>15</sup> Jan-March 2014 gas supplies to WAGP were approx. 5,800,000 MMscf, or an average 64 MMscf/day.

<sup>16</sup> The average gas supply over the last three months of 2013 is used as the end of project actual value for this indicator for the purpose of the ICR. However, the average volume since commissioning is lower because of the reduced number of days that the WAGP was available due to rupture and repairs.



and environmentally cleaner gas from Nigeria, the reduction in the wholesale generation cost in Benin and Togo is yet to be fully realized (their share in gas supply is less than 5% of the total); and (c) contracted gas supplies of 133 MMscf/day from Nigeria are yet to be assured on a sustained basis. These shortcomings are being addressed through other FGN and Bank initiatives in Nigeria, and gas supplies are expected to be stabilized by 2015.

47. **Indicator 5: Regional Regulatory Authority.** WAGPA has been established through the signing of WAGP Treaty and the International Project Agreement, and was actively involved in project monitoring during the construction phase. It has undertaken and harmonized the institutional and regulatory framework in the four countries, and has developed and implemented the following: (a) WAGP Regulations; (b) the Pipeline Development Plan; (c) Access Code; (d) commercial Agreements; and (e) rules of procedures for dispute resolution. The pipeline has been operational with adequate regulatory oversight, and the indicator has been fully achieved.

48. Overall assessment. The project development objectives have been achieved by delivering lower cost natural gas to the power plants in Ghana, Benin, and Togo and displacing higher cost liquid fuels, which has brought down the cost of gas-based electricity generation. The project has also fostered regional economic and political integration through the development of the West Africa electricity market and the operation of the WAGPA.

49. It is clear that provision of gas (and displacement of liquid fuels) has brought about an increased competitiveness of the power sectors in the above three countries. The provision of gas - even though still below contractual volumes - has also diversified the fuel mix. Of the five main indicators listed in the preceding paragraphs, Indicators 2 and 5 had been met by December 2013, while Indicator 1 (Wholesale cost of electricity supply) had been substantially achieved. Indicator 3 did not have a target value though gas is being provided to the two main gas consumers planned at appraisal, plus two additional entities. Finally, with regard to Indicator 4 (Gas export supplies to the WAGP), this indicator had reached 60% of targeted volumes by end 2013. Overall, based on progress made towards each of the above indicators, the achievement of the development objectives is rated **Moderately Satisfactory**.

### **3.3 Efficiency**

50. Efficiency of the WAGP is measured in terms of post-completion financial and economic returns and comparing these with what was forecast at the time of project appraisal. Such a comparison provides an assessment of the delays in implementation, impact of variation of capital and operating costs, increase of price of gas and liquid fuels, availability of gas volumes, commercial and economic benefits, and consequences of the unforeseen events.

51. Net present value / Economic rate of return. Despite the lower volume and interrupted supply of gas from Nigeria, the project remains the least cost alternative for consumer countries. Cost savings for generation on gas compared to LCO are estimated at 15-17 USc/kWh. The ex-post economic analysis shows that WAGP remains efficient, despite lower gas volumes and large pipeline cost overruns. Four key variables that influence the economic results have changed significantly since appraisal: (i) project costs; (ii) commissioning date; (iii) oil prices; and (iv) gas supply volume. In addition, the opportunity cost for gas in Nigeria has increased from an

estimated economic cost at project appraisal (in 2004) of US\$ 0.5/MMBtu to US\$4/MMBtu.<sup>17</sup> This increase reflects the increasing scarcity of gas in the Nigerian market that has resulted both from constrained supply in combination with increased demand for gas in the electricity generation subsector. Annex-3 provides details of the economic and financial evaluation of the project.

52. While gas supply from Nigeria is expected to improve by mid 2015, two supply scenarios were defined to analyze the ex-post economic evaluation of WAGP. The high case gas supply scenario assumes that existing gas volumes to Ghana, Benin and Togo of 80 MMBtu per day would be sustained from 2014 onwards. The results yield a net present value (NPV) of US\$1.9 million, and a corresponding economic internal rate of return (EIRR) of 18.6%. The low supply scenario assumes that supply volumes will be 60 MMBtu per day. The low case scenario yields a NPV of US\$1.1 million, and an EIRR of 16.0%. The ex-post EIRRs are lower than the ex-ante EIRRs of 25% (low case) and 31% (high case) due to (i) increased capital costs in combination with delays in commissioning, and (ii) lower gas supply volume than envisaged at appraisal. However, oil prices are currently about four times higher than projected at appraisal. This has partially offset the combined adverse impact of increased project costs, delayed commissioning, and reduced gas volumes, resulting in EIRRs between 16% and 18.6% in the low and high cases respectively in the ex-post evaluation.

53. Financial rate of return. An ex-post financial evaluation, consistent with the economic scenarios, was undertaken to assess the financial sustainability of WAGP. The financial results have also been strongly impacted by: (i) increased project investment costs; (ii) delays in commissioning; and (iii) reduced gas supply volumes. WAGP transportation charges currently are somewhat higher than originally anticipated at the time of appraisal. The estimated ex-post FIRR are 4.4% and 0.9% for the high and low case scenarios respectively, to be compared to the 15% weighted average cost of capital (WACC). The financial analysis shows that WAPCo will likely face problems to sustain operations and service its debt to the shareholders (or provide return on their equity).

54. Assessment of PRG in support of the project. World Bank Group (WBG) participation through the IDA PRG (and the MIGA guarantees) provided financial risk mitigation and political comfort to stakeholders during preparation and implementation. These guarantees addressed the critical risk of payments by VRA and enabled the project to proceed. The net benefits have been large, with multiplier effects on employment and livelihoods, given mobilization of investments of about \$1 billion and regular payments by VRA for the gas purchased. In addition, the involvement of WBG also helped ensure the implementation of the environmental and social mitigation measures to the benefit of the impacted communities.

### **3.4 Justification of Overall Outcome Rating**

55. Overall, the outcome of the project is rated as **Moderately Satisfactory (MS)**. The positive aspects of the project include: (i) relevance of the project objectives, design and

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<sup>17</sup> US\$4/MMBtu is an estimated opportunity cost based on what would enable capital cost recovery from investment in a combined cycle power plant. The actual gas price paid by IPPs in Nigeria is lower, around US\$2.70-3.0/MMBtu

implementation; (ii) significant economic benefits being derived by the three beneficiary countries; (iii) economic efficiency of the investment itself; and (iv) stimulus given to regional energy development despite implementation delays and less than contracted gas supply volumes.

56. The provision of gas has diversified the fuel mix and contributed to the reduction of greenhouse gases in consumer countries. Also, despite a delay of four years, a large cost overrun, and lower volumes of gas, the recalculated EIRR is still 16% in the low case scenario, which is acceptable. Of the 5 main indicators, all had been fully or substantively met by December 2013. With regard to Indicator 4 (Gas supply volumes to the WAGP), gas supplies were 60% of contracted volume by end 2013. However, by mid-2015, when the gas pipeline transmission capacity in Nigeria is expected to have been doubled, there is a realistic prospect that even greater economic benefits from this investment will be attained. Finally, the beginning of a West African regional gas market is already evident as several potential suppliers are taking steps to enter into commercial arrangements with suppliers in Nigeria and elsewhere (ENI and Tullow in Ghana; LNG importers). In sum, on the basis of the above considerations, a Moderately Satisfactory (MS) rating is justified for the overall outcome.

### **3.5 Overarching Themes, Other Outcomes and Impacts**

#### **(a) Poverty Impacts, Gender Aspects, and Social Development**

57. Poverty and social impacts. Provision of natural gas for power generation has enabled Ghana, Benin and Togo to produce electricity at competitive costs compared to liquid fuels, and limit the tariff increases which would have otherwise been necessary. The growth in electricity consumption in Ghana has been 7.2% per annum while commercial sector (small businesses, shops and small-scale production) growth has been 7.93%. The provision of electricity to customers in Ghana has been a contributing factor to help reduce poverty by 5 percentage points from 29% in 2005 to about 24% in 2012 (see Annex 2).

58. In addition, and as part of its corporate social responsibility, WAPCo completed 66 Community Development Projects (CDP) during the first two years of implementing livelihood assistance programs for the communities directly impacted by the project. For years 1 and 2, the focus was on community infrastructure (school blocks, boreholes, clinics, drainage, markets). In year 3, there was a shift from physical infrastructure to livelihood development programs (e.g. training and skills development, scholarships). The programs were designed based on results from a beneficiary assessment and socio-economic survey. The survey of income and livelihood measured changes from the start of the project in 2004-2005 (when a baseline measurement was undertaken in preparation for the RAP).

59. The results of the 2009 survey showed that: (a) educational levels continued to be moderately high but membership in social groups was limited; (b) the income levels reflected relative poverty, which was consistent with the regional poverty rate but less than the national average (12.5% of the total sample earned less than N5,000 (US\$ 33) per month); (c) access to land and other natural resources was found to be just adequate, but had declined slightly since the 2005 survey; and (d) some of the affected communities still did not have primary or secondary schools, water supply and health facilities (which government was supposed to

provide in 2008). Nonetheless, the outcome of the measures that were subsequently taken for livelihood restoration has led to positive social development for affected communities.<sup>18</sup>

60. Gender aspects. The socio-economic survey in Nigeria, where the vast majority of PAPs are located, was used by WAPCo to develop a profile of vulnerable groups (female-headed households; persons with disabilities etc). WAPCo assigned gender specialists to tailor the CDPs to the specific needs of female-headed households. For example, women comprised more than 60% of participants in the life skills training programs (e.g. water sanitation, safety, and nutrition) and 41% of the 162 beneficiaries of the scholarship program in 2012-13.

### **(b) Institutional Building/Strengthening**

61. Institution-building: The Project created a new regional gas regulatory authority, WAGPA, which established regulatory processes and an institutional capacity that can be used as models for natural gas pipeline operations in other jurisdictions. WAPCo, too, has acquired experience in implementing large gas pipeline infrastructure projects, which would be invaluable in either expanding the capacity of WAGP, or in extending the pipeline to other countries (such as Cote d'Ivoire). WAPCo has also been in contact with LNG companies to explore the LNG import option for filling up the available pipeline capacity. The utilities (VRA and CEB) have converted their generation units to dual fuel (liquid fuels and natural gas) and have trained their staff to operate the assets with either LCO or gas. All in all, WAGP has contributed to creating new capacity and strengthening existing institutions.

62. Additionally, WAPCo worked closely with federal and state environmental agencies, organized several training workshops, and shared international experiences to strengthen their professional capacities for regulating environmental aspects of pipeline operations. In this regard, WAPCo purchased air quality monitoring equipment for national environment agencies, sponsored training for their use, and organized meetings to create awareness about: (a) safety of pipelines; (b) danger of anchoring in the exclusion zone; and (c) issues arising from sand-mining close to the pipeline.

63. Supporting local authorities. WAGP has contributed to the implementation of sustainable social programs by turning over to communities the responsibilities for operating and maintaining (O&M) the CDPs. This was achieved through the signing of Memoranda of Understanding (MoU) between WAPCo and local authorities. While the project covered the expenses for O&M during the first year, WAPCo encouraged local governments to include the CDPs in their annual budgets (e.g. school teachers and health providers were to be recruited by local authorities for the schools and health centers).

64. Although the turn-over process proved more challenging than anticipated, WAPCo's emphasis on promoting the involvement of communities along the right of way of the onshore pipeline has proven to be an effective approach for three reasons. First, community participation

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<sup>18</sup> WAPCo's emphasis on developing community based communications created awareness of the benefits and responsibilities of communities adjacent to large-scale infrastructure projects.

in the enforcement of security measures contributed to greater awareness of security issues of onshore pipeline systems. Second, the measures that were implemented in combination with extensive consultations have raised awareness among government agencies, sponsors, and in particular WAPCo partners, about the importance of addressing social and environmental risks and community buy-in to ensure sustainability of large-scale infrastructure projects. Lastly, local governance, including dispute resolution processes, was strengthened.

**(c) Other Unintended Outcomes and Impacts (positive and negative)**

65. There have been no unintended outcomes and impacts.

**3.6 Summary of Findings of Beneficiary Survey and Stakeholder Workshops**

66. No Beneficiary Survey was carried out and no stakeholder workshops were organized.

**4. Assessment of Risk to Development Outcome**

**Rating: Moderate**

67. The key factor determining the sustainability of WAGP in the short term is gas supply volumes from Nigeria. This risk is both *technical* (in that shortfalls in new gas supplies and continuing growth in demand for gas in Nigeria along the ELPS will likely limit volumes available to WAGP buyers, until ELPS capacity is doubled by mid-2015 and a pipeline interconnecting east and west Niger delta regions in Nigeria is completed, currently estimated to be 2017) and *political* since the FGN may adopt a policy to limit export of natural gas in order to meet first its own domestic supply needs. The shortage of gas also poses financial sustainability risks for WAPCo. While these uncertainties would remain, the risk to the sustainability of the project benefits in the short term is considered **Moderate**. In the longer term, open access to WAGP (which has been allowed since 2012) could bring in new regional suppliers of gas, which could reduce the supply risk and improve prospects for longer term sustainability.

68. The risk relating to a potential future call on the PRG is **low**, even though VRA remains in a weak financial position because of its continuing dependence on oil fired thermal generation. However, the risk of VRA defaulting on its payment obligations is small because of the financial repercussions of not receiving any gas from WAPCo and having to resort to buying LCO i.e. VRA would end up paying a higher cost for the fuel needed to keep its thermal plants operating. Also, if gas were to be made available to VRA from recently discovered domestic sources in Ghana, it would improve VRA's financial position (through combined supplies from WAGP and domestic sources) but it would still not be sufficient to displace all the LCO used for thermal generation. In summary, therefore, the current high cost of imported LCO provides a strong incentive for VRA not to default on its payment obligations for gas supplied through WAGP.

## 5. Assessment of Bank and Borrower Performance

### 5.1 Bank Performance

#### (a) Bank Performance in ensuring Quality at Entry

##### **Rating: Moderately Satisfactory**

69. Bank performance in ensuring quality at entry is rated **Moderately Satisfactory**. Different alternatives for meeting growing electricity demands in consumer countries were correctly evaluated, social and environmental mitigation measures were incorporated into project design, and commercial risks were appropriately identified. The Bank undertook the preparation and appraisal of the operation in a comprehensive manner to ensure achievement of PDOs, consistent with the Bank's fiduciary obligations. The project was (a) in line with the region's development priorities; (b) identified major risks and mitigation measures; (c) addressed most safeguard issues satisfactorily; and (d) integrated lessons learned from previous projects in the region and countries. The choice of instrument (PRG) was also appropriate as it leveraged an investment of about \$ 1 billion through a PPP arrangement. In terms of shortcomings, the gas supply risk and the policy changes in Nigeria, which resulted in a greater emphasis on the use of natural gas in domestic power generation, thereby limiting gas availability for the WAGP in the short term, were not anticipated during project preparation; nor could they have been easily mitigated at the time of project appraisal. Finally, the Bank failed to foresee the sharp international oil price increase and the disruption it would cause on WAGP costs and implementation time<sup>19</sup>.

70. The reduced gas supply volumes and rising oil prices were hard to anticipate at the time of project appraisal. Nevertheless, the potential risks associated with the supply of gas, including the technical, social and governance issues on Nigeria's ELPS line, could have been more carefully assessed in terms of the reputational risk for the Bank and the commercial risk for WAPCo.

#### (b) Quality of Supervision

##### **Rating: Moderately Unsatisfactory**

71. Bank performance in quality of supervision is rated **Moderately Unsatisfactory**. As noted in the IP investigation, project supervision during the first year of implementation was not undertaken rigorously, given the Bank's reliance on the private sector's diligence. Following the IP investigation, Bank management reacted immediately by preparing, a Management Action Plan (MAP), in cooperation with WAPCo, to address issues identified in the IP Report. As a result, Bank management and the task team engaged in more intensive supervision and devoted a lot of time and attention to addressing the specific issues raised by the IP. Two Bank missions per year, and monthly field visits, during the construction phase were undertaken to improve

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<sup>19</sup> There was a greater demand for contractors for oil development projects in oil-producing countries, and hence incentives for working on complex gas development projects in frontier regions was temporarily reduced

technical and financial supervision and ensure compliance with safety, environmental and social safeguards policies. A total of 196 staff-weeks on WAGP project supervision were expended, of which 132 staff-weeks were spent during the period 2007-10 (see Annex 4). Ultimately, all safety, environmental, and social mitigation measures agreed under the MAP were completed by the time the project went into commercial operation.

72. As noted, the PDO was ambitious and did not only depend on the WAGP construction and operation. The Bank was involved in policy dialogue in the energy sector in all four countries during project implementation. In Ghana, Togo, and Benin, this included monitoring the financial status of the sector including regular payments for gas. The Bank team interacted intensively with the authorities in Nigeria to help assure contracted supplies for WAGP. The Bank could arguably have done more to bring together gas suppliers and off-takers around the issues of gas availability, and help revise and enforce the incentive structures for WAPCo suppliers and off-takers. However, it is still doubtful whether this gas supply risk could have been mitigated significantly, other than through dialogue at the regional political level.

### **(c) Justification of Rating for Overall Bank Performance**

#### **Rating: Moderately Satisfactory**

73. Overall Bank performance is rated **Moderately Satisfactory**. This rating combines the Bank performance rating in ensuring quality at entry (MS) and the Bank performance rating for quality of supervision (MU). The overall rating takes into account that the supervision improved considerably after the Inspection Panel case in 2007. The rating takes into account that the main factors causing less than contracted gas supplies (e.g. low gas supplies from Nigeria and the temporary rupture in the gas pipeline) were clearly outside the control of the Bank team.

## **5.2 Borrower Performance**

74. There is no Borrower under this project (as is usually the case in Investment Lending operations), but, instead, beneficiaries of the PRG. The principal beneficiary is WAPCo, which is covered against the payment risk of VRA for the transport of gas through WAGP. The following paragraphs will, therefore, assess the performance of the four participating governments and of WAPCo.

### **(a) Government Performance**

#### **Rating: Moderately Satisfactory**

75. Overall, the performance of the four participating governments in ensuring gas supply and improving sector performance has been mixed and is rated **Moderately Satisfactory**. This rating is a composite of the performance of the four participating governments. All four governments have remained committed to implementing the project despite project delays and consequent cost escalation as the principal stakeholders (through NNPC, VRA and CEB). On the off-taker side, the Government of Ghana has ensured that VRA always met its payment obligations to gas suppliers. On the other hand, despite the existence of a contractual framework

envisaged to bring commercial discipline, VRA and CEB were reluctant to invoke the pertinent clauses of their supply contracts, and instead have been relying on the goodwill of N-Gas to provide whatever gas volumes it could.

#### **(b) Implementing Agency Performance**

##### **Rating: Moderately Unsatisfactory**

76. WAPCo was the implementing agency for WAGP and beneficiary of the IDA PRG, and its performance is rated **Moderately Unsatisfactory**. This assessment is based on the actions taken (or not taken) and the timeliness of such actions, to ensure that the project met its development objectives and stated outputs, as well as met the safeguard obligations. The assessment also acknowledges that some factors that affected the outcome of WAGP were outside the control of WAPCo. However, two key factors – construction delays and the final cost of the project - were within the control of WAPCo. Also, had WAPCo given early priority to the social and community buy-in concerns, the initial problems in the implementation of social safeguards might have been prevented. There were costly failures relating to: (a) adherence to the hydrotest water discharge protocols in Ghana; (b) compliance with the RAP especially relating to compensation payment, consultation and livelihood restoration; and (c) putting in place an information system for safeguards monitoring. The safeguards team of WAPCo was not trained to handle the critical risks, especially along the pipeline right-of-way in Nigeria. The weak performance in the main construction contracts could also have been addressed earlier. It should be noted that WAPCo's performance improved later in the project implementation period.

#### **(c) Justification of Rating for Overall Borrower Performance**

77. Overall Borrower performance rating is considered **Moderately Satisfactory**. Strong commitment of all four countries to this regional infrastructure investment (including that the main regional body, ECOWAS), the sustained commitment of VRA to ensure payments for the gas Ghana received, and the improved supervision of safeguards obligations offset the early weaknesses in implementation performance noted above. The rating also takes into account the lack of proactivity of the FGN in attempting to resolve gas supply bottlenecks. Finally, international cost escalation of the investment itself in the aftermath of the global financial crisis from 2007-2008 was largely outside of the control of the four participating countries.

## **6. Lessons Learned**

78. Attention should be paid to both supply and demand-side risks in regional infrastructure investments. A key lesson for cross-border energy projects is that both supply-side and demand side risks need to be carefully assessed and their potential impact quantified. The WAGP project was well defined and prepared with appropriate commercial risk mitigation for payment obligations for the purchase of gas purchased. Risk mitigation measures were then defined within the scope and control of the project. However, the supply side risks, i.e. helping assure uninterrupted gas supplies from Nigeria, did not receive the same attention, despite the potential for jeopardizing the project development objectives. Even though a gas supply agreement was agreed to contractually, it has proved unenforceable in practice, due to the lack of practical



sanctions in the face of a competing need for this gas supply in Nigeria's rapidly expanding domestic gas market.

79. Assessment of Risk in operations involving Public-Private Partnerships (PPP). In operations involving a PPP, the objectives of the governments and those of the private sector partners are not identical. The PAD listed a number of risks to the project objectives and rated 'payment obligations to N-gas by VRA (and CEB) – correctly - as a 'Substantial' risk. The main focus of the risk section in the PAD was on risks to the project economics and finances, which were critical for the participation of the private oil companies. However, risks to the two main PDO's of 'improving the competitiveness of the energy sectors in Ghana, Benin and Togo' and 'fostering regional economic and political integration' were less clearly identified. For example, a regional infrastructure investment necessarily requires a close dialogue with participating countries to be successful, including with Nigeria, the supplier of natural gas. The main lesson emerging from this regional PPP is that risk analysis should typically go beyond risks faced by the private partners, and should focus directly on the specific risks to the PDOs.

80. Importance of a careful assessment of political, community, and social issues in large infrastructure investments. The high risks associated with political and social issues in the oil and gas sector in Nigeria, and in the region more generally, were known at the time of project preparation. While the up-front work had identified these risks and prepared mitigation measures, WAPCo's lack of familiarity with the chieftaincy issues in Nigeria, as well as with Bank policies on social safeguards, was not adequately taken into account. This became evident later during preparation of the initial phase of the RAP, as did problems with land and asset valuation. The clear lesson learned from the IP showed that special attention should have been given to these issues during the early days of construction. As shown in other large-scale infrastructure projects, attention to implementation of safeguard measures must be a critical focus of attention, including securing the participation and buy-in of directly affected communities. The up-front work at the time of appraisal had identified key risks and prepared mitigation measures. However, the follow up on these risks by WAPCo and the Bank team was hampered by the fact that personnel changes during the transition from preparation to construction phase caused extensive safeguards work to be neglected in the field. Special attention should have been given to this aspect during the early days of construction. If the implementation of safeguard measures is delayed, the construction and overall implementation schedule for the project should be adjusted accordingly.

81. The institutional framework for large multi-country projects like WAGP requires a careful balancing of interests and responsibilities of different stakeholders. In this case, there were strong interests of: (a) gas producing oil companies (Chevron, Shell, NNPC) to supply gas, including associated gas, which was hitherto being flared, to the West African regional market; (b) governments of the four participating countries which have an interest in balancing the domestic needs and exports (or imports); (c) NGC as the owner of ELPS to deliver gas from suppliers in Niger Delta to a tie-in point at Itoki (near Lagos), and earn the transportation charge; (d) WAPCo, owned by the gas suppliers and foundation customers (VRA, CEB), which has an interest in maximizing the use of pipeline capacity and earn the transportation tariff; and (e) foundation customers who have an interest in receiving the contracted volume of gas in order to

substitute liquid fuels. The risks, responsibilities and incentives of all these stakeholders need to be appropriately allocated for the success of the project.

82. *The scope and conduct of supervision of a transformational regional project should be comprehensive regardless of the instrument used and amount of Bank support.* The operation consisted of a relatively small PRG to one country which leveraged financing for a four country transformational infrastructure investment. While this kind of leverage is laudable, it requires an adjustment in how the Bank's prepares and supervises operations. Supervision was often focused on the physical aspects of the project (e.g. construction, safeguards) and less on the underlying regional dynamics of creating a gas market. During preparation and the early phases of supervision, this regional project lacked clear country ownership within the Bank. The supervision of the project was not given priority during the first 18 months following Board approval, reflected in the low supervision budget, until a request for an Inspection Panel review was registered in April 2006. Implementation support at this time focused mainly on the financial closure aspects of the transaction. The lack of clear country ownership in the Africa region during preparation and early supervision phases made it difficult to initiate a dialogue on regional energy investments, taking action to help assure gas supplies from Nigeria for the WAGP, and, more generally, discussing the particular institutional and policy needs of regional infrastructure investments. Many of these lessons from the preparation and early implementation of the WAGP have already been incorporated by the Bank in the past years. An African regional projects department has been created, which has since helped bring a stronger focus to cross-boundary issues. Also, at the time of the WAGP project, the use of PRGs was still an exception, as was working across the World Bank Group. Joint WBG support and the use of PRGs have both taken off in the energy sector in Africa since WAGP, building on the early pioneering work of the WAGP team. In general, when the WBG engages in these inherently risky transformational operations, it should place its full weight behind the operation, particularly during the implementation phase, leveraging its political weight within the countries as well as its financial and technical resources to increase the chances of success.

83. *Economic and financial evaluations should assume a wider range of commodity prices and other variables.* While the economic and financial analysis at appraisal was thorough, a more extensive sensitivity analysis<sup>20</sup> could have been carried out (especially to assess the cumulative impacts of different risks and variables). This is particularly important for large-scale infrastructure projects that are sensitive to project delays and associated cost increases. Also, the risk analysis should be applied to risks that cannot readily be mitigated- such as a single source gas supplier- and constitute an explicit part of the financing decision for large-scale infrastructure projects.

84. *Capital intensive, cross-border energy infrastructure projects should have stronger commercial underpinnings.* The WAGP was conceived as an ECOWAS initiative, with Nigeria playing a dominant role in exporting natural gas to its smaller neighbors in the region. The project, therefore, had strong regional political support. However, while an elaborate contractual framework was developed, the commercial provisions were rarely enforced by the signing

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<sup>20</sup> The PAD assumptions consider a range of crude oil prices only +/- 10% from the then current crude price. Actual crude price rose by 400% within four years of project appraisal.

parties. At the time of project sanction, WAGP prices were very attractive relative to domestic process. The main lesson is that upstream gas prices should be structured so that gas exports maintain their competitiveness vis-à-vis competing domestic sales.

**7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners**

**(a) Borrower/implementing agencies**

85. *See* Comments from WAPCo in Annex 7.

**(b) Co-financiers**

86. Not Applicable.

**(c) Other partners and stakeholders**

87. None received.

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in US\$ million equivalent)

Components	Appraisal Estimate (US\$ million)	Actual /Latest Estimate (US\$ million)	Percentage of Appraisal
EPC Contracts	517.7		
Development costs	71.9		
<b>Total Baseline Cost</b>	589.6	950.0	152.5

### (b) Financing

The entire Project was estimated to cost about US\$ 590 million. The International Development Association (IDA) provided a guarantee, in the amount of US\$ 50 million, for certain obligations of the Republic of Ghana related to the purchase of natural gas. Also, the Multilateral Investment Guarantee Agency (MIGA) provided a US\$ 75 million political risk guarantee to WAPCo in relation to the construction of the pipeline and associated facilities. WAPCo is also the beneficiary of similar insurance structures from Zurich (with reinsurance from OPIC) to back the payment obligations of the Governments of Ghana, Togo and Benin.

Source of Funds	Type of Financing	Appraisal Estimate (US\$ million)	Actual/Latest Estimate (US\$ million)	Percentage of Appraisal
Govt. of Ghana	Equity	28.8	28.8	100.00
NNPC		44.2	44.2	100.00
CNL		64.9	64.9	100.00
SPDC		31.8	31.8	100.00
SoBeGaz		3.5	3.5	100.00
SoToGaz		3.5	3.5	100.00
Govt. of Ghana	Shareholder Loans <sup>21</sup>	67.3	117.9	175.19
NNPC	Shareholder Loans	103.2	180.8	175.19
CNL	Shareholder Loans	151.5	265.4	175.19
SPDC	Shareholder Loans	74.3	130.2	175.23
SoBeGaz	Shareholder Loans	8.3	14.5	174.70
SoToGaz	Shareholder Loans	8.3	14.5	174.70
Others	Shareholder Loans	‘	50.0	
		589.6	950.0	161.13

### (c) Disbursement Profile

Not Applicable

<sup>21</sup>The WAPCo Business Plan 2014-18 supports assumptions that cost overruns and repairs to the pipeline associated with the force majeure event in 2012 were paid through additional share holder loans. The Plan indicates that shareholder loans now amount to nearly 85% of investments versus 70% at the time of project appraisal.

## Annex 2. Project Outputs

### Achievement of Project Development Objectives and Target Indicators

1. Achievement of PDO. Under the economic, physical and institutional and regulatory outcome indicators, following specific targets were defined in the Results Framework:

- Indicator-1: Decrease in the average wholesale cost of electricity supply in Ghana, Benin, and Togo compared to the "without gas" scenario. It was envisaged that the cost of electricity production in Ghana would be reduced by 10-20% and in Togo and Benin by 40% in 2008, as compared with status quo.
- Indicator-2: Physical completion of the regional gas pipeline and of spurs into Ghana, Benin, and Togo, including main connections to target power plants. This was to be manifested by WAPCo passing its performance testing (Completion certificate) by end CY 2006, and delivering forecast quantities of natural gas each year starting in 2007, within specifications, at the delivery points in Ghana, Togo and Benin.
- Indicator-3: Number of large, medium and small gas customers in Benin Ghana and Togo. While no specific target was set, it was envisaged that with increased gas supplies, the number of customers would keep increasing year-by-year.
- Indicator-4: Expanded volume of energy trade in the region, measured in terms of: (a) gas exports from Nigeria; (b) decrease in the use of oil-fired thermal plants in 2008; and (c) reduction of flaring and venting of AG in Nigeria by 200 MMscf /day by 2008.
- Indicator-5: Harmonization of the regional institutional, legal, and regulatory framework to increase private sector participation in the gas sector.

2. Decrease in wholesale generation cost in Ghana. With the availability of natural gas, the wholesale unit generation cost has been decreasing since 2009 (see Table-1). For 2011, the weighted-average generation cost is estimated at 6.98 USc/kWh, an overall reduction of 14% from the previous year. The supply of natural gas has had a favorable financial impact on the viability of the power sector as well, as the fuel bill went down when gas was available and consumed. In 2011, Ghana received the largest volume of gas, and supplies were steady till August 2012 when a third party pipeline breach occurred, resulting in the suspension of operations for 10 months. Ghana's fuel bill for power generation decreased by \$100 million in 2011 (from \$527 million in 2010 to \$427 million in 2011) even though 468 GWh of additional thermal generation took place during the year.

Table-1: Electricity Generation in Ghana

Year	Natural Gas (MMBtu)	LCO for Power (000 t)	Unit Fuel Price (\$/MBtu & bbl)		Fuel Bill (\$ m)	Electricity Generation (GWh)				Wholesale Unit Cost*** (c/kWh)	
			Gas	LCO*		Gas+LCO	Hydro	Thermal			Grand Total
					Gas**			LCO	Total		
2005	0	322.0	0.00	56.64	137	5629	0	1159	1159	6,788	5.61
2006	0	750.6	0.00	66.05	372	5619	0	2811	2811	8,430	10.00
2007	0	811.2	0.00	72.34	440	3727	0	3251	3251	6,978	13.58
2008	0	579.1	0.00	99.67	433	6195	0	2129	2129	8,324	7.91
2009	197.98	541.4	7.00	61.95	253	6,877	226	1,855	2081	8,958	6.84
2010	15,616.65	700.5	7.00	79.48	527	6,996	783	2,388	3171	10,167	8.11
2011	30,524.56	257.4	8.00	94.88	427	7,561	1842	1,797	3639	11,200	6.98
2012	15,491.67	703.7	8.50	94.05	628	8,071	1519	2,434	3953	12,024	7.73

\* EIA historical crude oil prices from [www.useconomy.about.com/od/economic\\_indicators/p/Crude\\_Oil.htm](http://www.useconomy.about.com/od/economic_indicators/p/Crude_Oil.htm); 7.5 bbl per ton

\*\*Sunon-Asogli and Tema2 (gas only), and 50% of TAPCO (assumed)

\*\*\* Hydro generation cost - USc 1/kWh; thermal generation on gas - USc 11/kWh; thermal generation on LCO - USc 28/kWh<sup>22</sup>

Source: National Energy Statistics 2000-12, Energy Commission of Ghana, July 2013

3. Impact of gas supply on the operations in Benin and Togo. The situation in Benin and Togo is similar to Ghana, and the impact of supply of gas to CEB since 2011 has been favorable in reducing the use of liquid fuels (Heavy Fuel Oil; Jet fuel) for thermal generation, and hence reducing costs (Table-2). Electricity generation using natural gas was the highest in 2012 till the pipeline breach in August 2012, and also picked up since the pipeline was repaired by mid-2013. The weighted-average unit cost of generation has come down in 2012 to 60.62 FCFA/KWh from 69.04 FCFA/KWh in 2011, a reduction of about 12%, even with reduced hydro availability.

Table-2: Electricity Generation in Benin and Togo

Description	2010	2011	2012	2013
<b>Generation (GWh):</b>				
Hydro	185	202	165	74
Thermal - Liquid Fuels	36	4	0.22	4
Thermal - Natural Gas	0	40	98	83
Total	221	246	263.22	161
<b>Fuel for thermal plants:</b>				
Liquid fuel (000 liters)	11,030	1,272	70	1,309
Natural gas (MMbtu)	0	409,096	1907,782	1687,120
<b>Unit cost of generation (FCFA/KWh):</b>				
Hydro	11.70	14.69	13.26	n.a.
Thermal - TAG de Lomé Port (HFO, gas) Plant	122.70	130.00*	140.18*	n.a.
Thermal -TAG de Cotonou Vèdoko (Jet fuel, gas)	n.a.	-	-	-
CEB weighted-average (hydro+thermal)	-	69.04	60.62	n.a.

Source: Communaute Electrique du Benin (CEB), Direction du Transport, SSTME

\* calculated / estimates

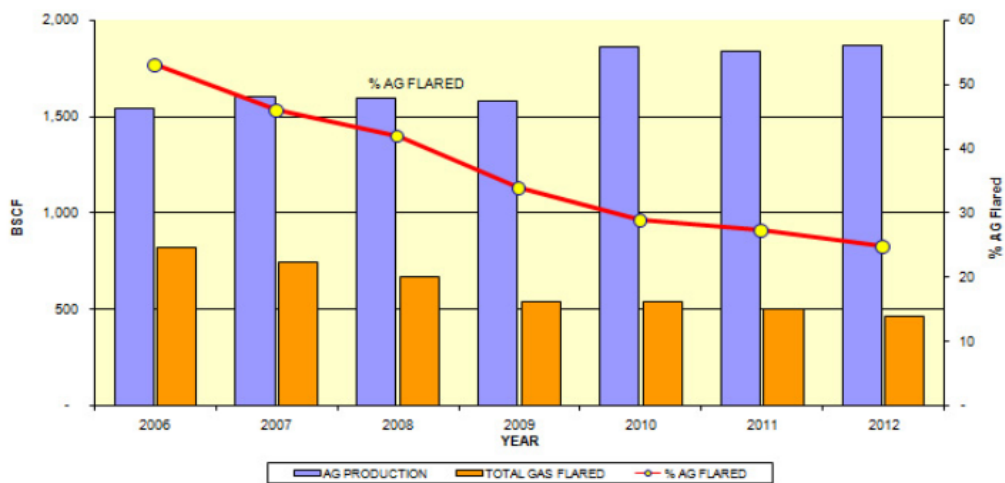
<sup>22</sup> Ghana Power Sector Financial Review (June 2013), World Bank Internal Paper

4. Progress on development indicators. The onshore and offshore pipelines, lateral spurs, and main connections to the target power plants have all been completed, and free-flow gas has been supplied since April 2009. However, due to supply limitations in Nigeria, the forecast quantities have not been supplied on a sustained basis to the foundation customers in Ghana, Togo and Benin.

5. The operation of this regional gas pipeline is nevertheless underpinned by commercial contracts and governed by a regional regulatory authority. WAGPA has been established through the signing of WAGP Treaty and the International Project Agreement, and was actively involved in project monitoring during the construction phase. It has undertaken and harmonized the institutional and regulatory framework in the four countries, and has developed and implemented the following: (a) WAGP Regulations; (b) the Pipeline Development Plan; (c) Access Code; (d) commercial Agreements; and (e) rules of procedures for dispute resolution. The pipeline has been operational with adequate regulatory oversight has also been achieved. WAGP has emerged as an important gas infrastructure investment that may be used to support expanded trade in the ECOWAS region, as new gas reserves and domestic supply infrastructure are developed in Nigeria and in other countries (e.g. Ghana).

6. Contribution to reduction in gas flaring. Since 2006, flaring in Nigeria has been reduced by about 50% to about 1200 MMscf/day in 2012 due largely to the implementation of a number of different gas utilization projects. During 2010-12 when WAGP became operational, flaring was reduced by about 200 MMscf/day by utilizing associated gas for domestic consumption. However, since WAGP derives its gas supply from both AG and non-AG sources, and the volume shipped is still small, its contribution to the reduction of gas flaring in Nigeria is modest.

Figure 1: Reduction in gas flaring in Nigeria during 2006-12



Source: Nigeria Department of Petroleum Resources Website ([www.dprnigeria.org.ng](http://www.dprnigeria.org.ng))

## Compliance with environmental and social safeguards

7. Overall. The ICR team has met with local communities and community leaders in Badagry, Cotonou, Lome, Tema and Takoradi; environmental agencies in Nigeria, Benin and Ghana; and with local and corporate community development officers of the WAPCo to determine the current state of compliance regarding environmental issues and WAGP's community development plan. The following results were determined:

- a. All environmental actions under the Management Action Plan (MAP) have been completed, and regular monitoring is ongoing.
- b. All outstanding resettlement claims (Nigeria and Togo) have been resolved. Payments have been made and all documents have been fully executed and are on file at WAPCo headquarters.
- c. Almost all social development projects have been completed and officially handed over to local communities for use and continued care (including operations funding, staffing and maintenance) as appropriate<sup>23</sup>.
- d. The personal relationships between the local communities and WAPCo were observed to be 'good to excellent'.
- e. It was observed that clear lines of communication have been established between community leaders or special purpose community committees and WAPCo local community relation coordinators.
- f. WAPCo managers and executives also meet on a periodic basis with local community leadership.

8. Real benefits to the community have been observed. Major projects include educational, medical, water and sanitation and community market physical structures and facilities. Meetings with local communities in Badagry, Cotonou, Lome, Tema and Takoradi confirmed the benefits described in the following paragraphs.

9. Education. The addition of 13 new building structures, providing classrooms for primary school children, have reduced the distance village children must walk by as much as 4 kilometers each way and in some cases have replaced previous unsafe and poorly ventilated structures. It was reported that with these capacity additions, the pre-existing primary schools no longer have had to conduct double sessions, which due to daylight limitations, restricted hours of education. Enrollment of students has visibly improved<sup>24</sup>.

10. Health. The addition of 7 clinics, additions to existing clinics and modern equipment and supplies has introduced a critical level of care previously not available or undersupplied to small communities in the vicinity of the pipeline. Generally staffed with nurses with periodic visits by

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<sup>23</sup> Exceptions generally fall into three categories: 1) final finishing touches are underway, awaiting third party completion and payment; 2) facilities which require electrification by a local distribution company, which is not under the control of WAPCo; or 3) facilities were completed as per the MOU with the community; however, a scope change was requested, granted, and completion still ongoing (for example, toilets are being added to an otherwise fully completed market in Benin).

<sup>24</sup> E.g. enrollment was estimated by an educator to be up approximately 40% in a Takoradi community.



doctors<sup>25</sup>, these clinics deliver primary care for common illnesses, triage and stability for major accidents and critical pre- and post-natal care, and sterile birthing conditions for community women. The installation of road drainage systems have reduced local flooding, improving area transportation and removing standing water areas which are potential breeding grounds for disease bearing insects. Water bore holes and storage facilities have been completed to improve water quality. These and the addition of toilets in public areas have improved community sanitation infrastructure.

11. Livelihood improvement projects. Market stalls have been provided to 3 communities to improve local commerce, and incentivize SME development. These projects are awaiting final completion (electrification, installation of toilets, fencing, etc). A quantitative determination of benefits cannot be made at this time. The creation of a community center in Takoradi has provided safe and modern facilities for meetings and events. The community commonly rents the use of this facility to generate income.

12. Ongoing social development programs. WAPCo faces a continuing post-construction challenge whereby the magnitude of social programs is intended to be scaled back during operations phase. This is justified because intrusion in community life has been much less in the operational phase. In addition, WAPCo's poor financial health limits its ability to provide a never-ending list of wants from local communities. The focus of development is on education and skill development during the operational phase, whereby WAPCo offers limited scholarships for secondary or higher education, or vocational training. This need was identified as part of its Public Needs Assessment and appears to be well received by local communities. To date, 165 educational scholarships and 94 technical training grants have been awarded to high potential children and youths in need at a cost to WAPCo of over \$127,000.

13. ROW and settlement. Encroachment of settlements along pipeline continues to be an ongoing problem. WAPCo continues to inspect ROW routinely, and encourages communities to report plans or efforts to build commercial or residential properties on the ROW. WAPCo has adopted a ROW maintenance policy that supports establishment of footpaths, but otherwise allows low growth vegetation to reestablish itself to discourage unlawful building on ROW.

### **Reduction in cost of power generation, increased energy access, and poverty reduction**

14. Improved access and capacity addition. Even though the pipeline has suffered *Force Majeure* events, pipeline challenges, and gas supply constraints whereby contract volume obligations have not been met, real reduction in power generation cost has accrued to the public utilities in Benin, Togo and Ghana. It is estimated that when fueled by gas, power generation costs are about 40% of the liquid fuel alternatives. Additionally, the availability of natural gas has increased the total generation capacity of the region by approximately 250 MW<sup>26</sup>.

15. Impact on poverty reduction. Table-3 provides the sectorial breakdown of energy consumption in Ghana, which is growing at about 7.2% per annum over the last eight years.

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<sup>25</sup> Clinic staff is decided and paid for by the local community

<sup>26</sup> Due to the addition of power generation that runs on natural gas (Sunon Asogli alone in Ghana is 200 MW).

Based on the socio-economic survey, it has been estimated that the incidence of poverty has been reduced by 5 percentage points during the period 2005-12, and provision of electricity has been one of the contributing factors. The situation in Benin and Togo is also similar to Ghana.

Table-3: Electricity Consumption by Sector in Ghana

Year	Residential	Non-Residential / Commercial	Industrial	Street Lighting	Total
2005	1,956	676	2,542	85	5259
2006	2,130	790	3,593	144	6657
2007	2,094	802	2,687	137	5720
2008	2,269	927	2,963	171	6330
2009	2,421	884	2,921	184	6410
2010	2,738	966	3,156	264	7124
2011	2,761	1,041	3,900	274	7976
2012	2,931	1,153	4,153	315	8552
Growth (%)	5.95%	7.93%	7.26%	20.58%	7.19%

Source: National Energy Statistics 2000-12, Energy Commission of Ghana, July 2013

## **Annex 3. Economic and Financial Analysis**

### **Net Present Value/Economic Rate of Return**

1. Four key variables that influence the economic results have changed significantly since appraisal: (i) project costs; (ii) commissioning date; (iii) oil prices; and (iv) gas supply from Nigeria (volumes and value). Other parameters (e.g. O&M costs) have had a comparatively limited impact on the overall return of the project. Given the continued uncertainty regarding gas volumes from Nigeria, two supply scenarios were analyzed in the ex-post economic evaluation of WAGP.

2. The 'high' gas supply scenario assumes that existing gas volumes to Ghana, Benin and Togo of 80 MMBtu per day will be sustained from 2014 onwards. The results yield a projected net present value (NPV) of US\$1.9 million, and a corresponding economic rate of return (EIRR) of 18.6%.

3. The 'low' supply scenario assumes that energy reforms and increased private sector participation in power generation in Nigeria will result in diversion of gas supply to the Nigerian domestic market, and would reduce supply volumes to WAGP to an average of 60 MMBtu per day. Nevertheless, the 'low' case scenario still yields an NPV of US\$1.1 million, and an EIRR of 16.0%.

4. Despite the adverse impacts of cost increases combined with delays and lower than anticipated gas supply volume, WAGP remains economically efficient. This is due to the fact that oil prices at the time of completion of the project were about 4 times higher than anticipated at appraisal. This has resulted in a corresponding sharp increase in the economic value of gas for power generation. At appraisal, it was anticipated that natural gas would reduce fuel costs by about 25% compared to LCO, corresponding to a saving of about 1.5USc/kWh. With the sharp increase in LCO prices, the saving is currently about 15 USc/kWh for a single cycle power plant.

### **Net Present value/Financial Rate of Return**

5. An ex-post financial evaluation, consistent with the economic scenarios, was undertaken to assess the financial sustainability of WAGP. The results have been influenced by changes in: (i) project costs; (ii) commissioning date; (iii) transportation tariff; and (iv) gas supply volume.

6. The pipeline project profitability has been reduced by cost overruns, delays in commissioning, and lower gas volumes. However, transportation tariffs for WAGP (as determined by WAGPA) have been adjusted upwards - at somewhat higher levels than originally anticipated.

7. The financial results indicate a financial rate of return (FIRR) before financing and corporate taxation of 4.4% and 0.9% for the high and low gas supply scenarios, respectively. Both results are significantly below the estimated weighted average Cost of capital (WACC) of 15%. WAPCo's future cash flows and profitability are very sensitive to the volumes of gas transported through the pipeline.

8. The results show that WAPCo will be unlikely to sustain operations and service the financial debt contracted with its shareholders (at a rate of 10%, with an additional tranche at 15%).

9. WAPCo would also have limited ability to raise commercial financing for future investment needs. Significant debt restructuring will be required to maintain and sustain operation in the longer run.

### **Conclusions**

10. The increase in oil prices since 2004 has considerably changed the economic and financial parameters of WAGP. The gas demand and payment risk, which was mitigated by the PRG, turned out to be a relatively minor issue, given that natural gas has become extremely valuable for power generation in consumer countries. However, the opportunity cost of gas exports (estimated at only 2.0 US\$/MMBtu, of which only 0.5 US\$/MMBtu was the producer price) has also increased significantly, resulting in a gas supply risk not anticipated at appraisal. The sharing of the project benefits has also shifted considerably – at the time of appraisal, it was envisioned that private investors and Nigeria would capture a significant share of the project economic benefits. The ex-post analysis shows that the off-takers (Ghana, Benin, and Togo) are major beneficiaries of WAGP due to lower-priced natural gas which displaces expensive liquid fuel imports.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team members

Name	Title	Unit	Responsibility/Speciality
<b>Lending</b>			
Michael Layec	Lead Energy Economist	AFTEG	Task Team Leader
Scott Sinclair	Lead Financial Officer	IEF	Financial Management
Pankaj Gupta	Sr. Financial Analyst	IEF	Financial Analysis
Thomas E. Walton	Regional Safeguards Coordinator	AFTSD	Environmental Advisor
Michael Silverman	Sr. Counsel	LEGCF	Legal
Dan Aronson	Consultant	AFTEG	
Erica Hyde	Program Assistant	AFTEG	Administrative
Ignatius Menezes	Consultant	AFTEG	
Lily Wong	Program Assistant	AFTEG	
Philippe Benoit	Lead Specialist	AFTEG	
V.S. Krishnakumar	Lead Procurement Specialist	AFTPC	Procurement Advisor
Kofi Boateng Agyen	Sr. Operations Officer	AFTPS	Private Sector Specialist
Arbo Bem-Achour	Sr. Social Scientist	AFTS1	Social Development
Robert Robelus	Sr. Environmental Assessment Specialist	AFTS1	Environmental Safeguards
Mourad Belguedj	Lead Energy Specialist	COCPO	
Sascha Djumena	Sr. Energy Specialist	COCPO	Oil, Gas & Mining
Charlotte Bingham	Sr. Environmental Specialist	ESDQC	Environment
Emanuele Santi	Communications Associate	EXTCD	Communications
Paul Mitchell	Manager	EXTCD	Communications
Karen Hudes	Sr. Counsel	LEGAf	Legal
Susan Maslen	Consultant	LEGCF	Legal
Mohammed Bekhechi	Lead Counsel	LEGEN	Legal
<b>Supervision</b>			
Syed Waqar Haider	Sector Leader	AFTSN	Task Team Leader
Michael Layec	Lead Energy Economist	AFTEG	Task Team Leader
Vijay S. Iyer	Sector Manager	AFTEG	Overall supervision
Scott Sinclair	Lead Financial Officer	IEF	Financial Management
Pankaj Gupta	Manager	TWIFS	Infrastructure Finance
Sunil W. Mathrani	Sr. Energy Specialist	AFTG2	Principal Engineer
Franklin Kofi S.W. Gbedey	Energy Specialist	AFTG2	Electrical Engineering Spec.
Robert Michael Lesnick	Consultant	ASNCS	Petroleum Specialist
David John Santley	Sr. Petroleum Specialist	SCEGM2	Petroleum Specialist
Stephen Lintner	Safeguards Adviser	OPSOR	Safeguards
Alexandra C. Bezeredi	Regional Environmental & Safeguards Adviser	AFTSG	Sr. Operations Advisor
Maria Concepcion J.	Lead Social Development	AFTCS	Sr. Social Scientist

Cruz	Specialist		
Chukwudi H. Okafor	Sr. Social Dev Specialist	AFTCS	Social Development
Angela Nyawira Khaminwa	Sr. Social Dev Specialist	ECSSO	Social Development
Caroline Mary Sage	Sr. Social Dev Specialist	EASID	Social Development
Mohamed Arbi Ben-Achour	Consultant	AFTCS	Social Development
Dan Aronson	Consultant	AFTCS	Social Development
Shobba Shetty	Sector Leader, SDN	SASDL	Rural Development
Thomas Walton	Environmental Consultant	AFTEN	Environmental Adviser
Amos Abu	Sr. Environmental Specialist	AFTN1	Environmentalist
Moses Yao Duphey	Consultant	AFTN3	Environment/Safeguards
Michael R. Silverman	Consultant	LEGEN	Legal
Stephan Dreyhaupt	Program Manager	MIGES	Guarantee Supervision
Abir Burgul	Senior underwriter	MIGOP	Guarantee Specialist
Cherian Samuel	Lead Evaluation Specialist	MIGES	Evaluation
Deniz Baharoglu	Social Development Specialist	MIGEP	Social Development
Robert McDonough	Consultant	MIGEP	Safeguards
Pepita Hortense C. Olympio	Program Assistant	AFMBJ	Administrative
Brenda Uche Anugwom	Program Assistant	AFCW2	Administrative
Esinam Hlomador-Lawson	Program Assistant	AFCTG	Administrative
Geraldine Agnes Wilson	Team Assistant	AFCW1	Administrative
Ayishetu Terewina	Program Assistant	AFCW1	Administrative

**(b) Staff Time and Cost**

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	US\$ Thousands (including travel and consultant costs)
Lending		
<b>FY03</b>	10.98	74.83
<b>FY04</b>	83.16	586.61
<b>FY05</b>	67.56	450.67
<b>FY06</b>	1.12	7.61
<b>Total:</b>	<b>162.82</b>	<b>1,119.72</b>
Supervision/ICR		
<b>FY05</b>	1.60	14.84
<b>FY06</b>	14.52	75.44
<b>FY07</b>	39.91	367.47
<b>FY08</b>	41.65	413.41
<b>FY09</b>	26.39	288.72
<b>FY10</b>	24.89	187.28
<b>FY11</b>	17.65	118.14
<b>FY12</b>	16.24	224.60
<b>FY13</b>	4.50	22.47
<b>FY14</b>	8.48	101.51
<b>Total:</b>	<b>195.83</b>	<b>1,813.88</b>

**(c) Ratings of Project Performance in ISRs**

No.	Date ISR Archived	DO	IP	Actual Disbursements N/A
1	18 Apr 2008	Satisfactory	Moderately Satisfactory	0.00
2	30 May 2008	Moderately Satisfactory	Moderately Unsatisfactory	0.00
3	07 Oct 2008	Moderately Satisfactory	Moderately Satisfactory	0.00
4	19 Dec 2008	Moderately Satisfactory	Satisfactory	0.00
5	03 Sep 2009	Moderately Satisfactory	Satisfactory	0.00
6	05 Jun 2010	Satisfactory	Satisfactory	0.00
7	23 Dec 2010	Satisfactory	Satisfactory	0.00
8	14 Sep 2011	Satisfactory	Satisfactory	0.00
9	23 May 2012	Satisfactory	Satisfactory	0.00
10	18 Mar 2013	Satisfactory	Satisfactory	0.00

## **Annex 5. Beneficiary Survey Results**

No Beneficiary Survey was conducted under the project.



## **Annex 6. Stakeholder Workshop Report and Results**

No Stakeholder Workshops were organized to discuss the lessons learnt in the implementation of WAGP project.

## **Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR**

(From: Jeremy Nelson, GM Commercial & Business Development, WAPCo)

1. The World Bank's support for the WAGP which began at the conception of the project contributed to the linking of different components of the WAGP value chain— gas suppliers and processors, gas shippers, power-plant operators, power distributors and end users. Its embrace made the project a reality. Putting its credibility behind some key ideas behind the construction of the WAGP, the Bank supported the argument that the WAGP would help reduce the waste of valuable resources and generate new revenue for the supplier and consuming countries. Indeed, a 1993 study partly supported by the World Bank projected that replacing crude oil and other fuels with natural gas could save about \$500 million over 20 years.
2. The Bank's perseverance in helping to move the pipeline project to a construction reality was remarkable. But the initial prospects of the WAGP lied significantly in its potential to proceed on a fully commercial basis. Through the Bank's leadership, the four WAGP States established a fiscal and regulatory framework for the project, using its influence to create an enabling environment for a commercial path for the WAGP.
3. The Bank's writing of a \$50 million PRI coverage proved a genuine financial commitment to the WAGP. Although a claim was never paid, the coverage was critical in mitigating the threat of political perils that could potentially undercut the needed private investment in three politically vulnerable countries. This shielded shareholders from the financial consequences of political turmoil making investment in the WAGP less dangerous and more appealing.
4. The Bank's performance proved that the WAGP was precisely the sort of involvement where its approach could create value, bringing a framework of environmental and social safeguards to bear on a highly novel initiative. Its seal of approval, added credibility to a project run by an industry with a history of turbulent community relations in the sub region. Its participation and willingness to listen to community stakeholders provided an added and independent forum where people impacted by the project could voice concerns and seek redress.
5. As a credible third party the Bank played a critical role in addressing community concerns about compensation payments and project impacts in host communities. In communities in Nigeria and Benin where the WAGP faced the strongest resistance, the intervention of the World Bank was instrumental in calming such resistance and fears. Its involvement also encouraged active participation of local stakeholders including governments, political leaderships and regulatory institutions whose support was critical to the success of the project.

### **Lessons learned**

6. The construction schedule of the WAGP called for the completion of the pipeline in stages with completion scheduled for early part of 2007. However, full installation did not occur until 2011 due to construction realities which caused schedule slippage. The delay among other

things made the initial cost estimates of the project appear too optimistic. Looking back, initial project cost estimates should have had adequate room for overcoming unforeseen construction problems that come with a project the magnitude of the WAGP.

7. Although the WAGP Treaty had been signed prior to construction, the consensus process with the various WAGP states was arduous and time consuming in several fronts. It was difficult to secure additional funding from the government owned shareholders when it became necessary during the last months of the construction period. These entities seemed unprepared to deal with the additional cost relating to cost overruns and financial risks that come with projects with the magnitude of the WAGP. *In the future, government stakeholders must be made to understand such risks and their responsibility to shoulder them when it becomes necessary.*

8. The necessity for trust and communication between the project team and community stakeholders was critical. The initial untrusting nature of the relationship between the WAGP and community stakeholders mainly in Nigeria and Benin spawned misunderstanding and doubts about motives, slowing early negotiations and conversations. One key lesson was the critical importance of community and political leaderships in addressing local resistance and building trust among local stakeholders whose support was crucial to the success of the project. The important role played by political leaderships in the four countries helped significantly in allaying fears and correcting misconceptions about the real objectives of the project.

9. During the compensation process for land and crops, there were indeed key challenges not unexpected of a novel and regional project like the WAGP. The World Bank's interventions provided ready succor to otherwise critical situations and with their resolution also heralded important lessons for facilitators of similar regional engagements in the future. In Nigeria, the use of third party intermediaries like agents and consultants in the compensation process denied many genuine land owners of their rightful compensation thereby questioning the transparency of the entire process. This had to be rectified eventually, but rather belatedly after a lot of legitimate questions had been raised about the entire compensation process in Nigeria.

10. The Bank's social approach as regards the WAGP highlighted 'best practice' recommendations with minimal attention to the WAGP context. Although best practice directives from the Bank prescribed for land and crop compensation proved useful and appropriate, pre-specified recommendations on 'livelihood restoration' 'vulnerable groups and 'sustainable financing' lacked legitimacy given the WAGP's land acquisition peculiarities.

## **Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders**

Not Applicable since the Project did not have Cofinanciers.

## **Annex 9. List of Supporting Documents**

### **Background Project Documents:**

1. West African Gas Pipeline (WAGP), Project Appraisal Document, November 2004.
2. WAGP Access Code, December 2004.
3. WAGP Guarantee Agreement, December 2004.
4. WAGP Indemnity Agreement, December 2004.
5. WAGP International Project Agreement, December 2004.
6. Project Description, Project Finance and Guarantees Group Brochure, January 2005.
7. WAGP: Assessment of the Quality at Entry, Quality Assurance Group, September 2006.

### **Environmental Assessment and Safety:**

8. Independent Integrity Review of Escravos – Lagos Pipeline System (ELPS), Penspen, 2001.
9. Environmental Impact Assessment (EIA) study and accompanying Environmental and Social Management Plan (ESMP) for Nigeria, Benin, Togo and Ghana, 2004.
10. Rapport de L’audience Publique Informatrice Sur Le Rapport D’etude D’impact Sur L’environnement, Du Projet De Gazoduc De L’afrique De L’ouest, Lomé, March 2004.
11. Terms of Reference for Independent Auditing and Reporting for all Measures in the WAGP Environmental Management Plan, January 2006.
12. WAGP Health, Environment, Safety and Security (HESS) Management Plan, May 2006.
13. Field Report: Takoradi Thermal Power Plant Oil Spill, September 2007.
14. Consultant Reports on Emergency Preparedness Exercises, March 2008.
15. Plan de Gestion Environnementale du Pro.Jet de Trenching et D'enterrement Du Gazoduc De L’afrique De L’ouest, April 2008.
16. WAPCO Environmental Management Workshop, September 2008.
17. Ghana ESMP Addendum for Rock Berm Installation and Decommissioning at Takoradi and Tema, March 2009.
18. WAGP-Tema Onshore Construction and Environmental Monitoring Report, August 2009.
19. VRA Takoradi Power Station Procedures for Emergency Fire Control, December 2010.
20. Shoreline Monitoring at Tema and Takoradi, Ghana, January 2011.
21. Heath Environment and Safety (HES) Drill Report at Takoradi, December 2011.

### **Environmental and Social Advisory Panel:**

22. Environmental and Social Advisory Panel (ESAP) Report on WAGP, Mission 1, November 2007.
23. ESAP Report on WAGP, Mission 2, November 2008.
24. ESAP Report on WAGP, Mission 3, October 2011.

### **Inspection Panel:**

25. WAGP Notice of Registration of Request for Inspection, May 2006.
26. WAGP Bank Management Response to Request for Inspection Panel, June 2006.
27. WAGP Final Eligibility Report and Recommendation on Request for Inspection, July 2006.
28. WAGP Investigation Report, April 2008.
29. WAGP Management Report and Recommendation, June 2008.
30. Progress Report 1 on the implementation of WAGP Management Action Plan, Dec 2008.
31. Progress Report 2 on the implementation of WAGP Management Action Plan, Dec 2009.

32. Progress Report 3 on the implementation of WAGP Management Action Plan, March 2011.
33. Progress Report 4 on the implementation of WAGP Management Action Plan, March 2012.
34. Progress Report 5 on the implementation of WAGP Management Action Plan, June 2014.

**Social Impact and Mitigation:**

35. WAGP Synthesis Report of Participating Countries, Institute of Statistical, Social and Economic Research (ISSER), September 2002.
36. Ghana Estate Survey and Valuation Assessment, September 2003.
37. Nigeria Estate Survey and Valuation Assessment, October 2003.
38. Togo Estate Survey and Valuation Assessment, October 2003.
39. Benin Estate Survey and Valuation Assessment, March 2004.
40. WAGP Resettlement Action Plan – Nigeria, Ghana, Benin and Togo, June 2004.
41. Terms of Reference for Independent Third Party Auditing of the WAGP Resettlement Action Plan, September 2006.
42. WAGP Independent External Third Party Audit (ERM) - Resettlement Action Plan and Community Development Plans, September 2007.
43. Compensation Rates for Economic Crops and Trees recommended by Nigeria OPTS, December 2007.
44. Valuation Re-study for Real Property Assets acquired along the pipeline route in Ogun and Lagos States, December 2007.
45. WAPCo 2007 Community Relations Annual Report, January 2008.
46. Agronomic and price survey of food and tree crops along WAPCO's pipeline route in Ogun and Lagos States, February 2008.
47. Socio-Economic Baseline and Livelihood Needs Assessment Survey Design, July 2008.
48. MIGA training on Social Assessment and Investment, August 2008.
49. Nigeria - Top-Up Compensation Sensitization Campaign Report, May 2008.
50. Nigeria – Top-Up Compensation payment – Witness NGO Report, November 2008.
51. Benin - Report on Outstanding Land Compensation payments, November 2008.
52. WAPCo Grievance Redress Mechanism and Complaints Register, December 2008.
53. WAPCo 2008 Community Relations Annual Report, January 2009.
54. WAPCo Baseline and Livelihoods Study in Nigeria, April 2009.
55. WAPCo 2009 Community Relations Annual Report, March 2010.
56. WAPCo Assessment of the impact of completed and functioning Community Development Projects (CDPs), September 2010.
57. Participatory Needs Assessment of WAPCo Project Communities, January, 2011.
58. WAPCo 2010 Community Relations Annual Report, February 2011.
59. World Bank training on Livelihood Restoration Strategy and Programs, October 2011.
60. WAPCo Community Relations Quarterly Report, March 2012.
61. WAPCo Community Relations Status Report, October 2013.

**Stakeholder Forums:**

62. West African Gas Stakeholders Engagement Forum (Accra) Summary Report, March 2012.
63. WAGP Technical Meeting (Lome), List of Participants, May 2012.
64. WAGP Technical Meeting (Abuja), Summary Report, August 2012.
65. WAGP Value Chain Market Forum, Presentation by the Managing Director, February 2014.

**Utility Statistics:**

66. Ghana National Energy Statistics (2001-12), Energy Commission, July 2013.
67. CEB Power Statistics 2013, March 2014.

**WAPCo:**

68. WAPCo Business Plan 2008-2012, November 2007.
69. WAPCo Business Plan 2014-2018, November 2013.
70. WAPCo presentation to the World Bank Supervision Mission, April 2011.
71. WAPCo Management Accounts, January 2010.

**WAPCo Progress Reports:**

72. WAGP Project Progress Report, May 2005.
73. WAGP Project Progress Report, June 2005.
74. WAGP Project Progress Report, July 2005.
75. WAGP Project Progress Report, August 2005.
76. WAGP Project Progress Report, September 2005.
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95. WAGP Project Progress Report, July 2007.
96. WAGP Project Progress Report, August 2007.
97. WAGP Project Progress Report, October 2007.
98. WAGP Project Progress Report, November 2007.

**World Bank Supervision Missions:**

99. WAGP Joint MIGA-IDA Safeguards Mission, Aide Memoire, June 2005.
100. WAGP Supervision Mission, Back to Office Report, April 2006.
101. WAGP Supervision Mission, Back to Office Report, May 2007.
102. WAGP Supervision Mission, Back to Office Report, November-December 2007.
103. WAGP Supervision Mission, Aide Memoire, May 2008.
104. WAGP Supervision Mission, Aide Memoire, December 2008.

105. WAGP Supervision Mission, Aide Memoire, July 2009.
106. WAGP Supervision Mission, Aide Memoire, April 2010.
107. WAGP Supervision Mission, Aide Memoire, November 2010.
108. WAGP Supervision Mission, Aide Memoire, August 2011.
109. WAGP Supervision Mission, Aide Memoire, May 2012.
110. WAGP Supervision Mission, Back to Office Report, February 2013.
111. WAGP Supervision Mission, Aide Memoire, November 2013.



# Annex 10. MAP

